PLANNING COMMISSIONERS

BRIAN LOWELL
Chair

JEFFREY BARNES
Vice-Chair

RAY L. BAKER
Commissioner

JEFFREY SIMS
Commissioner

CARLOS RAMIREZ
Commissioner

PATRICIA KORZEC
Commissioner

VACANT
Commissioner

PLANNING COMMISSION
Regular Meeting

Agenda

Thursday, January 26, 2017 at 7:00 PM
City Hall Council Chamber – 14177 Frederick Street

CALL TO ORDER

ROLL CALL

PLEDGE OF ALLEGIANCE

APPROVAL OF AGENDA

CONSENT CALENDAR

All matters listed under Consent Calendar are considered to be routine and all will be enacted by one roll call vote. There will be no discussion of these items unless Members of the Planning Commission request specific items be removed from the Consent Calendar for separate action.

APPROVAL OF MINUTES

Planning Commission - Special Meeting - Dec 15, 2016 7:00 PM

PUBLIC COMMENTS PROCEDURE

Any person wishing to address the Commission on any matter, either under the Public Comments section of the Agenda or scheduled items or public hearings, must fill out a "Request to Speak" form available at the door. The completed form must be submitted to the Secretary prior to the Agenda item being called by the Chairperson. In speaking to the Commission, member of the public may be limited to three minutes per person, except for the applicant for entitlement. The Commission may establish an overall time limit for comments on a particular Agenda item. Members of the public must direct their questions to the Chairperson of the Commission and not to other members of the Commission, the applicant, the Staff, or the audience.

Upon request, this agenda will be made available in appropriate alternative formats to persons with disabilities, in compliance with the Americans with Disabilities Act of 1990. Any person with a disability who requires a modification or accommodation in order to participate in a meeting should direct such request to Guy Pegan, ADA Coordinator, at 951.413.3120 at least 72 hours before the meeting. The 72-hour notification will enable the City to make reasonable arrangements to ensure accessibility to this meeting.

NON-PUBLIC HEARING ITEMS

General Plan Annual Report (Report of: Community Development)

Case: General Plan Annual Report

Applicant: City of Moreno Valley

Owner: N/A

Representative: N/A

Location: Citywide

Case Planner: Mark Gross

Council District: N/A

PUBLIC HEARING ITEMS

1. Case: PEN16-0103 (PA16-0013) Tentative Parcel Map

   Applicant: LGS Engineering, Inc.

   Owner: Catherine Kormos

   Representative: David Knell

   Location: Northeast corner of Jeranell Court and Alessandro Boulevard.

   Case Planner: Gabriel Diaz

   Council District: 3

   Proposal: PEN16-0103 (PA16-0013) Tentative Parcel Map 37104

STAFF RECOMMENDATION

Staff recommends that the Planning Commission **APPROVE** Resolution No. 2017-04, and thereby:

1. **CERTIFY** that PEN16-0103 (PA16-0013) Tentative Parcel Map 37104 qualifies as an exemption in accordance with the California Environmental Quality Act Guidelines, Section 15315 (Minor Land Divisions); and

2. **APPROVE** PEN16-0103 (PA16-0013) Tentative Parcel Map 37104 subject to the Conditions of Approval included as Exhibit A to Resolution No. 2017-04

2. Case: PEN16-0119 Plot Plan & PEN16-0120 Tentative Tract Map 35429

Applicant:	Creative Design Associates
Owner:	ENR Resources, LLC
Representative:	Creative Design Associates
Location:	Northwest corner of Alessandro Boulevard and Chara Street
Case Planner:	Gabriel Diaz
Council District:	3
Proposal:	PEN16-0119 Plot Plan & PEN16-0120 Tentative Tract Map 35429

STAFF RECOMMENDATION

Staff recommends that the Planning Commission **APPROVE** Resolution No. 2017-01 and Resolution No. 2017-02, and thereby:

1. **CERTIFY** that PEN16-0119 (PA13-0061) Plot Plan and PEN16-0120 (PA13-0162) Tentative Tract Map 35429 qualifies as an exemption in accordance with the California Environmental Quality Act Guidelines, Section 15332 (In-Fill Developments). The project is within the city limits, on a project site of no more than five acres substantially surrounded by urban uses, and consistent with all applicable general plan and zoning designations; and

2. **APPROVE** Resolution No. 2017-01 and thereby **APPROVE** Plot Plan PEN16-0119 (PA13-0061), subject to the attached conditions of approval included as Exhibit B; and

3. **APPROVE** Resolution No. 2017-02 and thereby **APPROVE** Tentative Tract Map PEN16-0020 (PA13-0062), subject to the attached conditions of approval included as Exhibit B.

3. Case: PEN16-0092 (PA16-0018) – General Plan Amendment
PEN16-0093 (PA16-0019) – Zone Change
PEN16-0094 (PA14-0052) – Conditional Use Permit
PEN16-0095 (PA14-0052) –Tentative Tract Map 36760

Applicant:	Mission Pacific Land Company
Owner:	MPLC Legacy 75 Associates, LP
Representative:	Rick Engineering Company
Location:	Southeast corner of Indian Street and Gentian Avenue
Case Planner:	Jeff Bradshaw
Council District:	4

Proposal: Legacy Park Project

STAFF RECOMMENDATION

Staff recommends that the Planning Commission:

1. **APPROVE** Resolution No. 2017-08 and thereby **RECOMMEND** that the City Council:

    - **ADOPT** a Mitigated Negative Declaration for General Plan Amendment application PEN16-0092, pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

    - **APPROVE** General Plan Amendment application PEN16-0092 based on the findings contained in this resolution, and as shown on the attachment included as Exhibit A.

2. **APPROVE** Resolution No. 2017-09 and thereby **RECOMMEND** that the City Council:

    - **ADOPT** a Mitigated Negative Declaration for Zone Change application PEN16-0093, pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

    - **APPROVE** Zone Change application PEN16-0093 based on the findings contained in this resolution, and as shown on the attachment included as Exhibit A.

3. **APPROVE** Resolution No. 2017-10 and thereby **RECOMMEND** that the City Council:

- **ADOPT** a Mitigated Negative Declaration for Conditional Use Permit application PEN16-0094, pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

- **APPROVE** the Mitigation Monitoring and Reporting Program prepared for Conditional Use Permit PEN16-0094 pursuant to the California Environmental Quality Act (CEQA) Guidelines, included as Exhibit A; and

- **APPROVE** Conditional Use Permit application PEN16-0094 based on the findings contained in this resolution, and subject to the attached conditions of approval included as Exhibit A.

4. **APPROVE** Resolution No. 2017-11 and thereby **RECOMMEND** that the City Council:

- **ADOPT** a Mitigated Negative Declaration for Tentative Tract Map 36760 (PEN16-0095), pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

- **APPROVE** the Mitigation Monitoring and Reporting Program prepared for Tentative Tract Map 36760 (PEN16-0095) pursuant to the California Environmental Quality Act (CEQA) Guidelines, included as Exhibit A; and

- **APPROVE** Tentative Tract Map 36760 (PEN16-0095) based on the findings contained in this resolution, and subject to the attached conditions of approval included as Exhibit A.

4. Case: Ironwood Village - General Plan Amendment, Change of Zone, Tentative Tract Map 37001, and Design Guidelines for a 181 Lot Single family Residential Development

Applicant: Global Investment & Development LLC

Owner: Ironwood 8 Properties LP

Representative: Anderson Consulting Engineers, Inc.

Location: Ironwood Avenue, east of Nason Street and west of Oliver Street (APN: 473-160-004)

Case Planner: Claudia Manrique

Council District: 2

Proposal: Ironwood Village - General Plan Amendment, Change of Zone, Tentative Tract Map 37001, and Design Guidelines for a 181 Lot Single family Residential Development

STAFF RECOMMENDATION

Staff recommends that the Planning Commission take the following action:

1. **APPROVE** Resolution No. 2017-05 and thereby **RECOMMEND** that the City Council:

   - **ADOPT** a Mitigated Negative Declaration, pursuant to the California Environmental Quality Act (CEQA) Guidelines for General Plan Amendment Application No. PEN16-0077 (PA15-0037); and

   - **ADOPT** the Mitigation Monitoring and Reporting Program prepared for General Plan Amendment Application No. PEN16-0077 (PA15-0037 pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

   - **APPROVE** General Plan Amendment Application No. PEN16-0077 (PA15-0037)

2. **APPROVE** Resolution No. 2017-06 and thereby **RECOMMEND** that the City Council:

   - **ADOPT** a Mitigated Negative Declaration, pursuant to the California Environmental Quality Act (CEQA) Guidelines for Change of Zone Application No. PEN16-0078 (PA15-0038); and

   - **ADOPT** the Mitigation Monitoring and Reporting Program prepared for Change of Zone Application No. PEN16-0078 (PA15-0038) pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

   - **APPROVE** Change of Zone Application No. PEN16-0078 (PA15-0038)

3. **APPROVE** Resolution No. 2017-07 and thereby **RECOMMEND** that the City Council:

   - **ADOPT** a Mitigated Negative Declaration, pursuant to the California Environmental Quality Act (CEQA) Guidelines for Tentative Tract Map 37001 Application No. PEN16-0079 (PA15-0039) and Plot Plan Application PEN16-0080 (PA15-0040); and

   - **ADOPT** the Mitigation Monitoring and Reporting Program prepared for Tentative Tract Map 37001 Application No. PEN16-0079 (PA15-0039) and Plot Plan

Application PEN16-0080 (PA15-0040) for the Ironwood Village Design Guidelines pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

- **APPROVE** Tentative Tract Map 37001 Application No. PEN16-0079 (PA15-0039)

- **APPROVE** Plot Plan Application PEN16-0080 (PA15-0040) for the Ironwood Village Design Guidelines

OTHER COMMISSION BUSINESS

STAFF COMMENTS

PLANNING COMMISSIONER COMMENTS

ADJOURNMENT

NEXT MEETING
Planning Commission Regular Meeting, February 23, 2017 at 7:00 P.M., City of Moreno Valley, City Hall Council Chamber, 14177 Frederick Street, Moreno Valley, CA 92553.

CITY OF MORENO VALLEY PLANNING COMMISSION
REGULAR MEETING
CITY HALL COUNCIL CHAMBER – 14177 FREDERICK STREET

Thursday, December 15, 2016 at 7:00 PM

CALL TO ORDER

CHAIR LOWELL – Good evening ladies and gentlemen. Welcome to the Special Planning Commission Meeting. Today is Thursday, December 15, 2016. The time is just after 7:00. It looks like it is 7:08 PM. I would like to call the meeting to order. Ms. Tadeo, could we have the roll call please?

ROLL CALL

Commissioners Present:
Commissioner Ramirez
Commissioner Baker
Commissioner Sims
Commissioner Gonzalez
Commissioner Nickel
Vice Chair Barnes
Chair Lowell
Commissioner Korzec - Excused Absent

Staff Present:
Rick Sandzimier, Planning Official
Paul Early, Assistant City Attorney
Erica Tadeo, Administrative Assistant
Jessica Descoteaux, Associate Planner
Adria Reinertson, Fire Marshal
Chris Ormsby, Senior Planner
Eric Lewis, City Traffic Engineer

Speakers:
Rafael Brugueras
Damon Allen

CHAIR LOWELL – Thank you very much. Vice Chair Barnes, could you lead us in the Pledge of Allegiance please?

PLEDGE OF ALLEGIANCE

CHAIR LOWELL – Thank you very much. Would anyone like to make a motion to approve tonight's Agenda?

APPROVAL OF THE AGENDA

COMMISSIONER BAKER – I will.

CHAIR LOWELL – Motioned by Commissioner Baker. Do we have a second?

COMMISSIONER GONZALEZ – I second.

CHAIR LOWELL – We have a second by Commissioner Gonzalez. All in favor, say aye.

CHAIR LOWELL – Aye.

VICE CHAIR BARNES – Aye.

COMMISSIONER RAMIREZ – Aye.

COMMISSIONER BAKER – Aye.

COMMISSIONER SIMS – Aye.

COMMISSIONER GONZALEZ – Aye.

COMMISSIONER NICKEL – Aye.

CHAIR LOWELL – All opposed say nay. No opposed. The motion passes 7-0. Tonight's Agenda is approved.

Opposed – 0

Motion carries 7 – 0

CHAIR LOWELL – That moves us onto our Consent Calendar.

CONSENT CALENDAR

All matters listed under Consent Calendar are considered to be routine and all will be enacted by one rollcall vote. There will be no discussion of these items unless Members of the Planning Commission request specific items be removed from the Consent Calendar for separate action.

APPROVAL OF MINUTES

Planning Commission - Regular Meeting - November 10, 2016 at 7:00 PM

Approve as submitted.

CHAIR LOWELL – Tonight we have one Consent Calendar item, which is approval of Minutes from the Regular Planning Commission Meeting from November 10, 2016. Unless we have any comments, I would like to make a motion to approve the Minutes. Do we have any comments or discussion?

COMMISSIONER NICKEL – I'll be abstaining since I wasn't seated.

VICE CHAIR BARNES – I'll second the motion.

CHAIR LOWELL – Then, all in favor, say aye.

CHAIR LOWELL – Aye.

VICE CHAIR BARNES – Aye.

COMMISSIONER RAMIREZ – Aye.

COMMISSIONER BAKER – Aye.

COMMISSIONER SIMS – Aye.

COMMISSIONER GONZALEZ – Aye.

CHAIR LOWELL – All opposed say nay. Abstaining we have Commissioner Nickel, so the motion passes 6-0 with one abstention. The Minutes are approved.

Opposed – 0

Motion carries 6 – 0 – 1 with one abstention

CHAIR LOWELL – That moves us onto Public Comments.

PUBLIC COMMENTS PROCEDURE

Any person wishing to address the Commission on any matter, either under Public Comments section of the Agenda or scheduled items or public hearings, must fill out a "Request to Speak" form available at the door. The completed form must be submitted to the Secretary prior to the Agenda item being called by the Chairperson. In speaking to the Commission, member of the public may be limited to three minutes per person, except for the applicant for entitlement. The Commission may establish an overall time limit for comments on a particular Agenda item. Members of the public must direct their questions to the Chairperson of the Commission and not to other members of the Commission, the applicant, the Staff, or the audience. Additionally, there is an ADA note. Upon request, this Agenda will be made available in appropriate alternative formats to persons with disabilities in compliance with the Americans with Disabilities Act of 1990. Any person with a disability who requires a modification or accommodation in order to participate in a meeting should direct their request to Guy Pagan, our ADA Coordinator, at (951) 413-3120 at least 48 hours prior to the meeting. The 48-hour notification will enable the City to make reasonable arrangements to ensure accessibility to this meeting.

NON-PUBLIC HEARING ITEMS

None

CHAIR LOWELL – Do we have any speakers waiting to talk on Non-Public Hearing Items?

ADMINISTRATIVE ASSISTANT ERICA TADEO – There is just one.

CHAIR LOWELL – Perfect, Mr. Brugueras.

SPEAKER RAFAEL BRUGUERAS – Good evening, Chair, Commissioners, Staff, Residents, and Guests. It is a great honor to be back here tonight with each one of you. It has been a little while. I've been busy meeting the residents of Moreno Valley. When I was campaigning for Mr. Brian Lowell and Dr. Gutierrez, I had a great honor, really. It is a beautiful city with a lot of different cultures. We have a wonderful city, and we made promises to them. We talked about public safety. We talked about jobs. We talked about development. We talked about having a peaceful place to live in, clean, and I made promises to them. And you're going to hear my promises tonight. You're going to see me a lot more than you ever did before because I promised them that I will fight for development and jobs to give people chances to go back to work. I always give them my story that my mother did for me, and I am going to share it with you and to those that are listening. When I was young and I was staying at my mother's, my mother always threw me out to go look for work, but she always gave me $2.00 so I can always have something to eat and take the train, have car fare. But there are two things I learned growing up, as of today, I don't steal and I don't beg because I have $2.00 in my pocket. Each one of you is in a position to help this city not to beg and steal. We can develop and bring jobs here. We have a great responsibility now more than ever since our country is now moving towards that purpose of bringing back jobs, and we have land in this city, and we have people that want to work in this city. Whether we start at $10.00, $15.00, or $20.00, we don't want to beg, and we don't want to steal. We just want to pay our bills and live a happy life. I am going to keep my promise to them. You'll see me a lot more, and thank you so much for coming back tonight.

CHAIR LOWELL – Thank you, Mr. Brugueras. Any other speakers?

ADMINISTRATIVE ASSISTANT ERICA TADEO – No.

CHAIR LOWELL – Last chance for Non-Public Hearing Items. Anybody want to speak? Okay, Non-Public Hearing Item portion is now closed. Moving onto the Public Hearing Items. The first Public Hearing Item tonight is PA16-0027, a Conditional Use Permit for a Banquet Facility. The Case Planner is Ms. Julia Descoteaux.

PUBLIC HEARING ITEMS

1. Case:	PEN16-0059 (PA16-0027) – Conditional Use Permit for a Banquet Facility (Existing Structure)
Applicant:	Huber Gutierrez
Owner:	Formosa Rentals, LLC

Representative:	Huber Gutierrez
Location:	24805 Alessandro Boulevard, Unit #9 at the southwest corner of Alessandro and Perris Boulevards (APN: 482-540-028)
Case Planner:	Julia Descoteaux
Council District:	3
Proposal:	PEN16-0059 (PA16-0027) – Conditional Use Permit for a Banquet Facility (Existing Structure)

STAFF RECOMMENDATION

Staff recommends that the Planning Commission **APPROVE** Resolution No. 2016-26, and thereby:

1. **CERTIFY** that this item is exempt from the provisions of the California Environmental Quality Act (CEQA), as a Class 1 Categorical Exemption, CEQA Guidelines, Section 15301 for Existing Facilities; and

2. **APPROVE** PEN16-0059 (PA16-0027) Conditional Use Permit (Existing Structure) subject to the attached Conditions of Approval included as Exhibit A.

ASSOCIATE PLANNER JULIA DESCOTEAUX – Good evening Planning Commissioner's. I am Julia Descoteaux, and I am the Associate Planner. I am the Planner for this project, which is a Conditional Use Permit for a Banquet Facility located in an existing structure at 24805 Alessandro Boulevard. The proposal is to establish a new 5000 square foot Banquet Facility, which will host social events such as weddings, wedding receptions, seminars, meetings, and operate on an as-needed basis generally Friday through Sunday. The Banquet Facility proposes to accommodate approximately 200 people at any given time, and the Applicant has indicated that there will be no alcohol sales and any food will be catered by outside licensed vendors. The Banquet Facility is located in the southwestern portion of the shopping center, and the space currently has single doors. The Applicant will be modifying that to add double doors in the front for better access to the facility. The existing shopping center has a variety of other commercial uses within the center including restaurants, a medical clinic, and retail offices and service-related businesses. It is in the Community Commercial Zone, which is intended to provide for general shopping needs of the area residents. Surrounding the shopping center includes commercial to the west and east and then residential uses are north of Alessandro Boulevard and the area behind, the south portion, is zoned for residential. Currently, there is a site behind this location that is vacant land and then, a little bit to the southwest, there are residential homes. The proposed facility in the shopping center, there will be no changes to the parking lot. The Parking Study was done, and there is adequate parking for this use and the other uses within the center. The proposal requires a Conditional Use Permit because it's within 300 feet of a Residential Zone, and the application was submitted on May 9, 2016. To date, all concerns or issues have been adequately addressed between City Staff and the Applicant. The proposal is in an existing center and, based on the use, size, and location, the project qualifies as a Class I Categorical Exemption under CEQA, Section 15301, for Existing Facilities. Notification was sent to all property owners within 300 feet and, to date, we have had no phone calls regarding the site. Staff recommends that the Planning Commission **APPROVE** Resolution 2016-26 certifying that the project is exempt from the provisions of the California Environmental Quality Act (CEQA) as a Class I Categorical Exemption and **APPROVE** PEN16-0059 Conditional Use Permit and the Existing Structure. The other Case number you'll note there is PA16-0027. That application came in prior to our conversion in ACP, so there are two numbers, but the new number is the PEN16-0059. This concludes my Staff Report, and myself and the Applicant are here to answer any questions for you. Thank you.

CHAIR LOWELL – What does the PEN stand for?

ASSOCIATE PLANNER JULIA DESCOTEAUX – Planning Entitlement.

CHAIR LOWELL – Awesome. Any questions for Staff before I move onto the Applicant? Commissioner Sims, go for it.

COMMISSIONER SIMS – It states that there is not going to be alcohol sales at the location. Is that the same….is that different than this is a wedding where they have receptions and so forth? Is it that the people that will be renting the hall can bring their own alcohol or set up their own bar, or how does that work?

ASSOCIATE PLANNER JULIA DESCOTEAUX – Currently, the application does not allow for alcohol at the site. If they intended to serve alcohol, they would have to come back and modify the Conditional Use Permit and also get a license from ABC.

COMMISSIONER SIMS – So I guess my question is…….

ASSOCIATE PLANNER JULIA DESCOTEAUX – No. They can't bring in alcohol.

CHAIR LOWELL – Consumption is different.

COMMISSIONER SIMS – Alright, thank you. Not that I am necessarily opposed to that, I just was wondering. It was just for my clarification, that's all. I wanted to know.

ASSOCIATE PLANNER JULIA DESCOTEAUX – Okay.

CHAIR LOWELL – Any other questions for Staff?

VICE CHAIR BARNES – Yes.

CHAIR LOWELL – Vice Chair Barnes.

VICE CHAIR BARNES – So ABC has a license for consumption only?

ASSOCIATE PLANNER JULIA DESCOTEAUX – Yes. They have to go through PD for that, the police department, as well.

VICE CHAIR BARNES – Okay. I had the same question. I also have a question on P3. It says 6:00 PM to 2:00 AM, so they couldn't have a Saturday afternoon function at 3:00?

ASSOCIATE PLANNER JULIA DESCOTEAUX – That's correct.

VICE CHAIR BARNES – Really? Their choice, or is that a City requirement?

ASSOCIATE PLANNER JULIA DESCOTEAUX – That is the way the application was submitted.

VICE CHAIR BARNES – Okay. P9 talks about site lighting. You know, it has to be maintained. Are they responsible for the maintenance?

ASSOCIATE PLANNER JULIA DESCOTEAUX – They and the landlord of the center. If there is something, they would have to contact their landlord and the landlord, so they would work together.

VICE CHAIR BARNES – Okay. My concern is that the landlord could impact their Conditional Use Permit because that same item applies in another condition where site maintenance is a condition. F2 talks about the fire alarm and an occupancy of 300 or more but the opening description talked about, I think, 200 max. So, does F2 not apply?

ASSOCIATE PLANNER JULIA DESCOTEAUX – That would not, based on the condition, would not apply. However, when they submit to Building and Safety and Fire, they'll look at the occupancy load and make a determination of the ultimate……

VICE CHAIR BARNES – It will be revisited.

ASSOCIATE PLANNER JULIA DESCOTEAUX – But, if the ultimate load does come out at the 300, then they would have to meet this condition.

VICE CHAIR BARNES – Okay, and I think that was it. Yeah, that was it. Thank you very much.

COMMISSIONER BAKER – Brian, I got one question.

CHAIR LOWELL – Commissioner Baker.

COMMISSIONER BAKER – A couple items here, and we may have them covered but I assume, I don't know what our rule is, I was always of the opinion, if you had 5000 square feet or more, you had to put a sprinkler system in. Is that correct? And I couldn't tell if they had sprinklers in there when I went there and looked at it. You know, automatic fire sprinkler.

ASSOCIATE PLANNER JULIA DESCOTEAUX – That would fall under the Building Code and Fire Code if it's required for their tenant improvement. However, it's an Existing Structure.

COMMISSIONER BAKER – It's what, Existing Structure?

ASSOCIATE PLANNER JULIA DESCOTEAUX – It's an Existing Structures, so…..

COMMISSIONER BAKER – It's a different issue then, right?

ASSOCIATE PLANNER JULIA DESCOTEAUX – And we can let fire address that.

FIRE MARSHAL ADRIA REINERTSON – Commissioner Baker, Adria Reinertson, Fire Marshal. The Existing Facility is fully sprinklered. Under our Municipal Code, we sprinkler new structures at 3600 square feet.

COMMISSIONER BAKER – 3600 okay.

FIRE MARSHAL ADRIA REINERTSON – Yes, and the assemblies, it just depends on what they are being used for and what their occupant load is.

COMMISSIONER BAKER – Very good.

FIRE MARSHAL ADRIA REINERTSON – So Code would be 300 occupants.

COMMISSIONER BAKER – Thank you so much. One other item I had. I know they are not going to prepare food there, but being from a food service background, what are they going to do for grease interceptor because, even if they are scraping plates off, you are going to have a waste issue there. I couldn't see any 3-VAT sinks on the plans. Is that something we need to deal with here, or is that Building and Safety or somebody else? I guess Health Department, right?

ASSOCIATE PLANNER JULIA DESCOTEAUX – That would fall under Building and Safety, and the Health Department, and probably EMWD too if it has to do with the drains.

COMMISSIONER BAKER – Okay, very good. Thank you.

CHAIR LOWELL – Commissioner Sims.

COMMISSIONER SIMS – Speaking of Eastern Municipal Water District, on this, I don't see there are any comment letters or any response. So the occupancy load potentially could be, with that kind of occupancy, could change like the sewer connection…..how does that work out? Is that done during building review or as circulated?

ASSOCIATE PLANNER JULIA DESCOTEAUX – Yes. That would be done during the building review and the Applicant has already been in contact with EMWD as well.

CHAIR LOWELL – Any other questions? Okay, I would like to invite the Applicant up please.

APPLICANT HUBER GUTIERREZ – Good evening.

CHAIR LOWELL – Good evening.

APPLICANT HUBER GUTIERREZ – My name is Huber Gutierrez, so we are the Applicant's and basically she already said it all. So it is going to be a Banquet Hall. Hopefully, you guys can approve it, and I don't know if you guys have any questions or any concerns or any other questions?

CHAIR LOWELL – Not right now. I don't think so. We were just inviting you up to have a chance to speak.

APPLICANT HUBER GUTIERREZ – Yeah, okay. Well basically what it is, it is just going to be a venue for social events. You know, we're not selling alcohol. However, I was a little confused when you guys mentioned something about that.

The guests, I guess they will be allowed to bring their own alcohol. We're not going to sell the alcohol, so I don't know how that is going to work.

CHAIR LOWELL – That was one of the concerns we had is if selling alcohol is the same as consuming alcohol and if there is a separate permit just for onsite consumption.

APPLICANT HUBER GUTIERREZ – I do not know. I have no….I don't have that information. I spoke to ABC over the phone, and they told me that there is no, we don't need a license for that because we're not selling alcohol there. We're not selling it. There might be alcoholic consumption, but we're not selling it so.

CHAIR LOWELL – We'll find out in a little bit. We will get down to that.

APPLICANT HUBER GUTIERREZ – Okay so, what else, I think basically I just wanted to point that out.

CHAIR LOWELL – Okay. If everything goes in favor, when do you guys plan on opening up?

APPLICANT HUBER GUTIERREZ – Within three to four months possibly, yeah.

CHAIR LOWELL – Perfect.

APPLICANT HUBER GUTIERREZ – Yeah.

CHAIR LOWELL – I appreciate it. Thank you.

APPLICANT HUBER GUTIERREZ – You're welcome.

CHAIR LOWELL – Do we have any Public Speakers? Any Comment Slips tonight?

ADMINISTRATIVE ASSISTANT ERICA TADEO – Just one, Rafael Brugueras.

CHAIR LOWELL – Mr. Rafael, you are up.

SPEAKER RAFAEL BRUGUERAS – Good evening once again, Chair, Commissioners, Staff, Guests, and Residents. I looked at this plan, and I went over to the site myself yesterday, and I read it. Planning Division General Conditions, Building and Safety, Fire Prevention Bureau, and Police Department, and I said to myself I need to come and meet the Applicant in person and ask him is he ready to do business in Moreno Valley because he needs to understand that he is going to meet the Commissioners and you kept me true to your questions of asking safety questions and concerns to other residents that are going to be walking or using that plaza for business. You know, and they may interact with their guests or somebody may go outside and maybe sip on his beer or a little drink. We don't know what people do, but we know that they are not going to sell alcohol. But we know that weddings, they have wine and alcohol at many weddings and I'm hoping that, if he is not responsible, the Applicant that is going to rent the facility may come to the City and get a permit to consume that alcohol there without making them responsible. I didn't hear that. I know that you're going to work it out. You mentioned that. So I'm happy for them because he said yes to your challenges, and he is willing to work with the Staff and the City to bring this business to Moreno Valley. This plaza needs a light on that side of the plaza because, the other side of the plaza, we have the 99 Cent Store and other facilities on that side. That side is well lit. Then, on the other side that we just mentioned, you have small businesses, the laundry mat and other little things. By having them on the weekend and at least fixing the lights and everything in the parking lot, that will help a lot with, once again, the residents that come to do business in that area next to them because I understand that he will be next to the restaurant that is there now. Anything that we can add to that side of the plaza is a plus for Moreno Valley. The good thing about it is we're going to allow 200 families to be together in a larger place because I thought about all the hotels that we have here that they only have small rooms like this. Sometimes families cannot find a larger place to enjoy, and there may be meetings and things like that. So we are going to bring a host of different people to our city that get a chance to see and hopefully, in time, we can start repairing Perris Boulevard to look a lot nicer and cleaner because it's an old city with its own history. And we would like to change it to a little modern look as time goes on with his help and others. Thank you for listening, and I hope you support him and approve his project. Thank you.

CHAIR LOWELL – Thank you very much, Mr. Brugueras. Would the Applicant like to respond to anything else you've heard tonight so far? Yes, no, maybe so? Okay, with that said, let's go into Commissioner Discussion. Anybody have any questions or concerns so far? We have Mr. Barnes ready to go.

VICE CHAIR BARNES – I guess I want to follow up on the alcohol issue. He has expressed a desire for the patrons to be able to consume if they are having a wedding reception or something so my only question is, should we approve this, does it make the addition of alcohol consumption more complicated for him? Or should that issue be resolved prior to this approval because I don't want to make it more complicated for him?

PLANNING OFFICIAL RICK SANDZIMIER – I think we're covered with the condition the way that it is written. The condition on page 45 is specifically written by our police department. It is Condition PD6 basically saying that ABC approvals will be required for alcohol license in this area. We can change that by adding a couple words. When applicable would be one way to do it because the ABC licensing is required if there is going to be any sale on the site. So, if they brought in somebody who was going to run a bar and they were going to sell it to the people that were coming to the event, that would be restricted. But, if they could qualify with the vendor…..

VICE CHAIR BARNES – But if it was provided by the host….

PLANNING OFFICIAL RICK SANDZIMIER – If the vendor was providing their own license, they may qualify. If the alcohol was free and was just provided as a host by the party, then we're covered here. There is an enforcement issue, but it basically relies on the person who is running the Banquet Facility to make sure that they are in compliance. Now, they are going to have to get a Business License from the City. If they want to indicate in there that they intend to have an ABC license provided by the person who provides the alcohol and it's not their responsibility, I can work with the Business License folks and see if there is a way to document that. But I think we're covered here.

VICE CHAIR BARNES – I just don't want to make it more complicated for him because if this were to be approved and then he is adding that after the fact, but if it could be addressed independently and not create any heartache then I'm good with it.

PLANNING OFFICIAL RICK SANDZIMIER – Our Municipal Code is more specific to convenient stores that are selling alcohol.

VICE CHAIR BARNES – Yeah.

PLANNING OFFICIAL RICK SANDZIMIER – And then the ABC License I think our attorney may want to answer here.

ASSISTANT CITY ATTORNEY PAUL EARLY – I don't know if I had anything to add other than to simplify. I think that the way it is written is as the Applicant has stated. There is no sales allowed but, if people bring in and serve alcohol (alcohol service), there is nothing restricting that at this point either under the Conditions or our Codes.

VICE CHAIR BARNES – Yeah, I think that's what Jeff and I were….

CHAIR LOWELL – Do you need a permit to consume alcohol onsite?

ASSISTANT CITY ATTORNEY PAUL EARLY – My five-minute research on ABC Licenses here on this because I sensed this coming up was that there is an exception under the ABC for what they deem to be private parties. That is a commercial establishment that's not open to the public. Obviously, it's going to be a case by case analysis. If they turned this into a facility where they were basically inviting the public in, they would be required to have a license and ABC would come down pretty hard on them if they were engaging in that type of activity. But, if they hold true to the a wedding where it's only the wedding guests who are present and they are not selling the alcohol, I don't believe an ABC License is going to be required.

CHAIR LOWELL – Okay so the nature of the proposal, with a private banquet facility where the patrons bring their own alcohol and disperse it freely to the guests at a private event, there is no conflict? There is no problem with ABC?

ASSISTANT CITY ATTORNEY PAUL EARLY – That would be allowed under our Code under these Conditions and, assuming they hold true to all of ABC's regulations, then yes, that would be true for them as well.

VICE CHAIR BARNES – It sounds like we're good then.

ASSISTANT CITY ATTORNEY PAUL EARLY – If your intention is to recognize that alcohol will be onsite, yes.

VICE CHAIR BARNES – Assuming, yeah, okay.

ASSISTANT CITY ATTORNEY PAUL EARLY – If your intention was not, then you wouldn't be good.

VICE CHAIR BARNES – I understand. Okay.

COMMISSIONER NICKEL – I have one question, Paul, excuse me. What would be the liabilities say they didn't follow through with getting okays for outside alcohol to come in and be consumed and one of their guests goes out and t-bones a family of four at Perris and Cactus. Who bears the liability for that? Because I mean bars and all have to know when to cut off.

ASSISTANT CITY ATTORNEY PAUL EARLY – Well the City wouldn't bear any liability. I can speak to that. The facts of your scenario, I can guarantee you a number of people would be included in that suit including the banquet facility, the hosts of the event, whoever served the alcohol or gave the alcohol to the person, whoever owned the vehicle that was involved in the collision whether or not they were the driver of the vehicle. All those people are likely to be brought into the suit. But, you know, that's the nature of our system.

COMMISSIONER NICKEL – Yeah.

CHAIR LOWELL – Yes, Commissioner Ramirez.

COMMISSIONER RAMIREZ – With regards to the facility being open until 2:00 AM, is this facility going to be required to have security or will they be using the onsite security at the shopping center?

ASSOCIATE PLANNER JULIA DESCOTEAUX – There is a Condition of Approval that states that, if there is concern, they would have to have……..If PD determines there is a concern later on, then they would have to provide security.

COMMISSIONER RAMIREZ – I have one question for the Applicant. What led you to open the business? Did you see a need for these types of facilities for families to gather? Can you come up to the microphone?

ASSISTANT CITY ATTORNEY PAUL EARLY – They just want to make sure it captures it all on the record. Thank you.

APPLICANT HUBER GUTIERREZ – I'm sorry. Yeah, definitely, we saw the need. There are just a few of them within the city. About a year ago, we had an event in the family, and it was kind of hard for us to find one available at the time that we needed it. So, you know, that kind of got knocking in our heads, and we own a business currently here within the City of Moreno Valley so I guess we have the entrepreneurial spirit so basically that is it.

COMMISSIONER RAMIREZ – Thank you.

APPLICANT HUBER GUTIERREZ – You're welcome.

CHAIR LOWELL – Commissioner Sims, you are on.

COMMISSIONER SIMS – Commissioner Ramirez asked my question. I looked at Condition P8, and it is pretty vague. But, if you have 200 people and there is alcohol and it is a wedding reception, it sounds like a good time. But I guess I just don't know how the……I guess is it just a matter of the activity that would be monitored by the PD that would then trigger some action? How would that go down as far as…..

COMMISSIONER NICKEL – After something happens?

COMMISSIONER SIMS – Yeah, something bad has to happen to trigger it and then we get a Condition or how does that work?

ASSOCIATE PLANNER JULIA DESCOTEAUX – That was a recommendation by the police department to have security there, but it is only a recommendation. They didn't want to place the condition out there. Normally, they give them the benefit of the doubt to begin with that everything is going to function properly and then, if it doesn't, then they come back and enforce the condition. Usually, it is up to the Applicant to make sure that they are providing a secure venue.

PLANNING OFFICIAL RICK SANDZIMIER – Mr. Chairman…..

COMMISSIONER SIMS – I just, I have been to a lot of weddings and the ones that I have seen that has been a hosted bar tend to be the consumption goes significantly more than the non-hosted bar so I think you're squaring up that you're going to need security potentially. I don't know what, are there other venues like this in the City and there is a requirement for security? I know that there is….

CHAIR LOWELL – There's one right here.

COMMISSIONER SIMS – Isn't there a venue over there by the…….

CHAIR LOWELL – Elsworth isn't it?

COMMISSIONER BAKER – Elsworth and…..

CHAIR LOWELL – The Jack in the Box parking lot.

COMMISSIONER SIMS – I was thinking of the one over there, it is the shopping center by the, it's where the dance studio is and the gymnastic place. There is kind of like a stand-alone little place right there. Is there a requirement for that one to have security?

SENIOR PLANNER CHRIS ORMSBY – I believe we looked at the Conditions for that. I believe they are similar to this project, and that project is actually relocating behind the Taco Bell, which is just a little bit east of there.

CHAIR LOWELL – Any other questions or comments?

PLANNING OFFICIAL RICK SANDZIMIER – Mr. Chairman, if I may.

CHAIR LOWELL – Mr. Sandzimier.

PLANNING OFFICIAL RICK SANDZIMIER – Just for clarification, on page 45, the condition I was referring to PD6, I would like to recommend that we add some additional language to that. The additional language I would like to add at the end would be to strike the period at the end of the sentence and add the words as required by California Department of Alcoholic Beverage Control Regulations. Then, with respect to, what enforcement opportunities or options would the City have? If they did not follow this requirement, say they did have an event and they were found to not be following ABC regulations, then we would have some grounds at least protected through this Conditional Use Permit approval. And, by our Municipal Code, it does allow the City to revoke a Conditional Use Permit if they are operating in violation. That isn't going to stop the event from happening, but it does maybe give us some protection if we ensure this here and the Applicant is fully aware that, if we do move forward and approve this this evening, that you're expecting them to be a responsible business and that they will follow these regulations. In terms of security, I apologize, I don't know what we we've put on the other banquet facilities we have in town. That was not something that…..

CHAIR LOWELL – I know that some of the bars that we've approved, they've required private security. Some Applicant's have required security, some haven't so I think it is a case by case basis.

PLANNING OFFICIAL RICK SANDZIMIER – Okay.

CHAIR LOWELL – One of the conditions in here, it says that there are supposed to be responsible for security should any measures arise, so it's kind of an as-needed condition so I'm comfortable with it. One of the other questions that I had that it doesn't appear to be an issue yet. Currently, to the south of the property, it is vacant. But, if something else comes in that's like a sensitive use that's like a residential site, I didn't see any noise regulations as a condition, so they are operating until 2:00 in the morning and it says generally Friday through Sunday but other days as needed so it could be possible that they are on a work day and they have a huge party until 2:00 AM. What's the noise regulation? Is it just the City's Standard Noise Regulation that they have to have quiet hours after what, 10:00?

PLANNING OFFICIAL RICK SANDZIMIER – That would be true, correct.

CHAIR LOWELL – There is no exception in this CUP?

PLANNING OFFICIAL RICK SANDZIMIER – No.

CHAIR LOWELL – I'm perfect with that. Any other questions or comments? Concerns?

COMMISSIONER BAKER – I had one other question. On the issue with the ADA, and I don't know if you require that, but the one thing that I did notice is there are no ramps or ADA spaces in front of this property. I mean it's null and void. It's about three doors I think. I would like to see that happen because you're going to have some older folk coming in that need, and I don't know if you can build that into the program or not.

PLANNING OFFICIAL RICK SANDZIMIER – We can.

COMMISSIONER BAKER – It does address the ADA issue. I just don't know if we went that deep with it or not for parking and the ramp?

PLANNING OFFICIAL RICK SANDZIMIER – So what you're asking for, we could draft a Condition that, prior to the issuance of a Building Permit, that the

Applicant demonstrate that the parking lot would be modified to include appropriate ADA parking spaces within the proximity to the new business.

COMMISSIONER BAKER – Yeah.

PLANNING OFFICIAL RICK SANDZIMIER – I would ask, before we put that condition in there….do we already have it in there?

ASSOCIATE PLANNER JULIA DESCOTEAUX – Yeah, B4.

COMMISSIONER BAKER – B4? Okay, good enough.

PLANNING OFFICIAL RICK SANDZIMIER – Okay. It sounds like we might already have that in there. The Condition is…..

ASSOCIATE PLANNER JULIA DESCOTEAUX – Before.

COMMISSIONER BAKER – Before? Okay good. Okeydoke, very good.

CHAIR LOWELL – Okay. I think all of our questions have been asked and answered. Would anybody like to make a motion?

COMMISSIONER NICKEL – I'd like to make one comment. I'm still not settled with the alcohol issue, and that's probably because I do have a bias as a critical care nurse for many, many years. I'm also concerned from the standpoint that we're hoping that everything is being done in good faith. And, when I went up and went around the rear of this site, there is a tire change store that is actually dumping tires. So, if the center can't follow those rules as simple as the trash dumpster, why am I to believe this is going to be safe for the public? That's just where I'm coming from.

CHAIR LOWELL – Well this permit is Applicant based. So, if the Applicant messes up, then they lose own permit. It's more of an enforcement issue than anything.

COMMISSIONER SIMS – I'd like to make a motion.

CHAIR LOWELL – Feel free to click the screen.

COMMISSIONER SIMS – What's that?

CHAIR LOWELL – Feel free to click the screen.

COMMISSIONER SIMS – Oh.

CHAIR LOWELL – Go ahead. Read your motion.

COMMISSIONER SIMS – I would like to recommend that the Planning Commission **APPROVE** Resolution No. 2016-26 and (1) **CERTIFY** that this Item is exempt from the provisions of California Environmental Quality Act as a Class I Categorical Exemption, CEQA Guidelines Section 15301, for Existing Facilities and (2) **APPROVE** PEN16-0059 (also referred to as PA16-0027) Conditional Use Permit for Existing Structures subject to the attached Conditions of Approval included as Exhibit A.

CHAIR LOWELL – The Conditions are as amended.

ASSISTANT CITY ATTORNEY PAUL EARLY – As proposed by the Planning Official?

CHAIR LOWELL – Yes.

ASSISTANT CITY ATTORNEY PAUL EARLY – With those amendments?

COMMISSIONER SIMS – Exactly.

CHAIR LOWELL – We have a motion by Commissioner Sims. We have a second by Vice Chair Barnes. All in favor, please cast your vote. I guess anybody cast your vote, not just in favor. All votes have been cast. Going once, going twice, the motion passes 6-0 with one abstention. The motion passes. Do we have a Staff wrap-up on this item?

Opposed – 0

Motion carries 6 – 0 – 1 with one abstention

PLANNING OFFICIAL RICK SANDZIMIER – Yes. This Item is an appealable action by the Planning Commission. If any interested party is inclined to want to appeal, they can file their appeal within 15 days of this action. They would direct that letter to the Community Development Director, and it would be going to the City Council within 30 days.

CHAIR LOWELL – Thank you very much. That moves us onto Item No. 2, which is Case PEN16-0020 formerly PA16-0002, a Plot Plan. The Applicant is SRG Acquisition, LLC, and the Case Planner is, once again, Ms. Julia Descoteaux.

2. Case: PEN16-0020 (PA16-0002) Plot Plan

Applicant: SRG Acquisition, LLC

Owner: Vogel Properties, LLC

Representative: Patrick Russell, SRG Acquisition, LLC

Location: SWC Indian Street & Grove View Road

Case Planner: Julia Descoteaux

Council District: 4

Proposal: PEN16-0020 (PA16-0002) – Plot Plan

STAFF RECOMMENDATION

Staff recommends that the Planning Commission **APPROVE** Resolution No. 2016-24 and 2016-25, and thereby:

1. **CERTIFY** that Final Environmental Impact Report (EIR, Attachment 2) PEN16-0019 (P16-003) for the Indian Street Commerce Center on file with the Community Development Department has been completed in compliance with the California Environmental Quality Act, the Planning Commission reviewed and considered the information contained in the Final EIR, and the Final EIR reflects the City's independent judgment and analysis as provided for in Planning Commission Resolution No. 2016-24; and

2. **ADOPT** the Findings and Statement of Overriding Considerations regarding the Final EIR for the Indian Street Commerce Center, attached hereto as Exhibit A to Resolution 2016-24; and

3. **APPROVE** the Mitigation Monitoring Program for the Final EIR for the proposed project, attached hereto as Exhibit B to Resolution 2016-24; and

4. **APPROVE** PEN16-0020 (PA16-0002) Plot Plan subject to the attached Conditions of Approval included as Exhibit A to Resolution 2016-25.

ASSOCIATE PLANNER JULIA DESCOTEAUX – Good evening again. The Item before you today is a Plot Plan for a 446,350 square foot warehouse building to be located on 19.64 acres in the Moreno Valley Industrial Area Specific Plan 208. The project provides for two alternatives, one for manufacturing and one for warehouse distribution, with differences being the number of parking required and the number of loading bay doors. The footprint of the building, the site access, landscaping, and water quality features will be the same for both alternatives. All the shipping and receiving areas will be located on the south side of the building with the opportunity for truck queueing along the north and west sides of the building. The proposed facility is a permitted use within the Industrial Area in the Zone in the Specific Plan. The plan is intended to provide locations for medium to heavy industrial and warehouse land uses. The proposed warehouse building is being built as a shell building for a single or multiple tenant occupancy with no tenant currently identified. The surrounding properties are also identified as industrial within the Specific Plan. Properties to the north include vehicle storage yards and operating warehouse distribution facilities. To the south, is an existing warehouse and, further south, is the City of Perris. There is a Waste Management Transfer Station to the northeast of the site and vacant land and existing facilities both to the east, north, and west. The project will take access from Indian Street at two locations with one driveway to the north being for auto vehicles, and parking is provided on the site per the City's Code Requirements with the parking areas designed with the required number of parking spaces and landscaping depending on the type of use being warehouse and manufacturing. The design of the building includes a concrete tilt-up building approximately 47 feet high with the use of color, reflective glazing, canopies, and mullions as decorative features. Landscaping and water quality areas will be designed and installed per the City's Municipal Code using water saving and drought tolerant design. The initial study was prepared for the project and determined that an Environmental Impact, EIR, was the appropriate environmental document for the project and it should focus on seven areas including air quality, biological resources, cultural resources, global climate change and greenhouse gas emissions, hazard and hazardous materials, hydrology and water, noise, transportation, and traffic. The EIR was prepared by Applied Planning with a Peer Consultation by First Carbon Solutions. The draft was circulated in August with the review period ending on October 10, 2016. Ten comment letters were received. All the comment letters were reviewed and responded to in the Final EIR, which was sent out on December 2, 2016 in advance of this meeting. The analysis presented in the EIR indicated that there are areas where the potential impact was significant and Mitigation Measures were implemented to reduce the impact to less than significant. Those that could not be reduced to a less than significant impact are listed in Section 4.0 of the Final EIR as significant and unavoidable and include air quality, greenhouse gas, and also traffic. The Planning Commission is asked to consider the Findings of Facts and Statement of Overriding Considerations for the project. CEQA requires that the decision-making agency balance the economic, legal, social, technological, and other benefits of a proposed project against its unavoidable environmental impacts. This would include project benefits such as the creation of jobs and other desired beneficial features versus the impacts of the project. Some benefits that were specifically identified included in your report are construction jobs, new jobs when the facility opens, the construction of the infrastructure around the facility. Mitigation Measures are also included, and they will be monitored under the reporting process. Public notice was sent to all property owners within 300 feet, posted on the site, and placed in the Press Enterprise. It was also sent to all the commenter's of the Draft EIR, and they were provided the Final EIR with that notification. To date, I have not received any phone calls or questions regarding the project. We have provided you a Revised Condition of Approval for a couple typographical errors. With respect to Condition of Approval P8, the square footage is 446,350, and the ALUC-10, the height is 48 feet. Staff recommends that the Planning Commission **APPROVE** Resolution No. 2016-24 and 2016-25 **CERTIFYING** the Environmental Impact Report, **ADOPTING** the Findings and Statement of Overriding Considerations, **APPROVING** the Mitigation Monitoring Program, and **APPROVING** the project with the attached Conditions of Approval. Staff is available for any questions. The Environmental consultant, Ross Geller from Applied Planning, is here to answer any questions related to the Environmental Impact Report. And, with him, is the Traffic Consultant, and also the Applicant from Sares-Regis is here as well. We also received one letter from, one of the comment letters from Johnson and Sedlack, stating that they were withdrawing their comments. This concludes Staff's presentation, and at this time we can answer questions for you. Thank you.

CHAIR LOWELL – Thank you very much. Any questions for Staff? I don't see any hands going up. Okay, I'd like to invite the Applicant up please.

APPLICANT PATRICK RUSSELL – Good evening. My name is Patrick Russell. I'm with Sares-Regis Group. I think Julia has done a good job of describing the project, and I just want to thank Staff, as well as the Commission for considering our project approval this evening. I am available to answer any questions that you would have. I would just like to add that the project is going to be a model for sustainability. It will be built to LEED Silver Certified Award levels. We're also including a solar ray for renewable energy at the building roof. There are many other features that have to do with water quality, water conservation, energy conservation, and green design that will be included in the project. So this should be a great project. It will meet the demands for the market, as well as be very environmentally conscious. So I'd be happy to answer any further questions that you would have.

CHAIR LOWELL – Do you have a perspective tenant in mind? I know we're talking some manufacturing, some distribution. That's what the summary said.

APPLICANT PATRICK RUSSELL – This is a spec project. We don't have a specific tenant in mind, but it's designed to accommodate a wide range of users that could be warehousing, corporate headquarters, manufacturing, or E-commerce. E-commerce has been growing at a rate of more than 15% annually, and we're seeing more and more of that business so that's a good possibility that we'd have that type of user.

CHAIR LOWELL – Is the building going to be built in hopes of a future tenant, or are you going to hold off construction until you have a tenant that is signed on the line to build for them?

APPLICANT PATRICK RUSSELL – Once we receive our approvals from this, the entitlement approvals, as well as the building department approvals, we will proceed with construction probably around the first of April.

CHAIR LOWELL – Awesome, and I'm excited. I like to see new businesses come to town, and I like to see new employment opportunities for our residents locally. It's a breath of fresh air to see people willing to invest in our City, so I appreciate it. Any other questions for the Applicant?

COMMISSIONER GONZALEZ – I do.

CHAIR LOWELL – Commissioner Gonzalez.

COMMISSIONER GONZALEZ – Regarding sustainability and your first comment, how would you say this building compares to say some of the older buildings that were built back in let's say the 2000s? You don't have to go into detail but just something, a general statement, what's the big difference, kind of the meat of what's changed, what's evolved from the standard warehouse building in, let's say 2005/2006 and, you know, 10 years now.

APPLICANT PATRICK RUSSELL – There are many different facets. We can talk about electrical energy consumption how now we've gone to low energy fixtures, LED lighting. The insulation requirements are much more rigid these days. The demands for energy are much lower because of the types of glass that we use, shading on the windows. It just goes on and on. Cool roofs in all the conditioned areas. Furthermore, rather than just consuming energy, we are also generating energy so we've come a long ways. It doesn't really stop at the building either. If we really look at the site and what's happening there is that, back in the early 2000s, the storm water would just ran straight into the storm drain. It could be carrying constituents or hazardous, those types of things. Now, we have the best management practices where we're filtering the water and we're also restoring our Aquifers through the percolation basins that we provide. It goes onto drought tolerant landscape and all the types of irrigation that have evolved over time to really reduce water consumption, so I look at it as really a wholistic approach to the project in the way that they are designed. It really started with the whole LEED movement. Now, we have Cal-Green, which is also modeling a lot of those same things so, much of what is required today, is not even voluntary. The LEED Certification still is voluntary. Things like the solar generation are voluntary, but there are many Tidal 24 and Cal-Green requirements that are very good for energy conservation and sustainability.

COMMISSIONER GONZALEZ – Thank you.

CHAIR LOWELL – Any other questions? I didn't see it in the report, but are you guys planning on utilizing electric forklifts and electric, what do you call them, pigs or whatever they use for shuttling containers to and from the loading docks?

APPLICANT PATRICK RUSSELL – Yard goats.

CHAIR LOWELL – Yard goats. There we go.

APPLICANT PATRICK RUSSELL – What we have agreed to is that we will have non-diesel equipment. We primarily see the electric forklifts in these types of facilities. Sometime they use propane and other clean fuels, but the diesel is being discouraged.

CHAIR LOWELL – We have a couple of warehouses in town that utilize electric equipment, and it's kind of refreshing when you walk through the warehouses and see these zero emission vehicles and they are being recharged through solar, which it's just nice. It takes a lot of the pollution concerns away from a lot of the residents. With the solar, are you planning on operating the facility on 100% solar or are you just putting X amount of solar panels on the roof to produce a certain amount and the rest is just going to be purchased?

APPLICANT PATRICK RUSSELL – Correct. The solar is primarily, the load that will be covered will primarily be the office portion of the site on the project, but any further needs within the warehouse would be through common means.

CHAIR LOWELL – Okay, Thank you very much

APPLICANT PATRICK RUSSELL – But still we're looking at using LED type of lighting and again low-energy consuming fixtures in the warehouse plus a lot of ambient natural light with the sky-lighting, so the energy demands have come a long ways in terms of tapering that off.

CHAIR LOWELL – I'm assuming this isn't your first commercial building?

APPLICANT PATRICK RUSSELL – No.

CHAIR LOWELL – Do you happen to have a list of a couple of key tenants that you have in some of your other facilities just so we can get an idea of who you're trying to attract?

APPLICANT PATRICK RUSSELL – Sure. Across the street from us, we built the Deckers Facility, and we have just recently finished the QVC facility in Ontario. There is Pier One in Ontario as well so these are very common large quality users that we've been able to attract to our buildings.

CHAIR LOWELL – Well, I appreciate it. I was just trying to get an idea of who you're tenants were so Thank you very much. Any other questions for the Applicant before I move on? I don't see any hands going up. Thank you very much. I appreciate it.

APPLICANT PATRICK RUSSELL – Thank you.

PLANNING OFFICIAL RICK SANDZIMIER – Mr. Chairman.

CHAIR LOWELL – Yes, Mr. Sandzimier.

PLANNING OFFICIAL RICK SANDZIMIER – May I provide a little bit of a Staff clarification. Mr. Russell was very clear that the solar installation is a voluntary installation. It is not a requirement of the project. The project did get reviewed by the Airport Land Use Commission, and the Airport Land Use Commission did have concerns about solar installation that if it could disrupt anything with the aircraft at the base. So it's not that it's not allowed, but we assured the Airport Land Use Commission that the City itself would not be requiring the Applicant to put the solar on the building, so we are not requiring them to put that on. It is voluntary, and when it comes in for building permits, it will most likely have to go through another Airport Land Use Commission Review. They may have to do a Glare Study, and they may have to take it back. They can do that as long as they satisfy the Airport Land Use Commission. There is actually a specific condition in your Conditions of Approval this evening. It's on page 253 of the packet. It lists all the various items that the Airport Land Use Commission.

CHAIR LOWELL – Do you happen to have the Condition Letter Number because I don't have page numbers on mine.

PLANNING OFFICIAL RICK SANDZIMIER – The Condition Number is Airport Land Use Commission Condition 2. It starts at the bottom of page 252 and then it goes on to page 253 or page 12 of the report. It says that, any use which could cause some light to be reflected towards an aircraft engaged is an issue, so basically we want to look at anything that has the potential of reflecting upwards so that can be done. But, like I said, it would require subsequent review by the Airport Land Use Commission, and we can take care of that during the Building Permit Issuance Review.

CHAIR LOWELL – Vice Chair Barnes.

VICE CHAIR BARNES – While we're on the subject of ALUC. ALUC Condition 4: The attached notice shall be given to all perspective purchasers of the property. What notice will that be? Did I miss something?

ASSOCIATE PLANNER JULIA DESCOTEAUX – I apologize. I thought we included that at the end of Conditions of Approval so I don't have that with me.

VICE CHAIR BARNES – What is it a notice of?

ASSOCIATE PLANNER JULIA DESCOTEAUX – Let me look through here just a moment, okay?

VICE CHAIR BARNES – Okay. We can move on. I was just curious what we were getting at.

PLANNING OFFICIAL RICK SANDZIMIER – What I can assure the Commission is, if you want to take a break, we can find that document. We should have it in our file but, in any event, we will attach that document to these Conditions of Approval since it is referenced.

VICE CHAIR BARNES – Okay.

PLANNING OFFICIAL RICK SANDZIMIER – So that would be…..

VICE CHAIR BARNES – The condition is correct. There is a notice that something.

ASSOCIATE PLANNER JULIA DESCOTEAUX – Yes there is.

VICE CHAIR BARNES – It's limited inadvertent.

ASSOCIATE PLANNER JULIA DESCOTEAUX – There is a notice.

VICE CHAIR BARNES – Thank you.

CHAIR LOWELL – You're good?

VICE CHAIR BARNES – Yeah, yeah. I was just curious about that.

CHAIR LOWELL – Any other questions before we move onto Public Comments?

COMMISSIONER BAKER – I've got one here on PE T8 and T9 on the, I guess it has to do with the transportation deal. What I'm wondering there is what our arrangement is with City of Perris where they come out with a $32,547 assessment. And, on Indian and Grove right there at the intersection, I know that's been improved. The City of Moreno Valley is only getting $4885. I know we have some kind of arrangement with the City of Perris down there even though that's in our City limits, right?

ASSOCIATE PLANNER JULIA DESCOTEAUX – Yes. I will refer to the Traffic Engineer for that.

COMMISSIONER BAKER – That's for Traffic Engineering, right?

CITY TRAFFIC ENGINEER ERIC LEWIS – Yes. So the payments shown are for Fair Share Contribution, their contribution to traffic at that intersection and to meet their Mitigation requirements.

COMMISSIONER BAKER – So does that happen on every warehouse that goes in in that area in the southern part of town? Perris gets some help? And I understand that because most of the traffic probably goes south toward their direction. Is that correct?

CITY TRAFFIC ENGINEER ERIC LEWIS – If the project will impact one of their intersections or multiple intersections, then we require the development to make a Fair Share Contribution to them.

COMMISSIONER BAKER – And how is that determined? On the square footage or the size of the intersection or?

CITY TRAFFIC ENGINEER ERIC LEWIS – Well it's based on the amount of new traffic that is introduced at the intersection so there's a formula.

COMMISSIONER BAKER – That's not on a traffic count then, right?

CITY TRAFFIC ENGINEER ERIC LEWIS – Correct.

COMMISSIONER BAKER – Okay, thank you so much.

CHAIR LOWELL – Any other questions? No?

ASSOCIATE PLANNER JULIA DESCOTEAUX – We have the notice. It is in….it talks about that the property is in the vicinity of an airport within what is known as an airport influence area. For that reason, the property may be subject to some of the annoyances and inconveniences associated with being near an airport. That's the notice.

VICE CHAIR BARNES – I do have a question, another question.

CHAIR LOWELL – Can we push that back until after Public Comments?

VICE CHAIR BARNES – I don't know. Do we ask the questions now?

CHAIR LOWELL – No. I think we should ask them after the Public Comments.

VICE CHAIR BARNES – Alright.

CHAIR LOWELL – Okay, I'd like to open up the Public Comments. We have two citizens waiting to speak. We have Mr. Damon Allen followed by Mr. Rafael Brugueras.

SPEAKER DAMON ALLEN – My name is Damon Allen. I am a 13 year resident of Moreno Valley. I have never spoken before the Planning Commission before, but I want to come up here again when you have Downtown Moreno Valley plans so we can get that on the road. I am with Southern California Environmental Justice Alliance. I would like to thank you for the opportunity to speak before you today. Since there is a time limit, I will not be able to get through the entirety of our comments, so I refer you to the comment letter to reflect the full scope of our comments.

CHAIR LOWELL – Could you pull the microphone a little closer.

SPEAKER DAMON ALLEN – Okay, how is that?

CHAIR LOWELL – Perfect.

SPEAKER DAMON ALLEN – Okay. We believe the EIR is flawed and should be redrafted and recirculated. Firstly, regarding Section 4272 of the EIR, the Air Quality Impact Statement. The EIR gives a sample construction schedule. The construction schedule presents the project in phases. However, phased construction is not required of the project. The EIR does not present any analysis of impact or particular Mitigation Measures for potential overlap of construction phases. There is no statement that the construction phases will not occur concurrently. Also, there is no requirement that the project be completed over a certain number of days given. Construction may occur faster as well, which results in a significantly greater daily impact. The EIR states, "Should construction occur any time after the dates presented here incremental in aggregate construction source emissions would likely decrease since emission factors for construction equipment would progressively decrease in the future." This statement is misleading as it assumes the best-case scenario. Contrary of CEQA's meaningful disclosure requirement, there is no indication of or requirement for the projects construction to (let me change pages here) utilize technology that may or may not exist to reduce emissions. The EIR continues to state "This is due to the natural turnover of the older fleet vehicles and replacement with more efficient equipment to enhance emission control and implementation of more stringent regulations, which act to reduce construction source emissions." Will the EIR be recirculated and analyzed if the project goes beyond construction dates given? Will it be analyzed against the more stringent regulations that do not currently exist? The statement is misleading and presents a scenario that is circumstantial and uncertain. Then, we have a comment also on the greenhouse gas emissions impact. The EIR states that the project emissions of GHG's are significant and unavoidable after mitigation. No Mitigation Measures are offered other than a reference to the projects design features and operational programs that would act to generally reduce the projects GHG emissions for area sources, energy sources, and other onsite emission sources, which combine and account for approximately 11% of the project's total GHG emissions. No further Mitigation Measures are offered. This is inadequate and the EIR must offer some Mitigation Measures beyond potential design features. Further, the EIR states that the project conflicts with the Scoping Plan, as well as Moreno Valley's Energy Efficient and Climate Action Strategy. There is no Mitigation Measure disclosed here either. The details of how the GHG emissions conflict with both documents is not discussed. This does not meet CEQA's meaningful disclosure requirements. Again, I thank you for your time.

CHAIR LOWELL – Thank you very much. Mr. Rafael Brugueras.

SPEAKER RAFAEL BRUGUERAS – Good evening again. I'm not sure if that should be answered first before I speak? I mean, I'm not saying that he's right or wrong, but I know when the Staff brings their Report to you they make sure what they are doing is correct. And that's been proven time after time so I learned something back there but, anyway, good evening once again Chair, Commissioners, Staff, Residents, and Guests. I'm glad to hear the Applicant speak first because he gave us all the positive notes of how to build a building energy efficient, water, landscaping. He gave it all to us. They are going to use their own energy and their own water without disturbing the City's, and that's a good thing and those are the projects that are coming to pass now. The old way is not going to happen anymore. We are now doing things differently, so I'm glad to hear that, but I just want to talk about the benefits of what can come to the City. It talks about it's going to cost 21 million dollars, and it's going to create 50 or 60 construction people for the next two years. And, after that, it's going to project 772 million dollars up to 3.7 billion dollars in new direct spending through construction and operations. This flood of funds has a positive economic and fiscal impact on the City of Moreno Valley in the form of fiscal revenue, job creation, household earnings, and economical output. Then, it talks about another $160,000 to $260,000 over 20 years. When you look at $160,000 or $260,000 over 20 years, when we add everything that we have done in the last several years, that helps our general fund. Okay, in then in here, it talks about billions of dollars or millions of dollars in revenue. See that's what happens when we have projects that come to our City and they produce in 20 years when they are built well as they are going to do for us. I'm just hoping that whatever this gentleman said can be corrected because that is important what he said. But I know that our Staff works very, very hard to make sure that these concerns are taken care of before they bring them to you and I guess we'll hear the explanation. But, anyway, I support what this project is going to do for Moreno Valley on that corner. Thank you.

CHAIR LOWELL – Thank you very much. Any other speakers wishing to speak before I close Public Comments? Going once, going twice. We have one hand up, the Applicant. I was just going to call you up to ask you if you wanted to respond. Let me close Public Comments. Any other Public Speakers wishing to speak? Anybody else wanting to speak? Going once, going twice. Public Comments are now closed. I was going to invite you back up to rebut anything you heard.

APPLICANT PATRICK RUSSELL – Okay, Thank you very much. I just wanted to respond to the comment that there really wasn't any mitigation proposed with respect to air quality and emissions control, and actually we spent a lot of time putting together a program where we have many mitigating factors, and I'd just like to name a few. First of all, for the construction, we will be using Tier 4 equipment, which is the heavy equipment, which is used for grading and so forth. Tier 4 equipment is State of the Art Emissions Control Equipment. They also have the best available control technology on that for monitoring and controlling emissions so that is very positive. Also, we have agreed that there will be no portable diesel generators used during the construction of the project. We also are providing limitations on idling for trucks and signage to three minutes or less. We are providing and encouraging the use of carpooling in van pools. We are providing special parking locations for those uses to encourage the ride sharing to get to work. We are also providing electrical vehicle charging stations to encourage the use of zero emissions automobiles. So we have one DC fast-charge unit, which again is the quick charge. It is a premium type of unit, as well as two level-two EVSE charging units for a total of three. We will also being putting conduits in and infrastructure to expand those electrical vehicle charging units over time as the tenants needs for those grow and to increase the number of zero emission vehicles. As I stated earlier, no diesel-powered forklifts are permitted onsite, and our landscape equipment will use only electric or equipment that is approved by the California Air Quality Board. So, in conclusion, I would just like to say that there are some significant and costly provisions that have been included into this plan that I think really will make a difference with the emissions, and I just wanted to make note of that. Thank you.

CHAIR LOWELL – For clarification, you said no diesel forklifts will be allowed onsite. Is that during operation or is that also during construction?

APPLICANT PATRICK RUSSELL – That would be at all times.

CHAIR LOWELL – So period. There will never be a diesel forklift on the site during construction or anytime?

APPLICANT PATRICK RUSSELL – Correct.

CHAIR LOWELL – Okay, thank you. Any questions or concerns before I move to discussion and deliberations? Nope, okay, I will open up the floor. Does anybody have any questions? Commissioner Sims.

COMMISSIONER SIMS – I don't have any questions, but I….looking over the paperwork on this, this project is located within Specific Plan 208, which is specifically for this type of use, so I can imagine that the conditions are all consistent with what was outlined in the Specific Plan for this type of development. And, of interest if you had a chance to look at the Fiscal Impact Report, you look at the numbers on that and, if you would indulge me a second, but the net annual revenue, that's net. That's after city expense for police and fire support and such is estimated to be $160,000 to $260,000 a year, so that's net new positive revenue to the City. The sustainable jobs are estimated between 500 and 400 between direct and indirect jobs that the project would influence and 50 to 60 jobs during the construction and that the net new household earnings, I did the math. Over the project, it would be around $40,000 per year on these jobs that will be influenced. Household earnings would be influenced positively by $40,000. I thought it was a pretty rigorous thing. They looked at six sources of revenue through the various taxes that the City would accumulate by this and it just, it's a warehouse in the right spot where warehouses are supposed to be. They got the Mitigation Measures that are consistent with the Specific Plan and the Conditions with the City, so I am very supportive of this project.

CHAIR LOWELL – Vice Chair Barnes.

VICE CHAIR BARNES – I want to second what Commissioner Sims said about the financial analysis. I really appreciated that being included in this Project Report because previously the Overriding Considerations were always somewhat vague. It's nice to see some real numbers that you can measure against the demands of the project, so I appreciate that addition very much. Also, observation on the conditions, which I always have, the conditions are dubitable that this thing gets built by yet the EDD conditions all say encouraged, may utilize, may work, encouraged, may. Why are they even in here if they are not requiring that they do anything? It's just an observation. And then, on a technical question, does the right-of-way for Grove exist west of Indian?

ASSOCIATE PLANNER JULIA DESCOTEAUX – No. I won't exist.

VICE CHAIR BARNES – It does not?

ASSOCIATE PLANNER JULIA DESCOTEAUX – It does not.

VICE CHAIR BARNES – It's not being vacated. It's already gone?

ASSOCIATE PLANNER JULIA DESCOTEAUX – If it's not already gone, it's in the process of being vacated.

VICE CHAIR BARNES – Okay.

ASSOCIATE PLANNER JULIA DESCOTEAUX – It's not intended for either this project or the project that's approved to the north of it.

VICE CHAIR BARNES – Okay. The reason I was asking is those driveways are very close together and was it considered to make Grove a four-way intersection with a shared driveway with the property to the north?

ASSOCIATE PLANNER JULIA DESCOTEAUX – That was discussed, but the property to the north has already been entitled.

VICE CHAIR BARNES – Oh, okay. Okay, and I think that concludes my questions. Thank you very much.

CHAIR LOWELL – Any other questions? Commissioner Gonzalez.

COMMISSIONER GONZALEZ – I just want to second the comments from my colleagues. This is a great project and a great place and that is what this Specific Plan was intended to do, and hopefully it is a very successful project.

CHAIR LOWELL – I have a question. On the Plot Plan, on the northwest corner of the site, the back corner doesn't look to be fire accessible. We show a fire access road that is 30 feet wide but that hard 90-degree turn doesn't look like it's going to accommodate a fire truck very well.

ASSOCIATE PLANNER JULIA DESCOTEAUX – I'll refer to Fire on that.

FIRE MARSHAL ADRIA REINERTSON – Adria Reinertson, Fire Marshal. Yes, it does appear that there is a 30-foot-wide lane all the way around, but certainly when we get to Building Permit Issuance and Plan Check, we would be setting down our turning radius templates to make sure that our engines and trucks can make that turn.

CHAIR LOWELL – It seems like that should be something that we address now to make sure that the building is in the right spot and the right square footage.

FIRE MARSHAL ADRIA REINERTSON – We generally don't, and we give them the parameters for the lane widths and then we issue conditions that all of those details will be handled during Plan Check.

CHAIR LOWELL – Okay, I guess that just kicks the can down the road for me. I don't have any other major concerns or questions. Anybody else?

PLANNING OFFICIAL RICK SANDZIMIER – I think you had one more Commissioner, but when you get done I do have some input.

COMMISSIONER NICKEL – Yes I did meet Mr. Russell quite a while ago when he was kind enough to have a public forum about this project. Sadly, there were not a lot of public there. I was there, a representative from Joint Powers was there, and a rep from the Sierra Club, but I know Mr. Russell takes a lot of pride in his buildings so I have good faith in this.

CHAIR LOWELL – Any other questions before I go to a motion? Well personally, I would like to say that the biggest problem I see facing our City is a major lack of employment opportunities. A lot of our youth stay at home. They work at minimum wage jobs, at Burger King, at Jack in the Box, or something that is not becoming up an upstanding citizen that needs a good well-paying long-term job. I welcome this project to the City. This is the right project in the right location. As Commissioner Sims said, it's where warehouses need to be. It's where they should be. We have two different warehouse communities, one on the east side of the town and one on the south side of town. This fits the right spot in the right place at the right time. We need the jobs in the City. We need the revenue, so I welcome you to town. With that, I would like to make a motion.

PLANNING OFFICIAL RICK SANDZIMIER – Mr. Chairman, may I, just for the record. I think this is important because some of the speakers did come up and question the quality of the Environmental Document so I just want, for the record because sometimes projects like this are challenged, I would like the record to reflect that we as your Staff have applied independent judgment, which is a requirement of CEQA. The consultant that was retained for the project was a professional consultant from Applied Planning. The City also secured the services with First Carbon to provide a Peer Review of the Environmental Document. The Environmental Document has been reviewed by both Professional Planners and your Professional Staff here. You already mentioned that the Statement of Overriding Considerations did have detail. We took extra caution to make sure that information was presented in the Staff Report so you did have that information available to you, and the public had that information available to you. We stand behind this project. We agree with what the Commission has found so far with the comments this evening that this is a good project in the right location in the City. I just want to make sure that the record reflects that. With regard to the Conditions of Approval from our Economic Development Department, we take great pride in this City to be business friendly. You've maybe heard the mantra that we operate at the speed of business, but we also have very detailed customer care standards. And the types of conditions that we've put in there with the EDD, the Economic Development Department, we're not going to dictate how a business is run, but we're giving them the opportunity to work with us with the resources that we have available to help the business be successful. So that's why those conditions are a little bit looser. We don't want to dictate exactly how they work, but those are there to make sure that the public and the businesses are aware that we do provide those services. And, with that, I'll conclude.

CHAIR LOWELL – Thank you very much. I do agree making the city business friendly is a good thing, and I applaud the Staff's actions and the research and homework you guys have done. With that, I personally would like to make the motion, so I'm going to jump on this one. I would like to recommend that the Planning Commission **APPROVE** Resolution No. 2016-24 and 2016-25 and thereby **CERTIFY** that the Final Environmental Impact Report (EIR, Attachment 2) PEN16-0019 (P16-03 is the other name for it) for the Indian Street Commerce Center on file with the Community Development Department has been completed in compliance with the California Environmental Quality Act. The Planning Commission viewed and considered the information contained in the Final EIR, and the Final EIR reflects the City's independent judgment and analysis as provided for in Planning Commission Resolution 2016-24, and **ADOPT** the Findings and Statements of Overriding Considerations regarding the Final EIR for the Indian Street Commerce Center attached hereto as Exhibit A to Resolution 2016-24, and **APPROVE** the Mitigation Monitoring Program for the Final EIR for the proposed project attached hereto as Exhibit B to Resolution 2016-24, and finally **APPROVE** PEN16-0020 (formerly PA16-0002) Plot Plan subject to the attached Condition of Approval included as Exhibit A to Resolution 2016-25.

PLANNING OFFICIAL RICK SANDZIMIER – As modified.

CHAIR LOWELL – As modified. So I have made the motion. We have a second by Commissioner Nickel. Please cast your votes. Going once, going twice. All votes have been cast. The motion passes 7-0. Do we have a Staff wrap-up on this Item?

Opposed – 0

Motion carries 7 – 0

PLANNING OFFICIAL RICK SANDZIMIER – Yes. This is a project that you are the final deciding body on. It is appealable to the City Council. If anybody is interested in appealing, they can file an appeal within 15 days. That appeal should be directed through the Director of Community Development. It will be forwarded to our City Clerk and agendized for a City Council Hearing within 30 days.

CHAIR LOWELL – Thank you very much. Moving onto Other Commissioner Business, which I don't think we have any.

OTHER COMMISSION BUSINESS

None

CHAIR LOWELL – Do we have any Staff Comments before we wrap up?

STAFF COMMENTS

PLANNING OFFICIAL RICK SANDZIMIER – I'd like to wish you all a very Merry Christmas and Happy New Year as we go into that.

CHAIR LOWELL – Thank you very much. Do we have any Planning Commissioner Comments?

PLANNING COMMISSIONER COMMENTS

VICE CHAIR BARNES – I second that.

COMMISSIONER RAMIREZ – I do. I just want to say thank you for this whole year. It has been great, a great learning experience with my fellow Commissioners. I have really enjoyed it. Thank you. And Staff as well. I have really enjoyed Staff input and…..

CHAIR LOWELL – As you can see the need for Alternate Planning Commissioners is very present today with both alternates being used. It has been very welcome. It has been a small learning curve throughout the year, but it has been a great addition to the Planning Commission. I welcome you guys, and thank you very much for your service and help.

ADJOURNMENT

CHAIR LOWELL – Again, I wish everybody happy holidays. Have a safe holiday season. Have a great New Year, and we will see you guys when we adjourn to the next Regular Planning Commission Meeting on January 26, 2017 right here at 7:00 PM. Thank you very much, and have a great night.

NEXT MEETING

Next Meeting: Planning Commission Regular Meeting, January 26, 2017 at 7:00 PM, City of Moreno Valley, City Hall Council Chamber, 14177 Frederick Street, Moreno Valley, CA 92553.

________________________ ____________________________________

Richard J. Sandzimier Date
Planning Official
Approved

________________________ ____________________________________

Brian R. Lowell Date
Chair

PLANNING COMMISSION

STAFF REPORT

Meeting Date: January 26, 2017

GENERAL PLAN ANNUAL REPORT

Case:	General Plan Annual Report
Applicant:	City of Moreno Valley
Owner:	N/A
Representative:	N/A
Location:	Citywide
Case Planner:	Mark Gross
Council District:	N/A

SUMMARY

The General Plan Annual Report includes information on the goals, objectives, policies and programs of the existing General Plan and provides major accomplishments and General Plan implementation projects to document compliance and consistency with the current Plan. The California Government Code Section 6400 requires that the legislative body of the City consider an annual progress report on the City's General Plan and to subsequently provide that annual progress report to the State Office of Planning and Research (OPR), and the Department of Housing and Community Development by April 1 of each year. The annual report is expected to cover the status of the General Plan and the progress in its implementation, including the progress in meeting the City's established share of regional housing needs. The Planning Commission, serving as the Advisory body to the City Council on planning matters, is requested to review and recommend to the City Council on the annual report prior to its submittal to OPR.

PROJECT DESCRIPTION

Background

California State Law requires each city to adopt a comprehensive, long-term general plan for its physical development and any land located outside its boundaries which bears a relationship to its planning activities. In essence, the City's general plan serves as the blueprint for future growth and development. As a blueprint for the future, the plan contains goals, objectives, policies and programs designed to provide decision makers with information and a basis for all land use related decisions.

The City of Moreno Valley incorporated on December 3, 1984. The City’s first General Plan was adopted by City Council Resolution on September 8, 1988. The last comprehensive update of the General Plan was completed and approved by the city Council on July 11, 2006. The last update of the Housing Element of the General Plan was approved by the City Council on February 11, 2014.

The existing General Plan incorporates all required elements as follows, with date of the last update noted:

- Circulation Element (2006)
- Community Development Element (2006)
- Conservation Element (2006)
- Housing Element (2014)
- Parks, Recreation and Open Space Element (2006)
- Safety/Noise Element (2006)

The Housing Element is the only mandatory Element of the General Plan that must be updated on a set schedule, which is presently based on an eight year cycle. The last update in February 2014 was performed in compliance with State Law. Following the adoption of that Housing Element, the State Department of Housing and Community Development (HCD) provided the City with certification of the document on May 19, 2014. With the certification the next required update of the Housing Element will be in year 2021. The other Elements of the General Plan should be updated from time to time to ensure that the policies and goals reflect the desired vision for the city, and does not become stale with respect to emerging industry trends and practices. When a General Plan has not been updated within a ten year period or longer, it is likely that the City will receive notification from the State. Given the last comprehensive update of the City General Plan was performed in 2006, consideration should be given to another update.

With regard to the required annual report, Section 65400 of the California Government Code requires the City to do the following:

A) A General Plan Annual Report shall be provided by April 1 of each year to the legislative body (i.e. City Council), the Office of Planning and Research (OPR) and the Department of Housing and Community Development (HCD); and

B) A status of the General Plan and progress in its implementation shall be provided in the form of a General Plan Annual Report; and

C) Progress in meeting its share of the regional housing needs pursuant to Section 65584 of the Government Code shall be provided in the General Plan Annual Report.

In addition to the State law, Objective 1.9 and supporting Initiatives 1.9.1 through 1.9.4 of the recent City Council adopted Momentum Moval strategic plan articulate a clear strategy for General Plan activity and planned next update. Initiative 1.9.1 specifically requires the preparation of an Annual Report by April 1, 2017 “that explains how current land use decisions relate to adopted goals, policies and other implementation measures, and as appropriate identify necessary course adjustments consistent with the Strategic Plan.” Initiative 1.9.2 calls for formation of a working group of key City staff to research and evaluate the current General Plan as a prerequisite to initiating the comprehensive update of the General Plan, which is expected to progress over the next three year period. These activities are underway.

Annual Report Contents

The 2015-2016 General Plan Annual Report, attached with this staff report, includes the following information:

- Acknowledgements
- Background, Analysis and Report Conclusions
- Major Accomplishments
- General Plan Implementation

The following two Appendices are key components of the General Plan Annual Report:

- Review of General Plan Goals, Objectives, Policies and Programs
- Housing Program Status Report

The General Plan Annual Report reports the major projects and General Plan Amendments approved by the Planning Commission and City Council during the reporting period. It includes a thorough assessment and report on actions and activities that the City is taking with regard to the specific articulated goals, objectives, policies and programs set forth in the City’s 2006 General Plan document. With the synopsis of status of each goal, objective, policy and program, information is provided to demonstrate how each are tied to corresponding Municipal Code regulations or program to foster implementation. Appendix A provides information on possible General Plan course adjustments that are under consideration with the scope of work preparation for the City’s next comprehensive General Plan update. These items are included in bold text within Appendix A to the General Plan Annual Report.

The Annual Report includes a Housing Program Status of the 2014 Housing Element. This information is provided as tables for the last three year time frame years 2014 - 2016. The information included also documents the housing types that have been constructed and occupied during this time period. From 2014 through 2016, the type of housing constructed and occupied in the City has been single-family homes. All 315 single-family homes constructed between 2014 through 2016 count towards the City's required Regional Housing Needs Assessment numbers for the category of Above Moderate Income Level Housing (1 through 5 units). Building and Safety staff verified the numbers by running reports on the building permits finalized in each of the noted years. Although the constructed and occupied housing numbers reflect only single-family dwellings for the three year reporting time period, other diverse housing types such as Planned Unit Developments and multiple-family residential apartment complexes have been entitled in 2015 and 2016.

The current Annual Report includes major projects, General Plan amendments, Municipal Code amendments and housing information not previously reported to OPR through December 2016.

As demonstrated in the attachments provided with this document, approved and completed projects and amendments to the General Plan are in conformance with the City's General Plan goals, objectives, policies and programs for each representative element. The City of Moreno Valley General Plan continues to serve as an effective guide for orderly growth and development, preservation and conservation of open space and natural resources. The City's Planning Commission and City Council have considered and followed the General Plan appropriately for long-range planning, capital improvement programs, community services, and associated fiscal and policy direction for Moreno Valley.

Conclusion

The General Plan Annual Progress Report is a State-mandated annual report on the implementation status of Moreno Valley's General Plan. The actions, plans, programs, and projects documented in the Annual Report represent the City's commitment to achieving the goals and objectives set forth in the seven (7) State mandated Elements.

The General Plan Annual Report is being provided to the Planning Commission for review and recommendation to the City Council. Subsequent to Planning Commission action on the Annual Report it shall be forwarded to the City Council for review and consideration as a consent calendar item. Following the City Council's action, the General Plan Annual Report will be forwarded to OPR and HCD by the April 1, 2017 due date.

ENVIRONMENTAL

The General Plan Annual Report is exempt from the California Environmental Quality Act (CEQA) pursuant to Section 15061 of the CEQA Guidelines as there is no possibility that the activity would create the potential for a significant impact upon the environment.

NOTIFICATION

Public noticing was not required to be provided for the General Plan Annual Progress

Report.

STAFF RECOMMENDATION

Staff recommends that the Planning Commission **APPROVE** Resolution No. 2017-03 and thereby:

1. **CERTIFY** that the proposed General Plan Annual Report qualifies as an exemption in accordance with Section 15061 of the California Environmental Quality Act (CEQA) Guidelines and

2. **RECOMMEND** to the City Council that the January 2015 to December 2016 General Plan Annual Report presented is consistent with the requirements of Government Code Section 64000 with regard to reporting on status of the City General Plan and progress in its implementation, and is ready for submittal to the Office of Planning and Research and to the Department of Housing and Community Development by April 1, 2017.

Prepared by:
Mark Gross
Senior Planner

Approved by:
Allen Brock
Community Development Director

ATTACHMENTS

1. PC Resolution
2. General Plan Annual Report
3. Appendix A to Annual Report - GP Goals and Policies
4. Appendix B to Annual Report - Housing Forms

RESOLUTION NO. 2017-03

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY RECOMMENDING APPROVAL OF THE 2015 THROUGH 2016 GENERAL PLAN ANNUAL REPORT TO THE CITY COUNCIL

WHEREAS, the State of California requires non-charter cities and counties to adopted a General Plan to provide guidance and direction for development activities; and,

WHEREAS, the City of Moreno Valley's current General Plan was adopted on July 11, 2006; and,

WHEREAS, California Government Code section 65400 mandates that cities submit an Annual Progress Report on the status of the General Plan and its implementation to their legislative bodies, the State Office of Planning and Research (OPR) and the Department of Housing and Community Development (HCD); and,

WHEREAS, the Annual Progress Report is required to include: a) The state of the Plan and the progress of its implementation; b) the progress in meeting its share of regional housing needs; and, c) the degree to which the General Plan complies with the Guidelines established by OPR; and,

WHEREAS, the City has prepared its Annual Progress Report due April 1, 2017 to include major accomplishments, General Plan implementation, General Plan goals, objectives, policies and programs, and a regional housing report attached to the staff report, in accordance with the Guidelines adopted by OPR ;and

WHEREAS, the City's Strategic Plan (Momentum Moval), adopted on August 16, 2016, included Initiative 1.9.1 or the preparation of a General Plan Annual Report prior to April 1, 2017 to explain how current land use decisions relate to adopted goals, policies, objectives programs and other implementation measures and the review of necessary course adjustments consistent with the Strategic Plan; and,

WHEREAS,; the City's Strategic Plan (Momentum Moval) also provides Initiative 1.9.2 including the formation of a working group of key City staff to research and evaluate the current General Plan adopted in 2006 as a prerequisite to initiating a comprehensive update of the General Plan; and,

WHEREAS, the Housing Element is one of seven mandatory elements of a General Plan required by the State of California; and; and,

WHEREAS, the Housing Element must be updated every five to eight years and reviewed for consistency with the State Department of Housing and Community Development; and,

WHEREAS, the Annual Report includes vital General Plan and housing information from January 2015 through December 2016; and

WHEREAS, on January 26, 2017, the City Planning Commission reviewed the item as a report and provided a recommendation to City Council; and

WHEREAS, all legal prerequisites to the adoption of this Resolution have occurred.

NOW, THEREFORE, BE IT RESOLVED, it is hereby found, determined and resolved by the Planning Commission of the City of Moreno Valley as follows:

The City of Moreno Valley has completed the General Plan Annual Report as required by California Government Code section 65400 for the 2015- 2016 calendar years.

The Annual Report provided herein as an attachment to the staff report is found to be consistent with the suggested content in the State Guidelines and is hereby accepted.

BE IT FURTHER RESOLVED that the Planning Commission **HEREBY APPROVES** Resolution No. 2017-03 and hereby:

1. **CERTIFIES** that the General Plan Annual Report qualifies as an exception in accordance with Section 15061 of the California Environmental Quality Act (CEQA) Guidelines, and

2. **RECOMMENDS APPROVAL** of the General Plan Annual Report by the City Council.

APPROVED this 26th day of January, 2017

Brian Lowell
Chair, Planning Commission

ATTEST:

____
Richard J. Sandzimier, Planning Official

APPROVED AS TO FORM:

____
City Attorney

CITY OF MORENO VALLEY
Community Development Department
Planning Division

GENERAL PLAN ANNUAL REPORT

JANUARY 2015 – DECEMBER 2016

ATTACHMENT 1

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ATTACHMENTS

ACKNOWLEDGEMENTS

CITY COUNCIL (Elected)	**DISTRICT**	**TERM EXPIRES**
Dr. Yxstian A. Gutierrez, Mayor	CITYWIDE MAYOR	December 2018
Victoria Baca, Mayor Pro-Tem	1	December 2020
Jeffrey J. Giba	2	December 2018
David Marquez	3	December 2020
Vacant	4	

PLANNING COMMISSION (Appointed)	**TERM EXPIRES**
Brian Lowell, Chairperson	March 31, 2017
Jeffrey Barnes, Vice-Chairperson	March 31, 2019
Carlos Ramirez	March 31, 2017
Ray L. Baker	March 31, 2017
Jeffrey D. Sims	March 31, 2019
Patricia Korzec	March 31, 2019
Vacant	March 31, 2019
Erlan Gonzalez (Alternate)	April 28, 2019
Lori Nickel (Alternate)	April 28, 2017

CITY MANAGER
Michelle Dawson

ASSISTANT CITY MANAGER
Thomas DeSantis

COMMUNITY DEVELOPMENT DEPARTMENT
Allen D. Brock, CBO, Director

Planning Division
Richard Sandzimier, Planning Official
Darisa Vargas, Senior Administrative Assistant
Erica Tadeo, Administrative Assistant
Chris Ormsby, AICP Senior Planner
Mark Gross, AICP Senior Planner
Jeffrey Bradshaw, Associate Planner
Julia Descoteaux, Associate Planner
Claudia Manrique, Associate Planner
Gabriel Diaz, Associate Planner
Leticia Esquivel, Senior Permit Technician
Summer Looy, Permit Technician
Grace Espino-Salcedo, Permit Technician
Sijifredo Fernandez, Contract Planner
Sergio Gutierrez, Administrative Intern

ANNUAL REPORT SUMMARY

BACKGROUND

On December 3, 1984, the City of Moreno Valley was incorporated as a general law city led by a City Council-Manager form of government. Prior to incorporation, the City of Moreno Valley consisted of 42 square miles and a population of 49,702 people. As of December 2016, the City includes 51.56 square miles with a population of 207,675 people.

The City adopted its first General Plan in 1988. The General Plan was comprehensively amended and updated on July 11, 2006. The current General Plan recognizes the community's diverse population, distinct residential neighborhoods, neighborhood and regional commercial activities, industrial potential and recreational amenities.

This document constitutes an annual report to the Planning Commission and City Council, and subsequent submittal to the Office of Planning and Research and State Department of Housing and Community Development, as required by state law on the updates of programs and policies in the General Plan. The document includes major projects, General Plan amendments, a Housing Program Status Report and a thorough review of existing goals, policies, objectives and programs of the General Plan. As the City did not provide an Annual Report for 2015, this Annual Report includes projects and information from January 2015 through and up to December 2016.

The following is a summary of the current adoption status of the different required elements of the General Plan:

- Circulation Element (2006)
- Community Development Element (2006)
- Conservation Element (2006)
- Housing Element (2014)
- Parks, Recreation and Open Space Element (2006)
- Safety and Noise Element (2006)

ANALYSIS

Government Code Section 65400

California Governments Code Section 65400 requires that the annual report be made to the legislative body on the status of the General Plan and progress towards its implementation, including activity towards its share of regional housing needs. State law requires the following:

A) A General Plan Annual Report shall be provided by April of each year to the City Council, the Office of Planning and Research (OPR) and the Department of Housing and Community Development (HCD) ; and

B) A status of the General Plan and progress in its implementation shall be provided in the General Plan Annual Report; and

C) Progress in meeting its share of the regional housing needs pursuant to Section 65584 of the Government Code shall be provided in the General Plan Annual Report.

Annual Review and Housing Program Summary Report

Pursuant to State Law, the Annual Report and Review of the City of Moreno Valley General Plan reports the progress in implementing the General Plan to the City Council. The City of Moreno Valley's Annual Report includes the following items:

1. A list of Major Accomplishments from January 2015 to December 2016

2. A list of General Plan Amendments from January 2015 to December 2016

3. Appendix A – Moreno Valley General Plan Complete List of Goals and Policies, which provides a status report of the 2006 General Plan goals, policies, objectives and programs towards implementing the City's blueprint for land use development.

4. Housing Program Status Report includes the City's progress made in meeting its share of regional housing needs pursuant to State Government Code Section 65584.

Moreno Valley General Plan – Goals, Objectives, Policies and Programs

The current 2006 General Plan Appendix A describes goals and policies in a comprehensive document providing the goal/policy number, a description of each goal and policy, a discussion on implementation status and the party responsible for carrying out each item.

- A goal is defined as a broad vision of what the community wants to achieve or provide to residents, landowners and business owners. It is a statement of a desired condition based on community values. Goals are general in nature and usually timeless.

- A policy is a specific statement that guides decision-making. It indicates a commitment of the City to a particular course of action. A policy is based on and assists to implement the goal.

The General Plan Annual Report also includes objectives leading up to the goal/policy as well as an update on existing programs.

General Plan Update

The State Office of Planning and Research (OPR) recommends that cities update their General Plan every ten (10) years. The City or Moreno Valley last completed an update to its General Plan on July 11, 2006, and is preparing for a comprehensive General Plan update in the next two to three years. The General Plan update is an extensive process that would include various public meetings involving City staff, commissions and extensive community outreach. Any update would most probably be subject to several public hearings before the Planning Commission and City Council. The cost and work involved with the update would be extensive.

Momentum MoVal, the City of Moreno Valley's recently adopted strategic plan represents the results of active engagement by Moreno Valley residents and the City Council in charting the community's course into the future. Adopted on August 16, 2016, Momentum Moval, in part, provides a course of action for the City's next comprehensive General Plan update. This includes Objective 1.9 to "Ensure the City's General Plan articulates the vision of how Moreno Valley wants to evolve over time, and provides an orderly and predictable process through which this vision is developed and implemented, including new attention to economic development, sustainability, public health, and innovation".

Four (4) initiatives have been adopted with this effort to assist in preparing for and completing the comprehensive General Plan Update. This includes two (2) initiatives related to the completion of the General Plan Annual Report. Initiative 1.9.1 requires the preparation of a General Plan Annual Report to the City Council before April 1, 2017 that explains how current land use decisions relate to adopted goals, policies and other implementation measures, and as appropriate, identifies necessary course adjustments consistent with the Strategic Plan. Initiative 1.9.2 includes the formation of a working group of key City staff to research and evaluate the current General Plan adopted in 2006 as a prerequisite to initiating a comprehensive update of the General Plan. Both items are to be completed in a one year time frame. This effort is being led by Community Development Planning staff who have been fully engaged with members of various internal departments/divisions in providing General Plan feedback occurring over the past four months October 2016 through January 2017, which activity is planned to continue through completion of the desired update.

Additional initiatives included in the City's Strategic Plan articulate a plan of action to completion of the comprehensive General Plan update. This includes Initiative 1.9.3, which "includes consideration of incremental set aside of funding in the annual budget development in anticipation of future General Plan update and Initiative 1.9.4, which calls for "conducting the comprehensive update of the City's General Plan and supporting environmental document, including all mandatory elements (except the Housing Element, which was updated in 2014) an Economic Development Element, and other desired optional Elements as authorized by the City Council." An additional new Elements under consideration with the next comprehensive update is a Healthy Cities Element. Incorporation of environmental justice considerations and information, where warranted, per in new planning legislation will be a part of the effort.

CONCLUSION

The City of Moreno Valley General Plan continues to serve as an effective guide for orderly growth and development, preservation and conservation of open space and natural resources. The document also provides for the efficient expenditure of public funds.

As illustrated in the attachments provided with this document, completed public projects are in conformance with the City's General Plan goals, objectives, policies and programs for each representative element. The City of Moreno Valley's legislative bodies have used the 2006 General Plan as a primary source of long-range planning and policy direction. Future work activity that is consistent with these efforts will continue to guide future growth and preserve the quality of life within the community.

MAJOR ACCOMPLISHMENTS

The City of Moreno Valley is committed to implementing the adopted General Plan, Development Code and Design Guidelines. The Development Code and Design Guidelines, combined with the adopted Landscape Guidelines, are major tools to implement the General Plan.

The purpose of this Annual Report is to highlight significant accomplishments and summarize ongoing General Plan projects that the City of Moreno Valley has been working on since January of 2015. A major function of this report is to acknowledge and evaluate the ongoing implementation of the General Plan. Major accomplishments include key projects that demonstrate how the City of Moreno Valley is carrying out the policy and vision of the General Plan. This report is prepared in accordance with Section 65040.5 of the California Government Code. As the City did not submit a report in 2015, major accomplishments between January 2015 and December 2016 are provided.

Major Accomplishments in 2015 through 2016

Major development projects reviewed and approved in January 2015 through December 2016 are as follows:

2015

- PA14-0033 (Conditional Use Permit), PA14-0032 (Tentative Tract Map No. 34544): A Tentative Tract Map 34544 and a Conditional Use Permit for a Planned Unit Development for subdivision of 9.4 acres parcel to 72 single family detached unit condominium complex including common recreation areas. Located at the north side of Cottonwood Avenue and east of Perris Boulevard. This project was withdrawn prior to action by the Planning Commission.

- PA13-0063 (Plot Plan), P13-130 (Environmental Impact Report (EIR)): A Plot Plan for the construction of a 1,109,378 square foot warehouse building on 50.68 net acres with the demolition of an existing warehouse facility. The project site is in the Moreno Valley Industrial Area Specific Plan 208. Approval of this project required the review and certification of an EIR. Located at 17300 Perris Blvd, northeast corner of Perris Boulevard and Modular Way.

- PA15-0010 (Tentative Tract Map 36882): Tentative Tract Map 36882 subdivides 9.4 gross acres into 40 single-family residential lots. Located at the south side of Brodiaea Avenue approximately 600 feet west of Moreno Beach Drive.

- PA15-0002 (Plot Plan), P15-003 (Revised Tentative Tract Map 35414): Plot Plan with hearing for a 266 unit multiple-family apartment project with a revised Tentative Tract Map. Located at 21595 Box Springs Road.

- PA14-0038 (Municipal Code Amendment): This amendment included the Density Bonus Ordinance related to Energy Efficiency. The City of Moreno Valley amended Chapter 9.03 of the City's Municipal Code to establish a density bonus for multi-family residential projects that incorporate energy efficiency and other green building standards and exceed the California building standards code

2016

- P15-066 (Tentative Tract Map 36933), P15-067 (Amended Conditional Use Permit): A Tentative Tract Map and Conditional Use Permit was approved for a Residential Planned Unit Development consisting of 274 residential units with various common open space amenities such as pocket parks, walking trails and a recreation facility. Located at the southeast corner of Fir Avenue and Eucalyptus Avenue.

- PA14-0011: (Municipal Code Amendment) – The proposed amendment (PA14-0011) includes various clarifications and text clean-ups amending several zoning regulations contained in Title 9 of the City of Moreno Valley Municipal Code. The proposed amendments include technical corrections to further internal Municipal Code consistency, including additions of definitions, changes to the Permitted Uses Table, and changes to massage facilities to be in agreement with changes that have been made to Title 11 (Peace, Morals, and Safety) of the Municipal Code. Minor changes were also made to truck idling times in Title 12 (Vehicles and Traffic), and hours of operation for construction and grading in Title 8 (Building and Construction).

- PA15-0047 (Tentative Parcel Map 37058), PA15-0048 (Master Plot Plan), PA15-0049 (Conditional Use Permit), PA15-0050 (Plot Plan), PA15-0051 (Conditional Use Permit), PA16-0012 (Plot Plan): The Quarter Project included the subdivision of a 8.54 acres into six parcels for the development of two hotels, a service station with convenience store, a multiple tenant retail building and future development of a fast food restaurant with drive-through and retail building. 12490 Day Street.

- PA16-0025 (Smoke Shop Regulations): A Municipal Code Amendment in Title 9 and Title 11 pertaining to the regulation of Smoke Shop uses citywide.

- PA14-0027 (Plot Plan): A Plot Plan for a new 39 unit apartment complex on 2.6 acre site. The project includes seven two-story multi-unit buildings. The multi-unit buildings include one 3-unit, one 5-unit, two 6-unit, one 8-unit, one 10-unit, and a leasing office building with one manager-unit. The unit mix includes 18 two-bedroom apartments and 21 three-bedroom apartments. A total of 109 parking spaces are proposed including 31 surface parking spaces, 8 garage spaces, and 70 covered carports. The project is located at 23778 and 23798 Hemlock Avenue, east of Swages Lane.

- PA15-0046 (Plot Plan), P16-083 (Variance): Plot Plan for development of a 438 unit apartment project on approximately 18 acres of a 27.41 acre site. Project includes a mix of 1 bedroom, 2 bedroom and 3 bedroom units in fifteen 2-story buildings and two 4-story buildings. Located near the southeast corner of Alessandro Boulevard and Brodiaea Avenue.

- PA16-0039 (Plot Plan): This Plot Plan application approved 272 multi-family apartments (1 and 2 story buildings). There will be four building types with a range of one to three bedrooms, a community building, and detached garages and carports on 19.82 acres of land. Located southeasterly of Alessandro Boulevard and Perris Boulevard.

GENERAL PLAN IMPLEMENTATION

The General Plan and the Development Code gives the City of Moreno Valley the tools necessary to guide the development of the City into the next century. Implementation of the General Plan includes key projects that demonstrate how the City of Moreno Valley is carrying out the policy and vision of the Plan.

The Planning Commission held public hearings on amendments to the General Plan and the Development Code. The Planning Commission recommended approval of the amendments, and they were forwarded to the City Council for final approval. As the City did not provide an Annual Report in 2015, projects representing General Plan Implementation are provided from January 2015 to December 2016.

General Plan Implementation in 2015 through 2016

The following General Plan related projects reviewed and approved in January 2015 through December 2016 are as follows:

2015

- PA14-0042 (Plot Plan), PA14-0043 (General Plan Amendment), PA14-0044 (Zone Change): A General Plan Amendment from Commercial (C) to Residential 20 (R20) and Zone Change from Community Commercial (CC) to Residential 20 (R20) for development of a Plot Plan for a 112 unit apartment project on 6.63 acres. The project proposes 14 two-story buildings with a mix of 1 and 2 bedroom units to include vehicle parking within carports and garages.

- PA12-0010 (General Plan Amendment), PA12-0011 (Development Agreement), PA12-0012 (Change of Zone), PA12-0013 (Specific Plan), PA21-0014 (Annexation), PA12-0015 (Tentative Parcel Map No. 36457), P12-016 (Environmental Impact Report): The proposed World Logistics Center (WLC) project involves approximately 3,818 acres of property. The project includes a General Plan Amendment to change the land use for the project area to Business Park/Light Industrial (BP) and Open Space (OS), which includes associated modifications to the Community Development Element, Parks, Recreation and Open Space Element, Circulation Element, Safety Element, and Conservation Element. The project also includes a Specific Plan for 2,610 acres of the project area to establish vision and development regulations for up to 40.6 million square feet of logistic development, and light logistics land uses, predominantly in the form of large high-cube industrial warehouse and distribution centers, and approximately 20,000 square feet of logistics support (e.g. fueling, associated retail). The proposed Change of Zone resulted in changes to the zoning atlas to reflect the designated areas for Logistics Development (LD), Light Logistics (LL) and Open Space (OS) for the entire project area both within and outside the proposed Specific Plan boundary. Eighty-five (85) acres of land at the northwest corner of Alessandro Boulevard and Gilman Springs Road within the Specific Plan boundary would be pre-zoned for LD as intended for a subsequent Annexation to the City. The project also includes Tentative Parcel Map No. 36457, which divides property for finance and conveyance purposes only and a Development Agreement between the City and Highland Fairview for only real estate within the Specific Plan boundary in which Highland Fairview has a legal or equitable interest (approximately 2,263 acres). Approval of the project included the repeal of the current Moreno Highlands Specific Plan No. 212-1.

- PA14-0038 (General Plan Amendment): Energy Efficiency General Plan Amendment - The General Plan Amendment consists of an update to the Conservation Element of the City's General Plan to include a detailed discussion of energy efficiency. Section 7.6.3 "Energy Efficiency" has been developed within the existing framework of the City's General Plan. The General Plan Amendment text provides an overview of the larger context of energy efficiency policy, and the City's approved Energy Efficiency, Climate Action Strategy and Greenhouse Gas Analysis. The final General Plan Amendment provides useful information that furthers energy efficiency and the reduction of greenhouse gas, and can be integrated into the planning efforts for use by the general public, private developers, city staff or other governmental entities

2016

There were no General Plan Amendment approvals to report from January 2016 to December 2016.

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

KEY	
Planning	Police
Land Development	Waste Coordinator
Special Districts	Transportation
Economic Development	Building
Parks / Community Services	Multiple Departments
Emergency Operations / Fire	

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
The City Structure Land Use Element Goals and Policies			
9.2 Community Development Element Goals, Objectives, Policies and Programs			
9.2.1 Community Development Element Goals			
Goal 2.1	A pattern of land uses, which organizes future growth, minimizes conflicts between land uses, and which promotes the rational utilization of presently underdeveloped and undeveloped parcels.	Land use designations provided in the General Plan minimizes conflicts between land uses and allows for buffers between industrial, commercial and more sensitive residential land uses. In higher intensity Specific Plans such as the Industrial Area Plan (SP 208), buffers have been established between industrial land uses and existing more sensitive residential development. This is an ongoing goal of the City.	Planning

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Goal 2.2	An organized, well-designed, high quality, and functional balance of urban and rural land uses that will meet the needs of a diverse population, and promote the optimum degree of health, safety, well-being, and beauty for all areas of the community, while maintaining a sound economic base.	The City of Moreno Valley strives to approve well-designed, high quality projects. There is a functional balance between urban and rural land uses that will meet the needs of the residents. For example, more rural land use designations are provided in the northern and eastern portions of the city, while urban land uses are provided in the western and southern portions. This practice allows for good sensible land use planning, while maintaining a sound economic base. This is an ongoing goal of the City.	Planning

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Goal 2.3	Achieves an overall design statement that will establish a visually unique image throughout the City.	The City of Moreno Valley's General Plan provides for an overall design statement which establishes unique visual images throughout the City. The Municipal Code, which is consistent with the General Plan, establishes overall design guidelines and standards for residential, commercial and industrial development proposals, and reviews items such as, color, unity/diversity massing, and building proportion. This is an ongoing City goal.	Planning
Goal 2.4	A supply of housing in sufficient numbers suitable to meet the diverse needs of future residents and to support healthy economic development without creating an oversupply of any particular type of housing.	The downturn of the economy in 2007 limited new housing development in the City until recently. In the last year, new residential housing projects have been submitted and housing product has been very diverse. This includes such project types as smaller lot Planned Unit Developments for the senior or first time homeowner and multiple family housing such as apartments. This is an ongoing City goal.	Planning

APPENDIX A
Moreno Valley General Plan
Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Goal 2.5	Maintenance of systems for water supply and distribution; wastewater collection, treatment, and disposal; solid waste collection and disposal; and energy distribution which are capable of meeting the present and future needs of all residential, commercial, and industrial customers within the City of Moreno Valley.	A specific goal for the City is to maintain water supply, wastewater collection/treatment/disposal and solid waste collection capable of meeting the present and future needs of City residents. MVU prepares an annual Distribution System Plan, which forecasts the future electrical needs of MVU's service area. Capital improvement projects are then developed and prioritized to ensure that the system will meet the present and future needs of MVU customers. This is an ongoing goal.	Water Purveyors/Waste Coordinator /MVU

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
9.2.2 Community Development Element Objectives and Policies			
Objective 2.1	Balance the provision of urban and rural lands within Moreno Valley by providing adequate land for present and future urban and economic development needs, while retaining the significant natural features and the rural character and lifestyle of the northeastern portion of the community.	The City of Moreno Valley continues to provide a balance of urban and rural land. The majority of the City is urbanized, with a continued emphasis of retaining natural features as well as the urban lifestyle with larger lots and larger animal keeping opportunities north of State Route 60 in the northeaster portion of the community. This is an ongoing City objective.	Planning

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Objective 2.2	Provide a wide range of residential opportunities and dwelling types to meet the demands of present and future residents of all socioeconomic groups.	The City has a very diverse residential mix, including a wide range of residential opportunities to meet the demand of all socioeconomic groups. As included in Moreno Valley's approved 2014 Housing Element, the City strives for affordable housing opportunities. The City allows opportunities for Planned Unit Developments (PUD's) that provide smaller lot housing for the senior and first time home buyer. Although the market has been slow for condominium development, apartment projects have recently picked up momentum . There are also continued opportunities for market rate single family home development, from tract maps that have been carried over from before the economic downturn. This is an ongoing City objective.	Planning

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Policies:			
2.2.1	In determining allowable density for residential parcels an "adjusted net acreage" shall be used. Adjusted net acres shall mean the land area that would remain after dedication of ultimate rights-of-ways for arterial streets, freeways and park dedications.	All allowable density of residential projects in the City are determined by calculating an adjusted net average of buildable area after infrastructure dedication for streets, utilities, parks etc. This is a continuing City policy.	Planning
2.2.2	The primary purpose of areas designated **Hillside Residential** is to balance the preservation of hillside areas with the development of view-oriented residential uses. a. Within the Hillside Residential category, appropriate	Section 9.03.040 B "Residential Site Development Standards" of the Municipal Code establishes standards for hillside residential development consistent with the goals, objectives and policies of the General Plan. Hillside residential development	Planning

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
	residential uses include large lot residential uses. Lots smaller than one acre may only be permitted as clustered units to minimize grading, and other impacts on the environment, inclusive of the Multi-Species Habitat Conservation Plan. b. The maximum residential density within Hillside Residential areas shall be determined by the steepness of slopes within the project. The maximum allowable density shall not exceed one dwelling unit per acre on sloping hillside property and shall decrease with increasing slope gradient. c. Future development within Hillside Residential areas shall occur in such a manner as to maximize preservation of natural hillside contours, vegetation and other characteristics. Hillside area developments should minimize grading by following the natural contours as much as possible. d. Development within Hillside Residential areas shall be evaluated to determine the precise boundaries of	includes large lot residential uses, with the maximum allowable density not to exceed one dwelling unit per acre on sloping hillside property, including a decreasing density with an increasing slope gradient. Allowable development would preserve the preservation of natural hillsides. A slope analysis is the likely vehicle for development in hillside residential areas to determine the percentage of slope. **Goals, objectives and policies of hillside residential development will be further evaluated with the next comprehensive General Plan update.**	

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
	the area. If the Community Development Director determines that adequate slope information is not available, applicants requesting to develop within these areas shall complete a slope analysis for the proposed development site. Portions of the development that exceed an average slope of 10% shall adhere to the policies within the Hillside Residential category. Portions of the development where the slopes are less than 10% on average shall adhere		

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
2.2.3	The primary purpose of areas designated **Rural Residential** is to provide for and protect rural lifestyles, as well as to protect natural resources and hillsides in the rural portions of the City. a. The maximum residential density within Rural Residential and areas shall be determined by the steepness of slopes within the individual project area. The maximum allowable density shall be 0.4 dwelling units per acre (an average lot size of 2.5 acres) on flat terrain and shall decrease with increasing slope gradient. b. Within the Rural Residential category, appropriate residential uses include large lot residential uses. Lots smaller than 2.5 acres may only be permitted as clustered units to minimize grading and other impacts on the environment, inclusive of the Multi-Species Habitat Conservation Plan.	Section 9.03.040 A "Residential Site Development Standards" of the Municipal Code establishes standards for rural residential development consistent with the goals, objectives and policies of the General Plan. This includes large lot residential development allowing a maximum density of 0.4 dwelling units per acre on flat terrain, with a decrease in density as the slope gradient increases. This is an ongoing policy.	Planning
2.2.4	The primary purpose of areas designated **Residential 1** is to provide for and protect rural lifestyles. The maximum allowable density for projects within the Residential 1 areas shall be 1.0 dwelling unit per acre.	Section 9.03.040 "Residential Site Development Standards" of the Municipal Code establishes requirements for Residential 1 development consistent with the goals, objectives and policies of the General Plan. Development shall not exceed 1 dwelling unit per acre. This is an ongoing policy.	Planning

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
2.2.5	The primary purpose of areas designated **Residential 2** is to provide for suburban lifestyles on residential lots larger than commonly available in suburban subdivisions and to provide a rural atmosphere. The maximum allowable density shall be 2.0 dwelling units per acre.	Section 9.03.040 "Residential Site Development Standards" of the Municipal Code establishes standards for Residential 2 development consistent with the goals, objectives and policies of the General Plan. Development shall not exceed 2 dwelling units per acre. This is an ongoing policy.	Planning
2.2.6	The primary purpose of areas designated **Residential 3** is to provide a transition between rural and urban density development areas, and to provide for a suburban lifestyle on residential lots larger than those commonly found in suburban subdivisions. The maximum allowable density shall be 3.0 dwelling units per acre.	Section 9.03.040 "Residential Site Development Standards" of the Municipal Code establishes standards for Residential 3 development consistent with the goals, objectives and policies of the General Plan. Development shall not exceed 3 dwelling units per acre. This is an ongoing policy.	Planning
2.2.7	The primary purpose of areas designated Residential 5 is to provide for single-family detached housing on standard sized suburban lots. The maximum allowable density shall be 5.0 dwelling units per acre.	Section 9.03.040 "Residential Site Development Standards" of the Municipal Code establishes standards for Residential 5 development consistent with the goals, objectives and policies of the General Plan. Development shall not exceed 5 dwelling unit per acre. This is an ongoing policy.	Planning

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

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2.2.8	The primary purpose of areas designated **Residential 10** is to provide for a variety of residential products and to encourage innovation in housing types. Developments within Residential 10 areas are typically expected to provide amenities not generally found in suburban subdivisions, such as common open space and recreational areas. The maximum allowable density shall be 10.0 dwelling units per acre.	Section 9.03.040 "Residential Site Development Standards" of the Municipal Code establishes standards for Residential 10 development consistent with the goals, objectives and policies of the General Plan. Development shall not exceed 10 dwelling units per acre. This is an ongoing policy.	Planning
2.2.9	The primary purpose of areas designated **Residential 15** is to provide a range of multi-family housing types for those not desiring dwellings on individual lots that include amenities such as common open space and recreational facilities. The maximum allowable density shall be 15.0 dwelling units per acre.	Section 9.03.040 "Residential Site Development Standards" of the Municipal Code establishes standards for multiple-family Residential 15 development consistent with the goals, objectives and policies of the General Plan. Development shall not exceed 15 dwelling unit per acre. This is an ongoing policy.	Planning
2.2.10	The primary purpose of areas designated **Residential 2**0 is to provide a range of high density multi-family housing types. Developments within Residential 20 areas shall also provide amenities, such as common open spaces and recreational facilities. The maximum density shall be 20 dwelling units per acre.	Section 9.03.040 "Residential Site Development Standards" of the Municipal Code establishes standards for high density residential 20 development consistent with the goals, objectives and policies of the General Plan. Development shall not exceed 20 dwelling units per acre. This is an ongoing policy.	Planning

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2.2.11	The primary purpose of areas designated **Residential 3**0 is to provide a range of high density multi-family housing types in an urban setting. Developments within Residential 30 areas shall also provide amenities, such as common open spaces and recreational facilities. The maximum density shall be 30 dwelling units per acre.	Section 9.03.040 "Residential Site Development Standards" of the Municipal Code establishes standards for high density Residential 30 development consistent with the goals, objectives and policies of the General Plan. Development shall not exceed 30 dwelling unit per acre. This is an ongoing policy.	Planning
2.2.12	Densities in excess of the maximum allowable density for residential projects may be permitted pursuant to California density bonus law.	The City encourages the use of density bonus for affordable housing and senior housing opportunities. Development Code Section 9.03.050 "Density Bonus Program for Affordable Housing" provides provisions for density bonus and greater on-site project densities. This is an ongoing policy.	Planning
2.2.13	Planned Unit Developments (PUD) shall be encouraged for residential construction in order to provide housing that is varied by type, design, form of ownership, and size. PUD's shall also provide opportunities to cluster units to protect significant environmental features and/or provide unique recreational facilities.	PUD's are encouraged to allow for more diverse designs, recreational opportunities and walkable residential communities. Section 9.03.060 "Planned Unit Developments of the Development Code provides for PUD's and clustering opportunities to avoid existing environmental constraints. This is an ongoing policy.	Planning

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2.2.14	Discourage costly "leap-frog" development patterns by encouraging in-fill development wherever feasible, thereby reducing overall housing costs. Development within an area designated as SP 212-1 (Moreno Highlands) is not considered to be leapfrog development.	Developing on infill properties is always encouraged by the City. This is an ongoing policy.	Planning
2.2.15	Encourage a diversity of housing types, including conventional, factory built, mobile home, and multiple family dwelling units.	The City encourages a diverse housing mix for all residentially zoned property. This is an ongoing policy.	Planning
2.2.16	Encourage the use of innovative and cost effective building materials, site design practices and energy and water conservation measures to conserve resources and reduce the cost of residential development.	The use of cost effective building materials, site design practices and energy/water conservation measures is encouraged through the Development and Building Codes. For example. The Landscape ordinance requires drought tolerant plant materials and waterwise irrigation practices . The Green Building Code requires conservations measures such as building material design and other energy requirements. This is an ongoing policy.	Planning
2.2.17	Affordable housing developments should be compatible in visual design with surrounding development.	All newly constructed affordable housing developments are compatible with both exterior design and surrounding development. This is an ongoing policy.	Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
2.2.18	Discourage nonresidential uses on local residential streets that generate traffic, noise or other characteristics that would adversely affect nearby residents.	Current zoning practices discourages and in many cases does not allow for impactful non-residential development to occur. The Municipal Code (Section 9.02.020 "Permitted Uses"), restricts non residential uses in residential zones that are contained to local residential streets. This is an ongoing policy.	Planning
Objective 2.3	Promote a sense of community and pride within residential areas through increased neighborhood interaction and enhanced project design.	A sense of community and pride is instilled in newly approved projects through good design and walkable communities. Increased neighborhood interaction is also encourage through such things as neighborhood watch and Pop teams established for multiple family residential development. This is an ongoing policy.	Planning

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Policies:			
2.3.1	Within individual residential projects, a variety of floor plans and elevations should be offered.	Pursuant to Section 9.16.130 (Table 9.16.130B) of the Code, all residential projects shall provide a variety of floor plans and elevations. This is an ongoing policy.	Planning
2.3.2	Encourage building placement variations, roofline variations, architectural projections, and other embellishments to enhance the visual interest along residential streets.	Chapter 16 of the Municipal Code requires roofline variations, architectural projections and other embellishments such as four sided architecture. This is an ongoing policy.	Planning
2.3.3	Discourage the development of single-family residences with a bulk (building mass) that is out of scale with the size of the parcels on which they are located.	The City understands that building massing is a very important issue to consider in residential elevations and when developing single-family residential communities. The design guidelines contained in Section 9.16.010 of the Municipal Code discourages building massing that is out of context with the existing neighborhood. This is an ongoing policy.	Planning
2.3.4	Design large-scale small lot single family and multiple family residential projects to group dwellings around individual open space and/or recreational features.	Section 9.03.060 "Planned Unit Developments" of the Municipal Code encourages PUD's for greater innovation in housing development and conservation of natural resources and open space. Recreational facilities such as picnic areas, pocket parks, walking paths and gyms are commonplace among PUD developments. This is an ongoing policy.	Planning

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
2.3.5	Ensure that all multiple family housing is well-designed, attractive and livable by: a. Ensuring all structures are architecturally compatible and include decorative architectural features and articulation in walls and roofs; b. Providing adequate parking, walkways, lighting, landscaping, amenities and open space areas; c. Providing private open space areas such as patios and balconies.	Pursuant to Chapter 16, Section 9.16.130 "Design Guidelines" of the Municipal Code, multiple-family residential projects shall be architecturally compatible with the existing neighborhood, provide parking, walkways and common open space areas such as picnic areas, pools, tot lots etc. This is an ongoing policy.	Planning
Objective 2.4	Provide commercial areas within the City that are conveniently located, efficient, attractive, and have safe and easy pedestrian and vehicular circulation in order to serve the retail and service commercial needs of Moreno Valley residents and businesses.	The City strives for commercial areas that provide functional vehicular circulation and safe pedestrian areas that are walkable internally between uses and externally to surrounding neighborhoods. This is an ongoing objective.	Planning
Policies:			

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
2.4.1	The primary purpose of areas designated **Commercial** is to provide property for business purposes, including, but not limited to, retail stores, restaurants, banks, hotels, professional offices, personal services and repair services. The zoning regulations shall identify the particular uses permitted on each parcel of land, which could include compatible noncommercial uses. Commercial development intensity should not exceed a Floor Area Ratio of 1.00 and the average floor area ratio should be significantly less.	Zoning regulations for commercial uses are consistent with established General Plan land use. For example, the City's zoning map establishes Commercial zoning designations and the Municipal Code Permitted Uses Table (Section 9.02.020-1) provides for permitted uses allowed for each commercial zoning category. This is an ongoing policy.	Planning
2.4.2	The commercial area located at the intersection of **Alessandro Boulevard and Redlands Boulevard** shall provide for commercial land uses that are compatible with the historical, small town nature of the original Moreno town site. The zoning regulations shall identify the particular uses permitted on each parcel of land, which could include compatible noncommercial uses.	The General Plan Land Use Map shows the site zoned as VC or Village Commercial, which is a unique zoning classification allowing for unique uses. Any development at this intersection has been and would need to be compatible with the historical, small town nature of the original site.	Planning

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2.4.3	The commercial area located on the **north side of State Route 60 at the intersection of Moreno Beach Drive** shall provide for the establishment of commercial land uses that serve the daily needs of the surrounding residential neighborhood and the traveling public. It is not intended to serve the needs of the region for goods, services, entertainment or recreation. The zoning regulations shall identify the particular uses and type of development permitted on each parcel, which could include office uses and compatible noncommercial uses.	Properties located north of State Route 60 at the intersection of Moreno Beach Drive are zoned CC or Community Commercial. The zoning established in the City's Land Use Map and Municipal Code identifies permitted uses allows for commercial/retail uses that both serve the needs of the surrounding residential neighborhood and the traveling public. The preferred alternative in the Highway 60 Corridor study suggested a town center concept which includes potential entertainment retail uses such as hotels and sit down restaurant. **This item shall be reviewed further during the next General Plan update.**	Planning
2.4.4	An overlay district limiting land uses to those that are supportive and compatible with medical uses shall be established around the **Riverside County Regional Medical Center and the Moreno Valley Community Hospital.** The zoning regulations shall identify the particular uses and type of development permitted on each parcel.	Municipal Code standards under Section 9.07-040 "Medical Use Overlay District (MUO)", provides the foundation to create and maintain diverse and supportive medical uses in the vicinity of the Riverside County Regional Medical Center (Riverside University Health Systems) and the Moreno Valley Community Hospital. This is an ongoing policy.	Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
2.4.5	The primary purpose of locations designated **Mixed-Use** on the Moreno Valley General Plan Land Use map is to provide for the establishment of commercial and office uses and/or residential developments of up to 20 dwelling units per acre. The zoning regulations shall identify the particular uses and type of development permitted on each parcel. Overall development intensity should not exceed a floor area ratio of 1.00.	The Mixed Use land use zone established in the General Plan provides for both commercial/office and higher density residential development opportunities. The permitted uses table (Municipal Code(Section 9.02.020-1) identifies types of uses and Residential Site Development Standards (Municipal Code Section 9.03.040-6) establishes floor area ratios. **The revised Mixed Use Overlay has established standards for denser residential development and allows density to rise from a maximum of 20 dwelling units per acre to a maximum of 40 dwelling units per acre. This item shall be further reviewed and adjusted accordingly with the next General Plan update.**	Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
2.4.6	The primary purpose of areas designated **Residential/Office** on the Moreno Valley General Plan Land Use map is to provide areas for the establishment of office-based working environments or residential developments of up to 15 dwelling units per acre. The zoning regulations shall identify the particular uses and type of residential development permitted on each parcel of land. Overall development intensity should not exceed a Floor Area Ratio of 1.00.	As established in Chapter 9,02, Section 9.02.020 of the Municipal Code, areas zoned Residential/Office provide office based working environments and allow for higher density multiple-family residential development. Zoning regulations identify particular uses, types of residential development and floor area ratio requirements. This is an ongoing policy.	Planning
2.4.7	The primary purpose of areas designated **Office** is to provide for office uses, including, administrative, professional, legal, medical and financial offices. The zoning regulations shall identify the particular uses permitted on each parcel of land, which could include limited non-office uses that support and are compatible with office uses. Development intensity should not exceed a Floor Area Ratio of 2.00 and the average intensity should be significantly less.	The Municipal Code (Sections 9.02.020 and 9.04.010) establishes permitted uses and defines areas designated for office type uses. Current zoning regulations identifies development intensity. This is an ongoing policy.	Planning

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2.4.8	Orient commercial development toward pedestrian use. Buildings should be designed and sited so as to present a human-scale environment, including convenient and comfortable pedestrian access, seating areas, courtyards, landscaping and convenient pedestrian access to the public sidewalk.	Section 9.04.010 encourages concentration of commercial use for the convenience of the public and to secure a mutually beneficial relationship between commercial uses and the and public. Section 9.16.150 "Commercial Design Guidelines requires pedestrian pathways in parking areas and further incorporates pedestrian ways and plazas to provide visual interest and functionality. This is an ongoing policy.	Planning
2.4.9	Require reciprocal parking and access agreements between individual parcels where practical.	Section 9.16.150 "Commercial Design Guidelines requires interspace access be provided between commercial centers reducing the number of drive approaches from the street and to encourage commercial/retail crossover. This is an ongoing policy.	Planning
2.4.10	Design internal roadways so that direct access is available to all structures visible from a particular parking area entrance in order to eliminate unnecessary vehicle travel, and to improve emergency response.	Internal roadways provide direct access to all structures visible from a parking area entrance. This would also be the norm for Specific Plans under Chapter 9.13. This is an ongoing policy.	Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
2.4.11	The commercial area located in the vicinity of the intersection of Gilman Springs Road and Jack Rabbit Trail shall provide those commercial support activities necessary and/or incidental to adjacent recreational uses and emphasize tourist-oriented activities and retail services. Recreation-oriented residential land use types may be appropriate to the extent that they are incidental to and complement the recreational character of the area. At such time as the area is annexed to the City, the zoning regulations shall identify the particular uses permitted on each parcel of land.	The General Plan Land Use Map provides a commercial land use designation for this area located in the City's Sphere of Influence. Based on the policy, land uses should be limited away from general commercial use, with an emphasis on more recreation or tourist oriented land uses. **This item shall be further reviewed and evaluated in the next comprehensive General Plan update.**	Planning
Objective 2.5	Promote a mix of industrial uses which provide a sound and diversified economic base and ample employment opportunities for the citizens of Moreno Valley with the establishment of industrial activities that have good access to the regional transportation system, accommodate the personal needs of workers and business visitors; and which meets the service needs of local businesses.	The Municipal Code provides for a mixture of industrial uses that provide a diverse economic base and opportunities for employment with access to regional transportation systems. For example, the recently approved World Logistics Center, situated in the southern and eastern portion of the City, takes advantage of easy access to the State Route 60 freeway.	Planning
Policies:			

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
2.5.1	The primary purpose of areas designated **Business Park/Industrial** is to provide for manufacturing, research and development, warehousing and distribution, as well as office and support commercial activities. The zoning regulations shall identify the particular uses permitted on each parcel of land. Development intensity should not exceed a Floor Area Ratio of 1.00 and the average floor area ratio should be significantly less.	The Business park/Industrial land use category provides for a wide variety of industrial uses from warehousing, manufacturing and office/support uses. The Municipal Code Permitted Uses Table (Section 9.02.020-1) establishes permitted uses allowed for this land use category. This is an ongoing policy.	Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
2.5.2	Locate manufacturing and industrial uses to avoid adverse impacts on surrounding land uses.	Industrial design guidelines provided in the Municipal Code Chapter 9.16 requires truck traffic to be channeled directly to truck routes and prohibits access to neighborhood streets. Manufacturing/industrial uses shall be screened and buffered from surrounding land uses. This is an ongoing policy.	Planning
2.5.3	Screen manufacturing and industrial uses where necessary to reduce glare, noise, dust, vibrations and unsightly views.	Municipal Code Sections 9.16.160 "Business Park/industrial" and 9.05.050 'Good Neighbor Guidelines for Warehouse Distribution Facilities" require screening for manufacturing and industrial uses in view of rights of way. This is an ongoing policy.	Planning

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2.5.4	Design industrial developments to discourage access through residential areas.	Industrial development is designed to discourage access through residential zones. Industrial design guidelines provided in the Municipal Code Chapter 9.16 requires truck traffic to be channeled directly to truck routes and prohibits access to neighborhood streets. In addition, Section 9.05.050 "Good Neighbor Guidelines for Warehouse Distribution Facilities" eliminates diesel trucks from unnecessarily traversing through residential neighborhoods based on establish truck routes, parking restrictions and proper signage An example includes the World Logistics Center project, a 41 million square foot industrial logistics hub in the southeastern portion of the City which has prevented access to Redlands Boulevard and the adjacent residential neighborhoods to the west by redesigning streets and preventing through access. This is an ongoing policy.	Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Objective 2.6	Maintain an adequate inventory of lands for the conduct of public, quasi-public, and institutional activities, including protection of areas needed for future public, quasi-public, and institutional facilities.	This is an on-going policy. Seniors and other users are encouraged to use para transit services provided by the Riverside Transit Agency. This is consistent with Chapter 9.11.080 of the Municipal Code.	Land Dev./Administrative Services/Police/Fire/Planning
Policies:			
2.6.1	The primary purpose of areas designated Public/Quasi-Public is to provide property for civic, cultural and public utility uses, including, but not limited to schools, libraries, fire stations, museums, and government offices. The zoning regulations shall identify the particular uses permitted on each parcel of land. Development intensity should not exceed a Floor Area Ratio of 1.00 and the average Floor Area Ratio should be significantly less.	The Municipal Code (Sections 9.02.020 and 9.04.010) establishes permitted uses and defines areas designated for "Public" uses. The description in this policy is consistent with zoning requirements in the above sections. This is an ongoing policy	Land Dev./Administrative Services/Police/Fire/Planning
Objective 2.7	Encourage open space preservation through appropriate land use policies that recognize the valuable natural resources and areas required for protection of public safety that exist in the City.	Municipal Code Chapter 9.06, Section 9.06.010 establishes standards for open space districts. The intent is to require specific regulations to preserve certain life styles, significant geological or other unique features, and protect the public health safety and welfare. Municipal Code Section 9.02.020 establishes permitted uses for properties located in the district. This is an ongoing objective.	Planning

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Policies:			
2.7.1	The primary purpose of areas designated **Open Space**, is to provide areas that are substantially unimproved, including, but not limited to areas for outdoor recreation, the preservation of natural resources, the grazing of livestock and the production of crops. Development intensity should not exceed a Floor Area Ratio of 0.10 and the average Floor Area Ratio should be significantly less.	The purpose of Open Space Districts is to provide primarily unimproved areas, while preserving natural and environmentally sensitive areas. Municipal Code Chapter 9.06, Section 9.06.010 establishes standards for open space districts. Municipal Code Section 9.02.020 establishes permitted uses for properties located in the district. This is an ongoing policy.	Planning
2.7.2	The primary purpose of areas designated **Floodplain** is to designate floodplain areas where permanent structures for human occupancy are prohibited to protect of the public health and safety. Development intensity should not exceed a Floor Area Ratio of 0.05.	Accomplished through site design consistent with Municipal Code Chapter 8.12.	Land Development/Planning
Objective 2.8	The major purpose of specific plans is to encourage and promote the development of larger-scaled mixed-use developments for the purpose of providing adequate flexibility and innovation in residential building types, land use mixes, site design, and development concepts.	Some of the objectives of a specific plan are s to encourage and promote the development of larger scaled mixed use developments for purposes of providing flexibility and innovation in residential building types, land use mixes, site design and development concepts for areas at or exceeding 15 acres. Municipal Code Chapter 9.13, Sections 9.13.010 through 9.13.050 provide purpose and intent, applicability and specific plan requirements. This is an ongoing objective.	Planning

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Policies:			
2.8.1	In order to provide superior design solutions, reduce adverse environmental impacts, preserve scenic values, and enhance the provision of open space and other amenities, transfers of residential densities permitted under the General Plan may be accomplished in accordance with the following: a. The transfer of residential densities may be accomplished only pursuant to approval of a planned unit development or hillside development. b. Up to one hundred percent (100%) of the density indicated on the General Plan Land Use map may be transferred within a single hillside development or planned unit development project. Densities may not be transferred from one project to another. c. The proposed transfer of densities shall be accomplished such that the project results in a superior use of land, increased sensitivity to the environment, and/or enhanced project amenities without an increased burden on public facilities and services.	Municipal Code chapter 9.03, Section 9.03.050 provides standards for density bonus and affordable housing opportunities. In addition, Chapter 9.03.060 "Planned Unit Developments", provide transfer of densities to preserve scenic areas, rock outcroppings and conservation of cultural or biological resources. Project amenities are enhanced by providing walkable communities that provide ample open space areas such as trails and parks. This is an ongoing policy.	Planning

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2.8.2	To the extent that development policies, land use standards, design guidelines, and other provisions of the adopted specific plans are, by their content, intended to address issues contained in the objectives, policies, and implementation programs of the Moreno Valley General Plan, and are inconsistent with the provisions of the General Plan, then the provisions of those specific plans shall be controlling; otherwise, all other provisions of the Moreno Valley General Plan shall remain in effect.	Specific Plans have been developed to be consistent with and to address issues contained in the Moreno Valley General Plan. All items not addressed in specific plans are directed to provisions in the Municipal Code (which is consistent with General Plan provisions). This is an ongoing policy.	Planning
Objective 2.9	Maintain City boundaries that are logical in terms of City service capabilities, economic development needs, social and economic interdependencies, citizen desires, and City costs and revenues.	Logical City boundaries have been maintained throughout the years with areas designated as spheres of influence for future expansion opportunities of the City. This is an ongoing objective.	Planning
Policies:			

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
2.9.1	Support and encourage the annexation of unincorporated areas within the General Plan study area for which: a. Long-term benefits will be derived by the City; b. Adequate infrastructure and services have been or can be economically provided in accordance with current City standards; c. The proposed annexation will generate sufficient revenues to adequately pay for the provision of City services within a reasonable period of time.	Logical City areas of future annexation of unincorporated areas (northern and eastern portions) have been encouraged to produce long term benefits only if the necessary infrastructure is in place or is attainable, and if the annexation can generate sufficient revenues to pay for City services. These areas have been designated as spheres of influence. This is an ongoing policy.	Planning
Objective 2.10	Ensure that all development within the City of Moreno Valley is of high quality, yields a pleasant living and working environment for existing and future residents, and attracts business as the result of consistent exemplary design.	It is an objective of the City of Moreno Valley to make sure that development is of the highest quality, provides a pleasant living and working environment for residents and from an economic development standpoint, attracts business based on high quality design. This is an ongoing objective.	Planning
Policies:			

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2.10.1	Encourage a design theme for each new development that is compatible with surrounding existing and planned developments.	Chapter 16, Section 9.16.130 "Design Guidelines" of the Municipal Code establishes design for different types of development. Consistent with this Chapter, design themes are encouraged for new development. The theme shall be compatible with surrounding development. This is an ongoing policy.	Planning
2.10.2	Screen trash storage and loading areas, ground and roof mounted mechanical equipment and outdoor storage areas from public view as appropriate.	Chapter 16, Section 9.16.130 "Design Guidelines" of the Municipal Code establishes design for screening of trash/ storage areas, loading areas, roof mounted mechanical equipment and outdoor storage areas from public view. This is an ongoing policy.	Planning

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2.10.3	Require exterior elevations of buildings to have architectural treatments that enhance their appearance. a. A design theme, with compatible materials and styles should be evident within a development project; b. Secondary accent materials, colors and lighting should be used to highlight building features; c. Variations in roofline and setbacks (projections and recesses) should be used to break up the building mass. d. Industrial buildings shall include architectural treatments on visible facades that are aesthetically pleasing.	Chapter 16, Section 9.16.130 "Design Guidelines" of the Municipal Code establishes design for exterior building facades and architectural treatments for all development types to include such items as overall design materials, accent materials, rooflines and architectural treatments for industrial buildings. This is an ongoing policy.	Planning
2.10.4	Landscaping and open spaces should be provided as an integral part of project design to enhance building design, public views, and interior spaces; provide buffers and transitions as needed; and facilitate energy and resource conservation.	Chapter 16, Section 9.16.130 "Design Guidelines" of the Municipal Code requires landscape buffers and open spaces to enhance public design, public views and interior spaces. Landscape in buffers and opens space also facilitates energy conservation. This is an ongoing policy.	Planning
2.10.5	Development projects adjacent to freeways shall provide landscaped buffer strips along the ultimate freeway right-of-way.	Chapter 16, Section 9.16.130 "Design Guidelines" of the Municipal Code requires freeway adjacent developments to provide landscape buffers along freeway rights of ways. This is an ongoing policy.	Planning

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2.10.6	Buildings should be designed with a plan for adequate signage. Signs should be highly compatible with the building and site design relative to size, color, material, and placement.	Chapter 9.12"Sign Regulations" of the Municipal Code establishes requirements for sign placement and design. For visibility and economic viability of the business, adequate signage is required for building and site design. This is an ongoing policy.	Planning
2.10.7	On-site lighting should not cause nuisance levels of light or glare on adjacent properties.	Chapter 9.08 "General Development Standards" Section 9.08.100 "Lighting" of the Municipal Code provides standards for lighting and limitations for light and glare. Recent modifications to the Code have provided for dark sky provisions with further limitations of light spillage onto adjacent properties. This is an ongoing policy.	Planning
2.10.8	Lighting should improve the visual identification of structures. Within commercial areas, lighting should also help create a festive atmosphere by outlining buildings and encouraging nighttime use of areas by pedestrians.	Chapter 9.08, Section 9.08.100 "Lighting" of the Municipal Code provides lighting standards for visual identification. Lighting accents to the building through up lighting opportunities outline buildings and encourage use by pedestrians at night. This is an ongoing policy.	Planning

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2.10.9	Fences and walls should incorporate landscape elements and changes in materials or texture to deter graffiti and add visual interest.	Both Chapters 9.08 Section 9.08.070 "Fences and Walls" and Chapter 9.16 "Design Guidelines" both require landscape elements, material changes and texture to deter graffiti to fences and walls This is an ongoing policy.	Planning
2.10.10	Minimize the use and visibility of reverse frontage walls along streets and freeways by such treatments as landscaping, berming, and "side-on" cul-de-sacs.	Due to the cost of establishing "Special Districts" to maintain reverse frontage landscape and irrigation, reverse frontage development has been discouraged. Therefore, the use of reverse frontage walls is minimal. Any necessary reverse frontage wall shall be decorative in nature and would include landscape and possible berming to break up the elevations. This is an ongoing policy.	Planning

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2.10.11	Screen and buffer nonresidential projects from adjacent residential property and other sensitive land uses when necessary to mitigate noise, glare and other adverse effects on adjacent uses.	Chapter 9.16 "Design Guidelines", Sections 9.16.150 and 9.16.160 and Chapter 9.08, Section 9.08.150 of the Municipal Code provides general screening and buffer requirements for non-residential properties to other sensitive properties. This would include such items as trash areas, loading areas, ground-mounted equipment, roof mounted equipment etc. This is an ongoing policy.	Planning
2.10.12	Screen parking areas from streets to the extent consistent with surveillance needs (e.g. mounding, landscaping, low profile walls, and/or grade separations).	Both Landscape Guidelines (Parking Lots) approved by resolution in 2009 and Chapter 9.16 "Design Guidelines" for residential, commercial, industrial and office land uses include guidelines for screening of materials and equipment from streetscapes. This is an ongoing policy.	Planning
2.10.13	Provide landscaping in automobile parking areas to reduce solar heat and glare.	Landscape Guidelines (Parking Lots) approved by resolution in 2009 specifically requires landscaping in automobile parking areas. This is an ongoing policy.	Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
2.10.14	Preserve or relocate existing mature trees and vegetation where practical. Mature trees shall be replaced when they cannot be preserved or relocated.	Landscape Guidelines approved by resolution in 2009 specifically requires preservation of landscape and specifically trees. Mature trees not able to be preserved shall be replaced at a 3 to 1 ratio. This is an ongoing policy.	Planning
2.10.15	Emphasize the "gateway status" of lands in the vicinity of the intersection of I-215 and State Route 60, at the intersection of Alessandro Boulevard and I-215, at the intersection of Perris Boulevard and State Route 60, and at State Route 60 and Gilman Springs Road. In the vicinity of those areas designated as having "gateway status", the City shall encourage community identification signing.	Although gateway status has been emphasized with a recent upgrade of community identification status, the City has not designated any specific areas along the I-215 or State Route 60 gateway status **As there are no specific policies or Code requirements on this subject, it is recommended that the item be further reviewed during the comprehensive update of the General Plan.**	Planning

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Objective 2.11	Maintain a water system that is capable of meeting the daily and peak demands of Moreno Valley residents and businesses, including the provision of adequate fire flows.	This item is accomplished through will serve letters, environmental documentation, and fire flow letters.	Land Development/Planning/Fire
Policies:			
2.11.1	Permit new development only where and when adequate water services can be provided.	This item is accomplished through will serve letters and environmental documentation.	Land Development/Planning
Objective 2.12	Maintain a wastewater collection, treatment, and disposal system that is capable of meeting the daily and peak demands of Moreno Valley residents and businesses.	Wastewater collection and treatment is provided by Eastern Municipal Water District (EMWD) Western Municipal Water District (WMWD), and Edgemont Community Services District (ECSD)	Land Development
Policies:			
2.12.1	Prior to the approval of any new development application ensure that adequate septic or sewer service capacity exists or will be available in a timely manner.	Requirement for sewer unless septic allowed by Riverside County Department of Environmental Health. This is consistent with Municipal Code Chapter 9.14.	Land Development
Objective 2.13	Coordinate development activity with the provision of public infrastructure and services to eliminate possible gaps in service provision.	Accomplished through design/construction consistent with Municipal Code Chapter 9.14.	Land Development
Policies:			
2.13.1	Limit the amount of development to that which can be adequately served by public services and facilities, based upon current information concerning the capability of public services and facilities.	Adequate public services are reviewed for each development proposal through California Environmental Quality Act guidelines.	Land Development/ Planning
2.13.2	Unless otherwise approved by the City, public water, sewer, drainage and other backbone facilities needed for a project phase shall be constructed prior to or concurrent with initial development within that phase.	Accomplished through design/construction consistent with Municipal Code Chapter 9.14.	Land Development

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2.13.3	It shall be the ultimate responsibility of the sponsor of a development project to assure that all necessary infrastructure improvements (including system wide improvements) needed to support project development are available at the time that they are needed.	Accomplished through design/construction consistent with Municipal Code Chapters 9.8 and 9.14.	Land Development
2.13.4	Encourage installation of advanced technology infrastructure, including, but not limited to, infrastructure for high speed internet access and solar energy.	Land Development is not providing guidance on high speed internet access or involved with solar energy. Any involvement would be through the plan check process completed for utilities.	Land Development
Objective 2.14	Establish and implement comprehensive solutions to the financing of public facilities that adequately distribute costs based on the level of benefit received and the timing of development.	This item is accomplished through implementation of DIF and TUMF programs consistent with Municipal Code Title 3.	Finance / Facilities / Land Development/SD/Capital Projects

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Policies:			
2.14.1	Conduct periodic review of public facilities impact mitigation fees in accordance with state statutes to ensure that the charges are consistent with the costs of improvements. Utilize the service and mitigation standards contained in the Moreno Valley General Plan as the basis for determining improvement costs.	DIF program is periodically updated and the program is implemented consistent with Municipal Code Title 3.	Finance / Facilities / Land Development/Capital Projects
2.14.2	Promote the establishment of benefit assessment districts, Mello-Roos Community Facilities Districts, tax increment financing, and other financing mechanisms in combination with programmed capital improvements to eliminate existing public service and facility gaps, and to provide necessary facilities in advance of the impacts created by development.	CFD No. 2014-01 (Maintenance Services) was established on March 25, 2014. The District was formed to provide an alternative financing tool for the development community. It provides a mechanism to fund the operation and maintenance of street lighting services and maintenance of public landscaping. With next comprehensive General Plan update, it is recommend to change, "Promote the establishment of benefit assessment district, Mello-Roos Community Facilities Districts, tax increment financing, and other financing mechanisms in combination. . ." with "Promote the establishment of various special financing districts based on qualifications of project in combination. . ."	Special Districts

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2.14.3	Review development projects for their impacts on public services and facilities including, but not necessarily limited to, roadways, water, sewer, fire, police, parks, and libraries and require public services or facilities to be provided at the standards outlined in the Moreno Valley General Plan and the standards of applicable service agencies.	Water and sewer impacts/service is determined during entitlement and will serve letters from purveyor.	Public Works / Public Safety/Facilities/Parks
Objective 2.15	Ensure that all Moreno Valley residents have access to high-quality educational facilities, regardless of their socioeconomic status or location within the City.	This objective is being met with continual cooperation and dialog with the Moreno Valley Unified School District and the Van Verde Unified School District.	Administrative Services/Planning

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Policies:			
2.15.1	Encourage an ongoing open liaison with all school districts regarding proposed school design and siting to maximize access and minimize impacts to adjacent uses.	This will ensure that City Standards are conveyed, joint-use facilities are considered, safe routes to school are established, opportunity for parks are incorporated on adjacent property, and amenities are designed to minimize impacts to adjacent uses.	Parks/Planning
Objective 2.16	Maintain local library facilities and reserves in accordance with the following minimum standards: 0.5 square feet of library space and 1.2 volumes per capita.	Libraries fall under Admin Services. While the space and volume goals are well within national standards (and even below) they are well beyond what we can hope to achieve with the funds that we have to dedicate to library services. the .5 sq. ft. standard would required over 100,000 sq. ft. of space for library services. We are currently at 14,000 sq. ft. of space, .06 sq. ft. of space per resident, and even with adding a satellite of 4,000 sq. ft. we would be at 18.000 sq. ft. total or .08 sq. ft. per resident. Additionally, our current collections is just over 82,000 volumes, the 1.2 standard would require 246,000 volumes.	Administrative Services/Parks
Policies:			

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2.16.1	Encourage inter-library loan agreements with the County library system and those of surrounding cities to provide the widest possible variety of materials to library patrons.	Inter-library loan agreements are encouraged with the County library system to provide the widest range and variety of materials possible to residents.	Administrative Services/Parks
2.16.2	Provide for the expansion of library facilities as needed to keep pace with the growing population of Moreno Valley.	Due to budgetary issues, the expansion of library facilities has not kept up with the pace of the growing population of Moreno Valley. **This item can be revisited with the comprehensive update of the General Plan.**	Administrative Service/Parks

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Objective 2.17	Provide cultural facilities, including history (natural, cultural and children's) and art museums and performing arts facilities.	The City collaborates with a number of cultural facilities including the Vanguard Galley (Moreno Valley Cultural Arts Foundation) to provide residents with art expos; clothing, toy, and food drives; charity art auctions; poetry readings; live music and theater events. The Conference & Recreation Center is home to the Moreno Valley Master Chorale and the Moreno Valley Community Band. Both offer performances quarterly at no cost to the community. The March Field Park Community Center is home to day camp and pre-school programs year round and is soon to be re-painted. The City's Arts commission is planning a Community Mural that will utilize volunteers to design and paint a mural on the exterior of the building depicting youth and recreation activities. On-going	Parks/Administrative Services
Policies:			
2.17.1	Promote the development and construction of a civic/cultural center and museums.	Moreno Valley has constructed the Conference and Recreation Center, Cottonwood Banquet Room, and Towngate Community Center for use as civic/cultural centers. A museum is planned at March Field Park in the future. Events at these facilities are ongoing.	Parks / Administrative Services

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Objective 2.18	Promote social services programs that meet the special needs for childcare, the elderly, and the disabled.	The City offers child care, elderly, and disabled programs to the community through Community Service District funding and grants. Many of these programs are held at City buildings and schools. On-going	Parks / Administrative Services

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Policies:			
2.18.1	Ensure that a full range of human service programs are available to meet the lifetime development needs of residents of all ages, including the special needs of seniors, families, children, disabled persons, and youth groups.	The City provides a range of activities to service residents of all ages. **Youth:** Sports – Flag Football, Pee-Wee and Jr Soccer and Baseball, Multi-Sport Clinics, Skateboarding, Golf and Foot golf, hiking Adult: Sports – Softball, Kickball, Arena Soccer, Soccer, Basketball, Skateboarding, Golf and Foot Golf, hiking, volleyball Life Enrichment Classes and Activities – acting, modeling, photography, writing, drawing, painting, dance, cheer, hula, martial arts, dog obedience, piano, guitar, CPR, Job Readiness Workshops, second languages, and aerobics **Special Needs:** Sunshine Social Club (physically challenged adults, professional development seminars, special transit (MoVan) **Seniors**: special transit (MoVan) , driving courses, free lunch, arts and crafts courses, fitness, bunco, billiards, guitar, special events, nutrition. All are ongoing programs.	Parks/Administrative Services

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
2.18.2	Encourage day care through zoning regulations by permitting such facilities in all compatible zoning classifications.	The City's Parks and Community Services Department locates their facilities within it's own facilities, which are properly zoned for such use.	Parks/Administrative Services / Community Development
2.18.3	Work closely with local schools, private companies, churches, non-profit agencies, government social service agencies, and community groups to facilitate the provision of community services.	The City works with various groups to jointly provide a multitude of services to the community. Examples of these groups include: Moreno Valley and Val Verde Unified School Districts, Salvation Army, Family Services Association, Master Chorale, Cultural Arts Foundation, Riverside University Health Systems, UC Riverside, Cal Baptist College, Friends of the Senior Center. Ongoing	Parks/Administrative Services
2.18.4	Encourage the development of senior citizens independent living and congregate care facilities in locations with convenient access to social, commercial, and medical services.	Development of senior citizen independent living and congregate care facilities are encouraged in locations convenient to social, commercial and medical services.	Administrative Services / *Community Development*
2.18.5	Promote volunteer involvement in all public programs and within the community as a whole.	The City promotes volunteer involvement through several departments and programs within the City.	Parks/Administrative Services

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
9.2 Community Development Element Goals, Objectives Policies and Programs			
9.2.3 Community Development Element Programs			
2-1	Develop a community signing scheme for street corridors, public buildings and selected entrances to the community and its sub-communities.	This is completed in concert with the bi-annual City Capital Improvement Plan effort. It is implemented in conformance with existing policies and procedures for signing throughout the City, and when needed, new policies may be developed. Wayfinding signs have been installed at selected locations. Future Wayfinding signs will be installed as need arises. "Welcome to Moreno Valley" signs have been installed at selected entrance points to the City, with remaining signs to be installed as priorities and funds allow.	Planning/Public Works/Capital Projects
2-2	Review and revise the Municipal Code to implement the goals, objectives and policies stated in the General Plan.	Periodically, the Municipal Code is revised and updated to reflect General Plan goals, objectives and policies. A General Plan annual report to review current General Plan standards is also completed and submitted to the Office of Planning and Research (OPR) each year. This is a policy that is reviewed annually with periodic updates throughout the year. This is an ongoing policy.	Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
2-3	Conduct a detailed capital improvement program using the revised population projections and proposed land use characteristics of the General Plan.	A detailed capital improvement program is conducted annually by the Capital Projects Division of Public Works. This is an ongoing policy.	Public Works/Planning/Capital Projects
2-4	Periodically study the feasibility of extending the sphere of influence north of the city limits and annexing unincorporated areas along the city boundary.	Designated spheres of influence have been established east and north of the city limits. The City periodically studies the extension of the existing spheres of influence to the north, with the latest attempt at expansion studied with the City Council in 2016. This is an ongoing policy.	Planning
2-5	Disseminate local childcare resource information and provide referral service to residents and businesses.	Childcare resource information is provided to residents and businesses in the City. Ongoing	Planning/Administrative Services
2-6	Encourage demand-response public transportation facilities, such as the mini-bus or dial-a-ride systems in order facilitate the transportation needs of the elderly and the disabled.	This is an on-going policy. Seniors and other users are encouraged to use para transit services provided by the Riverside Transit Agency. This is consistent with Chapter 9.11.080 of the Municipal Code.	Transportation/Planning
2-7	Provide City information identifying available social services and facilities in a broad range of formats.	**Housing:** Following the dissolution of RDA, there are no currently active programs due to limited or no funding available. Any projects funded with HOME or Housing Authority funding is provided on the City's website.	Housing/Administrative Services/Planning

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2-8	Evaluate existing social programs under the City's purview, and determine if they adequately address the needs of the aged, the disabled, low-income families and persons in crisis situations.	**Housing:** Following the dissolution of RDA, there are no currently active programs due to limited or no funding available. Any projects funded with HOME or Housing Authority funding is provided at City's website.	Housing/Administrative Services/Planning
2-9	Work with other jurisdictions to seek changes in state law to allow reasonable controls on the location of community care facilities, foster homes and sober living facilities.	The City strives to work with surrounding jurisdictions and jurisdictions in California regarding state law and controls on location of community care facilities, foster homes and sober living.	Planning/Administrative Services
The City Structure Economic Development Goals and Policies			
9.3 9.3 Economic Development Element Goals, Objectives, Policies and Programs			
9.3.1 Economic Development Element Goals			
	To be inserted after development of Economic Development Strategy.	**This item will be completed with the next comprehensive update to the General Plan.**	Economic Development
9.3.2 Economic Development Element Policies			
	To be inserted after development of Economic Development Strategy.	**This item will be completed with the next comprehensive update to the General Plan.**	Economic Development
9.3.3 Economic Development Element Programs			
	To be inserted after development of Economic Development Strategy.	**This item will be completed with the next comprehensive update to the General Plan.**	Economic Development
The City Structure Parks, Recreation and Open Space Element Goals and Policies			
9.4 Parks, Recreation and Open Space Element Goals, Objectives, Policies and Programs			
9.4.1 Parks, Recreation and Open Space Element Goals			

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Goal 4.1	To enhance Moreno Valley as a desirable place in which to live, work, shop, and do business.	The City provides numerous amenities for residents including parks, sports facilities, cultural/community centers, restaurants, stores, entertainment, and medical facilities, to promote the desirability of the City. Ongoing.	Parks / Community Services / *Economic Development*
Goal 4.2	To retain an open space system that will conserve natural resources, preserve scenic beauty, promote a healthful atmosphere, provide space for outdoor recreation, and protect the public safety.	The City promotes the preservation of it's natural resources and scenic beauty of open space, creating a healthy atmosphere for outdoor recreation and public safety, per MVMC Title 7. On-going.	Parks / Community Services / *Planning*
9.4.2 Parks, Recreation and Open Space Element Objectives and Policies			
Objective 4.1	Retain agricultural open space as long as agricultural activities can be economically conducted, and are desired by agricultural interests, and provide for an orderly transition of agricultural lands to other urban and rural uses.	The City encourages agricultural open space land as long as the activities can be economically conducted and it is an objective to provide for orderly transition of agricultural uses to other urban/rural lands. Permitted uses Table 9.02.020 in the Municipal Code allows for agricultural and crop production in all land use zones Ongoing.	Planning
Policies:			
4.1.1	Encourage grazing and crop production as a compatible part of a rural residential atmosphere.	Permitted uses Table 9.02.020 allows for agricultural and crop production in all land use zones. Ongoing.	Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Objective 4.2	Provide safe, affordable and accessible recreation facilities and programs to meet the current and future needs of Moreno Valley's various age and interest groups and promote the provision of private recreational facilities.	The City provides numerous safe, affordable, and accessible recreation facilities to meet the various needs or multiple age and interest groups. There are currently 4 community centers and 28 public parks that have recreation amenities. Ongoing.	Parks / Community Services
Policies:			
4.2.1	Neighborhood parks shall serve as the day-to-day recreational areas of the City, Neighborhood parks should be within a reasonable walking distance of the population served. Community parks may also serve day-to-day recreation needs. That portion of the community and/or regional facilities that provide similar amenities to those found in neighborhood parks shall also be considered as meeting this objective.	Neighborhood parks are designed and constructed to be located within a reasonable distance of the population they are intended to serve. Community parks are designed and constructed to include similar amenities as neighborhood parks to meet the objective of a neighborhood park. On-going.	Parks / Community Services
4.2.2	Community parks shall provide opportunities for participation in sports and related athletic activities, water-oriented recreation and other special interest activities (e.g. golf, tennis, equestrian, etc.).	Community parks provide opportunities for a variety of athletic activities. Examples of these include: Cottonwood Golf Center, Moreno Valley Equestrian Center, March Field Skate Park, tennis courts at three sites, basketball courts at several sites, and splash pads in two parks. Ongoing.	Parks / Community Services

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4.2.3	Employ a multifaceted approach in the financing and acquisition, development and maintenance of parkland, including the financing of parklands through development fees, state and federal grant-in-aid programs, gifts and donations, and other sources.	Moreno Valley utilizes development impact fees, Quimby in lieu fees, Community Facilities and Services Districts, and various grants, to finance acquisition, development, and maintenance of parks and parkland. "Zone A was formed at City incorporation to provide a funding mechanism for parks and community services. Every parcel in the City contributes to Zone A. CFD No. 1 (Park Maintenance) was established on July 8, 2003. The District was formed to provide financing tool for the residential development community. It provides a mechanism to fund the operation and maintenance of parks constructed after district formation. All new residential development is conditioned to contribute to the District. Willdan Financial has been engaged to evaluate possible amendment to CFD No. 1 or creation of a new CFD to provide for a tax rate layer for non-residential development "	Parks / Community Services

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4.2.4	Encourage special events (tournaments, festivals, celebrations) that reflect the uniqueness of Moreno Valley and contribute to community identity, cohesiveness and stability.	Moreno Valley encourages and hosts several special events. Some are unique to the City, in order to bring together it's residents. Examples are: 4th of July Independence Parade and Family Fun Fest, Youth Fest, Springtastic Festival and Egg Hunt, Recreation Expo, Concerts/Movies in the Parks, Snow Day and Holiday Tree Lighting. Ongoing	Parks / Community Services
4.2.5	Work in conjunction with private and public school districts and other public agencies to facilitate the public use of school grounds and facilities for recreational activities. The City shall also encourage the development of park sites adjacent to school facilities to maximize recreational opportunities in Moreno Valley.	The City has joint-use agreements with the school districts for use of recreation facilities. The City encourages new developments to construct parks next to schools to maximize recreational opportunities in the City. Ongoing.	Parks / Community Services
4.2.6	The City shall use cost effectiveness, demand and need for service and potential return on investment as criteria for the development and operation of future recreational facilities and programs.	The City Council sets activities/program fees. Typically, senior programs are no-cost and youth and adult fees are cost recovery. Sponsorships are utilized to off-set costs. Ongoing.	Parks / Community Services

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4.2.7	The City level of service standard is 3 acres of developed parkland for every 1,000 new residents. Exceptions from this ratio may be made in exchange for extraordinary amenities of comparable economic value. Land not suitable for active recreation purposes may not be counted toward fulfilling parkland dedication requirements.	The City's standard for developed parkland is 3 acres per 1,000 new residents. In some areas, this ratio has been reduced due to the City receiving added amenities that are equal to or exceed the value of property. The City does not take on new property not suitable for active recreation purposes as fulfillment for parkland dedication requirements. MVMC Chapter 3.4. (Ongoing).	Parks / Community Services
4.2.8	Encourage the development of recreational facilities within private developments, with appropriate mechanisms to ensure that such facilities are properly maintained and that they remain available to residents in perpetuity.	The Planning Division encourages development of recreational facilities within private developments, with facility maintenance provided through required Covenants, Conditions and Restrictions (CC&R's) and through a Homeowners Association.	Planning
4.2.9	In conjunction with the school districts, civic organizations, and other private, civic-minded entities, encourage and participate in the provision of organized recreational activities for Moreno Valley residents of all ages.	The City has many programs that incorporate organized recreation activities for schools, civic organizations, and private civic-minded entities. These are designed to encourage participation in organized recreational activities for resident of all ages.	Parks / Community Services

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4.2.10	Involve individuals and citizen groups reflecting a cross section of Moreno Valley citizens (including youth and adults) in the planning, design and maintenance of parks, recreation facilities and recreation programs.	The City has established a Park and Trail adoption system for individuals and groups to assist with the maintenance of parks and trails. City has several boards and commissions that assist with the planning and design of recreation facilities, parks, and trails. Ongoing	Parks / Community Services
4.2.11	Emphasize joint planning and cooperation with all public agencies as the preferred approach to meeting the parks and program needs of Moreno Valley citizens.	Moreno Valley jointly plans and cooperates with the local fire department, police department, and water district, in its approach to meet the needs of citizens. On-going	Parks / Community Services
4.2.12	Include multi-functional spaces and facilities in parks to facilitate cultural events.	Moreno Valley utilizes parks and the Conference and Recreation Center to facilitate cultural events such as: movies and concerts in the park; Artoberfest (art displays and performances); and various heritage related events.	Parks / Community Services
4.2.13	Provide recreation programs and access to facilities at reasonable costs.	The City provides many recreation programs and access to facility access at a reasonable cost. A few examples are: the Cottonwood Golf Center, Conference and Recreation Center gym, and Tee-ball. Ongoing	Parks / Community Services

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4.2.14	Establish linear parks in agreement with public and private utilities, including the State of California along the California Aqueduct, for the use and maintenance of utility corridors and rights-of-way for recreational purposes.	The City currently has agreements with the State Department of Water Resources for use of land over the California Aqueduct pipeline and Edison for the Sunnymead Ranch Linear Park. Ongoing	Parks / Community Services
4.2.15	Work closely with Riverside County Parks Department in its open space program to ensure that trail systems within Moreno Valley effectively link open space components.	The City requires developers that are located on Riverside County boundaries to coordinate their trail plans with the County Parks. (On-going) "Zone A was formed at City incorporation to provide a funding mechanism for parks and community services. Every parcel in the City contributes to Zone A. CFD No. 1 (Park Maintenance) was established on July 8, 2003. The District was formed to provide financing tool for the residential development community. It provides a mechanism to fund the operation and maintenance of parks constructed after district formation. All new residential development is conditioned to contribute to the District.	Parks / Community Services

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4.2.16	Acquire land jointly with the local school districts for future school/park sites.	The City makes every effort to coordinate placing parks next to schools. An example of an undeveloped park next to a school is adjacent to March Middle School. Through a joint-use agreement the City had two lighted ball fields constructed on the school and will have a developer dedicated and construct a park adjacent to the school. On-going	Parks / Community Services
4.2.17	Require new development to contribute to the park needs of the City.	New development is required to provide fully functioning parks or a in-lieu fee for future construction of parks.	Parks / Community Services
4.2.18	Provide lighted sports fields to increase availability and utilization of courts and playing field facilities.	Where funding allows, the City has added or revamped lighting of sport facilities. Added/revamped facilities include Lassalle Sports Park and Morrison Park. Ongoing	Parks / Community Services
Objective 4.3	Develop a hierarchical system of trails which contribute to environmental quality and energy conservation by providing alternatives to motorized vehicular travel and opportunities for recreational equestrian riding, bicycle riding, and hiking, and that connects with major regional trail systems.	The City has a master plan of multi-use trails and non-motorized bike trails throughout the City. They are designed to connect to trails and adjacent agencies. The trail plan is reviewed with each development annexing the City, each development building in the City, and on a yearly basis. Ongoing	Parks / Community Services

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Policies:			
4.3.1	The City's network of multiuse trails, including regional trails, community trails, and local feeder trails, shall (1) be integrated with recreational, residential and commercial areas, schools and equestrian centers; (2) provide access to community resources and facilities, and (3) connect urban populations with passage to hillsides, ridgelines, and other scenic areas.	Per the Master Plan of Trails and the General Plan, trails are incorporated into parks, residential, commercial, and industrial developments. In many instances, trails provide access to facilities and other community resources. Trails are designed to connect to scenic areas. Ongoing	Parks / Community Services
4.3.2	The City shall establish an agreement with public and private utilities for the use and maintenance of utility corridors and rights-of-way for trail purposes.	The City has several agreements with both public and private utilities for the design, construction, and maintenance of trails. Examples of these include the California Department of Water Resources, The Gas Company, and Southern California Edison. Ongoing	Parks / Community Services
4.3.3	All new development approvals shall be contingent on trail right-of-way dedication and improvement in accordance with the Master Plan of Trails (Figure 4-5).	In adherence to the Master Plan of Trails, the City may require fee or easement dedication for trails. New developments that annex to the City may be required to provide similar amenities. On-going	Parks / Community Services
4.3.4	In conjunction with all development review, the City shall consider multiuse trail access and traditional travel routes through the property.	Per the Master Plan of Trails and the General Plan, trails are incorporated into many developments adjacent to traditional travel routes (streets and sidewalks). On-going	Parks / Community Services

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4.3.5	In conjunction with the review and approval of nonresidential developments, the City should consider the use of multiuse trail amenities such as hitching posts, benches, rest areas, and drinking facilities.	In adherence to the Master Plan of Trails, the City may require trails and related amenities within nonresidential development.	Parks / Community Services
4.3.6	Wherever possible, development of residential areas conditioned for animal keeping on lots of ½ acre or larger, shall include a decomposed granite trail on one side of the street and traditional concrete sidewalk on the other.	Where applicable, feeder trails are conditioned for residential developments that allow animal keeping. The standard is to have a trail on one side of the street and a traditional sidewalk on the other. On-going	Parks / Community Services
4.3.7	Trail design and construction should take into consideration the safety and convenience of all trail users as the primary concern.	User safety and convenience are the upmost concern in the planning and construction of multi-use trails. On-going	Parks / Community Services
4.3.8	The City should facilitate the development of a multiuse regional trail system.	The City has been working with the County of Riverside and Lake Perris State Park to coordinate trail systems. On-going	Parks / Community Services
4.3.9	Unless otherwise specified due to fire department requirements, access or as established by a specific plan, city trails along roadways shall be ten (10) feet wide and shall be constructed with decomposed granite or equal material and shall provide appropriate fencing or other devices where needed to delineate trails from vehicular rights-of-way.	Multi-use trails where located adjacent or near roadways are designed to have a minimum flat surface of ten (10) foot in width, with a 2% cross-slope. Trails are delineated from vehicular traffic by means of fencing and or shrubbery. Trail surfaces are stabilized granite with a minimum thickness of four (4) inches.	Parks / Community Services

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4.3.10	Where firefighting access is required, trails shall be 20' wide to meet the needs of the Fire Department and its equipment. Fire Department requirements shall be met in all conditions where access is required.	Where fire access and a trail is required, the minimum width of the trail shall be 20', to accommodate fire equipment and staging. On-going	Parks / Community Services
4.3.11	In unusual situations where legal or topographical barriers exist (e.g., excessive slope, the configuration of right-of-way, existing vegetation, etc.), the City shall have the discretion to amend the trail requirement as needed to accomplish the goals of this General Plan.	The City makes amendments to specific trail locations, based on various topographical barriers. This is done to create a trail system that can be utilized by the majority of citizens, without inconvenience to residents. On-going	Parks / Community Services
4.3.12	Local feeder trails shall connect residential lots in property zoned for horse keeping to the community trail system.	Where appropriate zoning exists, the City requires developers to install Feeder Trails that connect residential lots to the City's Trail System. On-going	Parks / Community Services
4.3.13	The City will encourage volunteer programs for the improvement of existing trails for the purpose of providing an integrated trail network that is safe, functional and readily accessible.	The City encourages volunteers for it's Adopt a Trail Program, to maintain safe, functional, and accessible trails. To date, individuals to civic organizations have become volunteers. This is an on-going program.	Parks / Community Services
4.3.14	Where feasible, use drainage courses, utility rights-of-way and other such opportunities to incorporate trail and open space elements in the design of major development projects.	The City evaluates developer projects to maximize the undeveloped space for use with trails, passive parks, and open space. Ongoing	Parks / Community Services

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4.3.15	Utilize the Citizen's Advisory Board on Recreational Trails in making recommendations to City Council for the distribution of funds for the construction of new trails.	When funds are available, the Recreation Trails Board would be recommending body to City Council for distribution of funds to construct new trails. Ongoing	Parks / Community Services
9.4.3 Parks, Recreation and Open Space Element Programs			
Programs:			
4-1	Develop a parks and recreation facilities master plan to implement the Parks and Recreation Element.	In 2012 the City developed a Parks Master Plan, to outline the current recreational facilities, as well to identify the deficiencies. The master plan is a living document, to be updated periodically.	Parks / Community Services
4-2	Develop policies and criteria for the establishment of trails and rest/picnic areas in natural open space areas.	The City has developed policies and criteria for the establishment of trails and rest stops in open space areas. Ongoing	Parks / Community Services
4-3	Set policies and criteria for the establishment of greenbelt standards and design guidelines to allow flexibility in design of greenbelt/parks/open spaces areas within new development as long as non-auto circulation corridors (for equestrians, bicycles, pedestrians, etc.) are provided and the overall dedication requirement for greenbelt and park facilities is met.	The City has set policies and criteria for the design and construction of greenbelts, parks, and open space. Several provide for the use of equestrians, bicycles, and pedestrians. These uses have become dedication requirements. Reviews of standards and design are under review every one to two years.	Parks / Community Services

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4-4	Explore the feasibility of requiring new development to provide a percentage of the development in greenbelt area.	New developments are examined for possible greenbelts. Many of these developments are required to construct these greenbelts for the resident's use.	Parks / Community Services
4-5	Provide on-going opportunities for public involvement and input into the park planning process.	The public is involved in assessing the current and future needs of park amenities. Some of this is done through committees/boards/commissions and some it through community meetings. On-going	Parks / Community Services
4-6	Maintain advisory committees, such as the Parks and Recreation Advisory Committee, created by City Council in 1988, to serve in an advisory capacity on parks and recreation issues.	The City Parks and Community Services Departments maintains commissions/boards such as the Parks and Recreation Commission, Senior Advisory Board, Recreational Trails Board, various sports groups, and the Arts Commission.	Parks / Community Services
4-7	Work with coalitions of sports organizations to define mutually compatible facility needs and mechanisms for the development, construction, operation and maintenance of these facilities.	The City consistently meets with various sports groups to discuss facilities and their needs. The City utilizes this information to design and construct new facilities as well as modify existing facilities. Ongoing.	Parks / Community Services

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4-8	Investigate the feasibility of establishing a non-profit foundation to seek and receive donations from private sources for the support of Parks and Recreation programs and facilities.	The City's Library currently has a foundation for capital improvements. This foundation can be expanded upon to include various parks commissions/boards for specific programs. However, this must be approved by the IRS, so it does not jeopardize the City's tax exempt status. This program needs more investigation for additional uses. Ongoing.	Parks / Community Services
4-9	Acquire land and develop neighborhood and community parks in the "Recommended Future Parkland Acquisition Areas" shown in Figure 4-4.	**Figure 4-4 was not provided in the 2006 General Plan. This item will need to be removed or updated with the next comprehensive General Plan update.**	Parks / Community Services
4-10	Prepare a comprehensive plan of trails that clearly defines the routing of city trails and is part of the General Plan.	During the last General Plan update a comprehensive master plan of trails was adopted, which defines locations for city trails.	Parks / Community Services
4-11	Develop policies and criteria for the establishment of multiuse trails and rest/picnic areas in natural open space areas.	The City has developed policies and criteria for the establishment of trails and rest stops in open space areas. On-going. **This is a duplicate of Policy 4.2, and shall be removed during the next comprehensive General Plan Update.**	Parks / Community Services
4-12	Periodically review the Master Plan of Trails to show existing and planned trails.	The Master Plan of Trails is periodically reviewed, adding newly constructed trails to the plan. Ongoing with yearly reviews.	Parks / Community Services

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4-13	Enact ordinances requiring developers to incorporate trail corridors into their development plans in accordance with the Master Plan of Trails.	Ordinance 359 (1992) provides for recreational facilities for trails per the Master Plan of Trails.	Parks / Community Services
4-14	Develop standards for residential feeder trails to guide developers in locating and constructing trails and for the arrangement of on-going maintenance requirements of the trails.	The City has developed construction standards for residential feeder trails to guide developers in locating feeder trails, as well as requirement for the development to establish a funding mechanism to maintain these trails. On-going program	Parks / Community Services

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4-15	Establish a fee system for the equitable distribution of the cost of developing and maintaining trails citywide.	The City has established a Community Facilities District to pay for the cost of developing and maintaining trails. (On-going program.) Zone A was formed at City incorporation to provide a funding mechanism for parks and community services. Every parcel in the City contributes to Zone A. CFD No. 1 (Park Maintenance) was established on July 8, 2003. The District was formed to provide financing tool for the residential development community. It provides a mechanism to fund the operation and maintenance of parks constructed after district formation. All new residential development is conditioned to contribute to the District. Willdan Financial has been engaged to evaluate possible amendment to CFD No. 1 or creation of a new CFD to provide for a tax rate layer for non-residential development	Parks / Community Services
4-16	Investigate the feasibility of creating a special district(s) for the purpose of acquiring and managing open space and trails.	Currently, the City has a special district to manage trails. However, it has been the responsibility of developer associations to acquire and maintain open space.	Parks / Community Services

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4-17	Seek out and apply for grants sponsored by state and federal agencies, such as the Recreational Trails Program administered by the Federal Highways Administration and the State Department of Parks and Recreation.	The City applies for several grants for trails, if the qualifications are met. On-going program	Parks / Community Services
The City Structure Circulation Element Goals, Objectives, Policies, and Programs			
9.5 Circulation Element Goals, Objectives, Policies, and Programs			
9.5.1 Circulation Element Goals			
Goal 5.1	Develop a safe, efficient, environmentally and financially sound, integrated vehicular circulation system consistent with the City General Plan Circulation Element Map, Figure 9-1, which provides access to development and supports mobility requirements of the system's users.	This is an on-going goal. It is accomplished through provisions of Titles 9 and 12 of the Municipal Code.	Transportation
Goal 5.2	Maintain safe and adequate pedestrian, bicycle, and public transportation systems to provide alternatives to single occupant vehicular travel and to support planned land uses.	This is an on-going goal. It is accomplished through provisions of Titles 9 and 12 of the Municipal Code.	Transportation
9.5.2 Circulation Element Objectives and Goals			
Objective 5.1	Create a safe, efficient and neighborhood- friendly street system.	This is an on-going objective. It is accomplished in accordance with Titles 9 and 12 of the Municipal Code.	Transportation
Policies:			
5.1.1	Plan access and circulation of each development project to accommodate vehicles (including emergency vehicles and trash trucks), pedestrians, and bicycles.	This is an on-going policy. It is implemented in accordance with Title 9 of the Municipal Code.	Transportation
5.1.2	Plan the circulation system to reduce conflicts between vehicular, pedestrian and bicycle traffic.	This is an on-going policy. It is implemented in accordance with Titles 9 and 12 of the Municipal Code.	Transportation

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5.1.3	Require adequate off-street parking for all developments.	This is an on-going policy. It is implemented in accordance with Chapter 9.11 of the Municipal Code.	Transportation
5.1.4	Driveway placement shall be designed for safety and to enhance circulation wherever possible.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5.1.5	Incorporate American Disability Act (ADA) and Title 24 requirements in roadway improvements as appropriate.	This is an on-going policy. It is implemented in accordance with Chapter 9 of the Municipal Code.	Transportation
5.1.6	Design new developments to provide opportunity for access and circulation to future adjacent developments.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
Objective 5.2	Implement access management policies.	This is an on-going objective. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
Policies:			
5.2.1	Locate residential units with access from local streets. Minimize direct residential access from collectors. Prohibit direct single-family driveway access on arterials and higher classification roadways.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5.2.2	Feed short local streets into collectors.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5.2.3	Encourage the incorporation of traffic calming design into local and collector streets to promote safe vehicle speeds.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 and Title 12 of the Municipal Code.	Transportation

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5.2.4	Design new subdivisions to minimize the disruptive impact of motor vehicles on local streets. Long, broad and linear streets should be avoided. Residential streets should be no wider than 40 feet, and should have an uninterrupted length of less than one half mile. Curvilinear streets and cul-de-sacs are preferred. Streets within the subdivision should be designed to facilitate access to residences and to discourage through traffic.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
Objective 5.3	Maintain Level of Service (LOS) "C" on roadway links, wherever possible, and LOS "D" in the vicinity of SR 60 and high employment centers. Figure 9-2 depicts the LOS standards that are applicable to all segments of the General Plan Circulation Element Map.	This is an on-going objective. It is implemented in accordance with Title 9 of the Municipal Code. **A complete review of the Circulation Element will be accomplished with the next General Plan update.**	Transportation
Policies:			
5.3.1	Obtain right-of-way and construct roadways in accordance with the designations shown on the General Plan Circulation Element Map and the City street improvement standards.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5.3.2	Wherever feasible, promote the development of roadways in accordance with the City standard roadway cross-sections, as shown in Figure 9-3. Cross-sections range from two-lane undivided roadways to 8-lane divided facilities.	This is an on-going policy. It is implemented in accordance with Chapters 9.14.100 of the Municipal Code.	Transportation

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5.3.3	Create new roadway classifications to accommodate future traffic demand, including; Divided Major Arterial - Reduced Cross-Section, and Divided Arterial - 6-lane. These cross-sections are shown on Figure 9-3.	This is an on-going policy. It is implemented in accordance with Chapter 9.14.100 of the Municipal Code.	Transportation
5.3.4	For planning purposes, utilize LOS standards shown on Table 5 -1 to determine recommended roadway widths.	This is an on-going policy. It is implemented in accordance with Title 9 of the Municipal Code. **A complete review of the Circulation Element will be accomplished with the next General Plan update.**	Transportation
5.3.5	Ensure that new development pays a fair share of costs to provide local and regional transportation improvements and to mitigate cumulative traffic impacts. For this purpose, require new developments to participate in Transportation Uniform Mitigation Fee Program (TUMF), the Development Impact Fee Program (DIF) and any other applicable transportation fee programs and benefit assessment districts.	This is an on-going policy. It is implemented in accordance with Title 3 of the Municipal Code.	Transportation
5.3.6	Where new developments would increase traffic flows beyond the LOS C (or LOS D, where applicable), require appropriate and feasible mitigation measures as a condition of approval. Such measures may include extra right-of-way and improvements to accommodate left-turn and right-turn lanes at intersections, or other improvements.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation

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5.3.7	Provide consideration to projects that have overriding regional or local benefits that would be desirable even though the LOS standards cannot be met. These projects would be required to analyze traffic impacts and mitigate such impacts to the extent that it is deemed feasible.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5.3.8	Pursue arterial improvements that link and/or cross the State route 60 (SR-60) Freeway, including an additional over-crossing at Graham Street.	This is an on-going policy. An additional over-crossing at Graham Street is shown as Initiative 4.6.4 of the City's Strategic Plan.	Transportation
5.3.9	Address additional widenings at arterials providing access to SR-60 at Day Street, Frederick Street/Pigeon Pass road and Perris Boulevard.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code. **A complete review of the Circulation Element will be accomplished with the next General Plan update.**	Transportation
Objective 5.4	Maximize efficiency of the regional circulation system through close coordination with state and regional agencies and implementation of regional transportation policies.	This is an on-going objective. The City works closely with all state and regional agencies to enhance the efficiency of the regional circulation system.	Transportation

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Policies:			
5.4.1	Coordinate with Caltrans and the Riverside County Transportation Commission (RCTC) to identify and protect ultimate rights-of-way, including those for freeways, regional arterial projects, transit, bikeways and interchange expansion.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code. **A complete review of the Circulation Element will be accomplished with the next General Plan update.**	Transportation
5.4.2	Coordinate with Caltrans and RCTC regarding the integration of Intelligent Transportation Systems (ITS) consistent with the principles and recommendations of the Inland Empire Regional ITS Architecture Project.	This is an on-going policy. It is implemented in accordance with the City's ITS Master Plan.	Transportation
5.4.3	Work with property owners, in cooperation with RCTC, to reserve rights-of-way for potential Community and Environmental Transportation Acceptability Process (CETAP) corridors through site design, dedication, and land acquisition, as appropriate.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code. **A complete review of the Circulation Element will be accomplished with the next General Plan update.**	Transportation
5.4.4	The City Council will commit to establishing ongoing relationships with all agencies that play a role in the development of the City's transportation system. Council members who are appointed to these agencies as City representatives shall seek out leadership roles to maximize their effectiveness on behalf of the City. Council will strive to maintain continuity in their appointments of representatives to promote effective representation.	This is an on-going policy. The Administrative Codes for various regional agencies define the requirements for elected officials to be represented on their Executive Boards.	Transportation

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5.4.5	Work with RCTC, WRCOG, and the TUMF Central Zone Committee to facilitate the expeditious construction of TUMF Network projects, especially projects that directly benefit Moreno Valley.	This is an on-going policy. The City has designated certain Public Works staff to represent Moreno Valley interests at various Technical Advisory meetings.	Transportation
5.4.6	Cooperatively participate with SCAG, RCTC, and WRCOG in the planning for a transportation system that anticipates regional needs for the safe and efficient movement of goods and people.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code. A complete review of the Circulation Element will be accomplished with the next General Plan update.	Transportation
5.4.7	Utilizing a combination of regional, state and federal funds, development impact fees, and other locally generated funds, provide needed improvements along SR 60 and the associated interchanges, including interchange and grade separation improvements.	This is an on-going policy. It is implemented in accordance with Chapters 3.44 and 9.11.080 of the Municipal Code.	Transportation
5.4.8	Reserve rights-of-way to accomplish future improvements as specified in the Caltrans District 8 Route Concept Fact Sheet for SR-60. Specifically, SR-60 shall be built to six general purpose lanes and two High Occupancy Vehicle (HOV) lanes through Moreno Valley. Additional auxiliary lanes may be required between interchanges. The need for auxiliary lanes will be determined from future studies.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code. **A complete review of the Circulation Element will be accomplished with the next General Plan update.**	Transportation
5.4.9	Lobby the State Legislature to keep triple trailer trucks off highways in developed areas of California.	This policy is out of date. Staff does not actively lobby against triple trailer trucks off highways.	Transportation

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Objective 5.5	Maximize efficiency of the local circulation system by using appropriate policies and standards to design, locate and size roadways.	This is an on-going objective primarily accomplished through provisions in Chapter 9.11.080 of the Municipal Code.	Transportation
Policies:			
5.5.1	Space Collectors between higher classification roadways within development areas at appropriate one-quarter mile intervals.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5.5.2	Provide dedicated left-turn lanes at all major intersections on minor arterials and higher classification roadways.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5.5.3	Prohibit points of access from conflicting with other existing or planned access points. Require points of access to roadways to be separated sufficiently to maintain capacity, efficiency, and safety of the traffic flow.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5.5.4	Wherever possible, minimize the frequency of access points along streets by the consolidation of access points between adjacent properties on all circulation element streets, excluding collectors.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5.5.5	Design streets and intersections in accordance with the Moreno Valley Municipal Code.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5.5.6	Consider the overall safety, efficiency and capacity of street designs as more important than the location of on-street parking.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation

Attachment: Appendix A to Annual Report - GP Goals and Policies (2426 : General Plan Annual Report)

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5.5.7	For developments fronting both sides of a street, require that streets be constructed to full width. Where new developments front only one side of a street, require that streets be constructed to half width plus an additional 12-foot lane for opposing traffic, whenever possible. Additional width may be needed for medians or left and/or right turn lanes.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5.5.8	Whenever possible, require private and public land developments to provide on-site and off-site improvements necessary to mitigate any development-generated circulation impacts. A review of each proposed land development project shall be undertaken to identify project impacts to the circulation system. The City may require developers to provide traffic impact studies prepared by qualified professionals to identify the impacts of a development.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5.5.9	Design curves and grades to permit safe movement of vehicular traffic per applicable Caltrans and Moreno Valley standards.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5.5.10	Provide adequate sight distances for safe vehicular movement at all intersections and driveways.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation

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5.5.11	Implement National Pollutant Discharge Elimination System Best Management Practices relating to construction of roadways to control runoff contamination from affecting water resources.	The National Pollutant Discharge Elimination System Best Management Practices are required for projects relating to the construction of roadways, to control runoff contamination from impacting water resources (ongoing).	Transportation
Objective 5.6	Support development of a ground access system to March Inland Port in accordance with its development plan as a major cargo airport.	This is an on-going objective. The City works closely with the March Joint Powers Authority in implementing strategies / development in support of a major cargo airport.	Transportation
Policies:			
5.6.1	Ensure that City arterials that provide access to and from March Inland Port are properly designed to accommodate projected traffic volumes, including truck traffic.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5.6.2	Ensure that traffic routes to March Inland Port are planned to minimize impacts to City residential communities.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
Objective 5.7	Design roads to meet the needs of the residents of the community without detracting from the "rural" atmosphere in designated portions of Moreno Valley. (Designated "rural" areas include those encompassed by the Residential Agriculture 2, Residential 1, Rural Residential and Hillside Residential zoning districts. "Urban" areas encompass all other zoning districts.)	This is an on-going objective. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
Policies:			

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5.7.1	Pursue development of modified sidewalk standards for local and collector roads within low density areas to reflect the rural character of those areas.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5.7.2	Provide sidewalks on arterials in designated low density areas that provide access to schools and bus stops.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
Objective 5.8	Encourage development of an efficient public transportation system for the entire community.	This is an on-going objective. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
Policies:			
5.8.1	Support the development of high-speed transit linkages, or express routes, that would benefit the citizens and employers of Moreno Valley.	This is an on-going policy. The City works closely with Riverside Transit Agency (RTA) in the implementation of Bus Rapid Transit routes as developed in the RTA Comprehensive Operational Analysis (COA).	Transportation
5.8.2	Support the efforts of the March Joint Powers Authority in its pursuit of a Transit Center.	This is an on-going policy. The City works closely with Riverside Transit Agency (RTA) in the implementation of recommended improvements developed in the RTA Comprehensive Operational Analysis (COA).	Transportation
5.8.3	Encourage public transportation opportunities that address the particular needs of transit dependent individuals in the City such as senior citizens, the disabled and low -income residents.	This is an on-going policy. The City works closely with Riverside Transit Agency (RTA) in the implementation of recommended improvements developed in the RTA Comprehensive Operational Analysis (COA).	Transportation

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5.8.4	Ensure that all new developments make adequate provision for bus stops and turnout areas for both public transit and school bus service.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5.8.5	Continue on-going coordination with transit authorities toward the expansion of transit facilities into newly developed areas.	This is an on-going policy. The City works closely with Riverside Transit Agency (RTA) in the implementation of recommended improvements developed in the RTA Comprehensive Operational Analysis (COA).	Transportation
Objective 5.9	Support and encourage development of safe, efficient and aesthetic pedestrian facilities.	This is an on-going objective. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
Policies:			
5.9.1	Encourage walking as an alternative to single occupancy vehicle travel, and help ensure the safety of the pedestrian as follows: (a) All new developments shall provide sidewalks in conformance with the City's streets cross-section standards, and applicable policies for designated urban and rural areas. (b) The City shall actively pursue funding for the infill of sidewalks in developed areas. The highest priority shall be to provide sidewalks on designated school routes.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.100 of the Municipal Code.	Transportation
5.9.2	Walkways shall be designed to minimize conflicts between vehicles and pedestrians.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.100 of the Municipal Code.	Transportation

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5.9.3	Where appropriate, provide amenities such as, but not limited to, enhanced paving, seating, and landscaping to enhance the pedestrian experience.	This is an on-going policy. New development is reviewed and conditioned to provide pedestrian friendly infrastructure in accordance with 9.11.100 of the Municipal Code.	Transportation
5.9.4	Require the provision of convenient and safe pedestrian access to buildings from the public sidewalk.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.100 of the Municipal Code.	Transportation
Objective 5.10	Encourage bicycling as an alternative to single occupant vehicle travel for the purpose of reducing fuel consumption, traffic congestion, and air pollution. The Moreno Bikeway Plan is shown in Figure 9-4.	This is an on-going objective. Bicycle Infrastructure is developed in accordance with the adopted Bicycle Master Plan.	Transportation
Policies:			
5.10.1	Bikeways shall link residential neighborhood areas with parks, employment centers, civic and commercial areas, and schools.	This is an on-going policy. Bicycle Infrastructure is developed in accordance with the adopted Bicycle Master Plan.	Transportation
5.10.2	Integrate bikeways, consistent with the Bikeway Plan, with the circulation system and maintain Class II and III bikeways as part of the City's street system.	This is an on-going policy. Bicycle Infrastructure is developed in accordance with the adopted Bicycle Master Plan.	Transportation
5.10.3	Support bicycle safety programs, and active enforcement of laws relating to the safe operation of bicycles on City streets.	This is an on-going policy. Bicycle Infrastructure is developed in accordance with the adopted Bicycle Master Plan.	Transportation

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5.10.4	Link local bikeways with existing and planned regional bikeways.	This is an on-going policy. Bicycle Infrastructure is developed in accordance with the adopted Bicycle Master Plan.	Transportation
Objective 5.11	Eliminate obstructions that impede safe movement of vehicles, bicyclists, and pedestrians.	This is an on-going objective. Bicycle Infrastructure is developed in accordance with the adopted Bicycle Master Plan.	Transportation

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Policies:			
5.11.1	Landscaping adjacent to City streets, sidewalks and bikeways shall be designed, installed and maintained so as not to physically or visually impede public use of these facilities. (a) The removal or relocation of mature trees, street trees and landscaping may be necessary to construct safe pedestrian, bicycle and street facilities. (b) New landscaping, especially street trees shall be planted in such a manner to avoid overhang into streets, obstruction of traffic control devices or sight distances, or creation of other safety hazards.	This is an on-going program. Transportation Engineering works closely with Special Districts to ensure existing and proposed landscaping does not interfere with traffic control devices or pose any problems for pedestrians and cyclists.	Transportation
5.11.2	Driveways shall be designed to avoid conflicts with pedestrian and bicycle travel.	This is an on-going policy. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
Objective 5.12	Promote efficient circulation planning for all school sites that will maximize pedestrian safety, and minimize traffic congestion and neighborhood impacts.	This is an on-going objective. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
Policies:			

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5.12.1	Coordinate with school districts to identify suggested pedestrian routes within existing and new subdivisions for school children to walk to and from schools and/or bus stops.	This is an on-going policy. The city has a robust Safe Routes to School Program which provides for designated walking routes, and school age pedestrian education / encouragement outreach efforts.	Transportation
9.5.3 Circulation Element Programs			
Programs:			Transportation
5-1	Periodically review current traffic volumes, traffic collision data, and the pattern of urban development to coordinate, program, and as necessary revise the planning and prioritization of road improvements.	This is an on-going program. It is implemented in accordance with Title 12 of the Municipal Code.	Transportation
5-2	Periodically, reassess the goals, objectives and policies statements of the Circulation Element and propose amendments, as necessary.	This is an on-going program. **A comprehensive review of the Circulation Element will be performed with the next update of the General Plan.**	Transportation
5-3	Develop a comprehensive strategy to ensure full funding of the circulation system. The strategy will include the DIF, TUMF, and other funding sources that may be available to the City. In addition, the creation of benefit assessment districts, and road and bridge fee districts may be considered where appropriate.	This is an on-going policy. It is implemented in accordance with Title 3 of the Municipal Code.	Transportation

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5-4	Develop a multi-year transportation infrastructure improvement program that, to the extent feasible, phases the construction of new projects in advance of new development.	This is a bi-annual City Capital Improvement Plan effort. It is implemented in accordance with the City's bi-annual budget process.	Transportation
5-5	The above referenced program will prioritize circulation improvement projects to be funded from DIF, TUMF and other sources. Prioritization to consider the following factors: (a) Traffic safety; (b) Congestion relief; (c) Access to new development; (d) Equitable benefit.	This is a bi-annual City Capital Improvement Plan effort. It is implemented in accordance with the City's bi-annual budget process.	Transportation

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
5-6	Conduct studies of specified arterial segments to determine if any additional improvements will be needed to maintain an acceptable LOS at General Plan build-out. Generally, these segments will be studied as new developments are proposed in their vicinity. Measures will be identified that are consistent with the Circulation Element designation of these roadway segments, such as additional turn lanes at intersections, signal optimization by coordination and enhanced phasing, and travel demand management measures. The study of specified arterial segments will be required to identify measures to maintain an acceptable LOS at General Plan build-out for at least one of the reasons discussed below: (a) Segments will need improvement, but their ultimate volumes slightly exceed design capabilities. (b) Segments will need improvements but require inter-jurisdictional coordination. (c) Segments would require significant encroachment on existing adjacent development if built-out to their Circulation Element designations.	This is an on-going program. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code. The Circulation Element will undergo an extensive analysis with the next update of the General Plan.	Transportation

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
5-7	Establish traffic study guidelines to deal with development projects in a consistent manner. The traffic study guidelines shall include criteria for projects that propose changes it the approved General Plan land uses.	This is an on-going program. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code. T**raffic study guidelines will be modified with the next update of the General Plan to ensure compliance with SB 743.**	Transportation
5-8	Develop access guidelines for arterials with commercial frontage to facilitate access to development and preservation of safe flow of traffic. A component of guidelines shall address shared access.	This is an on-going program. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5-9	Collaborate with all adjacent jurisdictions to implement and integrate right-of-way requirements and improvement standards for General Plan roads that cross-jurisdictional boundary.	This is an on-going program. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation

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5-10	Support regional projects that improve access to Moreno Valley. Examples of specific ongoing projects that should be supported include: (a) CETAP Cajalco alignment and extension to State Route 241 in Orange County; (b) CETAP Moreno Valley to San Bernardino alternative alignments including Reche Canyon Road / Reche Vista Road alignment and the Pigeon Pass Road to Pepper Avenue alignment; (c) TUMF Backbone Network projects to widen Alessandro Boulevard and Van Buren Boulevard; (d) Measure A projects to widen SR-60 through the Badlands, widen Interstate 215 (I-215) from Riverside interchange to Interstate 10, and extension of San Jacinto commuter rail line; (e) Construction of commuter rail stations in Highgrove, and at the intersection of Alessandro at I-215; (f) Construction of HOV ramp connector from westbound SR-60 to south bound I-215; (g) Widen SR-60/I-215 from Moreno Valley interchange to Riverside interchange.	This is an on-going program. The City has designated certain Public Works staff to represent Moreno Valley interests at various Technical Advisory meetings.	Transportation
5-11	Work with RCTC, Caltrans, County of Riverside, adjacent jurisdictions and other affected agencies to plan and develop a multi-modal transportation system.	This is an on-going program. The City works closely with regional partners in the development of a circulation system that supports all modes of transportation.	Transportation

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5-12	Coordinate with Caltrans to redesign and reconstruct the SR-60 interchanges with Day Street, Perris Boulevard, Nason Street, Moreno Beach Drive, Redlands Boulevard, Theodore Street and Gilman Springs Road.	This is completed in concert with the bi-annual City Capital Improvement Plan effort. It is implemented in accordance with the City's bi-annual budget process and Riverside County's bi-annual Federal Transportation Improvement Plan (FTIP) process. Nason Street interchange is complete	Transportation
5-13	Implement Transportation demand management (TDM) strategies that reduce congestion in the peak travel hours. Examples include carpooling, telecommuting, and flexible work hours.	This is an on-going program. It is implemented in accordance with Chapter 9.11.080 of the Municipal Code.	Transportation
5-14	Implement programs in support of the efforts of Riverside Transit Agency toward the expansion of the existing bus system within the City and the provision of future public transportation consistent with the Riverside County Transit Plan.	This is an on-going program. The City works closely with Riverside Transit Agency (RTA) in the implementation of recommended improvements developed in the RTA Comprehensive Operational Analysis (COA).	Transportation
5-15	Work with Riverside County Transportation Commission and Riverside Transit Agency to implement the Transit Oasis system.	This program is out of date. The City worked with RTA when they developed their Comprehensive Operational Analysis which is their long range planning document.	Transportation
5-16	Implement programs that mitigate on-street hazards for bicyclists.	This is an on-going program. Bicycle Infrastructure is developed in accordance with the adopted Bicycle Master Plan.	Transportation

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5-17	Pursue regional, state and federal grant opportunities to fund design and construction of the City bikeway system.	This is an on-going program. Bicycle Infrastructure funding opportunities are identified in the adopted Bicycle Master Plan.	Transportation
5-18	Pursue grant funding that supports traffic safety at and in the vicinity of school facilities.	This is an on-going program. The City aggressively pursues all traffic safety related grant funding.	Transportation

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
5-19	Work with school districts and private schools to identify school site locations and designs that will minimize traffic impacts and promote traffic safety.	This is an on-going program. The city has a robust Safe Routes to School Program which provides for designated walking routes, and school age pedestrian education / encouragement outreach efforts.	Transportation
5-20	Work with school districts and private schools to identify suggested school routes and drop-off/pick-up plans for cars and buses.	This is an on-going program. The city has a robust Safe Routes to School Program which provides for designated walking routes, and school age pedestrian education / encouragement outreach efforts.	Transportation
5-21	Work with school districts and private schools to develop and promote traffic safety education programs.	This is an on-going program. The city has a robust Safe Routes to School Program which provides for designated walking routes, and school age pedestrian education / encouragement outreach efforts.	Transportation
The City Structure Safety Element Goals, Objectives, Policies, and Programs			
9.6 Safety Element Goals, Objectives, Policies, and Programs			
9.6.1 Safety Element Goals			

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Goal 6.1	To achieve acceptable levels of protection from natural and man-made hazards to life, health, and property	1. The City of Moreno Valley has a robust, pro-active emergency management program that incorporates all elements of NIMS. 2. The City contracts with Cal-Fire for fire protection and emergency services. 3. the City's fire prevention and building safety divisions adopt and enforce the latest codes pertaining to structural, building construction and fire safety in the built environment.	Fire / Police / Building / Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Goal 6.2	To have emergency services which are adequate to meet minor emergency and major catastrophic situations.	1.The City contracts with Cal-Fire for fire protection and emergency services. The city has seven fire stations and access to a full complement of emergency services to respond to fires, medical emergencies, extrications, urban search and rescue, wild land fires, and swift water rescues. 2.Building and Safety Inspectors are trained through Cal OES and certified for the State of California in the Safety Assessment Program, for emergency assessment of all buildings and properties. 3. PD: The police department is almost fully staffed, and fully prepared to provide adequate services to meet emergency and catastrophic incident needs.	Fire / Police / Building
9.6.2 Safety Element Objectives and Goals			
Objective 6.1			
	Minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage due to seismic ground shaking and secondary effects.	All residential and commercial buildings and structures are built to the current 2016 California Building Codes part 1 &2, volume 1&2 for all seismic events.	Fire / Police / Building / Planning
Policies:			

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
6.1.1	Reduce fault rupture and liquefaction hazards through the identification and recognition of potentially hazardous conditions and areas as they relate to the San Jacinto fault zone and the high and very high liquefaction hazard zones. During the review of future development projects, the City shall require geologic studies and mitigation for fault rupture hazards in accordance with the Alquist-Priolo Special Study Zones Act. Additionally, future geotechnical studies shall contain calculations for seismic settlement on all alluvial sites identified as having high or very high liquefaction potential. Should the calculations show a potential for liquefaction, appropriate mitigation shall be identified and implemented.	1. All residential and commercial buildings and structures are built to the current 2016 California Building Codes part 1 &2, volume 1&2 for all seismic events . **Fire:** This is really a Building and Land Development thing. Fire should be removed.	Fire / Police / Building / Planning
6.1.2	Require all new developments, existing critical and essential facilities and structures to comply with the most recent Uniform Building Code seismic design standards.	All residential and commercial buildings and structures are built to the current 2016 California Building Codes part 1 &2, volume 1&2 for all seismic events . **Fire:** The City's building safety division adopts and enforces the latest California Building Code pertaining to structural and seismic safety in the built environment. This is an ongoing goal. See MVMC 8.20.	Fire / Police / Building

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Objective 6.2	Minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage, and to minimize nuisances due to flooding.	Currently being done consistent with Municipal Code capture 8.12 as well as Federal Emergency Management Agency (FEMA) requirements.	Land Development

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Policies:			
6.2.1	Permit only that development in 100-year floodplain that represents an acceptable use of the land in relation to the hazards involved and the costs of providing flood control facilities. Locate critical facilities, such as hospitals, fire stations, police stations, public administration buildings, and schools outside of flood hazard areas.	This item is currently applied consistently with Municipal Code Chapter 8.12 as well as Federal Emergency Management Agency (FEMA) requirements.	Land Development
6.2.2	Storm drains and catch basins owned and operated by the City shall be inspected, cleaned and maintained pursuant to an approved clean out schedule.	M&O maintains storm drains compliant with NPDES requirements consistent with Muni Code Chapter 8.10.	Land Development/M&O
6.2.3	Maximize pervious areas in order to reduce increases in downstream runoff resulting from new development.	This is accomplished through the review/implementation of WQMPs and site design features consistent with Municipal Code Chapters 9.16, 9.17, et al.	Land Development /Planning

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6.2.4	Design, construct and maintain street and storm drain flood control systems to accommodate 10 year and 100 year storm flows respectively.	Design of Street and storm drain flood control systems are accomplished through design review of improvement plans and studies consistent with Municipal Code Section 9.14.110. **Capital Projects:** This is completed in conjunction with Riverside County Flood Control and Water Conservation District's (RCFC&WCD) cooperation and funding. It is implemented in accordance with RCFC&WCD's annual Zone budget effort.	Land Development/M&O, Capital Projects
6.2.5	The storm drain system shall conform to Riverside County Flood Control and Water Conservation District master drainage plans and the requirements of the Federal Emergency Management Agency.	This item is accomplished through design review of improvement plans and studies consistent with Muni Code Chapter 8.12. **Capital Projects:** This is completed in conjunction with Riverside County Flood Control and Water Conservation District's (RCFC&WCD) cooperation and funding. It is implemented in accordance with RCFC&WCD's annual Zone budget effort.	Land Development/Capital Projects

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Objective 6.3	Provide noise compatible land use relationships by establishing noise standards utilized for design and siting purposes.	Chapter 9.10, Section 9.10.140 "Noise and Sound" of the Municipal Code provides standards for commercial and industrial uses. Additionally, Title 11, Chapter 11.80 "Noise Regulation" provides requirements for construction noise and times construction and grading can occur. This is an ongoing objective for all development.	Planning
Policies:			

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
6.3.1	The following uses shall require mitigation to reduce noise exposure where current or future exterior noise levels exceed 20 CNEL above the desired interior noise level: a. Single and multiple family residential buildings shall achieve an interior noise level of 45 CNEL or less. Such buildings shall include sound-insulating windows, walls, roofs and ventilation systems. Sound barriers shall also be installed (e.g. masonry walls or walls with berms) between single-family residences and major roadways. b. New libraries, hospitals and extended medical care facilities, places of worship and office uses shall be insulated to achieve interior noise levels of 50 CNEL or less. c. New schools shall be insulated to achieve interior noise levels of 45 CNEL or less.	Chapter 9.10, Section 9.10.140 "Noise and Sound" of the Municipal Code provides standards for commercial and industrial uses. Additionally, Title 11, Chapter 11.80 "Noise Regulation" provides regulations for construction noise and times construction and grading can occur. If CNEL levels are not met with the uses listed in this policy, mitigation measures for items such as installation shall be provided through the Noise Study and/or environmental document. This is an ongoing	Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
6.3.2	Discourage residential uses where current or projected exterior noise due to aircraft over flights will exceed 65 CNEL.	Title 11, Chapter 11.80 "Noise Regulation" provides requirements for residential uses noise and Section 9.07.060 of the Municipal Code provides standards consistent with the Air Installation Compatibility Zone (ACUZ) Use Overlay District. Land use and building restrictions are provided when exceeding noise levels or if development/use is not in compliance with ACUZ standards. This is an ongoing policy.	Planning
6.3.3	Where the future noise environment is likely to exceed 70 CNEL due to overflights from the joint-use airport at March, new buildings containing uses that are not addressed under Policy 6.3.1 shall require insulation to achieve interior noise levels recommended in the March Air Reserve Base Air Installation Compatible Use Zone Report.	Section 9.07.060, referring to the Air Installation Compatibility Zone (ACUZ) Use Overlay District, provides land use and building restrictions when exceeding noise levels or not in compliance with ACUZ standards. This is an ongoing policy.	Planning
6.3.4	Encourage residential development heavily impacted by aircraft over flight noise, to transition to uses that are more noise compatible.	Section 9.07.060 as well as ACUZ and/or standards required by the Airport Land Use Commission encourage non-compatible land uses to transition to more compatible uses.	Planning
6.3.5	Enforce the California Administrative Code, Title 24 noise insulation standards for new multi-family housing developments, motels and hotels.	Title 24 noise insulation standards for both new multi-family housing developments and hotels/motels are continually enforced through the California Administrative Code. This is an ongoing policy.	Planning

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6.3.6	Building shall be limited in areas of sensitive receptors.	Section 9.07.060 as well as ACUZ and/or Airport Land Use Commission regulations restricts or limits building within areas of sensitive receptors.	Planning
Objective 6.4	Review noise issues during the planning process and require noise attenuation measures to minimize acoustic impacts to existing and future surrounding land uses.	Potential Noise issues to surrounding land uses are reviewed through the project design review stage at the Project Review Staff Committee and through the California Environmental Quality Act (CEQA) standards. Mitigation measures for noise shall be provided in environmental documents to limit noise impacts. This is an ongoing City objective.	Planning
Policies:			
6.4.1	Site, landscape and architectural design features shall be encouraged to mitigate noise impacts for new developments, with a preference for noise barriers that avoid freeway sound barrier walls.	Specific design features are incorporated into projects during design review to minimize noise impacts. This could include site design features such as the placement of loading areas away from residential sensitive receptors, dense landscape and decorative walls. This is an ongoing policy.	Planning

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Objective 6.5	Minimize noise impacts from significant noise generators such as, but not limited to, motor vehicles, trains, aircraft, commercial, industrial, construction, and other activities.	Chapter 9.10, Section 9.10.120 "Performance Standards" of the Municipal Code requires all mechanical and electrical equipment associated with such items as vehicles, land use or construction etc. to screen and minimize potential noise in a manner that it does not disturb adjacent uses and activities. (Ongoing)	Planning
Policies:			
6.5.1	New commercial and industrial activities (including the placement of mechanical equipment) shall be evaluated and designed to mitigate noise impacts on adjacent uses	Chapter 9.16 "Design Guidelines", Sections 9.16.150 and 9.16.160 and Chapter 9.08, Section 9.08.150 of the Municipal Code provides general screening and buffer requirements for non-residential properties to other sensitive properties. This would include such items as trash areas, loading areas, ground-mounted equipment, roof mounted equipment etc. Chapter 9.10, Section 9.10.120 "performance Standards" of the Municipal Code requires all mechanical and electrical equipment associated with such items as vehicles, land use or construction etc. to screen and minimize potential noise in a manner that it does not disturb adjacent uses and activities. This is an ongoing policy.	Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
6.5.2	Construction activities shall be operated in a manner that limits noise impacts on surrounding uses.	Chapter 9.10, Section 9.10.140 "Noise and Sound" of the Municipal Code provides standards for commercial and industrial uses. Additionally, Title 11, Chapter 11.80 "Noise Regulation" provides regulations for construction noise and times construction and grading can occur. This is an ongoing policy.	Planning
Objective 6.6	Promote land use patterns that reduce daily automotive trips and reduce trip distance for work, shopping, school, and recreation.	The General Plan Land Use Map and the City's zoning map have provided land uses and patterns that reduce vehicle trips and distances for essential services. The City's Climate Action Plan also has provided strategies to reduce vehicle miles traveled. This is an ongoing objective.	Planning
Policies:			
6.6.1	Provide sites for new neighborhood commercial facilities within close proximity to the residential areas they serve.	The General Plan Land Use Map and the City's zoning map have provided land use designations and patterns that provide opportunities for residential areas to easily access neighborhood commercial areas (Ongoing)	Planning

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6.6.2	Provide multi-family residential development sites in close proximity to neighborhood commercial centers in order to encourage pedestrian instead of vehicular travel.	Zoning Maps provided in the Municipal Code are consistent with the General Plan land use maps and have provided multiple-family zoning near or adjacent to where neighborhood commercial zoned property is located. This is an ongoing policy.	Planning
6.6.3	Locate neighborhood parks in close proximity to the appropriate concentration of residents in order to encourage pedestrian and bicycle travel to local recreation areas.	Moreno Valley strives to locate neighborhood parks in close proximity to the development the park will serve. Examples of these are: Victoriano Park/School, El Potrero Park/School, Morrison Park, Westbluff Park, and Ridgecrest Park. Pedestrian and bicycle travel to the parks are encourage, as well as shopping areas around parks. On-going	Parks
Objective 6.7	Reduce mobile and stationary source air pollutant emissions.	Mobile and stationary source air pollution emissions are reviewed for most projects. For larger industrial projects, it is a primary objective to reduce air pollution sources. Air Quality is reviewed through the California Environmental Quality Act Guidelines and mitigation measures to reduce source are pollution emissions are a frequent occurrence. This is an ongoing City objective	Planning
Policies:			

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6.7.1	Cooperate with regional efforts to establish and implement regional air quality strategies and tactics.	The City complies with standards within the California Air Resources Board (CARB) South Coast Air Quality Management District SCAQMD) requirements and rules (i.e. Rule 403) regarding emissions and air quality strategies. Checks and balances are reviewed thoroughly in the appropriate project environmental document. This is an ongoing policy.	Planning
6.7.2	Encourage the financing and construction of park-and-ride facilities.	This is an on-going policy. The City works closely with Caltrans and RCTC in the development of Park and Ride Facilities.	Transportation
6.7.3	Encourage express transit service from Moreno Valley to the greater metropolitan areas of Riverside, San Bernardino, Orange and Los Angeles Counties.	This is an on-going policy. The City works closely with Riverside Transit Agency (RTA) in the implementation of recommended improvements developed in the RTA Comprehensive Operational Analysis (COA).	Transportation
6.7.4	Locate heavy industrial and extraction facilities away from residential areas and sensitive receptors.	Chapter 9.05 provides Good Neighbor standards for the location of heavy industrial uses away from residential uses. Examples of established buffer areas in large industrial projects are within the World Logistics Specific Plan and the Industrial Area Plan (SP 208), each separating industrial uses from residential uses.	Planning

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6.7.5	Require grading activities to comply with South Coast Air Quality Management District's Rule 403 regarding the control of fugitive dust.	All grading activities comply with the South Coast Air Quality Management Districts Rule 403. Conditions of approval on projects confirm control of fugitive dust by such measures as continual watering of the site and restriction of grading during higher wind events. This is an ongoing policy.	Planning
6.7.6	Require building construction to comply with the energy conservation requirements of Title 24 of the California Administrative Code.	All residential and commercial buildings and structures are built to the current 2016 California Energy and Green Codes for all new and remodeled and tenant improvement project.	Building
Objective 6.8	As feasible given budget constraints, strive to maintain a police force with a ratio of one sworn officer for each 1,000 residents.	Fire should be removed from this item PD: The county continues to fill open positions and the new contract allows for two additional sworn officers.	Police / Fire
Policies:			
6.8.1	Explore the most effective and economical means of providing responsive and adequate law enforcement protection in the future.	Fire should be removed from this item PD: Senior leadership continues to work toward improving community policing programs, reducing crime, improving service and reducing costs.	Police / Fire

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Objective 6.9	Reduce the risk and fear of crime through physical planning strategies that maximize surveillance opportunities and minimize opportunities for crime found in the present and future built environment, and by creating and maintaining a high level of community awareness and support of crime prevention.	Fire should be removed from this item PD: Senior leadership continues to work toward improving community policing programs, reducing crime, improving service delivery, and improving the perception of safety in the city. New patrol tactics, team deployments, social media platforms, and crime analysis strategies are being used to maximize our efforts.	Police / Fire
Policies:			
6.9.1	Promote the establishment of neighborhood and business watch programs to encourage community participation in the patrol of neighborhood areas, and increased awareness of any suspicious activity.	Fire should be removed from this item PD: Our Community Services Unit and Problem Oriented Policing Teams continues to work with neighborhood watch programs, businesses, and apartment managers to encourage community participation in the patrol of neighborhood areas, and increased awareness of any suspicious activity. A social media component is in the works to assist with these programs as well.	Police / Fire

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6.9.2	Require well-lighted entrances, walkways and parking lots, street lighting in all commercial, industrial areas and multiple-family residential areas to facilitate nighttime surveillance and discourage crime.	Fire should be removed from this item PD: Crime Prevention through Environmental Design (CPTED) Concepts are provided to businesses and homeowners via an inspection process handled by the Department's Community Services Unit.	Police / Fire
6.9.3	Incorporate "defensible space" concepts into the design of dwellings and nonresidential structures, including, but not limited to configuration of lots, buildings, fences, walls and other features that facilitate surveillance and reinforce a sense of territorial control.	Fire should be removed from this item PD: Crime Prevention through Environmental Design (CPTED) Concepts are provided to businesses and homeowners via an inspection process handled by the Department's Community Services Unit.	Police / Fire /Planning
Objective 6.10	Protect life and property from the potential short-term and long-term deleterious effects of the necessary transportation, use, storage treatment and disposal and hazardous materials and waste within the City of Moreno Valley.	The Fire Prevention Division strives to inspect business occupancies who store, handle, use hazardous materials on an annual basis. The latest California Fire Code regulations pertaining to hazardous materials processes are enforced.	Fire
Policies:			
6.10.1	Require all land use applications and approvals to be consistent with the siting criteria and other applicable provisions of the adopted Hazardous Waste Management Plan, which is also incorporated into and as part of the General Plan.	The Hazardous Waste Management Plan.	Waste Coordinator

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6.10.2	Manage the generation, collection, storage, processing, treatment, transport and disposal of hazardous waste in accordance with provisions of the City of Moreno Valley's adopted Hazardous Waste Management Plan, which is also incorporated into and as part of the General Plan.	The Hazardous Waste Management Plan. Host hazardous waste collection events; educate residents how to properly handle and dispose of hazardous waste; support Riverside County's efforts to provide residents and businesses with opportunities to dispose of hazardous waste properly. Work with Federal, State and County agencies to identify and regulate the use and disposal of toxic waste.	Waste Coordinator
Objective 6.11	Maintain an integrated emergency management program that is properly staffed, trained, and equipped for receiving emergency calls, providing initial response, providing for key support to major incidents.	1. The City of Moreno Valley has a robust, pro-active emergency management program that incorporates all elements of NIMS. 2. The City contracts with Cal-Fire for fire protection and emergency services.	Fire
Policies:			
6.11.1	Respond to any disaster situation in the City to provide necessary initial response and providing for key support to major incidents.	1. The City of Moreno Valley has a robust, pro-active emergency management program that incorporates all elements of NIMS. 2. The City contracts with Cal-Fire for fire protection and emergency services.	Emergency Operations / Fire

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6.11.2	Provide emergency first aid treatment when necessary.	1. The City of Moreno Valley has a robust, pro-active emergency management program that incorporates all elements of NIMS. 2. The City contracts with Cal-Fire for fire protection and emergency services.	Emergency Operations / Fire
6.11.3	Support the maintenance of a trauma center within the City.	The City contracts with Cal-Fire for fire protection and emergency services.	Emergency Operations / Fire
6.11.4	Aggressively attack uncontrolled fires and hold losses to a minimum.	The City contracts with Cal-Fire for fire protection and emergency services.	Fire
6.11.5	Minimize uncontrolled fires through support of weed abatement programs.	The Fire Prevention Division has a pro-active hazard abatement program in which all vacant parcels are inspected on an annual basis to ensure proper maintenance is being conducted by property owners.	Fire
Objective 6.12			
	Coordinate with Federal, State and County agencies and neighboring communities in developing a regional system to respond to emergencies and major catastrophes.	1. The City of Moreno Valley has a robust, pro-active emergency management program that incorporates all elements of NIMS. 2. The City contracts with Cal-Fire for fire protection and emergency services.	Emergency Operations / Fire
Policies:			

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6.12.1	Support mutual aid agreements and communication links with the County of Riverside and other local participating jurisdictions.	1. The City of Moreno Valley has a robust, pro-active emergency management program that incorporates all elements of NIMS. 2. The City contracts with Cal-Fire for fire protection and emergency services.	Emergency Operations / Fire
Objective 6.13	Maintain fire prevention, fire-related law enforcement, and public education and information programs to prevent fires.	The Fire Prevention division conducts inspections on multi-family dwellings, schools, hospitals, and business occupancies and provides education to residents and business owners regarding fire code violations and other potential safety problems.	Emergency Operations / Fire
Policies:			
6.13.1	Provide fire safety education to residents of appropriate age.	The Fire Prevention division conducts inspections on multi-family dwellings, schools, hospitals, and business occupancies and provides education to residents and business owners regarding fire code violations and other potential safety problems. The fire department participates in a number of public events throughout the year providing public education to our residents.	Fire

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Objective 6.14	Maintain the capacity to respond rapidly to emergency situations.	1. The City of Moreno Valley has a robust, pro-active emergency management program that incorporates all elements of NIMS. 2. The City contracts with Cal-Fire for fire protection and emergency services.	Fire
Policies:			
6.14.1	Locate fire stations in accordance with the Fire Station Master Plan as shown in Figure 6-1. The exact location of each fire station may be modified based on availability of land and other factors.	Since the general plan was written, Station 58 was added off Moreno Beach and Auto Mall Dr. and Station 99 was added at Morrison and Cottonwood.	Fire
6.14.2	Relate the timing of fire station construction to the rise of service demand in surrounding areas.	1. Demand for service is continually monitored by Cal-Fire and recommendations are brought to the city.	Fire

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Objective 6.15	Ensure that property in or adjacent to wildland areas is reasonably protected from wildland fire hazard, consistent with the maintenance of a viable natural ecology.	1. The Fire Prevention Division has a pro-active hazard abatement program in which all vacant parcels are inspected on an annual basis to ensure proper maintenance is being conducted by property owners. 2. During development, the Fire Prevention division ensures that all Wildland Urban Interface developments meet the construction requirements of the California Fire and Building Codes.	Fire
Policies:			
6.15.1	Encourage programs to minimize the fire hazard, including but not limited to the prevention of fuel build-up where wildland areas are adjacent to urban development.	1. The Fire Prevention Division has a pro-active hazard abatement program in which all vacant parcels are inspected on an annual basis to ensure proper maintenance is being conducted by property owners. 2. During development, the Fire Prevention division ensures that all Wildland Urban Interface developments meet the construction requirements of the California Fire and Building Codes.	Fire

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6.15.2	Tailor fire prevention measures implemented in wildland areas to both the aesthetic and functional needs of the natural environment.	1. The Fire Prevention Division has a pro-active hazard abatement program in which all vacant parcels are inspected on an annual basis to ensure proper maintenance is being conducted by property owners. 2. During development, the Fire Prevention division ensures that all Wildland Urban Interface developments meet the construction requirements of the California Fire and Building Codes.	Fire
Objective 6.16	Ensure that uses within urbanized areas are planned and designed consistent with accepted safety.	1. The Fire Prevention Division has a pro-active hazard abatement program in which all vacant parcels are inspected on an annual basis to ensure proper maintenance is being conducted by property owners. 2. During development, the Fire Prevention division ensures that all Wildland Urban Interface developments meet the construction requirements of the California Fire and Building Codes.	Fire
Policies:			

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
6.16.1	Ensure that ordinances, resolutions and policies relating to urban development are consistent with the requirements of acceptable fire safety, including requirements for smoke detectors, emergency water supply and automatic fire sprinkler systems.	1. The Fire Prevention division enforces the latest state adopted California Fire Code to ensure appropriate fire protection systems are installed. 2. Annual inspections are conducted as resources permit to ensure fire protection systems are properly maintained.	Fire
6.16.2	Encourage the systematic mitigation of existing fire hazards related to land urban development or patterns of urban development as they are identified and as resources permit.	The Fire Prevention division conducts annual inspections as resources permit to ensure fire protection systems are properly maintained, egress and ingress are provided for, and that other hazards are mitigated as required.	Fire
6.16.3	Ensure that adequate emergency ingress and egress is provided for each development.	1. The Fire Prevention division reviews all new developments for sufficient ingress, egress, and water supply. 2. The Fire Prevention division conducts annual inspections as resources permit to ensure fire protection systems are properly maintained, egress and ingress are provided for, and that other hazards are mitigated as required.	Fire

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6.16.4	Within the safety zones (e.g. Air Crash Hazard Zones and Clear Zones) shown in Figure 6-5, residential uses shall not be permitted, and business uses shall be restricted to low intensity uses as defined in the March Air Reserve Base Air Installation Compatible Use Zone Report, as amended from time to time.	Residential uses are generally not permitted and businesses shall be restricted to low intensity uses within air crash hazard and clear zones. This use is monitored and regulated by March Air Reserve Base Air Installation Compatible Use Zones and the Airport Land Use Commission (ALUC), This is an ongoing policy.	Planning
Objective 6.17	Provide non-emergency public services provided that such demands do not interfere with fire protection and other emergency services.	1. The City of Moreno Valley has a robust, pro-active emergency management program that incorporates all elements of NIMS.	Fire
9.6.3 Safety Element Programs			
Programs:			
6-1	Request that public utility companies inspect their facilities and distribution networks to determine the potential impact of earthquake damage.	**MVU** routinely inspects all facilities and performs any necessary repairs. Fire: 1. The City of Moreno Valley has a robust, pro-active emergency management program that works closely with local hospitals, utilities and other critical infrastructure.	Fire/MVU
6-2	Evaluate historic buildings relative to the need for mitigation of geologic hazards, while weighing their historical value against the potential hazard of their collapse.	All residential and commercial buildings and structures are built to the current 2016 California Building Codes for all renovations to historic buildings	Building

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
6-3	Reevaluate designated truck routes in terms of noise impact on existing land uses to determine if those established routes and the hours of their use should be adjusted to minimize exposure to truck noise.	This is an on-going program. It is accomplished through provisions of Title 12 of the Municipal Code. A comprehensive review of the designated truck routes will be performed with the General Plan update.	Transportation
6-4	Review existing ordinances to ensure that building and site design standards specifically address crime prevention utilizing defensible space criteria. Incorporate security standards into the Municipal Code.	No action has been taken in this area; however, the Department's Community Services Unit can begin working on this immediately.	Police/Planning
6-5	Seek state and federal grants to offset any required additions in law enforcement staffing and/or equipment.	Senior police leadership is constantly on the lookout out for grant opportunities. Similarly, the Riverside County Sheriff's Department assists in this effort by applying for grants on the police department's behalf. All grant awards are sent to the city for approval before acceptance. The police department is currently utilizing serval grants to fund equipment purchases and staff positions.	Police

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
6-6	Update the Fire Protection Master Plan as conditions warrant.	1. Demand for service is continually monitored by Cal-Fire and recommendations are brought to the city.	Fire
6-7	Establish regulations for development along the urban-wildland interface.	1. The Fire Prevention Division has a pro-active hazard abatement program in which all vacant parcels are inspected on an annual basis to ensure proper maintenance is being conducted by property owners. 2. During development, the Fire Prevention division ensures that all Wildland Urban Interface developments meet the construction requirements of the California Fire and Building Codes.	Fire
6-8	Establish criteria for the design, maintenance, modification and replacement of fire facilities.	1. Demand for service is continually monitored by Cal-Fire and recommendations are brought to the city.	Fire

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
6-9	Establish criteria for weed abatement programs.	1. The Fire Prevention Division has a pro-active hazard abatement program in which all vacant parcels are inspected on an annual basis to ensure proper maintenance is being conducted by property owners. 2. During development, the Fire Prevention division ensures that all Wildland Urban Interface developments meet the construction requirements of the California Fire and Building Codes.	Fire
The City Structure Conservation Element Goals, Objectives, Policies, and Programs			
9.7 Conservation Element Goals, Objectives, Policies, and Programs			
9.7.1 Conservation Element Goals			
Goal 7.1	To achieve the wise use of natural resources within the City of Moreno Valley, its sphere of influence and planning area.	The City continues to adhere to Goal 7.1, which includes conservation of natural resources within the city limits and is sphere of influence.	Planning
9.7.2 Conservation Element Objectives and Goals			
Objective 7.1	Minimize erosion problems resulting from development activities.	Accomplished through grading and erosion control plans consistent with Municipal Code Chapter 8.21.	Land Development
Policies:			
7.1.1	Require that grading plans include appropriate and feasible measures to minimize erosion, sedimentation, wind erosion and fugitive dust.	Grading plans are reviewed for these aspects consistent with Municipal Code Chapter 8.21.	Land Development

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
7.1.2	Circulation patterns within newly developing portions of Moreno Valley, particularly in hillside areas, should follow natural contours to minimize grading.	Circulation patterns are accomplished through review of site plans and tract maps consistent with Municipal Code Chapters 8.21 and 9.16	Land Development
Objective 7.2	Maintain surface water quality and the supply and quality of groundwater.	Surface water quality is achieved through the review and implementation of WQMPs consistent with Municipal Code Chapter 8.10.	Land Development
Policies:			
7.2.1	New development may use individual wells only where an adequate supply of good quality groundwater is available.	Well installation is governed by Riverside County Department of Environmental Health.	Land Development
7.2.2	The City shall comply with the provisions of its permit(s) issued by the Regional Water Quality Control Board for the protection of water quality pursuant to the National Pollutant Discharge Elimination System.	This is an on-going policy, consistent with Municipal Code Chapter 8.10.	Land Development
7.2.3	In concert with the water purveyor identify aquifer recharge areas and establish regulations to protect recharge areas and regulate new individual wells.	To date, this item is not required. Wells governed by Riverside County Department of Environmental Health. **This policy may need to be reviewed further with the next comprehensive General Plan update.**	Land Development

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Objective 7.3	Minimize the consumption of water through a combination of water conservation and reuse.	To date, this item is not required. Wells are governed by Riverside County Department of Environmental Health. **This policy may need to be reviewed further with the next comprehensive General Plan update.**	Land Development/Planning/Special Districts
Policies:			
7.3.1	Require water conserving landscape and irrigation systems through development review. Minimize the use of lawn within private developments, and within parkway areas. The use of mulch and native and drought tolerant landscaping shall be encouraged.	The City's Water Conservation Landscape Ordinance as approved in 2009 requires water conservation landscape and irrigation systems in all development review. City uses Public Works Department Landscape Design Guidelines, Planning Division Landscape Standards and Municipal Code Chapter 17, Title 9 when reviewing and approving landscape plans for public landscape. In 2016, non-functional turf (irrigated with potable water) was removed in all publically maintained medians and parkway and replaced with drought tolerant landscaping and water efficient irrigation. This is an ongoing policy.	Planning
7.3.2	Encourage the use of reclaimed wastewater, stored rainwater, or other legally acceptable non-potable water supply for irrigation.	Land Development contributes to reuse through review/implementation of WQMPs consistent with Municipal Code Chapter 8.10.	Land Development/Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Objective 7.4	Maintain, protect, and preserve biologically significant habitats where practical, including the San Jacinto Wildlife Area, riparian areas, habitats of rare and endangered species, and other areas of natural significance.	The Planning Division, through the provisions of the Western Riverside County Multi-species Habitat Conservation Plan. assures that biologically significant habitats are protected and preserved during site design review at the Project Review Staff Committee. This is an ongoing objective.	Planning
Policies:			
7.4.1	Require all development, including roads, proposed adjacent to riparian and other biologically sensitive habitats to provide adequate buffers to mitigate impacts to such areas.	Development or public rights of way proposed adjacent to significant habitats are protected and preserved during site design review and review at the Project Review Staff Committee. This is an ongoing policy.	Planning
7.4.2	Limit the removal of natural vegetation in hillside areas when retaining natural habitat does not pose threats to public safety.	1. The Fire Prevention Division has a pro-active hazard abatement program in which all vacant parcels are inspected on an annual basis to ensure proper maintenance is being conducted by property owners.	Fire
7.4.3	Preserve natural drainage courses in their natural state and the natural hydrology, unless the protection of life and property necessitate improvement as concrete channels.	Accomplished through site design consistent with Municipal Code Chapters 8.12, 8.21, and 9.16.	Planning / Land Development

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7.4.4	Incorporate significant rock formations into the design of hillside developments.	Natural rock formations are incorporated into design of hillside residential developments through Municipal Code standards included in Section 9.03.040 "Residential Site Development Standards" and Section 9.16.190 "Natural Open Space Standards". Section 9.03.060 "Planned Unit Developments" also incorporates the conservation of Cultural and Natural Resources. This is an ongoing policy.	Planning
7.4.5	The City shall fulfill its obligations set forth within any agreement(s) and permit(s) that the City may enter into for the purpose of implementing the Western Riverside County Multi-species Habitat Conservation Plan.	This goal is satisfied through the Western Riverside County Multi-Species Habitat Conservation Plan (MSHCP) approved on June 17, 2003, The MSHCP Plan was incorporated by the City of Moreno Valley and the City fulfills its obligations for implementing the Plan regarding agreements, permits, review of cell groups etc. This is an ongoing policy.	Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Objective 7.5	Encourage efficient use of energy resources.	The City's adopted Climate Action Strategy provides strategies for efficient use of energy resources citywide. MVU regularly forecasts demand for energy and procures enough energy to meet demand. A portion of the energy is from renewable resources, such as wind and solar. This is an ongoing objective.	Planning/MVU

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Policies:			
7.5.1	Encourage building, site design, and landscaping techniques that provide passive heating and cooling to reduce energy demand.	Building, site design and landscaping techniques that provide passive heating and cooling as well as energy reduction are achieved by following the current 2016 California Energy and Green Code for reference. MVU has established Energy Efficiency Programs for residential and commercial customers that provide rebates and incentives for the installation of energy saving projects, including window film and cool roof applications.	Building/Planning /MVU

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7.5.2	Encourage energy efficient modes of transportation and fixed facilities, including transit, bicycle, equestrian, and pedestrian transportation. Emphasize fuel efficiency in the acquisition and use of City-owned vehicles.	**MVU:** In March 2016, MVU completed the installation of electric vehicle charging stations that are available to the public. Installation of additional electric vehicle charging stations at City Hall will begin in February 2017. **Transportation:** This is an on-going policy. It is accomplished through implementation of the Bicycle Master Plan, continued development of the Safe Routes to School program, and support of the recommendations within RTA's Comprehensive Operational Analysis. Also Public Works uses fuel efficiency as a major factor in the acquisition of City vehicles.	Transportation/MVU
7.5.3	Locate areas planned for commercial, industrial and multiple family density residential development within areas of high transit potential and access.	The General Plan Land Use Map and the City's zoning map have provided land use designations and patterns that provide opportunities for commercial, industrial and multiple-family residential development to locate within areas of high transit potential and access. New plans such as the Nason Corridor and Alessandro Corridor have provided additional opportunities for development near transit corridors. This is an ongoing policy.	Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
7.5.4	Encourage efficient energy usage in all city public buildings.	Efficient energy usage in all city public buildings is achieved by following the current 2016 California Energy and Green Code for reference. MVU works with Facilities to implement energy efficient measures in MVU-served city facilities. Examples include lighting retrofits at the Conference and Rec Center and the Animal Shelter. This is an ongoing policy.	Building/MVU
7.5.5	Encourage the use of solar power and other renewable energy systems.	The use of solar power and other renewable energy systems is achieved by following the current 2016 California Energy and Green Code and by goals included in the City's Climate Action Plan. MVU has a solar program for residential and commercial customers. To date, MVU customers have installed over 6 MW of solar.	Planning / Building
Objective 7.6	Identify and preserve Moreno Valley's unique historical and archaeological resources for future generations.	The City has identified historical and archeological resources for preservation purposes. This includes review of historic resources through project review under the California Environmental Quality Act (CEQA) and archeological resources through Native American Tribal entity review and general Archeological Studies through CEQA review. This is an ongoing objective of the City.	Planning / Building
Policies:			

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
7.6.1	Historical, cultural and archaeological resources shall be located and preserved, or mitigated consistent with their intrinsic value.	Through environmental review and required technical studies, project conditions of approval and coordination with Native American Tribes,, mitigation measures are provided to conserve cultural resources that are uncovered during excavation and construction act ivies This is an ongoing policy.	Planning
7.6.2	Implement appropriate mitigation measures to conserve cultural resources that are uncovered during excavation and construction activities.	Through environmental review and required technical studies, project conditions of approval and coordination with Native American Tribes, mitigation measures are provided to conserve cultural resources that are uncovered during excavation and construction activities This is an ongoing policy.	Planning
7.6.3	Minimize damage to the integrity of historic structures when they are altered.	Altered structures are reviewed internally with Building and Planning staff and on an individual basis with the Environmental and Historical Preservation Board. This is an ongoing policy.	Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
7.6.4	Encourage restoration and adaptive reuse of historical buildings worthy of preservation.	Restoration and adaptive reuse to preserve historical buildings are reviewed internally with Building and Planning staff and on an individual basis with the Environmental and Historical Preservation Board. This is an ongoing policy.	Planning
7.6.5	Encourage documentation of historic buildings when such buildings must be demolished.	When historic buildings must be demolished, they are first reviewed by the Environmental and Historical Preservation Board. Any documentation would occur through the Building and Safety Division.	Planning
Objective 7.7	Where practical, preserve significant visual features significant views and vistas.	Review of development projects through Project Staff Review strive to preserve visual features, significant views and vistas. The item is further reviewed through Appendix G, "Aesthetics" and "Cultural Resources" of the California Environmental Quality Act (CEQA Guidelines. This is an ongoing objective.	Planning
Policies:			

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
7.7.1	Discourage development directly upon a prominent ridgeline.	Section 9.03.040 B "Residential Site Development Standards" of the Municipal Code establishes standards for hillside residential development consistent with the goals, objectives and policies of the General Plan. Allowable development would preserve natural hillsides and ridgelines. **Goals, objectives and policies of hillside residential development will be further evaluated with the next comprehensive General Plan update**.	Planning
7.7.2	Require new electrical and communication lines to be placed underground.	This item is accomplished through site design consistent with Municipal Code Section 9.14.130.	Land Development
7.7.3	Implement reasonable controls on the size, number and design of signs to minimize degradation of visual quality.	Sign regulations included in Chapter 9.12 "Sign Regulations" provides controls on size, number and design of signs. Sign programs for larger commercial and industrial sites also provide regulations that are consistent with the Municipal Code and General Plan policy.	Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
7.7.4	Gilman Springs Road, Moreno Beach Drive, and State Route 60 shall be designated as local scenic roads.	Caltrans manages the Scenic Highway Program in accordance with State Scenic Highway Guidelines and Sections 260 through 263 of the Streets and Highways Code. A county highway component was added to the Program in Section 154 of the Streets and Highways Code. Key criteria include memorable landscape, minimal intrusions, local support, and length not less than 1 mile.	Transportation/Planning
7.7.5	Require development along scenic roadways to be visually attractive and to allow for scenic views of the surrounding mountains and Mystic Lake.	Development along scenic roadways and the allowance for scenic views of the surrounding mountains are achieved through environmental review and Appendix N "Aesthetics" of the California Environmental Quality Act Guidelines.	Building/Planning
7.7.6	Minimize the visibility of wireless communication facilities by the public. Encourage "stealth" designs and encourage new antennas to be located on existing poles, buildings and other structures.	Chapter 9.09, Section 9.09.040 "Communication facilities, antennas and satellite dishes includes standards to minimize the visibility of wireless communications and encourages stealth designs. Co-location of facilities are encouraged. This is an ongoing policy.	Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Objective 7.8	Maintain an adequate system of solid waste collection and disposal to meet existing and future needs.	Maintain an adequate system of solid waste collection and disposal to meet existing and future needs: Franchise agreement is in place, continued update/amendments as existing and future needs change and or emerge.	Waste Coordinator

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Policies:			
7.8.1	Encourage recycling projects by individuals, non-profit organizations, or corporations and local businesses, as well as programs sponsored through government agencies.	Encourage recycling projects by individuals, non-profit organizations, or corporations and local businesses, as well as programs sponsored through government agencies. The City of Moreno Valley actively encourages recycling projects and promotes participation in Keep Moreno Valley Clean and Beautiful (KMVCB); and educates groups regarding recyclable materials guidelines and goals. The City is involved in extensive outreach and education activities with respect to the three R's: reduce, reuse, recycle.	Waste Coordinator
9.7.3 Conservation Element Programs			
Programs:			

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
7-1	Support regional solid waste disposal efforts by the County of Riverside.	**Capital Projects:** The City offers a number of waste reduction, recycling and community clean-up programs. There is a franchise agreement in place with a major solid waste/recycling (AB 939) hauler, for residential (curbside) and commercial (AB 341) materials, that has resulted in the attainment of significant diversion. The City in partnership with Riverside County hosts biannual hazardous and electronic waste collections and community outreach events. The City is implementing AB 1826, requiring businesses to recycle their organic waste. The City has implemented a used motor oil and filters recycling public education program, and promotes Riverside County's free Backyard Composting Workshops, where residents can learn to properly compost green waste.	Waste Coordinator/M&O/Capital Projects
7-2	Advocate for natural drainage channels to the Riverside County Flood Control District, in order to assure the maximum recovery of local water, and to protect riparian habitats and wildlife.	This item is accomplished through site design and coordination with Flood Control consistent with Municipal Code Chapter 8.12.	Land Development /Capital Projects

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7-3	Maintain a close working relationship with EMWD to ensure that EMWD plans for and is aware of opportunities to use reclaimed water in the City.	A close working relationship is maintained with EMWD on all projects to review reclaimed water opportunities in the City	Land Development/Special Districts
7-4	Provide guidelines for preferred planting schemes and specific species to encourage aesthetically pleasing landscape statements that minimize water use.	Current Landscape Development Guidelines and Specifications in the Municipal Code provide preferred planting schemes and aesthetically pleasing landscape statements that minimize water use and require drought tolerant species. This is an ongoing policy.	Planning
7-5	Develop incentives where appropriate, for the maintenance and sensitive rehabilitation of historic structures and properties.	Although historic structures and properties are reviewed and conserved, specific incentives have not been developed for maintenance and sensitive rehabilitation of historic structures. **This item shall be further reviewed and evaluated in the next comprehensive General Plan update.**	Planning

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7-6	In areas where archaeological or paleontological resources are known or reasonably expected to exist, based upon the citywide survey conducted by the UCR Archaeological Research Unit, incorporate the recommendations and determinations of that report to reduce potential impacts to levels of insignificance.	Archeological and paleontological resources are reviewed through face to face meetings with Native American Tribes and review of studies that determine where resources lie. One such vehicle to review resources is the studies and reports provided by the UCR Archaeological Research Unit. The City incorporates the recommendations and determinations of these reports into the review of proposed development projects to reduce any noted impacts to levels of insignificance. This is an ongoing policy.	Planning
The City Structure Housing Element Goals, Objectives, Policies, and Programs			
9.8 Housing Element Goals, Objectives, Policies, and Programs			
9.8.1 Housing Element Goals			
Goal 8.1	Improve and maintain decent, sanitary and affordable housing.	**Housing:** Following the dissolution of RDA, there are no currently active programs due to limited or no funding available. The Housing Authority is continuing to monitor previously funded affordable units.	Housing/Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Goal 8.2	Improve and maintain decent, sanitary and affordable housing for very-low income households and seniors.	**Housing:** Following the dissolution of RDA, there are no currently active programs due to limited or no funding available. The Housing Authority is continuing to monitor previously funded affordable units.	Housing/Planning
Goal 8.3	Reduce substandard housing and health and safety violations.	**Housing:** Following the dissolution of RDA, there are no currently active programs due to limited or no funding available. The Housing Authority is continuing to monitor previously funded affordable units.	Housing/Planning
Goal 8.4	Assist in the revitalization of older neighborhoods.	**Housing:** Following the dissolution of RDA, there are no currently active programs due to limited or no funding available.	Housing/Planning
Goal 8.5	Improve and maintain decent and affordable rental housing.	**Housing:** Following the dissolution of RDA, there are no currently active programs due to limited or no funding available. The Housing Authority is continuing to monitor previously funded affordable units.	Housing/Planning
Goal 8.6	Assist very low, low and moderate-income first time buyers to purchase homes.	**Housing:** Following the dissolution of RDA, there are no currently active programs due to limited or no funding available.	Housing/Planning

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Goal 8.7	Add to the number of affordable rental units for very low and low-income households.	**Housing:** Following the dissolution of RDA, there are no currently active programs due to limited or no funding available. The Housing Authority is continuing to seek new opportunities to develop new units.	Housing/Planning
Goal 8.8	Create affordable housing units for senior households.	**Housing:** Following the dissolution of RDA, there are no currently active programs due to limited or no funding available. The Housing Authority is continuing to seek new opportunities to develop new units.	Housing/Planning
9.8.2 Housing Element Objectives and Policies			
Objective 8.1	Rehabilitate a minimum of fifteen single- family homes under the Home Improvement Loan Program (HILP).	From the 2014-2021 Housing Element Update -The Home Improvement Loan Program is on hold pending identification of new funding source. The program was previously funded by Redevelopment Agency. **Housing:** The program has met its goal and is currently no longer active due to funding.	Housing/Planning

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Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Objective 8.2	Rehabilitate a minimum of fifteen single-family homes under the Homeowner Assistance for Minor Rehabilitation loan program (HAMR).	From the 2014-2021 Housing Element Update - The Homeowners Assistance for Minor Rehabilitation (HAMR) program is on hold pending identification of new funding source. The program was previously funded by the Redevelopment Agency. **Housing:** The program has met its goal and is currently no longer active due to funding.	Housing/Planning
Policies:			
8.2.1	Rehabilitate single-family homes to correct substandard conditions, improve handicap accessibility, and improve the aesthetics of older neighborhoods, thereby contributing to their preservation and revitalization.	**Housing:** Following the dissolution of RDA, there are no currently active programs due to limited or no funding available. The Housing Authority is continuing to seek new opportunities to contribute to preservation of units.	Housing/Planning

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Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Objective 8.3	Rehabilitate a minimum of ninety mobile homes, for very low-income homeowners, in mobile home parks citywide, under the Mobile Home Grant Program.	From the 2014-2021 Housing Element Update - Policy/Program # 8.4 - Program is due to continue as the City converted to a contract program with Habitat for Humanity starting in FY 2013-14. - Housing may have additional information. **Housing:** Following the dissolution of RDA, there are no currently active programs due to limited or no funding available. Through the City's CDBG funds, there continues to be multiple units addressed each year.	Housing/Planning
Policies:			
8.3.1	Correct substandard conditions in mobile home parks.	Following the dissolution of RDA, there are no currently active programs due to limited or no funding available. Through the City's CDBG funds, there continues to be multiple units addressed each year.	Housing/Planning
Objective 8.4	Obtain code compliance from a minimum of twenty-five very low and moderate-income property owners, citywide, with emphasis on focus neighborhoods.	From the 2014-2021 Housing Element Update - Policy/Program # 8.3 - Program description - Administer a program to provide grant funds for neighborhood beautification in targeted neighborhoods. **Housing:** Following the dissolution of RDA, there are no currently active programs due to limited or no funding available. Code Compliance continues to seek compliance of the units.	Housing/Planning

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Policies:			
8.4.1	Enforce correction by property owners of identified housing and code violations in rental properties occupied by very low to moderate-income households.	From the 2014-2021 Housing Element Update - Policy/Program # 8.3 - New program funds included in FY 2013-14 CDBG allocation will allow continuation of the program. **Housing:** Following the dissolution of RDA, there are no currently active programs due to limited or no funding available. Code Compliance continues to seek compliance of the units	Housing/Planning
Objective 8.5	Conduct five neighborhood clean-ups annually; provide related services to Community Development Block Grant (CDBG) areas in conjunction with other projects, and assist in clean-up of 360 housing units.	From the 2014-2021 Housing Element Update - Policy/Program # 8.6 -The program will continue with funds from future CDBG allocations.	Housing/Planning
Policies:			Housing/Planning

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
8.5.1	Provide neighborhood improvement programs to CDBG target areas.	From the 2014-2021 Housing Element Update - Policy/Program # 8.5 - The program originally included both CDBG target areas and the Redevelopment Area. The program was revised after dissolution of the state's redevelopment agencies. Funding of the program in the CDBG target areas will continue in the 2014-2021 planning cycle. **Housing:** Following the dissolution of RDA, there are no currently active programs due to limited or no funding available.	Housing/Planning
Objective 8.6	Assist 300 households citywide.	Following the dissolution of RDA, there are no currently active programs due to limited or no funding available.	Housing/Planning
Policies:			
8.6.1	Provide fair housing and landlord/tenant education services to very low to moderate-income households.	Following the dissolution of RDA, there are no currently active programs due to limited or no funding available. Through the City's CDBG funding, the City continues to fund Fair Housing services.	Housing/Planning
Objective 8.7	Rehabilitate fifty multi-family units, citywide, through utilization of the Rental Rehabilitation Program.	**The program has met its goal and is currently no longer active due to funding.**	Housing/Planning
Policies:			
8.7.1	To eliminate substandard housing conditions for low-income renters, while enhancing the appearance of multi-family developments.	The City is currently working on establishing funding sources for this item. Ongoing.	Housing/Planning

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Objective 8.8	Assist households with down payment and closing costs.	From the 2014-2021 Housing Element Update - Policy/Program # 8.10 - Program description - Provide funds for Homebuyer Assistance Program (HAP) silent seconds. Work with approved lenders. **Housing: Following the dissolution of RDA, there are no currently active programs due to limited or no funding available.**	Housing/Planning
Policies:			
8.8.1	Provide assistance to facilitate homeownership for very low to moderate-income households.	From the 2014-2021 Housing Element Update - Policy/Program # 8.10 - Program will continue (need update from Housing) Housing: Following the dissolution of RDA, there are no currently active programs due to limited or no funding available.	Housing/Planning
Objective 8.9	Create a minimum of 126 affordable rental units, citywide.	**Following the dissolution of RDA, there are no currently active programs due to limited or no funding available.** The Housing Authority will continue to address new units as funding is available.	Housing/Planning

APPENDIX A

Moreno Valley General Plan
Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
Policies:			
8.9.1	Facilitate the creation of affordable rental units.	From the 2014-2021 Housing Element Update - Policy/Program # 8.13 - Program 8.13 was deleted after dissolution of the state's redevelopment agencies. The City will continue to look for new funding source and other programs to promote the development of affordable units for larger families. Housing: Following the dissolution of RDA, there are no currently active programs due to limited or no funding available.	Housing/Planning
Objective 8.10	Create a minimum of seventy senior units.	Following the dissolution of RDA, there are no currently active programs due to limited or no funding available. The Housing Authority will continue to address new units as funding is available.	Housing/Planning
Policies:			
8.10.1	Create decent and affordable housing opportunities for low and very-low income seniors.	Following the dissolution of RDA, there are no currently active programs due to limited or no funding available. The Housing Authority will continue to address new units as funding is available.	Housing/Planning
9.8.3 Housing Element Programs			
Programs:			

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
8-1	Utilize the Home Improvement Loan Program (HILP) that provides a 3% loan for up to $15,000 deferred for 20 years. Available citywide for very low to lower income homeowners.	**The program has met its goal and is currently no longer active due to funding.**	Housing/Planning
8-2	Utilize the Homeowner Assistance for Minor Rehabilitation (HAMR) loan program that provides a 3% to 5% loan for up to $7,500 amortized over a 10-year term.	**The program has met its goal and is currently no longer active due to funding.**	Housing/Planning
8-3	Utilize the Mobile Home Grant Program that provides grants up to $10,000 for owner-occupants of mobile homes.	CDBG Funding is still being used for this purpose.	Housing/Planning
8-4	Provide enhanced code compliance services and referrals to City housing rehabilitation programs.	When Redevelopment was dissolved several years ago any referrals ceased at that point due to lack of funding availability	Housing/Planning
8-5	Utilize the City Neighborhood Clean-up Program to provide volunteers and equipment to neighborhoods for clean-up activities.	This program was administered by the Sustainability & intergovernmental Program Manager. The city has created an Annual Day of Volunteerism (5.1.2) that may replace this program.	Housing/Planning
8-6	Contract with a fair housing agency to mediate between landlords and tenants and educate them on their rights and responsibilities.	Fair housing receives CDBG funding for these activities on an annual basis.	Housing/Planning
8-7	Update the City's Analysis of Impediments to Fair Housing.	This item is no longer active due to funding loss. Funding sources are being looked at.	Housing/Planning
8-8	Provide rehabilitation loans through the City's Rental Rehabilitation Program that offers 5% loans with the first year deferred and amortized over a 19-year period.	The program has met its goal and is currently no longer active due to funding.	Housing/Planning

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
8-9	Through the Homebuyer Assistance Program, provide 30-year deferred silent second loans, with no interest, up to 20% or $200,000 of the purchase price of resale homes.	The program has met its goal and is currently no longer active due to funding.	Housing/Planning
8-10	Work with local CHDO to construct and/or rehabilitate houses for very low-income households.	The City receives an allocation of HOME funds for CHDOs. This funding may only be used for this purpose.	Housing/Planning
8-11	Purchase HUD homes for resale to first time homebuyers.	**Following the dissolution of RDA, there are no currently active programs due to limited or no funding available.** The Housing Authority will continue to address new units as funding is available.	Housing/Planning
8-12	Administer new construction home ownership program and youth job training.	**Following the dissolution of RDA, there are no currently active programs due to limited or no funding available.** The Housing Authority will continue to address new units as funding is available.	Housing/Planning
8-13	Work with housing developers by providing Agency assistance to write-down the costs of units via loans.	**Following the dissolution of RDA, there are no currently active programs due to limited or no funding available.** The Housing Authority will continue to address new units as funding is available.	Housing/Planning

APPENDIX A
Moreno Valley General Plan
Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
8-14	Provide financial assistance for the development of affordable rental units for larger families.	**Following the dissolution of RDA, there are no currently active programs due to limited or no funding available.** The Housing Authority will continue to address new units as funding is available.	Housing/Planning
8-15	Revise General Plan.	The General Plan will need to be revised to add the R30 land use. This will be provided with the next comprehensive General Plan update.	Housing/Planning
8-16	Continue to implement permit streamlining.	Permit streamlining is ongoing in support of affordable housing projects within the Housing Element.	Housing/Planning
8-17	Develop standards for mobile home parks and mobile home subdivisions.	If not governed or following under state regulations, Mobile home parks and subdivisions are addressed in the Municipal Code regarding use (Section 9.02.020-1 - Conditional Use Permit in residential zones) and standards (Section 9.08.110 "Manufactured Home Requirements").	Housing/Planning
8-18	Review parking standards for multi-family 3 and 4 bedroom units, including covered parking requirements to determine if reductions are appropriate.	The Municipal Code addresses density bonus, affordable housing and senior housing projects through reductions/modifications to standards.	Housing/Planning
8-19	Review second unit regulations to determine if expansion is merited to additional districts.	This item is ongoing to meet new state regulations and will remain in compliance with State law requirements.	Housing/Planning

APPENDIX A

Moreno Valley General Plan

Complete list of Goals and Policies

Goal/Policy	Description	Discussion on Implementation Status	Responsible Party
8-20	Continue to pay the development fees for projects, on a case-by-case basis, that have received State or Federal funds, such as Section 202 and Tax Credits.	All uses, including Section 202 projects , continue to pay development impact fees on a case by case basis (ongoing).	Housing/Planning
8-21	Utilize Redevelopment Agency funds, where appropriate and necessary, to facilitate infrastructure for affordable projects.	**Following the dissolution of RDA, there are no currently active programs due to limited or no funding available.**	Housing/Planning
8-22	Propose general plan changes for rezoning areas in the city to housing uses or mixed uses that include housing.	The Municipal Code was updated in 2014 to include provisions for mixed use projects	Housing/Planning
8-23	Facilitate the construction of a sixty-nine unit multi-family senior complex.	We are currently pursuing a senior development opportunity on Housing Authority property.	Housing/Planning

ANNUAL ELEMENT PROGRESS REPORT
Housing Element Implementation
(CCR Title 25 §6202)
Appendix B

Jurisdiction City of Moreno Valley

Reporting Period 01/01/2014 - 12/31/2014

Table A

Annual Building Activity Report Summary - New Construction
Very Low-, Low-, and Mixed-Income Multifamily Projects

Housing Development Information									Housing with Financial Assistance and/or Deed Restrictions		Housing without Financial Assistance or Deed Restrictions
1	2	3	4				5	5a	6	7	8
Project Identifier (may be APN No., project name or address)	Unit Category	Tenure R=Renter O=Owner	Affordability by Household Incomes: Very Low-Income	Low-Income	Moderate-Income	Above Moderate-Income	Total Units per Project	Est. # Infill Units*	Assistance Programs for Each Development See Instructions	Deed Restricted Units See Instructions	Note below the number of units determined to be affordable without financial or deed restrictions and attach an explanation how the jurisdiction determined the units were affordable. Refer to instructions.
(9) Total of **Moderate and Above Moderate** from Table A3 ►					0	93	93				
(10) Total by income Table A/A3 ► ►						93	93				
(11) Total **Extremely Low-Income** Units*											

* Note: These fields are voluntary

ANNUAL ELEMENT PROGRESS REPORT
Housing Element Implementation
(CCR Title 25 §6202)
Appendix B

Jurisdiction City of Moreno Valley

Reporting Period 01/01/2014 - 12/31/2014

Table A2
Annual Building Activity Report Summary - Units Rehabilitated, Preserved and Acquired pursuant to GC Section 65583.1(c)(1)

Please note: Units may only be credited to the table below when a jurisdiction has included a program it its housing element to rehabilitate, preserve or acquire units to accommodate a portion of its RHNA whichmeet the specific criteria as outlined in GC Section 65583.1(c)(1)

Activity Type	Affordability by Household Incomes				(4) The Description should adequately document how each unit complies with subsection (c)(7) of Government Code Section 65583.1
	Extremely Low-Income*	Very Low-Income	Low-Income	TOTAL UNITS	
(1) Rehabilitation Activity				0	
(2) Preservation of Units At-Risk				0	
(3) Acquisition of Units				0	
(5) Total Units by Income	0	0	0	0	

* Note: This field is voluntary

Table A3
Annual building Activity Report Summary for Above Moderate-Income Units (not including those units reported on Table A)

	1. Single Family	2. 2 - 4 Units	3. 5+ Units	4. Second Unit	5. Mobile Homes	6. Total	7. Number of infill units*
No. of Units Permitted for **Moderate (>=8 units)**						0	
No. of Units Permitted for **Above Moderate (=1-5 units)**	93					93	

* Note: This field is voluntary

ANNUAL ELEMENT PROGRESS REPORT
Housing Element Implementation
(CCR Title 25 §6202)
Appendix B

Jurisdiction City of Moreno Valley

Reporting Period 01/01/2014 - 12/31/2014

Table B

Regional Housing Needs Allocation Progress

Permitted Units Issued by Affordability

Enter Calendar Year starting with the first year of the RHNA allocation period. See Example.			2014									Total Units to Date (all years)	Total Remaining RHNA by Income Level
Income Level		RHNA Allocation by Income Level	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9		
Very Low	Deed Restricted	1,500											1,500
	Non-deed restricted												
Low	Deed Restricted	993											993
	Non-deed restricted												
Moderate	Deed Restricted	1,112											1,112
	Non-deed restricted												
Above Moderate		2,564	93									93	2,471
Total RHNA by COG. Enter allocation number:		6,169	93									93	6,076
Total Units ► ► ►													
Remaining Need for RHNA Period ► ► ► ► ►													

Note: units serving extremly low-income households are included in the very low-income permitted units totals.

Attachment: Appendix B to Annual Report - Housing Forms (2426 : General Plan Annual Report)

ANNUAL ELEMENT PROGRESS REPORT
Housing Element Implementation
(CCR Title 25 §6202)
Appendix B

Jurisdiction City of Moreno Valley
Reporting Period 01/01/2014 - 12/31/2014

Table C
Program Implementation Status

Program Description (By Housing Element Program Names)	**Housing Programs Progress Report - Government Code Section 65583.** Describe progress of all programs including local efforts to remove governmental constraints to the maintenance, improvement, and development of housing as identified in the housing element.		
Name of Program	**Objective**	**Timeframe in H.E.**	**Status of Program Implementation**

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Housing Element Implementation
(CCR Title 25 §6202)
Appendix B

Jurisdiction City of Moreno Valley
Reporting Period 01/01/2014 - 12/31/2014

General Comments:

2014 - 93 SINGLE FAMILY (Residential 5 Zoning) HOMES WERE BUILT/FINALED/OCCUPIED

ANNUAL ELEMENT PROGRESS REPORT
Housing Element Implementation
(CCR Title 25 §6202)

Jurisdiction City of Moreno Valley

Reporting Period 01/01/2015 - 12/31/2015

Table A

Annual Building Activity Report Summary - New Construction Very Low-, Low-, and Mixed-Income Multifamily Projects

Housing Development Information										Housing with Financial Assistance and/or Deed Restrictions		Housing without Financial Assistance or Deed Restrictions
1	2	3	4				5	5a		6	7	8
Project Identifier (may be APN No., project name or address)	Unit Category	Tenure R=Renter O=Owner	Affordability by Household Incomes: Very Low-Income	Low-Income	Moderate-Income	Above Moderate-Income	Total Units per Project	Est. # Infill Units*		Assistance Programs for Each Development See Instructions	Deed Restricted Units See Instructions	Note below the number of units determined to be affordable without financial or deed restrictions and attach an explanation how the jurisdiction determined the units were affordable. Refer to instructions.
(9) Total of **Moderate and Above Moderate** from Table A3 ►					0	103	103					
(10) Total by income Table A/A3 ► ►						103	103					
(11) Total **Extremely Low-Income** Units*												

* Note: These fields are voluntary

ANNUAL ELEMENT PROGRESS REPORT
Housing Element Implementation
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Jurisdiction City of Moreno Valley

Reporting Period 01/01/2015 - 12/31/2015

Table A2
Annual Building Activity Report Summary - Units Rehabilitated, Preserved and Acquired pursuant to GC Section 65583.1(c)(1)

Please note: Units may only be credited to the table below when a jurisdiction has included a program it its housing element to rehabilitate, preserve or acquire units to accommodate a portion of its RHNA whichmeet the specific criteria as outlined in GC Section 65583.1(c)(1)

Activity Type	Affordability by Household Incomes				(4) The Description should adequately document how each unit complies with subsection (c)(7) of Government Code Section 65583.1
	Extremely Low-Income*	Very Low-Income	Low-Income	TOTAL UNITS	
(1) Rehabilitation Activity				0	
(2) Preservation of Units At-Risk				0	
(3) Acquisition of Units				0	
(5) Total Units by Income	0	0	0	0	

* Note: This field is voluntary

Table A3
Annual building Activity Report Summary for Above Moderate-Income Units (not including those units reported on Table A)

	1. Single Family	2. 2 - 4 Units	3. 5+ Units	4. Second Unit	5. Mobile Homes	6. Total	7. Number of infill units*
No. of Units Permitted for **Moderate**						0	
No. of Units Permitted for **Above Moderate**	103					103	

* Note: This field is voluntary

ANNUAL ELEMENT PROGRESS REPORT
Housing Element Implementation
(CCR Title 25 §6202)

Jurisdiction City of Moreno Valley

Reporting Period 01/01/2015 - 12/31/2015

Table B

Regional Housing Needs Allocation Progress

Permitted Units Issued by Affordability

Enter Calendar Year starting with the first year of the RHNA allocation period. See Example.			2014	2015								Total Units to Date (all years)	Total Remaining RHNA by Income Level
Income Level		RHNA Allocation by Income Level	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9		
Very Low	Deed Restricted	1,500											1,500
	Non-deed restricted												
Low	Deed Restricted	993											993
	Non-deed restricted												
Moderate	Deed Restricted	1,112											1,112
	Non-deed restricted												
Above Moderate		2,564	93	103								196	2,368
Total RHNA by COG. Enter allocation number:		6,169											
Total Units ► ► ►			93	103								196	
Remaining Need for RHNA Period ► ► ► ► ►													5,973

Note: units serving extremly low-income households are included in the very low-income permitted units totals.

ANNUAL ELEMENT PROGRESS REPORT
Housing Element Implementation
(CCR Title 25 §6202)

Jurisdiction City of Moreno Valley
Reporting Period 01/01/2015 - 12/31/2015

Table C

Program Implementation Status

Program Description (By Housing Element Program Names)	**Housing Programs Progress Report - Government Code Section 65583.** Describe progress of all programs including local efforts to remove governmental constraints to the maintenance, improvement, and development of housing as identified in the housing element.		
Name of Program	**Objective**	**Timeframe in H.E.**	**Status of Program Implementation**

ANNUAL ELEMENT PROGRESS REPORT
Housing Element Implementation
(CCR Title 25 §6202)

Jurisdiction City of Moreno Valley

Reporting Period 01/01/2015 - 12/31/2015

General Comments:

2015 - 103 SINGLE FAMILY (Residential 5 Zoning) HOMES WERE BUILT/FINALED/OCCUPIED

ANNUAL ELEMENT PROGRESS REPORT
Housing Element Implementation
(CCR Title 25 §6202)

Jurisdiction City of Moreno Valley

Reporting Period 01/01/2016 - 12/31/2016

Table A

Annual Building Activity Report Summary - New Construction
Very Low-, Low-, and Mixed-Income Multifamily Projects

Housing Development Information									**Housing with Financial Assistance and/or Deed Restrictions**		**Housing without Financial Assistance or Deed Restrictions**
1	2	3	4				5	5a	6	7	8
Project Identifier (may be APN No., project name or address)	Unit Category	Tenure R=Renter O=Owner	Affordability by Household Incomes				Total Units per Project	Est. # Infill Units*	Assistance Programs for Each Development	Deed Restricted Units	Note below the number of units determined to be affordable without financial or deed restrictions and attach an explanation how the jurisdiction determined the units were affordable. Refer to instructions.
			Very Low-Income	Low-Income	Moderate-Income	Above Moderate-Income			See Instructions	See Instructions	
(9) Total of **Moderate and Above Moderate** from Table A3 ►					0	0	0				
(10) Total by income Table A/A3 ► ►											
(11) Total **Extremely Low-Income** Units*											

* Note: These fields are voluntary

ANNUAL ELEMENT PROGRESS REPORT
Housing Element Implementation
(CCR Title 25 §6202)

Jurisdiction City of Moreno Valley
Reporting Period 01/01/2016 - 12/31/2016

Table A2
Annual Building Activity Report Summary - Units Rehabilitated, Preserved and Acquired pursuant to GC Section 65583.1(c)(1)

Please note: Units may only be credited to the table below when a jurisdiction has included a program it its housing element to rehabilitate, preserve or acquire units to accommodate a portion of its RHNA whichmeet the specific criteria as outlined in GC Section 65583.1(c)(1)

Activity Type	Affordability by Household Incomes				(4) The Description should adequately document how each unit complies with subsection (c)(7) of Government Code Section 65583.1
	Extremely Low-Income*	Very Low-Income	Low-Income	TOTAL UNITS	
(1) Rehabilitation Activity				0	
(2) Preservation of Units At-Risk				0	
(3) Acquisition of Units				0	
(5) Total Units by Income	0	0	0	0	

* Note: This field is voluntary

Table A3
Annual building Activity Report Summary for Above Moderate-Income Units (not including those units reported on Table A)

	1. Single Family	2. 2 - 4 Units	3. 5+ Units	4. Second Unit	5. Mobile Homes	6. Total	7. Number of infill units*
No. of Units Permitted for **Moderate**						0	
No. of Units Permitted for **Above Moderate**						0	

* Note: This field is voluntary

ANNUAL ELEMENT PROGRESS REPORT
Housing Element Implementation
(CCR Title 25 §6202)

Jurisdiction City of Moreno Valley

Reporting Period 01/01/2016 - 12/31/2016

Table B

Regional Housing Needs Allocation Progress

Permitted Units Issued by Affordability

Enter Calendar Year starting with the first year of the RHNA allocation period. See Example.			2014	2015	2016							Total Units to Date (all years)	Total Remaining RHNA by Income Level
Income Level		RHNA Allocation by Income Level	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9		
Very Low	Deed Restricted	1,500											1,500
	Non-deed restricted												
Low	Deed Restricted	993											993
	Non-deed restricted												
Moderate	Deed Restricted	1,112											1,112
	Non-deed restricted												
Above Moderate		2,564	93	103	119							315	2,249
Total RHNA by COG. Enter allocation number:		6,169											
Total Units ► ► ►			93	103	119							315	
Remaining Need for RHNA Period ► ► ► ► ►													5,854

Note: units serving extremly low-income households are included in the very low-income permitted units totals.

ANNUAL ELEMENT PROGRESS REPORT
Housing Element Implementation
(CCR Title 25 §6202)

Jurisdiction City of Moreno Valley
Reporting Period 01/01/2016 - 12/31/2016

Table C

Program Implementation Status

Program Description (By Housing Element Program Names)	**Housing Programs Progress Report - Government Code Section 65583.** Describe progress of all programs including local efforts to remove governmental constraints to the maintenance, improvement, and development of housing as identified in the housing element.		
Name of Program	**Objective**	**Timeframe in H.E.**	**Status of Program Implementation**

ANNUAL ELEMENT PROGRESS REPORT
Housing Element Implementation
(CCR Title 25 §6202)

Jurisdiction City of Moreno Valley

Reporting Period 01/01/2016 - 12/31/2016

General Comments:

2016 - 119 SINGLE FAMILY (Residential 5 Zoning) HOMES WERE BUILT/FINALED/OCCUPIED

PLANNING COMMISSION

STAFF REPORT

Meeting Date: January 26, 2017

PEN16-0103 (PA16-0013) TENTATIVE PARCEL MAP 37104

Case:	PEN16-0103 (PA16-0013) Tentative Parcel Map
Applicant:	LGS Engineering, Inc.
Owner:	Catherine Kormos
Representative:	David Knell
Location:	Northeast corner of Jeranell Court and Alessandro Boulevard.
Case Planner:	Gabriel Diaz
Council District:	3

SUMMARY

The proposed project is a tentative parcel map to subdivide 1.1 gross acres of land at the northeast corner of Jeranella Court and Alessandro Boulevard from one legal parcel into two parcels. No new land development is proposed at this time with this subdivision. The property is presently developed with four existing single family homes. The project site is located within a Residential 3 (R3) zoning district.

The Tentative Parcel Map was previously reviewed by the Planning Commission at a Public Hearing on August 25, 2015. At that meeting the parcel map was continued to address additional information requested by the Planning Commission. The requested information regarded the septic systems, and compliance with the septic system requirements of the County of Riverside Department of Environmental Health. While it has more time than anticipated at the prior Planning Commission time of consideration, the applicant has now provided locations of onsite septic systems on the map, and has provided a preliminary clearance letter from the County of Riverside Department of Environmental Health each of which were necessary to address the interests of the

Planning Commission expressed at the August 25, 2016 Public Hearing meeting. There are no outstanding concerns and the project is now ready for Planning Commission consideration and action.

PROJECT DESCRIPTION

Project

LGS Engineering, Inc. is proposing Tentative Parcel Map 37104 to subdivide one legal parcel into two parcels on 1.1 gross acres of land. The project site is located at the northeast corner of Jeranella Court and Alessandro Boulevard. The Assessor Parcel Numbers are 478-040-007 and 478-040-008.

The Tentative Parcel Map has been submitted to subdivide the existing property consistent with pre-existing deeds to facilitate the sale of the property. The property, which has two separate Assessor Parcel Numbers (APN), had been sold combined by deed prior to 1972. The proposed map is intended to formalize the subdivision back to two parcels consistent with the APNs. There are no physical improvements on or off-site associated or authorized with this subdivision. The project site has been improved, and includes four existing older single family homes. The current assessor's parcel map identifies two assessor parcels for the one existing legal parcel. The proposed parcel map will be consistent with the assessor parcel numbers as shown in aerial photograph (Attachment 5). The project site is located in a Residential 3 (R3) zoning district.

Tentative Parcel Map 37104 will create two legal parcels (Parcel 1 and 2). The existing placement of the four homes on the existing single parcel does not conform to the underlying R3 standards based on the number of residential units on the property and due to the existing setback between the existing single family house and the north property line. The creation of Parcel 1 of the proposed map will not increase the nonconformity of the existing homes to the City's required development standards. As proposed, Parcel 2 will meet all development standards, including the R3 zoning setback requirements. The setbacks of the existing residential homes on both Parcel 1 and 2 with respect to the newly created parcel line will be consistent with the R3 zoning setback requirements.

Parcel 1 will have lot dimensions of approximately 108 feet in width by 212 feet in length, and have a lot size of 22,108 square feet. Parcel 2 will have lot dimensions of approximately 108 feet in width by 212 feet in length, and have a lot size of 21,783 square feet. Both parcels will be consistent with Municipal Code Section 9.03.040 for lot size, lot depth, and lot width in the R3 zone. The tentative parcel map has been revised since the August 25, 2016 Planning Commission Public Hearing meeting. Additional information has been added to the map as per the request of the Planning Commission. The existing homes are on septic systems and the septic system locations have been identified on the tentative parcel map. In addition, the lot line that divides Parcel 1 and Parcel 2 has been relocated and skewed to satisfy the requirements of the County of Riverside Department of Environmental Health requirements of one-half acre (21,780 sq. ft.) minimum lot sizes for parcels with septic systems, and to meet the minimum setback of five feet from the interior lot line to the existing building on Parcel 1 (Building B).

Site/Surrounding Area

The project site is located at the northeast corner of Jeranella Court and Alessandro Boulevard. The site is relatively flat and currently developed with four older single family homes on 1.1 gross acres. Jeranella Court is an unimproved road and Alessandro Boulevard is a paved street.

The project site is within a Residential 3 (R3) zoning district (Attachment 4). The areas surrounding the project site to the north, east, south and west are zoned as single family Residential 3 (R3). There are existing single family homes to the west and east, and empty lots to the north and south.

Access/Parking

There are two main access points proposed with Tentative Parcel Map 37104, one from Alessandro Boulevard and one from Jeranella Court. Parcel 1 has three existing single family homes on site, two of the homes have access from Jeranella Ct. and the other home has access from Alessandro Boulevard. Parcel 2 has one single family home with access from Alessandro Boulevard. All four of the existing single family homes have existing onsite parking. No new development is proposed as part of the parcel map application.

Design/Landscaping

The design of the Parcel Map will create two legal parcels from one parcel. Parcel 1 will have lot dimensions of approximately 108 feet in width by 212 feet in length, and a lot size of 22,108 square feet. Parcel 2 will have lot dimensions of approximately 108 feet in width by 212 feet in length, and a lot size of 21,783 square feet. Both parcels are consistent with the City's development standards for lot size, lot depth, and lot width in the R3 zone (Municipal Code Section 9.03.040), and are consistent with the one-half acre requirement for parcels with septic systems per the County of Riverside Department of Environmental Health requirements.

The site is fairly flat with existing single family homes on the property. The property contains mature trees and landscaping. No additional landscaping is being required.

REVIEW PROCESS

The Tentative Parcel Map application was initially submitted in March 2016. City staff from various departments including Public Works and the Fire Prevention Bureau reviewed the Tentative Parcel Map. Public Works requested some technical revisions on the Tentative Parcel Map.

The Tentative Parcel Map was reviewed by the Planning Commission on August 25, 2015 Public Hearing meeting and the parcel map was continued to address additional information requested by the Planning Commission. The requested information regarded the septic systems and compliance with the septic system requirements of the County of Riverside Department of Environmental Health. The applicant since has plotted the existing septic systems on the Tentative Parcel Map, and provided a Preliminary Clearance form letter from the County of Riverside Department of Environmental Health. Although it took some time for the applicant to research and identify the locations of the existing septic systems that step has been completed. Over the course of the additional review process, staff and the applicant have successfully worked to resolve all design details.

ENVIRONMENTAL

Planning staff has reviewed the request in accordance with the latest edition of the California Environmental Quality Act (CEQA) Guidelines and has determined that the project qualifies for an exemption under the provisions of the CEQA as a Class 15 Categorical Exemption, CEQA Guidelines, Section 15315 for Minor Land Divisions.

The Class 15 exemption applies to the parcel map because the map is consistent with the criteria identified below:

- The site is located in an urbanized area and is a subdivision of four or fewer parcels.
- A variance is not required.
- All services and access to the proposed parcels to local standards are available.
- The parcel was not involved in a division of a larger parcel within the previous two years
- The parcel does not have an average slope greater than 20 percent.

NOTIFICATION

In accordance with Section 9.02.200 of the Municipal Code, public notification was sent to all property owners of record within 300' of the proposed project site on January 12, 2017 (Attachment 3). In addition, the public hearing notice for this project was posted on the project site on January 13, 2017 and published in the Press Enterprise newspaper on January 15, 2017.

STAFF RECOMMENDATION

Staff recommends that the Planning Commission **APPROVE** Resolution No. 2017-04, and thereby:

1. **CERTIFY** that PEN16-0103 (PA16-0013) Tentative Parcel Map 37104 qualifies as an exemption in accordance with the California Environmental Quality Act Guidelines, Section 15315 (Minor Land Divisions); and

2. **APPROVE** PEN16-0103 (PA16-0013) Tentative Parcel Map 37104 subject to the Conditions of Approval included as Exhibit A to Resolution No. 2017-04

Prepared by:
Gabriel Diaz
Associate Planner

Approved by:
Allen Brock
Community Development Director

ATTACHMENTS

1. Planning Commission Resolution 2017-04
2. Exhibit A Conditions of Approval
3. Public Hearing Notice
4. Land Use Plan
5. Aerial Photograph
6. Tentative Parcel Map 37104
7. County of Riverside Department of Environmental Health Form Letter
8. Photo Exhibit

PLANNING COMMISSION RESOLUTION NO. 2017-04

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY APPROVING TENTATIVE PARCEL MAP 37104 APPLICATION PEN16-0103 (PA16-0013), TO SUBDIVIDE ONE PARCEL INTO TWO PARCELS ON 1.1 GROSS ACRES AT THE NORTH EAST CORNER OF JERANELLA COURT AND ALESSANDRO BOULVARD. (APNS: 478-040-007 AND 478-040-008)

WHEREAS, LGS Engineering, Inc., has filed an application for the approval of Tentative Parcel Map 37104 application PEN16-0103 (PA16-0013), a proposal to subdivide one parcel into two parcels on a 1.1 gross acre site located within Assessor's Parcel Numbers 478-040-007 and 478-040-008 as described in the title of this Resolution; and

WHEREAS, the application has been evaluated in accordance with established City of Moreno Valley procedures, and with consideration of the General Plan and other applicable regulations; and

WHEREAS, upon completion of a thorough development review process the project was appropriately agendized and noticed for a public hearing before the Planning Commission of August 25, 2016; and

WHEREAS, on August 25, 2016, the Planning Commission of the City of Moreno Valley conducted a public hearing to consider the application; and

WHEREAS, on August 25, 2016, the Planning Commission of the City of Moreno Valley requested additional information on the septic systems on the project and the project was continued;

WHEREAS, upon completion of the additional information regarding the septic systems on the property and the development review process the project was appropriately agendized and noticed for a public hearing before the Planning Commission of January 26, 2017; and

WHEREAS, on January 26, 2017, the Planning Commission of the City of Moreno Valley conducted a public hearing to consider the application; and

WHEREAS, on January 26, 2017, the Planning Commission of the City of Moreno Valley made and issued an Environmental Determination that the project is exempt from the California Environmental Quality Act (CEQA) (Public Resources Code section 21000 et. seq.) under CEQA Guideline Section 15315, Minor Land Divisions;

WHEREAS, all legal prerequisites to the adoption of this Resolution have occurred; and

WHEREAS, pursuant to Government Code Section 66020(d)(1), **NOTICE IS HEREBY GIVEN** that this project is subject to certain fees, dedications, reservations and other exactions as provided herein.

NOW, THEREFORE, BE IT RESOLVED, by the Planning Commission of the City of Moreno Valley as follows:

A. This Planning Commission hereby specifically finds that all of the facts set forth above in this Resolution are true and correct.

B. Based upon substantial evidence presented to this Planning Commission during the above-referenced meeting on January 26, 2017, including written and oral staff reports, and the record from the public hearing, this Planning Commission hereby specifically finds as follows:

1. That the proposed map is consistent with applicable general and specific plans and the zoning ordinance;

FACT: The proposed tentative parcel map will create two residential parcels. The proposed parcel map is consistent with General Plan Objective 2.1.3 Land Use Plan. The current General Plan designation is residential 3. The current Municipal Code Zoning designation is single family residential 3 (R3). The allowed density for the R3 zone is a maximum of 3 dwelling units per acre. The project will not be adding additional units to the project site.

The project as designed and conditioned will achieve the objectives of the City of Moreno Valley's General Plan. The proposed project is consistent with the General Plan and does not conflict with the goals, objectives, policies, and programs established within the Plan.

2. That the design or improvement of the proposed subdivision is consistent with applicable general and specific plans;

FACT: The proposed parcel map is consistent with General Plan Objective 2.1.3 Land Use Plan. The current General Plan designation is residential 3. The current Municipal Code Zoning designation is single family residential 3 (R3). The allowed density for the R3 zone is a maximum of 3 dwelling units per acre. The project will not be adding additional units to the project site.

The areas surrounding the project site to the north, east, south and west are zoned as single family residential 3 (R3). There are existing single family homes to the west and east, and empty lots to the north and south.

The land division proposed by Tentative Parcel Map No. 37104 is consistent with the City's Municipal Code Section 9.14 Land Divisions. The proposed parcel map will subdivide the 1.1 gross acres located within Assessor's Parcel Numbers 478-040-007, and 478-040-008 into two residential parcels.

The subdivision as designed and conditioned is consistent with existing goals, objectives, policies and programs of the General Plan.

3. That the site is physically suitable for the type of development;

FACT: The project site is located at the north east corner of Jeranella Court and Alessandro Boulevard. The zoning for the site is single family residential 3 (R3). The project site has four existing single family homes and no new development is proposed.

4. That the site of the proposed land division is physically suitable for the proposed density of the development;

FACT: The project site is rectangular in shape and is comprised of topography that is fairly flat. The parcel map is designed in accordance with the provisions of the City's Municipal Code Section 9.14 Land Divisions. The project site is physically suitable for the proposed density of the existing development. No additional density is being added as part of this project. The project site has four existing single family homes and no new development is proposed.

5. That the design of the subdivision or the proposed improvements are not likely to cause substantial environmental damage or substantially and avoidably injure fish or wildlife or their habitat;

FACT: The project site has four existing single family homes and no new development is proposed.

Planning staff has reviewed the request in accordance with the latest edition of the California Environmental Quality Act (CEQA) Guidelines and has determined that the project qualifies for an exemption under the provisions of the CEQA as a Class 15 Categorical Exemption, CEQA Guidelines, Section 15315 for Minor Land divisions.

The Class 15 exemption applies to the parcel map because the map is consistent with the criteria identified below:

- The site is located in an urbanized area and is a subdivision of four or fewer parcels.
- The land division is consistent with the General Plan and zoning.
- A variance is not required.
- All services and access to the proposed parcels to local standards are available.
- The parcel was not involved in a division of a larger parcel within the previous two years.
- The parcel does not have an average slope greater than 20 percent.

Therefore, the parcel map will not cause substantial environmental damage or substantially and avoidably injure fish or wildlife or their habitat.

6. That the design of the subdivision or type of improvements is not likely to cause serious public health problems;

FACT: As conditioned, the proposed parcel map will not cause serious public health problems. The project site has four existing single family homes and no new development is proposed. There are no known hazardous conditions associated with the property, the design of the land division.

The parcel map has been designed consistent with the City's Municipal Code Section 9.14 Land Divisions and meets all City requirements related to subdividing a property.

7. That the design of the subdivision or the type of improvements will not conflict with easements, acquired by the public at large, for access through or use of, property within the proposed subdivision;

FACT: The tentative parcel map has been designed to accommodate and not conflict with existing easements on the subject site including utility and storm drain easements. The project site has four existing single family homes and no new development is proposed.

8. That the proposed land division and the associated design and improvements are consistent with applicable ordinances of the city.

FACT: The land division proposed by Tentative Parcel Map No. 37104 is consistent with the City's Municipal Code Section 9.14

Land Divisions. The subdivision as designed and conditioned is consistent with applicable ordinances of the city.

The design of the Parcel Map will create two legal parcels from one parcel. Parcel 1 will have roughly lot dimensions of 108 feet in width by 212 feet in length, and have a lot size of 22,108 square feet. Parcel 2 will have roughly lot dimensions of 108 feet in width by 212 feet in length, and have a lot size of 21,783 square feet. Both parcels are consistent with the City's development standards for lot size, lot depth, and lot width in the R3 zone Municipal Code Section 9.03.040. In addition both parcels are consistent with the half acre (21,780 sq. ft.) requirement for parcels with septic systems per the County of Riverside Department of Environmental Health requirements.

C. FEES, DEDICATIONS, RESERVATIONS, AND OTHER EXACTIONS

1. FEES

Impact, mitigation and other fees are due and payable under applicable ordinances and resolutions. These fees may include but are not limited to: Development Impact Fee, Transportation Uniform Mitigation Fee (TUMF), Multi-species Habitat Conservation Plan (MSHCP) Mitigation Fee, Stephens Kangaroo Habitat Conservation fee, Underground Utilities in lieu Fee, Area Drainage Plan fee, Bridge and Thoroughfare Mitigation fee (Future) and Traffic Signal Mitigation fee. The final amount of fees payable is dependent upon information provided by the applicant and will be determined at the time the fees become due and payable.

Unless otherwise provided for by this resolution, all impact fees shall be calculated and collected at the time and in the manner provided in Chapter 3.32 of the City of Moreno Valley Municipal Code or as so provided in applicable ordinances and resolutions. The City expressly reserves the right to amend the fees and the fee calculations consistent with applicable law.

2. DEDICATIONS, RESERVATIONS, AND OTHER EXACTIONS

The adopted Conditions of Approval for PEN16-0103 (PA16-0013), incorporated herein by reference, include dedications, reservations, and exactions pursuant to Government Code Section 66020 (d) (1).

3. CITY RIGHT TO MODIFY/ADJUST; PROTEST LIMITATIONS

The City expressly reserves the right to establish, modify or adjust any fee, dedication, reservation or other exaction to the extent permitted and as authorized by law.

Pursuant to Government Code Section 66020(d)(1), NOTICE IS FURTHER GIVEN that the 90 day period to protest the imposition of any impact fee, dedication, reservation, or other exaction described in this resolution begins on the effective date of this resolution and any such protest must be in a manner that complies with Government Code Section 66020(a) and failure to follow this procedure in a timely fashion will bar any subsequent legal action to attack, review, set aside, void or annul imposition.

The right to protest the fees, dedications, reservations, or other exactions does not apply to planning, zoning, grading, or other similar application processing fees or service fees in connection with this project and it does not apply to any fees, dedication, reservations, or other exactions of which a notice has been given similar to this, nor does it revive challenges to any fees for which the Statute of Limitations has previously expired.

BE IT FURTHER RESOLVED that the Planning Commission **HEREBY APPROVES** Resolution No. 2017-04 and thereby:

1. **CERTIFY** that Tentative Parcel Map 37104 application PEN16-0103 (PA16-0013) is exempt from the provisions of the California Environmental Quality Act (CEQA), as a Class 15 Categorical Exemption, CEQA Guidelines, Section 15315 for Minor Land Divisions; and

2. **APPROVE** Tentative Parcel Map 37104 application PEN16-0103 (PA16-0013) based on the findings contained in the resolution and subject to the conditions of approval included as Exhibit A of the resolution.

APPROVED on this 26th day of January, 2017.

____
Brian R. Lowell
Chair, Planning Commission

ATTEST:

Richard J. Sandzimier, Planning Official

APPROVED AS TO FORM:

City Attorney

Attached: Conditions of Approval

CITY OF MORENO VALLEY
PLANNING DIVISION
CONDITIONS OF APPROVAL
PEN16-0103 (PA16-0013) TENTATIVE PARCEL MAP 37104
ASSESSOR'S PARCEL NUMBERS: 478-040-007 & 478-040-008

Approval Date:
Expiration Date:

This set of conditions shall include conditions from:

_X_ Planning (P)
_X_ Public Works, Transportation (TE)
_X_ Public Works, Land Development (LD)

COMMUNITY DEVELOPMENT DEPARTMENT

Planning Division

P1. This approval shall comply with all applicable requirements of the City of Moreno Valley Municipal Code.

P2. This tentative parcel map shall expire three years after the approval date of this tentative parcel map unless extended as provided by the City of Moreno Valley Municipal Code; otherwise it shall become null and void and of no effect whatsoever in the event the applicant or any successor in interest fails to properly file a final map before the date of expiration. (MC 9.02.230, 9.14.050, 080)

P3. The site shall be developed in accordance with the approved tentative parcel map on file in the Community Development Department -Planning Division, the Municipal Code regulations, General Plan, and the conditions contained herein. (MC 9.14.020)

Timing Mechanisms for Conditions (see abbreviation at beginning of affected condition):

R - Map Recordation
GPA – Grading Plan Approval
BP - Building Permits
MR – Map Recordation
AOS – Acceptance of Streets
CP – Construction Permit
GP - Grading Permits
BF – Building Final
P - Any permit
MA – Map Approval
WP - Water Improvement Plans
IPA – Improvement Plan Approval
SI – Street Improvements

Governing Document (see abbreviation at the end of the affected condition):

GP - General Plan
MC - Municipal Code
Ord - Ordinance
Res - Resolution
UBC - Uniform Building Code
SBM - Subdivision Map Act
MC – Municipal Code
CEQA - California Environmental Quality Act
Ldscp - Landscape Development Guidelines and Specs
UFC - Uniform Fire Code

P4. All undeveloped portions of the site shall be maintained in a manner that provides for the control of weeds, erosion and dust. (MC 9.02.030)

P5. All landscaped areas shall be maintained in a healthy and thriving condition, free from weeds, trash and debris. (MC 9.02.030)

PUBLIC WORKS DEPARTMENT

Transportation Engineering Division

Based on the information contained in our standard review process we recommend the following conditions of approval be placed on this project:

General Conditions

TE1. Alessandro Boulevard is classified as a 4-lane Divided Arterial at this location per City Standard Plan No. MVSI-103A-0. Any modifications or improvements undertaken by this project shall be consistent with the City's standards for this.

TE2. Jeranella Court is classified as a Local Street per City Standard Plan No. MVSI-107A-0. Any modifications or improvements undertaken by this project shall be consistent with the City's standards for this facility

TE3. All driveways shall conform to Section 9.11.080, and Table 9.11.080-14 of the City's Development Code - Design Guidelines and City Standard Plan No. MVSI-111A-0 for residential driveway approach.

Land Development Division

The following are the Public Works Department – Land Development Division Conditions of Approval for this project and shall be completed at no cost to any government agency. All questions regarding the intent of the following conditions shall be referred to the Land Development Division.

General Conditions

LD1. (G) The developer shall comply with all applicable City ordinances and resolutions including the City's Municipal Code (MC) and if subdividing land, the Government Code (GC) of the State of California, specifically Sections 66410 through 66499.58, said sections also referred to as the Subdivision Map Act (SMA). [MC 9.14.010]

LD2. (G) The tentative parcel map shall correctly show all existing easements, traveled ways, and drainage courses. Any omission may require the map or plans associated with this application to be resubmitted for further consideration. [MC 9.14.040(A)]

Prior to Map Approval

LD3. (MA) Final maps (prepared by a registered civil engineer and/or licensed surveyor) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

LD4. (MA) All street dedications shall be free of all encumbrances, irrevocably offered to the public and shall continue in force until the City accepts or abandons such offers, unless otherwise approved by the City Engineer.

LD5. (EP) A digital (pdf) copy of the final map shall be submitted to the Land Development Division.

LD6. (CO) All outstanding fees shall be paid.

Special Conditions

LD7. Prior to approval of the final map, the map shall show the following as depicted on the approved tentative tract map:

(a) A 20 foot (20') wide street right of way dedication along the westerly limits of proposed Parcel 1 (APN 478-040-008), which results in a total easterly right of way half-width of 30 feet (30') on Jeranella Court. Jeranella Court will be per MVSI-107A-0 (modified).

(b) Corner cut-back dedication per City Standard MVSI-165-0 at the northeast corner of Alessandro Boulevard and Jeranella Court.

This may affect your property.

Notice of
PUBLIC HEARING

Notice is hereby given that a Public Hearing will be held by the Planning Commission of the City of Moreno Valley on the following item(s):

Project: PEN16-0103 (PA16-0013 Tentative Parcel Map)
Applicant: LGS Engineering, Inc
Owner: Catherine Kormos
Representative: David Knell
A.P. No(s): 478-040-007 & 478-040-008
Location: North-east corner of Jeranella Ct. & Alessandro Blvd.
Proposal: Tentative Parcel Map 37104 will subdivide one legal parcel into two parcels on 1.1 gross acres. The property is developed with existing single family homes. The current zoning is R3.
Council District: 3

The project has been evaluated against criteria set forth in the California Environmental Quality Act (CEQA) Guidelines and it was determined that the project will not have a significant effect on the environment. Therefore, a recommendation to find the project exempt from the provisions of the CEQA as a Class 15 Categorical Exemption, CEQA Guidelines, Section 15315 for Minor Land Divisions is being carried forward with the project.

A public hearing before the Planning Commission has been scheduled for the proposed project. Any person interested in commenting on the proposal and recommended environmental determination may speak at the hearing or provide written testimony at or prior to the hearing. The project application, supporting plans and environmental documents may be inspected at the Community Development Department at 14177 Frederick Street, Moreno Valley, California during normal business hours (7:30 a.m. to 5:30 p.m., Monday through Thursday; 7:30 a.m. to 4:30 p.m., Friday), or you may telephone (951) 413-3206 for further information.

The Planning Commission, at the Hearing or during deliberations, could approve changes or alternatives to the proposal. If you challenge any of these items in court, you may be limited to raising only those items you or someone else raised at the Public Hearing described in this notice, or in written correspondence delivered to the Planning Commission at, or prior to, the Public Hearing.

LOCATION N ↑

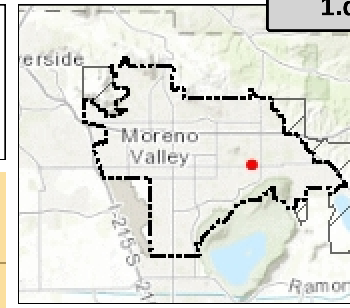
PLANNING COMMISSION HEARING

City Council Chamber, City Hall
14177 Frederick Street
Moreno Valley, Calif. 92553

DATE AND TIME: January 26, 2017 at 7 PM
CONTACT PLANNER: Gabriel Diaz
PHONE: (951) 413-3226

Upon request and in compliance with the Americans wit Disabilities Act of 1990, any person with a disability who require a modification or accommodation in order to participate in meeting should direct such request to Guy Pegan, AD Coordinator, at 951.413.3120 at least 48 hours before th meeting. The 48-hour notification will enable the City to mak reasonable arrangements to ensure accessibility to this meeting.

Land Use Map
Zone: R3



Legend

Zoning
- Commercial
- Industrial/Business Park
- Public Facilities
- Office
- Planned Development
- Large Lot Residential
- Residential Agriculture 2 DU/AC
- Residential 2 DU/AC
- Suburban Residential
- Multi-family
- Open Space/Park

Master Plan of Trails
- Bridge
- Improved
- Multiuse
- Proposed
- Regional
- State

- Parcels
- City Boundary
- Sphere of Influence

Notes

APNS: 478-040-007 & 478-040-008

157.7 0 78.87 157.7 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere

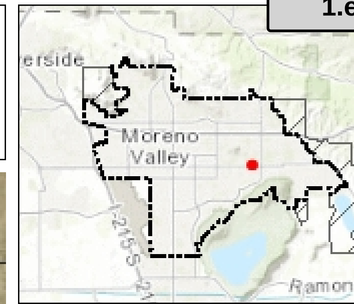
Print Date: 8/16/2016

DISCLAIMER: The information shown on this map was compiled from the City of Moreno Valley GIS and Riverside County GIS. The land base and facility information on this map is for display purposes only and should not be relied upon without independent verification as to its accuracy. Riverside County and City of Moreno Valley will not be held responsible for any claims, losses or damages resulting from the use of this map.

Attachment: Land Use Plan (2436 : PEN16-0103 (PA16-0013) Tentative Parcel Map 37104)

MORENO VALLEY
WHERE DREAMS SOAR

Aerial Photograph



Legend

Master Plan of Trails
- Bridge
- Improved
- Multiuse
- Proposed
- Regional
- State

- Parcels
- City Boundary
- Sphere of Influence

Notes

APNS: 478-040-007 & 478-040-008

157.7 0 78.87 157.7 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere

Print Date: 8/16/2016

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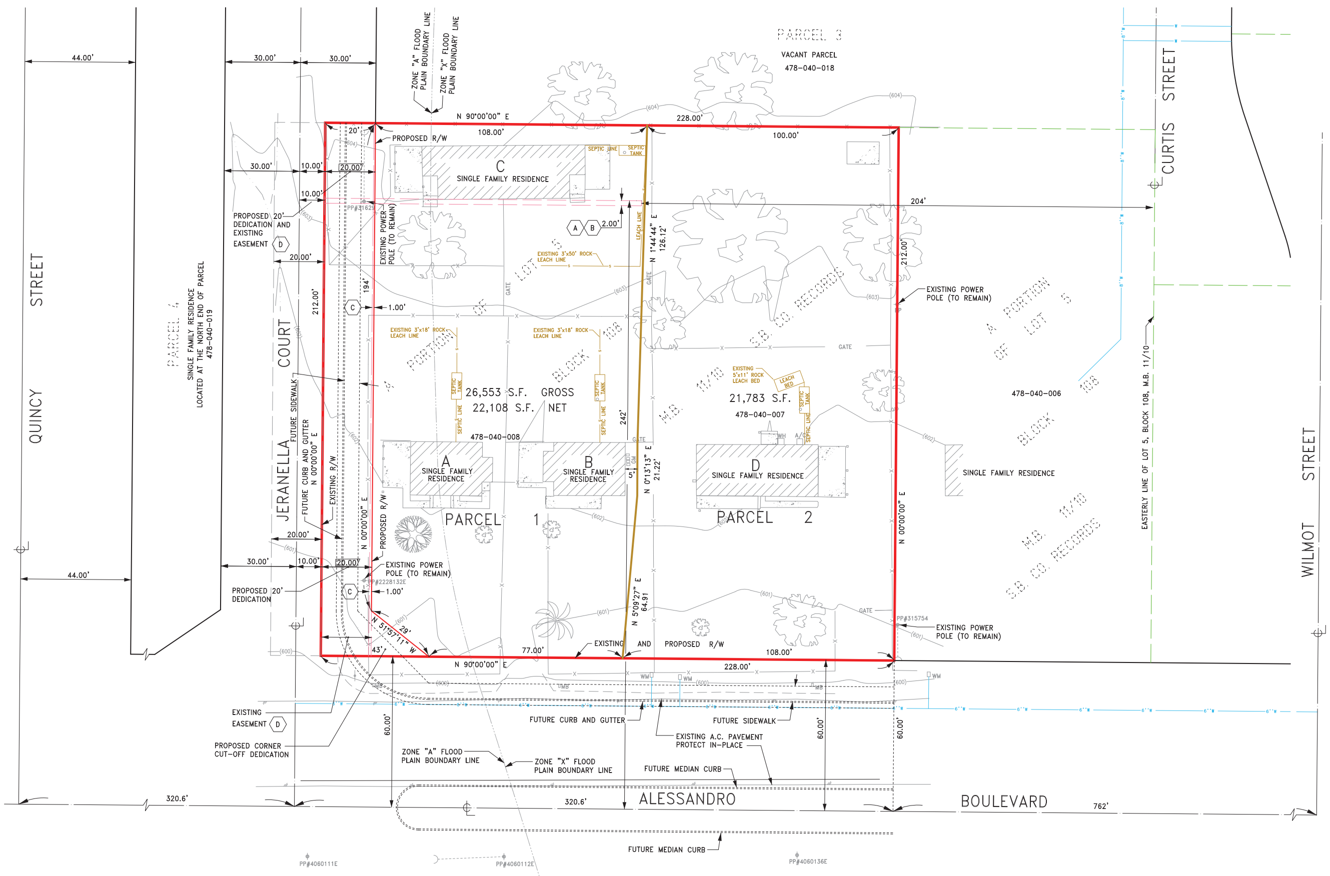
Attachment: Aerial Photograph (2436 : PEN16-0103 (PA16-0013) Tentative Parcel Map 37104)

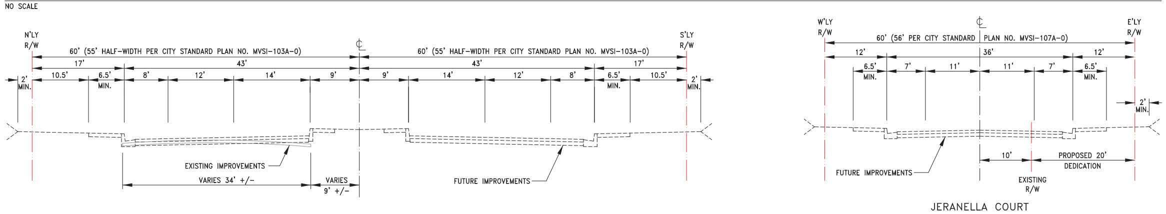
IN THE CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

TENTATIVE PARCEL MAP NO. 37104



TYPICAL STREET SECTIONS :

NO SCALE



ALESSANDRO BOULEVARD
4-LANE DIVIDED ARTERIAL – PUBLIC
STANDARD PLAN NO. MVSI-103A-0

JERANELLA COURT
LOCAL STREET – PUBLIC
NO EXISTING IMPROVEMENTS
STANDARD PLAN NO. MVSI-107A-0

GENERAL NOTES :

1. GROSS ACREAGE : 1.110 ACRES (48,336 S.F.)
2. NET ACREAGE : 1.013 ACRES (44,096 S.F.)
3. PROPERTY LIES WITHIN THE MORENO VALLEY UNIFIED SCHOOL DISTRICT.
4. EXISTING GENERAL PLAN DESIGNATION: R-3
5. EXISTING AND PROPOSED ZONING: R-3
6. EXISTING AND PROPOSED LAND USE : SINGLE FAMILY RESIDENTIAL
7. TOTAL NUMBER OF PARCELS: 2
8. PROJECT DENSITY: 3.95 DU/AC
9. PROJECT IS WITHIN FEMA ZONE "A" AND ZONE "X". NO BASE FLOOD ELEVATIONS DETERMINED.
10. NO NEW CONSTRUCTION IS PROPOSED. ALL EXISTING IMPROVEMENTS ARE TO BE PROTECTED IN-PLACE.
11. ALL EXISTING TELEPHONE POLES ARE TO REMAIN.
12. THE LAND IS NOT SUBJECT TO LIQUEFACTION OR OTHER GEOLOGIC HAZARD AND IS NOT WITHIN A SPECIAL STUDIES ZONE.
13. ASSESSOR'S PARCEL NUMBERS: 478-040-007 AND 478-040-008
14. SITE ADDRESSES: 28566, 28574, 28576, 28580 AND 28594 ALESSANDRO BOULEVARD MORENO VALLEY, CA 92555
15. TOPOGRAPHY SOURCE: FIELD SURVEY (DATE OF SURVEY: FEB. 3, 2016)
16. BOUNDARY DATA SHOWN IS RECORD INFORMATION.
17. ALL BUILDINGS HAVE EXISTING UTILITY SERVICES WHICH ARE TO REMAIN IN-PLACE.

EASEMENT NOTES :

THE FOLLOWING ITEMS WERE LISTED AS EXCEPTIONS WITHIN THE PRELIMINARY TITLE REPORT FOR THE PROPERTY DATED FEB. 2, 2016 AS PREPARED BY TICOR TITLE, ORDER NO, 00300596-993-SS1. THE UNDERSIGNED ASSUMES NO LIABILITY FOR ERROR IN THE TITLE REPORT OR INFORMATION NOT SHOWN IN THIS REPORT.

(A) 2.00' WIDE EASEMENT TO JOHN F. EASTUS AND MYRTLE E. EASTUS FOR THE INSTALLATION AND MAINTENANCE OF WATER LINES PER DOCUMENT RECORDED SEPTEMBER 22, 1954 IN BOOK 1633, PAGE 115 OF OFFICIAL RECORDS.

(B) 2.00' WIDE EASEMENT TO JERRY A. AND MINNIE L. CHAMBERLIN FOR WATER PIPE LINES PER DOCUMENT RECORDED FEBRUARY 16, 1966 AS INSTRUMENT NO. 17652 OF OFFICIAL RECORDS.

(C) CENTERLINE OF (NO WIDTH) EASEMENT TO CALIFORNIA ELECTRIC POWER COMPANY PER DOCUMENT RECORDED DECEMBER 31, 1954 IN BOOK 1672, PAGE 594 OF OFFICIAL RECORDS.

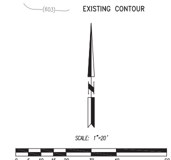
(D) 20.00' WIDE EASEMENT PER DOCUMENT RECORDED SEPTEMBER 22, 1954 IN BOOK 1632, PAGE 552 OF OFFICIAL RECORDS.

A RIGHT OF WAY FOR ALL PIPELINES, DITCHES AND FLUMES NECESSARY TO IRRIGATE SAID PROPERTY AND OTHER LAND, AND TO ENTER UPON SAID LAND FOR THE PURPOSE OF LAYING, CONSTRUCTING AND REPAIRING SAID PIPELINES, DITCHES AND FLUMES AND THE RIGHT TO CONDUCT WATER IN AND THROUGH THE SAME, AND THE RIGHT OF WAY FOR RAILROAD PURPOSES ALL AS RESERVED IN DEEDS OF RECORD AND AS SHOWN ON M.B. 11/10.

SAID RIGHT OF WAY CANNOT BE PLOTTED FROM THE RECORD.

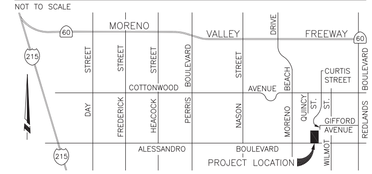
LEGEND :

- CENTERLINE
- PARCEL MAP BOUNDARY
- PROPOSED PARCEL LINES
- FUTURE IMPROVEMENTS
- CHAINLINK FENCE
- CONCRETE
- EASEMENT LINE
- FLOOD PLAIN LIMITS
- EDGE OF PAVEMENT
- A/C — AIR CONDITIONING UNIT
- GM — GAS METERS
- MB — MAILBOXES
- PP — POWER POLE
- R/W — RIGHT OF WAY
- WH — WATER HEATER
- A.C. — ASPHALTIC CONCRETE
- EXISTING IMPROVEMENTS – TO BE PROTECTED IN PLACE
- TREE – TO BE PROTECTED IN PLACE
- (A) EASEMENT PER NOTES ABOVE
- (603) EXISTING CONTOUR



VICINITY MAP :

NOT TO SCALE



STATEMENT OF PURPOSE :

THE PURPOSE OF THIS PARCEL MAP IS TO SUBDIVIDE THE EXISTING LOT INTO 2 PARCELS THAT MATCH THE EXISTING TAX ASSESSOR'S PARCEL MAP TO FACILITATE THE TRANSFER OF TITLE. NO IMPROVEMENTS ARE PROPOSED AS A RESULT OF THIS SUBDIVISION.

LEGAL DESCRIPTION :

LYING WITHIN SECTION 11, TOWNSHIP 3 SOUTH, RANGE 3 WEST, SAN BERNARDINO MERIDIAN.

A PORTION OF LOT 5 IN BLOCK 108, AS SHOWN ON MAP NO. 1 OF THE LANDS OF BEAR VALLEY AND ALESSANDRO DEVELOPMENT COMPANY FILED IN BOOK 11, PAGE 10 OF MAPS, RECORDS OF SAN BERNARDINO COUNTY, DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE EAST LINE OF SAID LOT 5 AND THE CENTERLINE OF ALESSANDRO AVENUE AS SHOWN ON SAID MAP; THENCE WEST, ALONG THE CENTERLINE OF SAID ALESSANDRO AVENUE, 102 FEET TO THE TRUE POINT OF BEGINNING; THENCE NORTH, PARALLEL WITH THE EAST LINE OF SAID LOT, 272 FEET; THENCE WEST, PARALLEL WITH THE CENTERLINE OF ALESSANDRO AVENUE, 228 FEET; THENCE SOUTH, PARALLEL WITH THE EAST LINE OF SAID LOT, 272 FEET TO THE CENTERLINE OF ALESSANDRO AVENUE; THENCE EAST, ALONG THE CENTERLINE OF ALESSANDRO AVENUE, 228 FEET TO THE TRUE POINT OF BEGINNING.

EXCEPTING THEREFROM THAT PORTION OF ALESSANDRO AVENUE.

AN EASEMENT OVER A PORTION OF LOT 5 IN BLOCK 108, AS SHOWN ON MAP NO. 1 OF THE LANDS OF BEAR VALLEY AND ALESSANDRO DEVELOPMENT COMPANY FILED IN BOOK 11, PAGE 10 OF MAPS, RECORDS OF SAN BERNARDINO COUNTY, DESCRIBED AS FOLLOWS:

COMMENCING AT THE INTERSECTION OF THE EAST LINE OF SAID LOT 5 AND THE CENTERLINE OF ALESSANDRO AVENUE; THENCE WEST, ALONG THE CENTERLINE OF ALESSANDRO AVENUE, 330 FEET TO THE TRUE POINT OF BEGINNING; THENCE NORTH, PARALLEL WITH THE EAST LINE OF SAID LOT, 272 FEET; THENCE WEST, PARALLEL WITH THE CENTERLINE OF ALESSANDRO AVENUE, 20 FEET; THENCE SOUTH, PARALLEL WITH THE EAST LINE OF SAID LOT, 272 FEET TO THE CENTERLINE OF ALESSANDRO AVENUE; THENCE EAST, ALONG THE CENTERLINE OF ALESSANDRO AVENUE, 20 FEET, TO THE TRUE POINT OF BEGINNING.

EXCEPTING THEREFROM THAT PORTION OF ALESSANDRO AVENUE.

PARCEL SUMMARY TABLE :

PARCEL NO.	AREA (ACRES)	AREA (SQ. FT.)	EXISTING & PROPOSED ZONING	EXISTING AND PROPOSED LAND USE	NO. OF DWELLING UNITS
1	0.508	22,106	R-3	SINGLE FAMILY RESIDENTIAL	3
2	0.500	21,783	R-3	SINGLE FAMILY RESIDENTIAL	1
JERANELLA COURT	0.102	4,447	R-3	PUBLIC STREET	N/A
TOTALS	1.110 GROSS 1.008 NET	48,336 GROSS 43,889 NET	R-3	SINGLE FAMILY RESIDENTIAL AND PUBLIC STREET	4

UTILITY PURVEYORS :

CABLE TV:
VERIZON FIOS
(888)553-1555
TIME WARNER CABLE
(888)892-2253

SEWER & WATER :
EASTERN MUNICIPAL WATER DISTRICT
(951)928-3777

TELEPHONE:
VERIZON
(800)483-4000
AT&T
(800)310-2355

GAS:
THE GAS COMPANY
(800)427-2200

TRASH SERVICE:
WASTE MANAGEMENT OF INLAND VALLEY
(800)423-9986

ELECTRICITY:
MORENO VALLEY ELECTRIC UTILITY
(844)341-6469
SO. CALIFORNIA EDISON
(800)684-8123

SEPTIC SYSTEM STATEMENT:

TITLE TO SAID ESTATE OR INTEREST IS AS FOLLOWS:

IN THE EVENT THAT I WERE TO UPGRADE, REPAIR OR MODIFY THE SEPTIC SYSTEM, I WOULD NEED TO DO SO TO CURRENT STANDARDS WHICH HAVE BEEN REFERED TO AS AN "ADVANCED TREATMENT UNIT". I AGREE TO THIS AND THIS STATEMENT WILL SERVE AS MY ACCEPTANCE OF THIS REQUIREMENT.

BORIS MOLINA — 1- -2017 DATE

OWNER(S)/APPLICANT(S) :

TITLE TO SAID ESTATE OR INTEREST IS AS FOLLOWS:

CATHERINE R. KORMOS, A WIDOW; CATHERINE REBECCA KORMOS; THE CATHERINE R. KORMOS IRREVOCABLE TRUST DATED JUNE 28, 1993, CATHERINE R. KORMOS AS TRUSTEE FOR THE BENEFIT OF CATHERINE R. KORMOS AND HER DESIGNATED BENEFICIARIES; FRANK AND CATHERINE R. KORMOS FAMILY LIVING TRUST; AND CATHERINE R. KORMOS, TRUSTEE OF THE FRANK AND CATHERINE R. KORMOS FAMILY LIVING TRUST, ALL AS THEIR INTERESTS APPEAR OF RECORD.

CATHERINE R. KORMOS
16225 N. MEADOW PARK DRIVE
SUN CITY, ARIZONA 85351
TEL. (206) 890-0148

BORIS MOLINA
P.O. BOX 1781
SANTA ANA, CALIFORNIA 92702
TEL. (714) 651-2919
EMAIL borismolinabarrera@gmail.com

PREPARED BY :

WILLDAN Engineering
13191 CROSSROADS PARKWAY NORTH, SUITE 405
INDUSTRY, CALIFORNIA 91746
MAIN (562)908-6200, FAX (562)695-2120

PROFESSIONAL LAND SURVEYOR DAVID O. KNELL PLS No. 5301 STATE OF CALIFORNIA

PREPARED UNDER THE SUPERVISION OF:

David O. Knell
DAVID O. KNELL, P.L.S. 5301 — 1-11-2017 DATE

County of Riverside

DEPARTMENT OF ENVIRONMENTAL HEALTH

TENTATIVE MAP PRELIMINARY CLEARANCE
(SAN-53)

DATE: 1/9/17 PARCELS/LOTS: 2
TRACT/PARCEL MAP #: 37104 ZONING: R-3
APN: 478-040-007, -008 MAP SCHEDULE: ______

AT THIS TIME, DEH DOES NOT OBJECT TO THE CONSIDERATION OF THIS MAP. FURTHER INFORMATION MAY BE REQUIRED AT SPECIFIC MILESTONES.

1. DOMESTIC WATER:

- ☐ THE ______ WATER DISTRICT HAS AGREED IN WRITING TO FURNISH DOMESTIC WATER TO EACH AND EVERY LOT WITHIN THIS SUBDIVISION AS PER LETTER DATED ______.
- ☐ ACCEPTABLE WATER SUPPLY PERMIT APPLICATION IS ON FILE WITH THIS DEPARTMENT TO FORM THE ______ WATER COMPANY.
- ☒ EVIDENCE OF EXISTING WATER SUPPLY IN THE FORM OF A UTILITY BILL FROM: EASTERN MUNICIPAL WATER DISTRICT (EMWD).
- ☐ INDIVIDUAL WELL(S) ______

2. DOMESTIC SEWAGE DISPOSAL:

- ☐ CONNECTION TO ______ SEWER SYSTEM AS PER LETTER DATED ______.
- ☒ EXISTING ONSITE WASTEWATER TREATMENT SYSTEMS (OWTS) AS CERTIFIED BY LICENSED C-42 CONTRACTOR: TIM TAYLOR (LIC#: 879314)

ADDITIONAL COMMENTS:
Any repairs/modifications/upgrades of existing OWTS shall meet the current requirements of the Department's Local Agency Management (LAMP) and any other applicable codes or regulations. If sewer is available, the site will be required to connect to sewer and abandon existing OWTS under permit with this Department.

Since Parcel 1 (APN: 478-040-008) has 3 existing structures that have been verified by both this Department and the Santa Ana Regional Water Quality Control Board (SARWQCB), to have existed prior to minimum lot size requirements, the existing structures can continue to exist but if any repairs/modifications/upgrades are required, they will need to be designed to use Advanced Treatment Units (ATUs).

Additional items may be required upon official project submittal to this Department for review such as a Phase I Environmental Site Assessm

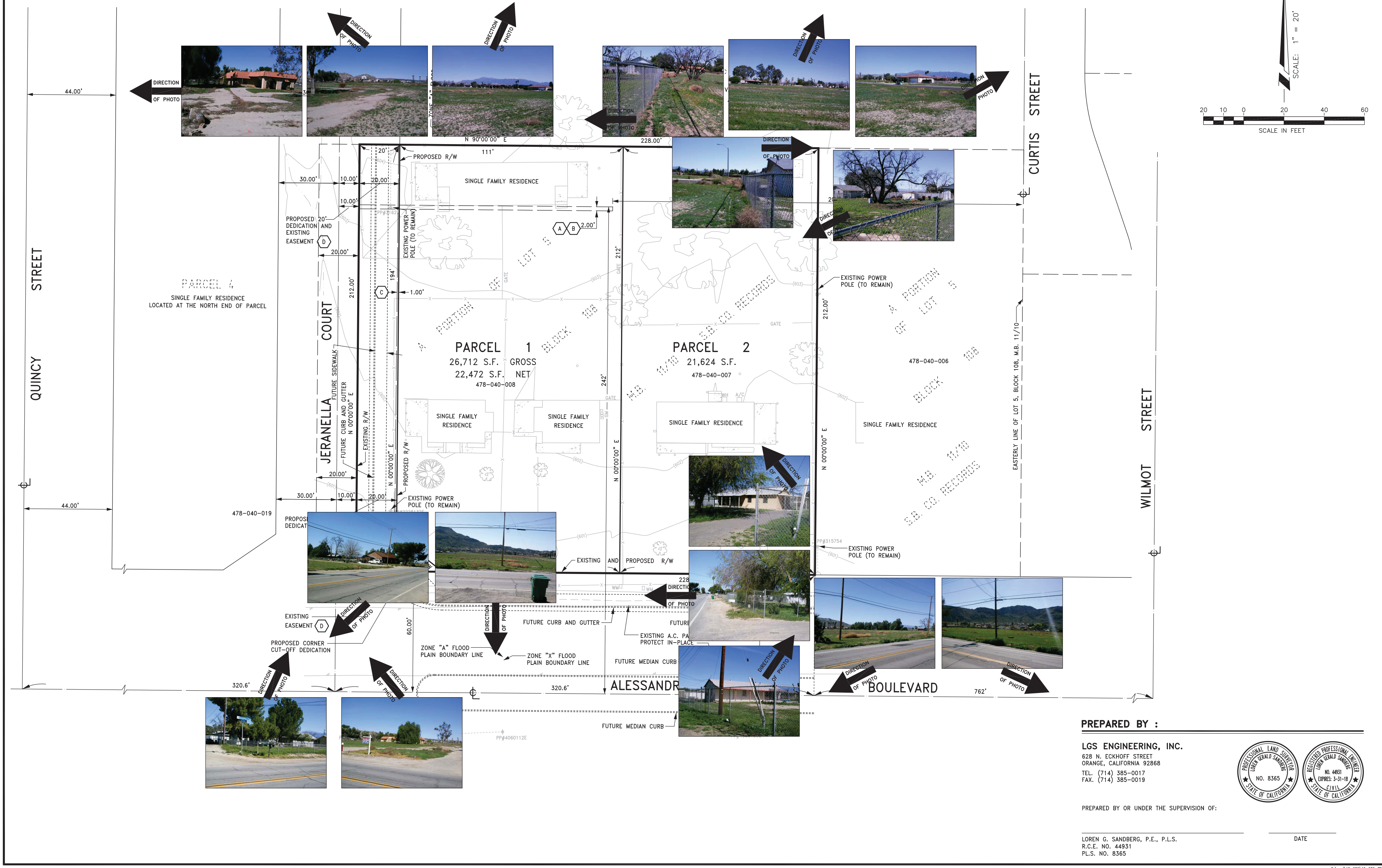
and/or a Noise study.

Kristine Kim /
ENVIRONMENTAL HEALTH SPECIALIST

Received by: David Knell Dknell@willdan.com

IN THE CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

TENTATIVE PARCEL MAP NO. 37104



PLANNING COMMISSION

STAFF REPORT

Meeting Date: January 26, 2017

PEN16-0119 PLOT PLAN & PEN16-0120 TENTATIVE TRACT MAP 35429

Case:	PEN16-0119 Plot Plan & PEN16-0120 Tentative Tract Map 35429
Applicant:	Creative Design Associates
Owner:	ENR Resources, LLC
Representative:	Creative Design Associates
Location:	Northwest corner of Alessandro Boulevard and Chara Street
Case Planner:	Gabriel Diaz
Council District:	3

SUMMARY

The proposal is to develop 58 multifamily condominium units with common open space. The project is located on 4.8 net acres. The proposal includes two and three unit building types. All units within the project include three bedrooms. Buildings are two-story with enclosed garages. The project is located on the northwest corner of Alessandro Boulevard and Chara Street, and the site is zoned Residential 15 (R15) which allows for up to 15 dwelling units per acre.

The project, as designed and conditioned, conforms to all development standards of the R15 zone and the design guidelines for multifamily residential uses as prescribed within the City's Municipal Code and Landscape Standards.

PROJECT DESCRIPTION

Project

The project consists of a Plot Plan and Tentative Tract Map application for a new 58-unit multifamily condominium project on vacant 4.8 net acres of land on the northwest corner of Alessandro Boulevard and Chara Street. The project includes 22 buildings; there are 14 building with three units and eight buildings with two units. All units within the project include three bedroom floor plans. Buildings are two-story in height and include enclosed garages. The two story buildings are set back a minimum of fifty-seven feet from the property line adjacent to the existing single-family homes located along the easterly property line of the project.

The project is providing common open space on the northern and southern portions of the site, and each unit meets the minimum requirement of 150 square feet of private open space. Parking for the development will include a combination of attached garages and standard parking surface spaces.

The project includes four floor plans (A, B, C & D) ranging in size from 1,518 square feet to 1,656 square feet. All first floor plans consist of a two car garage, kitchen, dining room, living room, and powder room. The second floor plans consist of two bedrooms and a master bedroom with walk in closet for a total of three bedrooms, a laundry room, and a bathroom. Floor Plan A has a total living area of 1,518 square feet. Floor Plan B has a total living area of 1,526 square feet. Floor Plan C has a total living area of 1,725 square feet. Floor Plan D has a total living area of 1,656 square feet. Floor Plan C is the only option with a loft on the second floor.

The project provides numerous amenities including common open space for activities and a children's play area. The project achieves required private space through the patio and entry design features. Required public common open space is achieved throughout the project in courtyards and other gathering areas.

The project is consistent with the existing R15 zoning which allows for up to 15 dwelling units per acre.

Site

The project site is zoned Residential 15 (R15) and is located on the northwest corner of Alessandro Boulevard and Chara Street. The project site is relatively flat. There are tree stumps and some older stockpiled dirt mounds on the site. The project site is vacant of any buildings, and is comprised of two rectangular shaped parcels and one rectangular shape parcel (Assessor Parcels Nos. 479-230-011, 479-230-012 & 479-230-027). The total project site is 4.8 net acres.

The site has been routinely disked for weed abatement over the years. There are some older existing trees on the site, along with olive trees adjacent to Alessandro Boulevard. A condition of approval has been placed on the project to ensure the relocation and/or replacement of mature trees as provided for in the City's Municipal Code. There is no evidence of sensitive habitat or riparian areas within the project site.

Surrounding Area

The project site is bounded to the north by a concrete storm channel and single-family homes zoned Residential 5 (R5). Existing single-family homes consistent with the Residential 5 (R5) zone (maximum five dwelling units per acre) are located to the east. To the south, the site is bounded by Alessandro Boulevard and the New Horizon Mobile Park (Residential 15 (R15)). The Moreno Valley School District offices (Office (O)) are located to the west.

Overall, the proposed multifamily residential condominium development has been found to be consistent with the objectives, goals and policies outlined in the City's General Plan, and compatible with the existing and planned land uses in the project area.

Access/Parking

The primary vehicular access to the proposed development will be from two driveways located on Timo Street and Chara Street. Both driveway entrances are on the eastern boundary of the project. There is no access driveway from Alessandro Boulevard. The proposed project would construct medians on Alessandro Boulevard. Timo Street dead ends into the project and becomes a private cul-de-sac at the property line which leads to the internal circulation of the units.

Internal circulation within the project site includes driveway aisles that measure 24 feet wide and which will meet all City's design standards. The driveways and interior drive aisles within the site have been reviewed and approved by the Fire Prevention Bureau for fire truck access. The site design has been evaluated to ensure adequate truck maneuvering and turnaround for delivery trucks and trash pick-up.

The project as designed provides a total of 158 parking spaces including 116 garages, and 42 open parking spaces for residents and guests. Based on Municipal Code Section 9.11, the project requires a total of 145 parking spaces, of which 116 must be covered. The project as designed satisfies all parking requirements of the City's Municipal Code including ADA accessible parking. Applicable building code/Cal Green requirements shall be addressed through building plan check. If required to be designed to the 2016 building code standards, infrastructure for future electric vehicle supply equipment (EVSE), including EV parking spaces if applicable, will be addressed prior to building permit issuance.

Design/Landscaping

This project, as designed and conditioned, conforms to all development standards of the R15 zone and the design guidelines for multifamily residential condominium developments prescribed in the City's Municipal Code and City Landscape Standards.

The design guidelines for multifamily projects call for buildings to include a variety of colors and architectural features to break up the massing of buildings and provide visual interest. This variation has been demonstrated in the project design. The architectural design of the condominiums includes stucco exteriors with architectural features around windows and entrances to the buildings to break up massing and add focal points to the building. These detailed features include, concrete tile roofs, window trim and shutters, colored trim, wood siding, wood trellises, wrought iron guard rails, covered balconies and stone veneer. Variation among the buildings is created with the mixture of two and three unit buildings, roof lines, two different colored concrete tiles, porches, balconies, and a proposed color palette of earth tones.

The building elevations and six foot wall along Alessandro Boulevard have been enhanced to provide visual interest from the street view. This includes the addition of stone veneer to facades. The proposed wall along Alessandro Boulevard has been upgraded with a combination or tubular steel fence on top of a decorative block wall that includes a combination of split face and precision block, along with decorative block columns with a cap.

The proposed project includes two double-bin trash enclosures, which exceeds the City's design standard of one trash enclosure for every 48 residential units. The trash enclosures are evenly distributed throughout the site to ensure ease of access to all residential units. The enclosures will be designed to the City's standards, which will include solid roofs compatible with the overall project architecture.

The project has been designed to meet the needs of residents as set forth in the design guidelines. The project entries off of Timo Street and Chara Street provide centralized access to accommodate arriving guests and residents. The project includes both outdoor open space and gathering areas, and balconies and patios to provide the required private open space area for each residential unit. The project includes common open areas with a tot lot for children.

All walls and fences on the site will be constructed with decorative block, wrought iron, and vinyl. The walls and trash enclosures for this project are conditioned to be consistent with the City's Municipal Code standards for placement, height and materials.

ENVIRONMENTAL

Planning staff has reviewed the request in accordance with the latest edition of the California Environmental Quality Act (CEQA) Guidelines and has determined that the project qualifies for an exemption under the provisions of the CEQA as a Class 32 Categorical Exemption, CEQA Guidelines, Section 15332 for In-Fill Development Projects.

The Class 32 exemption applies to the 58-unit multifamily condominium project because the Plot Plan and Tentative Tract Map are consistent with the criteria identified below:

- The project is consistent with the applicable general plan designation and all applicable general plan policies as well as with applicable zoning designation and regulations.
- The proposed development occurs within city limits on a project site of no more than five acres substantially surrounded by urban uses.
- The project site has no value as habitat for endangered, rare or threatened species.
- Approval of the project would not result in any significant effects relating to traffic, noise, air quality, or water quality.

- The site can be adequately served by all required utilities and public services.

NOTIFICATION

The public hearing notice for this project was published in the local newspaper on January 15, 2017. Public notice was sent to all property owners of record within 300 feet of the project site on January 12, 2017. The public hearing notice for this project was also posted on the project site on January 13, 2017.

As of the date of report preparation, staff had received no phone calls or other correspondence in response to the noticing for this project.

REVIEW / AGENCY COMMENTS

The project was submitted in November 2013. The Plot Plan and Tentative Tract Map warranted a comprehensive review, therefore, the plans were routed through several City departments, including Public Works, Fire Department, Public Safety, Building, and Planning, and various outside agencies including, but not limited to Moreno Valley Unified School District, Eastern Municipal Water District, Riverside Transit Agency, U.S. Post Office, gas and electric utilities for their review.

Upon completion of the initial plan review, the project was reviewed by the Pre-Project Review Staff Committee (Pre-PRSC) in December 2013, and then the Project Review Staff Committee (PRSC) in January 2014. Modifications were requested to the plot plan, preliminary grading plans and map to address building setbacks, parking, density, and a variety of site design considerations. Written comments were provided to the applicant.

Revised plans were submitted by the applicant in November 2014, and progressed through subsequent reviews to work through various site design options between February 2015 and September 2016. Upon resolution of all outstanding site, building, preliminary grading and map comments, the project was scheduled for the Planning Commission public hearing on January 26, 2017.

STAFF RECOMMENDATION

Staff recommends that the Planning Commission **APPROVE** Resolution No. 2017-01 and Resolution No. 2017-02, and thereby:

1. **CERTIFY** that PEN16-0119 (PA13-0061) Plot Plan and PEN16-0120 (PA13-0162) Tentative Tract Map 35429 qualifies as an exemption in accordance with the California Environmental Quality Act Guidelines, Section 15332 (In-Fill Developments). The project is within the city limits, on a project site of no more than five acres substantially surrounded by

urban uses, and consistent with all applicable general plan and zoning designations; and

2. **APPROVE** Resolution No. 2017-01 and thereby **APPROVE** Plot Plan PEN16-0119 (PA13-0061), subject to the attached conditions of approval included as Exhibit B; and

3. **APPROVE** Resolution No. 2017-02 and thereby **APPROVE** Tentative Tract Map PEN16-0020 (PA13-0062), subject to the attached conditions of approval included as Exhibit B.

Prepared by:
Gabriel Diaz
Associate Planner

Approved by:
Allen Brock
Community Development Director

ATTACHMENTS

1. Public Hearing Notice
2. Planning Commission Resolution 2017-01
3. Planning Commission Resolution 2017-02
4. Exhibit A - Conditions of Approval
5. Aerial Photograph
6. Zoning Map
7. Tentative Tract Map and Preliminary Grading
8. Chara Villa Project Plans
9. Color Elevations
10. Material Board I
11. Material Board II
12. Material Board III

This may affect your property

Notice of
PUBLIC HEARING

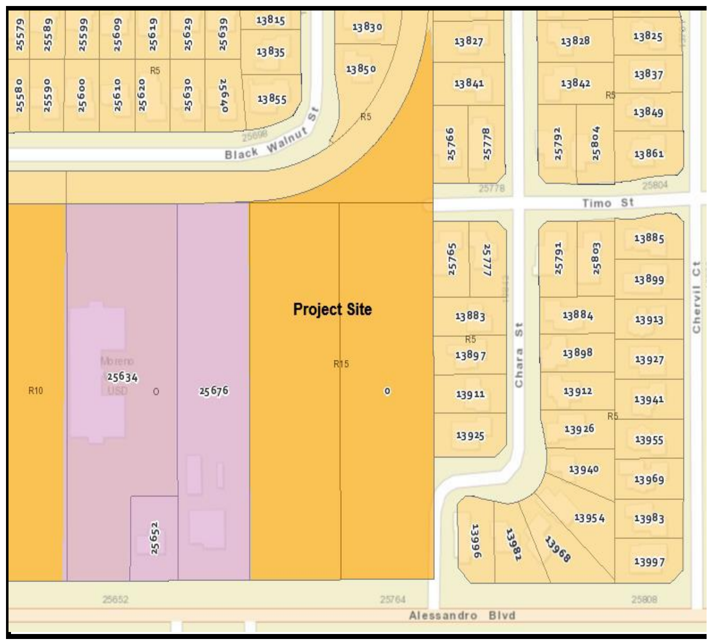
Notice is hereby given that a Public Hearing will be held by the Planning Commission of the City of Moreno Valley on the following item(s):

Project: PEN16-0119 (PA13-0061 Plot Plan) & PEN16-0120 (PA13-0062 Tentative Tract Map 35429)
Applicant: Creative Design Associates
Owner: ENR Resources, LLC
Representative: Creative Design Associates
A.P. No(s): 479-230-011, 479-230-012 & 479-230-027
Location: Northwest corner of Alessandro Boulevard and Chara Street
Proposal: Plot Plan and Tentative Tract Map applications for 58 multi-family condominium units with common open space. The project is located on 4.8 net acres. The proposal includes two and three unit building types. All condominium units within the project include three bedrooms. Buildings are two-story with enclosed garages. The project is consistent with the current R15 zoning which allows for up to 15 dwelling units per acre.
Council District: 3

The project has been evaluated against criteria set forth in the California Environmental Quality Act (CEQA) Guidelines and it was determined that the project is exempt from the provisions of CEQA as a Class 32 Categorical Exemption, CEQA Guidelines, Section 15332 In-Fill Development Projects in that the project site is of no more than five acres and is consistent with all of the other conditions identified in CEQA Guidelines Section 15332.

A public hearing before the Planning Commission has been scheduled for the proposed project. Any person interested in commenting on the proposal and recommended environmental determination may speak at the hearing or provide written testimony at or prior to the hearing. The project application, supporting plans and environmental documents may be inspected at the Community Development Department at 14177 Frederick Street, Moreno Valley, California during normal business hours (7:30 a.m. to 5:30 p.m., Monday through Thursday; 7:30 a.m. to 4:30 p.m., Friday), or you may telephone (951) 413-3206 for further information.

The Planning Commission, at the Hearing or during deliberations, could approve changes or alternatives to the proposal. If you challenge any of these items in court, you may be limited to raising only those items you or someone else raised at the Public Hearing described in this notice or in written correspondence delivered to the Planning Commission at, or prior to, the Public Hearing.



LOCATION N

PLANNING COMMISSION HEARING

City Council Chamber, City Hall
14177 Frederick Street
Moreno Valley, Calif. 92553

DATE AND TIME: January 26, 2017 at 7 PM
CONTACT PLANNER: Gabriel Diaz
PHONE: (951) 413-3226

Upon request and in compliance with the Americans with Disabilities Act of 1990, any person with a disability who requires a modification or accommodation in order to participate in a meeting should direct such request to Guy Pegan, ADA Coordinator, at 951.413.3120 at least 48 hours before the meeting. The 48-hour notification will enable the City to make reasonable arrangements to ensure accessibility to this meeting.

PLANNING COMMISSION RESOLUTION NO. 2017-01

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY APPROVING PLOT PLAN APPLICATION PEN16-0119 (PA13-0061) FOR DEVELOPMENT OF A 58 UNIT MULTIFAMILY RESIDENTIAL CONDOMINIUM PROJECT ON AN APPROXIMATELY 4.8 ACRE SITE LOCATED ON THE NORTHWEST CORNER OF ALESSANDRO BOULEVARD AND CHARA STREET (ASSESSOR'S PARCEL NUMBERS 479-230-011, 479-230-012 & 479-230-027).

WHEREAS, Creative Design Associates, has filed an application for the approval of Plot Plan PEN16-0119 (PA13-0061) for development of a 58 unit multifamily residential condominium project located on the northwest corner of Alessandro Boulevard and Chara Street as described in the title above; and

WHEREAS, the application has been evaluated in accordance with established City of Moreno Valley (City) procedures, and with consideration of the General Plan and other applicable regulations; and

WHEREAS, upon completion of a thorough development review process the project was appropriately agendized and noticed for a public hearing before the Planning Commission of the City of Moreno Valley (Planning Commission); and

WHEREAS, the public hearing notice for this project was published in the local newspaper on January 15, 2017. Public notice was sent to all property owners of record within 300 feet of the project site on January 12, 2017. The public hearing notice for this project was also posted on the project site on January 13, 2017; and

WHEREAS, on January 26, 2017, the Planning Commission held a public hearing to consider the application; and

WHEREAS, on January 26, 2017, the Planning Commission of the City of Moreno Valley determined that the project is exempt from the California Environmental Quality Act (CEQA) (Public Resources Code section 21000 et. seq.) under CEQA Guideline Section 15332, In-Fill Development Projects; and

WHEREAS, all legal prerequisites to the adoption of this Resolution have occurred; and

WHEREAS, pursuant to Government Code Section 66020(d)(1), **NOTICE IS HEREBY GIVEN** that this project is subject to certain fees, dedications, reservations and other exactions as provided herein.

NOW, THEREFORE, BE IT RESOLVED, it is hereby found, determined and resolved by the Planning Commission as follows:

A. This Planning Commission hereby specifically finds that all of the facts set forth above in this Resolution are true and correct.

B. Based upon substantial evidence presented to this Planning Commission during the above-referenced meeting on January 26, 2017, including written and oral staff reports, public testimony and the record from the public hearing, this Planning Commission hereby specifically finds as follows:

1. **Conformance with General Plan Policies –** The proposed use is consistent with the General Plan, and its goals, objectives, policies and programs.

FACT: The project proposes development of a 58 unit multifamily residential condominium project on an approximately 4.8 net acre site. The General Plan land use designation for the project site is within the Residential/Office.

The project is consistent with General Plan policies and objectives. General Plan Policy 2.4.6 states that the primary purpose of areas designated Residential/Office is to provide areas for the establishment of office-based working environments or residential developments of up to 15 dwelling units per acre.

The project as designed and conditioned meets the stated General Plan policies for residential development.

The project as proposed is consistent with General Plan Goal 2.4 which identifies the need for a supply of housing in sufficient numbers suitable to meet the diverse needs of future residents and to support healthy economic development without creating an oversupply of any particular type of housing. The project is also consistent with General Plan Objective 2.2 which states that the City will provide a wide range of residential opportunities and dwelling types to meet the demands of present and future residents of all socioeconomic groups.

This project, as designed and conditioned, conforms to all development standards of the R15 zone and the design guidelines for multifamily residential condominium developments prescribed in the City's Municipal Code and City Landscape Standards.

The design guidelines for multifamily projects call for buildings to include a variety of colors and architectural features to break up the massing of buildings and provide visual interest. This variation has been demonstrated in the project design. The architectural design of the condominiums includes stucco exteriors with architectural features around windows and entrances to the buildings to break up massing and add focal points to the building. These detailed features include, concrete tile roofs, window trim and shutters, colored trim, wood siding, wood trellises, wrought iron guard rails, covered balconies and stone veneer. Variation among the buildings is created with the mixture of two and three unit buildings, roof lines, two different colored concrete tiles, porches, balconies, and a proposed color palette of earth tones.

The project as designed and conditioned will achieve the objectives of the City of Moreno Valley's General Plan. The proposed project is consistent with the General Plan and does not conflict with the goals, objectives, policies, and programs established within the Plan.

2. **Conformance with Zoning Regulations –** The proposed use complies with all applicable zoning and other regulations.

FACT: The project site is currently zoned R15. The proposed project is within the range of density allowed under the R15 zoning. The project provides a residential density of 12.08 dwelling units to the acre within the density range permitted within the R15 zone (12 to 15 dwelling units per acre).

The project is designed in accordance with the provisions of Section 9.03 Residential Districts and Section 9.16 Design Guidelines of the City's Municipal Code. The project as designed and conditioned would comply with all applicable zoning and other regulations.

3. **Health, Safety and Welfare –** The proposed use will not be detrimental to the public health, safety or welfare or materially injurious to properties or improvements in the vicinity.

FACT: The proposed multifamily residential condominium project as designed and conditioned will provide acceptable levels of protection from natural and man-made hazards to life, health, and property consistent with General Goal 9.6.1. The project site is located within approximately one and one half miles from Fire Station No. 99. Therefore, adequate emergency services can be provided to the site consistent with General Plan Goal 9.6.2.

The proposed multifamily residential condominium project will not be detrimental to the public health, safety or welfare or materially injurious to properties or improvements in the vicinity. Planning staff has reviewed the request in accordance with the latest edition of the California Environmental Quality Act (CEQA) Guidelines and has determined that the project qualifies for an exemption under the provisions of the CEQA as a Class 32 Categorical Exemption, CEQA Guidelines, Section 15332 for In-Fill Development Projects.

The Class 32 exemption applies to the multifamily residential condominium project because the Plot Plan is consistent with the criteria identified below:

- The project is consistent with the applicable general plan designation and all applicable general plan policies as well as with applicable zoning designation and regulations.
- The proposed development occurs within city limits on a project site of no more than five acres substantially surrounded by urban uses.
- The project site has no value as habitat for endangered, rare or threatened species.
- Approval of the project would not result in any significant effects relating to traffic, noise, air quality, or water quality.
- The site can be adequately served by all required utilities and public services.

The project as designed and conditioned will result in a development that will minimize the potential for loss of life and protect residents and visitors to the City from physical injury and property damage due to seismic ground shaking and flooding as provided for in General Plan Objective 6.1 and General Plan Objective 6.2. The project as designed and conditioned will be required to comply with the Municipal Code and all applicable building codes, and will be consistent with the City's Municipal Code, Section 9.03 Residential Districts.

4. **Location, Design and Operation –** The location, design and operation of the proposed project will be compatible with existing and planned land uses in the vicinity.

FACT: The project site is consistent with the Residential/Office General Plan and Residential 15 zoning designations. The surrounding area has already been developed consistent with the existing General Plan and zoning designations. This includes existing single-family homes to the north and east, a residential mobile home park to the south, and existing school district offices to the west.

The project includes 22 buildings with a mix of two and three unit building types. There are 14 building with three units and 8 buildings with two units. All units within the project include three bedroom floor plans. Buildings are two-story with enclosed garages. In addition the project is providing common open space on the northern and southern portions of the site, and each unit meets the minimum requirement of 150 square feet of private open space. Parking for the development will include a combination of attached garages and standard parking surface spaces. The project includes four floor plans (A, B, C & D), all first floor plans consist of a two car garage, kitchen, dining room, living room, and powder room. The second floor plans consist of two bedrooms and a master bedroom with walk in closet for a total of three bedrooms, a laundry room, and a bathroom. Floor Plan A has a total living area of 1,518 square feet. Floor Plan B has a total living area of 1,526 square feet. Floor Plan C has a total living area of 1,725 square feet. Floor Plan D has a total living area of 1,656 square feet. Floor Plan C is the only option within a loft on the second floor, and Floor Plan D is the only option with a sixty-three square foot balcony. The two story buildings are setback a minimum of fifty-seven feet from the property line adjacent to the existing single-family homes located along the easterly property line of the project. The project achieves required private space through the patio and entry design features. Required public common open space is achieved throughout the project in courtyards and other gathering areas.

The architectural design of the condominiums includes stucco exteriors with architectural features around windows and entrances to the buildings to break up massing and add focal points to the building. These detailed features include, concrete tile roofs, window trim and shutters, colored trim, wood siding, wood trellises, wrought iron guard rails, covered balconies and stone veneer. Variation among the buildings is created with the mixture of two and three unit buildings, roof lines, two different colored concrete tiles, porches, balconies, and a proposed color palette of earth tones.

The building elevations and six foot wall along Alessandro Boulevard have been enhanced to provide visual interest from the street view. The buildings have been enhanced with the addition of stone veneer. The proposed wall along Alessandro Boulevard has been upgraded with tubular steel fence on top of a decorative block wall that includes a combination of split face and precision block, along with decorative block columns with a cap.

The project has been designed to minimize the impact on the residential collector streets, and meet the needs of residents as set forth in the design guidelines. The project entries off of Timo Street and Chara Street are centralized access to accommodate arriving guests and residents. There is no access provided from Alessandro Boulevard.

As designed and conditioned the proposed multifamily residential condominium project is compatible with existing and proposed land uses in the vicinity.

C. FEES, DEDICATIONS, RESERVATIONS, AND OTHER EXACTIONS

1. FEES

Impact, mitigation and other fees are due and payable under currently applicable ordinances and resolutions. These fees may include but are not limited to: Development Impact Fee, Transportation Uniform Mitigation Fee (TUMF), Multi-species Habitat Conservation Plan (MSHCP) Mitigation Fee, Stephens Kangaroo Habitat Conservation fee, Underground Utilities in lieu Fee, Area Drainage Plan fee, Bridge and Thoroughfare Mitigation fee (Future) and Traffic Signal Mitigation fee. The final amount of fees payable is dependent upon information provided by the applicant and will be determined at the time the fees become due and payable.

Unless otherwise provided for by this Resolution, all impact fees shall be calculated and collected at the time and in the manner provided in Chapter 3.32 of the City of Moreno Valley Municipal Code or as so provided in the applicable ordinances and resolutions. The City expressly reserves the right to amend the fees and the fee calculations consistent with applicable law.

2. DEDICATIONS, RESERVATIONS, AND OTHER EXACTIONS

The adopted Conditions of Approval for PEN16-0119 (PA13-0061), incorporated herein by reference, may include dedications, reservations, and exactions pursuant to Government Code Section 66020 (d) (1).

3. CITY RIGHT TO MODIFY/ADJUST; PROTEST LIMITATIONS

The City expressly reserves the right to establish, modify or adjust any fee, dedication, reservation or other exaction to the extent permitted and as authorized by law.

Pursuant to Government Code Section 66020(d)(1), NOTICE IS FURTHER GIVEN that the 90 day period to protest the imposition of any impact fee, dedication, reservation, or other exaction described in this Resolution begins on the effective date of this Resolution and any such protest must be in a manner that complies with Section 66020(a) and failure to timely follow this procedure will bar any subsequent legal action to attack, review, set aside, void or annul imposition.

The right to protest the fees, dedications, reservations, or other exactions does not apply to planning, zoning, grading, or other similar application processing fees or service fees in connection with this project and it does not apply to any fees, dedication, reservations, or other exactions of which a notice has been given similar to this, nor does it revive challenges to any fees for which the applicable statute of limitations has previously expired.

BE IT FURTHER RESOLVED that the Planning Commission **HEREBY APPROVES** Resolution No. 2017-01, and thereby:

1. **CERTIFY** that Plot Plan PEN16-0119 (PA13-0061) is exempt from the provisions of the California Environmental Quality Act (CEQA), as a Class

32 Categorical Exemption, CEQA Guidelines, Section 15332 for In-Fill Development Projects; and

2. **APPROVE** Plot Plan PEN16-0119 based on the findings contained in this resolution, and subject to the attached conditions of approval included as Exhibit A.

APPROVED on this 26th day of January, 2017.

____
Brian Lowell
Chair, Planning Commission

ATTEST:

____
Richard J. Sandzimier, Planning Official
Secretary to the Planning Commission

APPROVED AS TO FORM:

____
City Attorney

Attached: Conditions of Approval

PLANNING COMMISSION RESOLUTION NO. 2017-02

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY APPROVING TENTATIVE TRACT MAP 35429 APPLICATION PEN16-0120 (PA13-0062), CREATING ONE LOT FOR CONDOMINIUM PURPOSES FOR THE DEVELOPMENT OF A 58 UNIT MULTIFAMILY CONDOMINIUM PROJECT ON AN APPROXIMATELY 4.8 ACRE SITE LOCATED ON THE NORTHWEST CORNER OF ALESSANDRO BOULEVARD AND CHARA STREET (ASSESSOR'S PARCEL NUMBERS 479-230-011, 479-230-012 & 479-230-027).

WHEREAS, Creative Design Associates, has filed an application for the approval of Tentative Tract Map 35429 PEN16-0120 (PA13-0062), a proposal to create one lot for condominium purposes for the development of a 58 unit multifamily residential condominium project, merging three parcels into one on a 4.8 net acre site located within Assessor's Parcel Numbers 479-230-011, 479-230-012 & 479-230-027 as described in the title of this Resolution; and

WHEREAS, the application has been evaluated in accordance with established City of Moreno Valley (City) procedures, and with consideration of the General Plan and other applicable regulations; and

WHEREAS, upon completion of a thorough development review process the project was appropriately agendized and noticed for a public hearing before the Planning Commission of the City of Moreno Valley (Planning Commission); and

WHEREAS, the public hearing notice for this project was published in the local newspaper on January 15, 2017. Public notice was sent to all property owners of record within 300 feet of the project site on January 12, 2017. The public hearing notice for this project was also posted on the project site on January 13, 2017; and

WHEREAS, on January 26, 2017, the Planning Commission of the City of Moreno Valley conducted a public hearing to consider the application; and

WHEREAS, on January 26, 2017, the Planning Commission of the City of Moreno Valley determined that the project is exempt from the California Environmental Quality Act (CEQA) (Public Resources Code section 21000 et. seq.) under CEQA Guideline Section 15332, In-Fill Development Projects; and

WHEREAS, all legal prerequisites to the adoption of this Resolution have occurred; and

WHEREAS, pursuant to Government Code Section 66020(d)(1), **NOTICE IS HEREBY GIVEN** that this project is subject to certain fees, dedications, reservations and other exactions as provided herein.

NOW, THEREFORE, BE IT RESOLVED, by the Planning Commission of the City of Moreno Valley as follows:

A. This Planning Commission hereby specifically finds that all of the facts set forth above in this Resolution are true and correct.

B. Based upon substantial evidence presented to this Planning Commission during the above-referenced meeting on January 26, 2017, including written and oral staff reports, and the record from the public hearing, this Planning Commission hereby specifically finds as follows:

1. That the proposed map is consistent with applicable general and specific plans and the zoning ordinance;

FACT: The proposed tentative tract map will create one lot for condominium purposes for the development of a 58 unit multifamily residential condominium project. The proposed tract map is consistent with General Plan Objective 2.1.3 Land Use Plan. The current General Plan designation is Residential/Office. The current Municipal Code Zoning designation is Residential 15 (R15). The proposed project is within the range of density allowed under the R15 zoning. The project provides a residential density of 12.08 dwelling units to the acre. The range for density permitted within the R15 zone is 12 to 15 dwelling units per acre.

The project is consistent with General Plan policies and objectives. General Plan Policy 2.4.6 states that the primary purpose of areas designated Residential/Office is to provide areas for the establishment of office-based working environments or residential developments of up to 15 dwelling units per acre.

The project as proposed is consistent with General Plan Goal 2.4 which identifies the need for a supply of housing in sufficient numbers suitable to meet the diverse needs of future residents and to support healthy economic development without creating an oversupply of any particular type of housing. The project is also consistent with General Plan Objective 2.2 which states that the City will provide a wide range of residential opportunities and dwelling types to meet the demands of present and future residents of all socioeconomic groups.

The tract map as designed and conditioned will achieve the objectives of the City of Moreno Valley's General Plan. The proposed map is consistent with the General Plan and does not conflict with the goals, objectives, policies, and programs established within the Plan.

2. That the design or improvement of the proposed subdivision is consistent with applicable general and specific plans;

FACT: The proposed parcel map is consistent with General Plan Objective 2.1.3 Land Use Plan. The General Plan land use designation for the project site is within the Residential/Office. The current Municipal Code Zoning designation is Residential 15 (R15). The allowed density for the R15 zone is a maximum of 15 dwelling units per acre.

Tentative Tract Map No. 35429 for condominium purposes is consistent with the City's Municipal Code Section 9.14 Land Divisions. The proposed tract map will create one lot for condominium purposes for the development of a 58 unit multifamily residential condominium project, merging three parcels into one on a 4.8 net acre site located within Assessor's Parcel Numbers 479-230-011, 479-230-012 & 479-230-027.

The subdivision as designed and conditioned is consistent with existing goals, objectives, policies and programs of the General Plan.

3. That the site is physically suitable for the type of development;

FACT: The project site is vacant and relatively flat located at the northwest corner of Alessandro Boulevard and Chara Street. The zoning for the site is Residential 15 (R15). The project site is consistent with the Residential 15 zoning designations. The surrounding area has already been developed consistent with the existing General Plan and zoning designations. This includes existing single-family homes to the north and east, a residential mobile home park to the south, and existing school district offices to the west.

4. That the site of the proposed land division is physically suitable for the proposed density of the development;

FACT: The project site is vacant of any buildings, and is comprised of two rectangular shaped parcels and one rectangular shape parcel and is comprised of topography that is fairly flat. The tract map establishes one lot physically suitable for condominium development. The tract map is designed in accordance with the provisions of the City's Municipal Code Section 9.14 Land Divisions.

5. That the design of the subdivision or the proposed improvements are not likely to cause substantial environmental damage or substantially and avoidably injure fish or wildlife or their habitat;

FACT: The project site is vacant and relatively flat and the surrounding area has already been developed consistent with the existing General Plan and zoning designations. This includes existing single-family homes to the north and east, a residential mobile home park to the south, and existing school district offices to the west.

Planning staff has reviewed the request in accordance with the latest edition of the California Environmental Quality Act (CEQA) Guidelines and has determined that the project qualifies for an exemption under the provisions of the CEQA as a Class 32 Categorical Exemption, CEQA Guidelines, Section 15332 for In-Fill Development Projects.

The Class 32 exemption applies to the tract map because the map is consistent with the criteria identified below:

- The project is consistent with the applicable general plan designation and all applicable general plan policies as well as with applicable zoning designation and regulations.
- The proposed development occurs within city limits on a project site of no more than five acres substantially surrounded by urban uses.
- The project site has no value as habitat for endangered, rare or threatened species.
- Approval of the project would not result in any significant effects relating to traffic, noise, air quality, or water quality.
- The site can be adequately served by all required utilities and public services.

Therefore, the parcel map will not cause substantial environmental damage or substantially and avoidably injure fish or wildlife or their habitat.

6. That the design of the subdivision or type of improvements is not likely to cause serious public health problems;

FACT: As conditioned, the proposed tract map will not cause serious public health problems. Based on the available environmental resources information, there are no known hazardous conditions associated with the property.

The tract map has been designed consistent with the City's Municipal Code Section 9.14 Land Divisions and meets all City requirements related to subdividing a property.

7. That the design of the subdivision or the type of improvements will not conflict with easements, acquired by the public at large for access through or use of property within the proposed subdivision;

FACT: The tentative tract map has been designed to accommodate and not conflict with existing easements on the subject site including utility and storm drain easements. The tract map proposal is to create one lot for condominium purposes for the development of a 58 unit multifamily residential condominium project, merging three parcels into one on a 4.8 net acre site located within Assessor's Parcel Numbers 479-230-011, 479-230-012 & 479-230-027.

8. That the proposed land division and the associated design and improvements are consistent with applicable ordinances of the city.

FACT: The land division proposed by Tentative Tract Map No. 35429 is consistent with the City's Municipal Code Section 9.14 Land Divisions. The one lot for condominium purposes as designed and conditioned is consistent with applicable ordinances of the City.

C. FEES, DEDICATIONS, RESERVATIONS, AND OTHER EXACTIONS

1. FEES

Impact, mitigation and other fees are due and payable under applicable ordinances and resolutions. These fees may include but are not limited to: Development Impact Fee, Transportation Uniform Mitigation Fee (TUMF), Multi-species Habitat Conservation Plan (MSHCP) Mitigation Fee, Stephens Kangaroo Habitat Conservation fee, Underground Utilities in lieu Fee, Area Drainage Plan fee, Bridge and Thoroughfare Mitigation fee (Future) and Traffic Signal Mitigation fee. The final amount of fees payable is dependent upon information provided by the applicant and will be determined at the time the fees become due and payable.

Unless otherwise provided for by this resolution, all impact fees shall be calculated and collected at the time and in the manner provided in Chapter 3.32 of the City of Moreno Valley Municipal Code or as so provided in applicable ordinances and resolutions. The City expressly reserves the right to amend the fees and the fee calculations consistent with applicable law.

2. DEDICATIONS, RESERVATIONS, AND OTHER EXACTIONS

The adopted Conditions of Approval for PEN16-0120 (PA13-0062), incorporated herein by reference, include dedications, reservations, and exactions pursuant to Government Code Section 66020 (d) (1).

3. CITY RIGHT TO MODIFY/ADJUST; PROTEST LIMITATIONS

The City expressly reserves the right to establish, modify or adjust any fee, dedication, reservation or other exaction to the extent permitted and as authorized by law.

Pursuant to Government Code Section 66020(d)(1), NOTICE IS FURTHER GIVEN that the 90 day period to protest the imposition of any impact fee, dedication, reservation, or other exaction described in this resolution begins on the effective date of this resolution and any such protest must be in a manner that complies with Government Code Section 66020(a) and failure to follow this procedure in a timely fashion will bar any subsequent legal action to attack, review, set aside, void or annul imposition.

The right to protest the fees, dedications, reservations, or other exactions does not apply to planning, zoning, grading, or other similar application processing fees or service fees in connection with this project and it does not apply to any fees, dedication, reservations, or other exactions of which a notice has been given similar to this, nor does it revive challenges to any fees for which the Statute of Limitations has previously expired.

BE IT FURTHER RESOLVED that the Planning Commission **HEREBY APPROVES** Resolution No. 2017-02, and thereby:

1. **CERTIFY** that Tentative Tract Map PEN16-0120 (PA13-0062) is exempt from the provisions of the California Environmental Quality Act (CEQA), as a Class 32 Categorical Exemption, CEQA Guidelines, Section 15332 for In-Fill Development Projects; and

2. **APPROVE** Tentative Tract Map PEN16-0120 based on the findings contained in this resolution, and subject to the attached conditions of approval included as Exhibit A.

APPROVED on this 26th day of January, 2017.

Brian R. Lowell
Chair, Planning Commission

ATTEST:

Richard J. Sandzimier, Planning Official

APPROVED AS TO FORM:

City Attorney

Attached: Conditions of Approval

CITY OF MORENO VALLEY
CONDITIONS OF APPROVAL
PLOT PLAN PEN16-0119 (PA13-0061) FOR A
58 UNIT CONDOMINIUM PROJECT &
TENTATIVE TRACT MAP 35429 PEN16-0120 (PA13-0062)
ASSESSOR'S PARCEL NUMBERS: 479-230-011, 479-230-012 & 479-230-027

Effective Approval Date:
Effective Expiration Date:

COMMUNITY DEVELOPMENT DEPARTMENT

Planning Division

P1. Plot Plan PEN16-0119 and Tentative Tract Map PEN16-0120 has been approved for the development of a new 58-unit multifamily condominium project on vacant 4.8 net acres of land on the northwest corner of Alessandro Boulevard and Chara Street. The project includes 22 buildings; there are 14 building with three units and eight buildings with two units. All units within the project include three bedroom floor plans. Buildings are two-story in height and include enclosed garages. The two story buildings are set back a minimum of fifty-seven feet from the property line adjacent to the existing single-family homes located along the easterly property line of the project.

The project as designed provides a total of 158 parking spaces including 116 garages, and 42 open parking spaces for residents and guests. Based on Municipal Code Section 9.11, the project requires a total of 145 parking spaces, of which 116 must be covered.

P2. This approval shall comply with all applicable requirements of the City of Moreno Valley Municipal Code.

P3. This tentative map shall expire three years after the approval date of this tentative map unless extended as provided by the City of Moreno Valley Municipal Code; otherwise it shall become null and void and of no effect whatsoever in the event the applicant or any successor in interest fails to properly file a final map before the date of expiration. (MC 9.02.230, 9.14.050, 080)

Timing Mechanisms for Conditions (see abbreviation at beginning of affected condition):

R - Map Recordation	GP - Grading Permits	CO - Certificate of Occupancy or building final
WP - Water Improvement Plans	BP - Building Permits	P - Any permit

Governing Document (see abbreviation at the end of the affected condition):

GP - General Plan	MC - Municipal Code	CEQA - California Environmental Quality Act
Ord - Ordinance	DG - Design Guidelines	Ldscp - Landscape Development Guidelines and Specs
Res - Resolution	UFC - Uniform Fire Code	UBC - Uniform Building Code
	SBM - Subdivision Map Act	

P4. This plot plan shall expire three years after the approval date unless extended as provided by the City of Moreno Valley Municipal Code; otherwise it shall become null and void and of no effect whatsoever. (MC 9.02.230)

P5. The site shall be developed in accordance with the approved plot plan and tentative tract map on file in the Community Development Department - Planning Division, the General Plan, the Municipal Code regulations, and the conditions contained herein. (MC 9.14.020)

P6. All undeveloped portions of the site shall be maintained in a manner that provides for the control of weeds, erosion and dust. (MC 9.02.030)

P7. All landscaped areas shall be maintained in a healthy and thriving condition, free from weeds, trash and debris. (MC 9.02.030)

P8. Any signs indicated on the submitted plans are not included with this approval. Any signs, whether permanent (e.g. wall, monument) or temporary (e.g. banner, flag), proposed for this development shall be designed in conformance with the sign provisions of the Municipal Code or an approved sign program, if applicable, and shall require separate application and approval by the Planning Division. No signs are permitted in the public right of way. (MC 9.12)

P9. All site plans, grading plans, landscape and irrigation plans, and street improvement plans shall be coordinated for consistency with this approval.

P10. The design of all swales and basins that are visible from the public right-of-way shall be integrated with the surrounding landscape areas.

PRIOR TO GRADING

P11. (GP) Prior to approval of any grading permit, the developer shall submit a tree plan to the Planning Division for review and approval. The plan shall identify all mature trees (4 inch trunk diameter or larger) on the subject property and City right-of-way. Using the grading plan as a base, the plan shall indicate trees to be relocated, retained, and removed. Replacement trees shall be: shown on the plan; be a minimum size of 24 inch box; and meet a ratio of three replacement trees for each mature tree removed or as approved by the Community Development Director or designee. (GP Objective 4.4, 4.5, DG)

P12. (GP) Prior to issuance of grading permits, the developer shall pay the applicable Stephen's' Kangaroo Rat (SKR) Habitat Conservation Plan mitigation fee. (Ord)

P13. (GP) Prior to the issuance of grading permits, final erosion control landscape and irrigation plans for all cut or fill slopes over 3 feet in height shall be submitted to the Planning Division for review and approval for the phase in process. The plans shall be designed in accordance with the slope erosion plan as required by the City Engineer for that phase. Man-made slopes greater than 10 feet in height shall be "land formed" to conform to the natural terrain and shall be landscaped and stabilized to minimize visual scarring. (GP Objective 1.5, MC 9.08.080, DG)

P14. (GP) If potential historic, archaeological, or paleontological resources are uncovered during excavation or construction activities at the project site, work in the affected area will cease immediately and a qualified person (meeting the Secretary of the Interior's standards (36CFR61)) shall be consulted by the applicant to evaluate the find, and as appropriate recommend alternative measures to avoid, minimize or mitigate negative effects on the historic, prehistoric, or paleontological resource. Determinations and recommendations by the consultant shall be implemented as deemed appropriate by the Community Development Director, in consultation with the State Historic Preservation Officer (SHPO) and any and all affected Native American Tribes before any further work commences in the affected area.

If human remains are discovered, work in the affected area shall cease immediately and the County Coroner shall be notified. If it is determined that the remains are potentially Native American, the California Native American Heritage Commission and any and all affected Native American Indians tribes such as the Morongo Band of Mission Indians or the Pechanga Band of Luiseno Indians shall be notified and appropriate measures provided by State law shall be implemented. (GP Objective 23.3, DG, CEQA).

P15. (GP) Prior to approval of any grading permits, final median enhancement/landscape/irrigation plans shall be submitted to the Planning Division, and Public Works Department – Special Districts Division for review and approval by each division. (GP - Circulation Master Plan) Timing of installation shall be determined by Special Districts.

P16. (GP) Prior to the issuance of grading permits, the grading plan shall show decorative concrete paving for all driveway ingress/egress locations of the project and across drive aisles throughout the development to connect required paths of travel with the public right-of-way.

P17. (GP) Prior to issuance of grading permits, the developer shall submit wall/fence plans to the Planning Division for review and approval and of any proposed retaining walls. The wall and fence materials shall be decorative in nature, while the combination of retaining and other walls on top shall not exceed the City's height requirement.

P18. (GP) Within thirty (30) days prior to any grading or other land disturbance, a pre-construction survey for Burrowing Owls shall be conducted pursuant to the established guidelines of the Multiple Species Habitat Conservation Plan.

PRIOR TO RECORDATION OF FINAL MAP

P19. (R) Prior to final map recordation, subdivision phasing (including any proposed common open space or improvement phasing, if applicable), shall be subject to the Planning Division approval. Any proposed phasing shall provide for adequate vehicular access to all lots in each phase as determined by the City Transportation Engineer or designee and shall substantially conform to all intent and purpose of the subdivision approval. (MC 9.14.080)

P20. (R) Prior to recordation of the final map, final median enhancement/landscape/irrigation plans shall be reviewed and approved by the Planning Division, and Public Works Department - Special Districts Administration for review and approval by each division. (GP - Circulation Master Plan)

P21. (R) Prior to recordation of the final subdivision map, the developer shall submit for review and approval the following documents to the Planning Division which shall demonstrate that the project will be developed and maintained in accordance with the intent and purpose of the approval:

a. The document to convey title
b. Deed restrictions, easements, or Covenants, Conditions and Restrictions to be recorded

The approved documents shall be recorded at the same time that the subdivision map is recorded. The documents shall contain provisions for general maintenance of the site, joint access to proposed parcels, open space use restrictions, conservation easements, guest parking, feeder trails, water quality basins, lighting, landscaping and common area use items such as general building maintenance (apartments, condominiums and townhomes) tot lot/public seating areas and other recreation facilities or buildings. The approved documents shall also contain a provision, which provides that they may not be terminated and/or substantially amended without the consent of the City and the developer's successor-in-interest. (MC 9.14.090)

In addition, the following deed restrictions and disclosures shall be included within the document and grant deed of the properties:

- The developer and homeowners association shall promote the use of native plants and trees and drought tolerant species to the extent feasible.

- (R) All lots designated for open space and or detention basins, shall be included as an easement to, and maintained by a Homeowners Association (HOA) or other private maintenance entity. All reverse frontage landscape areas shall also be maintained by the onsite HOA. Language to this effect shall be included and reviewed within the required Covenant Conditions and Restrictions (CC&Rs) prior to the approval of the final map.

- Maintenance of any and all common facilities.

- A conservation easement for lettered lots shall be recorded on the deed of the property and shown on the final map. Said easement shall include access restrictions prohibiting motorized vehicles from these areas.

PRIOR TO BUILDING PERMITS

P22. (BP) Prior to issuance of building permits, the Planning Division shall review and approve the location and method of enclosure or screening of transformer cabinets, commercial gas meters and back flow preventers as shown on the final working drawings. Location and screening shall comply with the following criteria: transformer cabinets and commercial gas meters shall not be located within required setbacks and shall be screened from public view either by architectural treatment or landscaping; multiple electrical meters shall be fully enclosed and incorporated into the overall architectural design of the building(s); back-flow preventers shall be screened by landscaping. (GP Objective 43.30, DG)

P23. (BP) Prior to issuance of building permits, screening details shall be addressed on plans for roof top equipment and trash enclosures submitted for Planning Division review and approval. All equipment shall be completely screened so as not to be visible from public view, and the screening shall be an integral part of the building. For trash enclosures, landscaping shall be included on at least three sides. The trash enclosure, including any roofing, shall be compatible with the architecture for the building(s). (GP Objective 43.6, DG)

P24. (BP) Prior to issuance of building permits, two copies of a detailed, on-site, computer generated, point-by-point comparison lighting plan, including exterior building, parking lot, and landscaping lighting, shall be submitted to the Planning Division for review and approval. The lighting plan shall be generated on the plot plan and shall be integrated with the final landscape plan. The plan shall indicate the manufacturer's specifications for light fixtures used and shall include style, illumination, location, height and method of shielding. The lighting shall be designed in such a manner so that it does not exceed one-quarter foot-candle minimum maintained lighting measured from within five feet of any property line. The lighting level for all parking lots or structures shall be a minimum coverage of one foot-candle of light with a maximum of eight foot-candles. After the third plan check review for lighting plans, an additional plan check fee will apply. (MC 9.08.100, DG)

P25. (BP) Prior to issuance of building permits, for multi-family projects that propose phased occupancy, a phasing plan application shall be submitted to the Planning Division for approval.

P26. (BP) Prior to issuance of building permits, the developer or developer's successor-in-interest shall pay all applicable impact fees, including but not limited to Transportation Uniform Mitigation fees (TUMF), Multi-species Habitat Conservation Plan (MSHCP) mitigation fees, and the City's adopted Development Impact Fees. (Ord)

P27. (BP) Prior to the issuance of building permits, the site plan shall include landscape for trash enclosures to include landscape on three sides, while elevation plans for trash enclosures shall be provided that include decorative enhancements such as an enclosed roof and other decorative features that are consistent with the architecture of the proposed buildings on the site, subject to the approval of the Planning Division.

P28. (BP) Prior to issuance of any building permits, final landscaping and irrigation plans shall be submitted for review and approved by the Planning Division. After the third plan check review for landscape plans, an additional plan check fee shall apply. The plans shall be prepared in accordance with the City's Landscape Standards and shall include:

A. A three (3) foot high decorative wall, solid hedge or berm shall be placed in any setback areas between a public right of way and a parking lot for screening.
B. Drought tolerant landscape shall be used. Sod shall be limited to gathering and recreation areas.
C. Street trees shall be provided every 40 feet on center in the parkway along the Alessandro Boulevard, Chara Street and Timo Street frontages.
D. On-site trees shall be planted at an equivalent of one (1) tree per thirty (30) linear feet of the perimeter of a parking lot and per thirty linear feet of a building dimension for the portions of the building visible from a parking lot or right of way. Trees may be massed for pleasing aesthetic effects.
E. Enhanced landscaping shall be provided at all driveway entries and street corner locations and along the Alessandro Boulevard, Chara Street and Timo frontages.
F. The review of all utility boxes, transformers etc. shall be coordinated to provide adequate screening from public view.
G. Landscaping on three sides of any trash enclosure.
H. All site perimeter and parking lot landscape and irrigation shall be installed prior to the release of certificate of any occupancy permits for the site.
I. Bio-retention or other water quality or storm water infrastructure placed in a required landscape planter shall be landscaped per Municipal Code Section 9.17 and the City's Landscape Standards.

PRIOR TO BUILDING FINAL

P30. (BF) Prior to building final, the required landscaping and irrigation shall be installed. (MC 9.03.040)

P31. (BF) Prior to building final all required and proposed fences and walls shall be constructed according to the approved plans on file in the Planning Division. (MC 9.080.070).

P32. (BF) Prior to building final, installed landscaping and irrigation shall be inspected by the Planning Division. All on-site and common area landscaping shall be installed in accordance with the City's Landscape Standards and the approved project landscape plans and all site clean-up shall be completed. All site perimeter and parking lot landscape and irrigation shall be installed prior building final for the site or pad in question.

P33. (BF) Prior to building final, Planning approved/stamped landscape plans shall be provided to the Community Development Department – Planning Division on a CD disk.

MORENO VALLEY UNIFIED SCHOOL DISTRICT

S1. (BP) Prior to issuance of building permits, the developer shall provide to the Community Development Director a written certification by the affected school district that either: (1) the project has complied with the fee or other exaction levied on the project by the governing board of the district, pursuant to Government Code Section 65996; or (2) the fee or other requirement does not apply to the project.

UNITED STATES POSTAL SERVICE

PO1. (BP) Prior to the issuance of building permits, the developer shall contact the U.S. Postal Service to determine the appropriate type and location of mailboxes.

BUILDING AND SAFETY DIVISION

GENERAL CONDITIONS OF APPROVAL

The following conditions have been generated based on the information provided with your application. Please note that future revisions or changes in scope to the project may require additional items. Fee estimates for plan review and permits can be obtained by contacting the Building Safety Division at 951.413.3350.

B1. All new structures shall be designed in conformance to the latest design standards adopted by the State of California in the California Building Code, (CBC) Part 2, Title 24, California Code of Regulations including requirements for allowable area, occupancy separations, fire suppression systems, accessibility, etc. The current code edition is the 2016 CBC.

B2. The proposed residential project shall comply with The California Green Building Standards Code, Section 4.106.4, mandatory requirements for Electric Vehicle Charging Station (EVCS)

B3. Prior to submittal, all new development, including residential second units, are required to obtain a valid property address prior to permit application. Addresses can be obtained by contacting the Building Safety Division at 951.413.3350.

B4. The proposed project's occupancy shall be classified by the Building Official and must comply with exiting, occupancy separation(s) and minimum plumbing fixture requirements of the 2016 California Plumbing Code Table 4-1.

B5. Building plans submitted shall be signed and sealed by a California licensed design professional as required by the State Business and Professions Code.

B6. The proposed residential project (3 or more dwelling units) shall comply with the latest Federal Law, Americans with Disabilities Act, and State Law, California Code of Regulations, Title 24, Chapter 11A for accessibility standards for the disabled including access to the site, exits, kitchens, bathrooms, common spaces, pools/spas, etc.

B7. The proposed development is subject to the payment of required development fees as required by the City's current Fee Ordinance at the time a building application is submitted or prior to the issuance of permits as determined by the City.

B8. The proposed project is subject to approval by the Eastern Municipal Water District and all applicable fees and charges shall be paid prior to permit issuance. Contact the water district at 951.928.3777 for specific details.

B9. Prior to permit issuance, every applicant shall submit a properly completed Waste Management Plan (WMP), as a portion of the building or demolition permit process. (MC 8.80.030)

B10. Any construction within the city shall only be as follows: Monday through Friday (except for holidays) seven a.m. to seven p.m.; Saturday from eight a.m. to four p.m., unless written approval is first obtained from the Building Official or City Engineer per City of Moreno Valley Municipal Code (MC 8.14.040E).

B11. Contact the Building Safety Division for permit application submittal requirements.

FIRE PREVENTION BUREAU

With respect to the conditions of approval, the following fire protection measures shall be provided in accordance with Moreno Valley City Ordinances and/or recognized fire protection standards:

F1. Final fire and life safety conditions will be addressed when the Fire Prevention Bureau reviews building plans. These conditions will be based on occupancy, use, California Building Code (CBC), California Fire Code (CFC), and related codes, which are in force at the time of building plan submittal.

F2. The minimum number of fire hydrants required, as well as the location and spacing of fire hydrants, shall comply with the C.F.C., MVMC, and NFPA 24. A fire hydrant shall be located within 50 feet of the fire department connection for buildings protected with a fire sprinkler system. Fire hydrants shall not be closer than 40 feet to the structures. The size and number of outlets required for the approved fire hydrants are (6” x 4” x 2 ½”) (CFC 507.5.1, 507.5.7, Appendix C, NFPA 24-7.2.3, MVMC 912.2.1)

F3. During phased construction, dead end roadways and streets which have not been completed shall have a turn-around capable of accommodating fire apparatus. (CFC 503.2 and 503.2.5)

F4. Prior to issuance of Building Permits, the applicant/developer shall provide the Fire Prevention Bureau with an approved site plan for fire lane signage, address display boards and fire hydrant placement. (MVMC 8.36.050 and CFC 501.3)

F5. Prior to construction and issuance of building permits, all locations where structures are to be built shall have an approved Fire Department emergency vehicular access road (all weather surface) capable of sustaining an imposed load of 80,000 lbs. GVW, based on street standards approved by the Public Works Director and the Fire Prevention Bureau. (CFC 501.4 and MVMC 8.36.050 Section A)

F6. Prior to construction and issuance of Building Permits, fire lanes and fire apparatus access roads shall have an unobstructed width of not less than twenty–four (24) feet as approved by the Fire Prevention Bureau and an unobstructed vertical clearance of not less the thirteen (13) feet six (6) inches. (CFC 503.2.1 and MVMC 8.36.060[E])

F7. Prior to construction, all roads, driveways and private roads shall not exceed 12 percent grade. (CFC 503.2.7 and MVMC 8.36.060[G])

F8. If construction is phased, each phase shall provide an approved emergency vehicular access way for fire protection prior to any building construction. (CFC 501.4)

F9. Prior to construction, all locations where structures are to be built shall have an approved Fire Department access based on street standards approved by the Public Works Director and the Fire Prevention Bureau. (CFC 501.3)

F10. Prior to building construction, dead end roadways and streets which have not been completed shall have a turnaround capable of accommodating fire apparatus. (CFC 503.2.5)

F11. Prior to issuance of Building Permits, the applicant/developer shall participate in the Fire Impact Mitigation Program. (Fee Resolution as adopted by City Council)

F12. Prior to issuance of Building Permits, plans for private water mains supplying fire sprinkler systems and/or private fire hydrants shall be submitted to the Fire Prevention Bureau for approval. Fire hydrants shall be installed, made serviceable, and be accepted by the Moreno Valley Fire Department prior to beginning construction (CFC 105 and CFC 3312.1)

F13. Prior to issuance of Certificate of Occupancy or Building Final, "Blue Reflective Markers" shall be installed to identify fire hydrant locations in accordance with City specifications. (CFC 509.1 and MVLT 440A-0 through MVLT 440C-0)

F14. Prior to issuance of Certificate of Occupancy or Building Final, all <u>multi-family residences</u> shall display the address in accordance with the Riverside County Fire Department Premises Identification standard 07-01. (CFC 505.1)

F15. Prior to issuance of a Certificate of Occupancy or Building Final, a directory display monument sign shall be required for apartment, condominium, townhouse or mobile home parks. Each complex shall have an illuminated diagrammatic layout of the complex which indicates the name of the complex, all streets, building identification, unit numbers, and fire hydrant locations within the complex. Location of the sign and design specifications shall be submitted to, and approved by, the Community Development Department – Planning Division and the Fire Prevention Bureau prior to installation. (MVMC 9.12.060 [H,I])

F16. Prior to issuance of Certificate of Occupancy or Building Final, the applicant/developer shall install a fire sprinkler system based on square footage and type of construction, occupancy or use. Fire sprinkler plans shall be submitted to the Fire Prevention Bureau for approval prior to installation. (CFC Chapter 9)

F17. All exterior security emergency access gates shall be electronically operated and be provided with Knox key switches for access by emergency personnel. (CFC

506.1)

F18. The angle of approach and departure for any means of Fire Department access shall be a maximum of 6 percent grade for 25 feet of approach/departure. (CFC 503)

F19. Prior to issuance of Certificate of Occupancy or Building Final, the applicant/developer shall install a fire alarm system monitored by an approved Underwriters Laboratory listed central station based on a requirement for monitoring the sprinkler system, occupancy or use. Fire alarm panel shall be accessible from exterior of building in an approved location. Plans shall be submitted to the Fire Prevention Bureau for approval prior to installation. (CFC Chapter 9 and MVMC 8.36.100)

F20 Approval of the safety precautions required for buildings being constructed, altered or demolished shall be required in addition to other approvals required for specific operations or processes associated with such construction, alteration or demolition. (CFC Chapter 14 & CBC Chapter 33)

F21. Prior to construction, all traffic calming designs/devices must be approved by the Fire Marshal and City Engineer.

PUBLIC WORKS DEPARTMENT

SPECIAL DISTRICTS DIVISION

Acknowledgement of Conditions

The following are the Special Districts Division's Conditions of Approval for PEN16-0119 (PA13-0061) and PEN16-0120 (PA13-0062); this project shall be completed at no cost to any Government Agency. All questions regarding the following Conditions including but not limited to intent, requests for change/modification, variance and/or request for extension of time shall be sought from the Special Districts Division of the Public Works Department 951.413.3480 or by emailing specialdistricts@moval.org.

General Conditions

SD-1 The parcel(s) associated with this project have been incorporated into the Moreno Valley Community Services District Zone A (Parks & Community Services) and Zone C (Arterial Street Lighting). All assessable parcels therein shall be subject to annual parcel taxes for Zone A and Zone C for operations and capital improvements.

SD-2 Plans for median landscape areas designated in the project's Conditions of Approval for incorporation into a City coordinated landscape maintenance program, shall be prepared and submitted in accordance with the City of Moreno Valley Public Works Department Landscape Design Guidelines. The guidelines are available on the City's website at www.moval.org/sd or from the Special Districts Division (951.413.3480 or specialdistricts@moval.org).

SD-3 The Developer, or the Developer's successors or assignees shall be responsible for all median landscape maintenance for a period of one (1) year commencing from the time all items of work have been completed to the satisfaction of Special Districts staff as per the City of Moreno Valley Public Works Department Landscape Design Guidelines, or until such time as the District accepts maintenance responsibilities.

SD-4 Any damage to existing landscape areas maintained by the City of Moreno Valley due to project construction shall be repaired/replaced by the Developer, or Developer's successors in interest, at no cost to the City of Moreno Valley.

SD-5 The removal of existing trees with four-inch or greater trunk diameters (calipers), shall be replaced, at a three to one ratio, with minimum twenty-four (24) inch box size trees of the same species, or a minimum thirty-six (36) inch box for a one to one replacement, where approved. (MC 9.17.030)

SD-6 The ongoing maintenance of any parkway landscaping required to be installed behind the curb on Alessandro Blvd, Chara St., and Timo St. shall be the responsibility of the property owner.

SD-7 Plan check fees for review of median landscape plans for improvements that shall be maintained by the City of Moreno Valley are due upon the first plan submittal. (MC 3.32.040)

SD-8 Inspection fees for the monitoring of median landscape installation associated with the City of Moreno Valley maintained medians are due prior to the required pre-construction meeting. (MC 3.32.040)

SD-9 Street Light Authorization forms for all street lights that are conditioned to be installed as part of this project must be submitted to the Special Districts Division for approval, prior to street light installation. The Street Light Authorization form can be obtained from the utility company providing electric service to the project, either Moreno Valley Utility or Southern California Edison. For questions, contact the Special Districts Division at 951.413.3480 or specialdistricts@moval.org.

Prior to Recordation of Final Map

SD-10 (R) This project has been conditioned to provide a funding source for the continued maintenance, enhancement, and/or retrofit of parks, open spaces, linear parks, and/or trail systems. The Developer shall satisfy this condition with one of the options below.

a. Participate in a special election for annexation into Community Facilities District No. 1 and pay all associated costs of the special election process and formation, if any; or

b. Establish an endowment fund to cover future maintenance costs for new neighborhood parks.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option prior to City Council action authorizing recordation of the final map for the development. A minimum of 90 days is needed to complete the special election process. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

Annexation to CFD No. 1 shall be completed or proof of payment to establish the endowment fund shall be provided prior to the issuance of the first building permit for this project.

SD-11 (R) This project has been identified to be included in the formation of a Community Facilities District for Public Safety services including but not limited to Police, Fire Protection, Paramedic Services, Park Rangers, and Animal Control services. The property owner(s) shall not protest the formation; however, they retain the right to object to the rate and method of maximum special tax. In compliance with Proposition 218, the property owner shall agree to approve the mail ballot proceeding (special election) for either formation of the CFD or annexation into an existing district that may already be established. The Developer must notify the Special Districts Division at 951.413.3480 or specialdistricts@moval.org of its intent to record the final map for the development 90 days prior to City Council action authorizing recordation of the map. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution. (California Government Code Section 53313 et. seq.)

SD-12 (R) This project is conditioned to provide a funding source for the following special financing program(s):

a. Street Lighting Services for capital improvements, energy charges, and maintenance.
b. Landscape Maintenance Services for median landscaping on Alessandro Blvd.

The Developer's responsibility is to provide a funding source for the capital improvements and the continued maintenance of the landscaped area. The Developer shall satisfy this condition with one of the options below.

i. Participate in a special election (mail ballot proceeding) and pay all associated costs of the special election and formation, if any. Financing may be structured through a Community Services District zone, Community Facilities District, Landscape and Lighting Maintenance District, or other financing structure as determined by the City; or

ii. Establish a Property Owner's Association (POA) or Home Owner's Association (HOA) which will be responsible for any and all operation and maintenance costs.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option prior to City Council action authorizing recordation of the final map for the development. The option for participating in a special election requires approximately 90 days to complete the special election process. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

The financial option selected shall be in place prior to the issuance of the first building permit for this project.

SD-13 (R) This project is conditioned to provide a funding source for the operation and maintenance of public improvements and/or services associated with new development in that territory. The Developer shall satisfy this condition with one of the options below.

a. Participate in a special election for maintenance/services and pay all associated costs of the election process and formation, if any. Financing may be structured through a Community Facilities District, Landscape and Lighting Maintenance District, or other financing structure as determined by the City; or

b. Establish an endowment fund to cover the future maintenance and/or service costs.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option prior to City Council action authorizing recordation of the final map for the development. A minimum of 90 days is needed to complete the special election process. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

The financial option selected shall be in place prior to the issuance of the first building permit for the project.

SD-14 *Residential* (R) If Land Development, a Division of the Public Works Department, requires this project to supply a funding source necessary to provide for, but not limited to, stormwater utilities services for the required continuous operation, maintenance, monitoring, systems evaluation and enhancements of on-site facilities and performing annual inspections of the affected areas to ensure compliance with state mandated storm water regulations, a funding source needs to be established. The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option for the National Pollution Discharge Elimination System (NPDES) program (see Land Development's related condition). Participating in a special election the process requires a 90 day period prior to City Council action authorizing recordation of the final map for the development and to participate in a special election process. This allows adequate time to be in compliance with the provisions of Article 13D of the California Constitution. California Health and Safety Code Sections 5473 through 5473.8 (Ord. 708 Section 3.1, 2006) & City of Moreno Valley Municipal Code Title 3, Section 3.50.050.)

Prior to Building Permit Issuance

SD-15 (BP) This project has been identified to potentially be included in the formation of a Map Act Area of Benefit Special District for the construction of major thoroughfares and/or freeway improvements. The property owner(s) shall participate in such District and pay any special tax, assessment, or fee levied upon the project property for such District. At the time of the public hearing to consider formation of the district, the property owner(s) will not protest the formation, but will retain the right to object any eventual assessment that is not equitable should the financial burden of the assessment not be reasonably proportionate to the benefit the affected property obtains from the improvements to be installed. The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option when submitting an application for the first building permit to determine whether the development will be subjected to this condition. If subject to the condition, the special election requires a 90 day process in compliance with the provisions of Article 13C of the California Constitution. (Street & Highway Code, GP Objective 2.14.2, MC 9.14.100).

SD-16 (BP) Prior to the issuance of the first building permit for this project, the Developer shall pay Advanced Energy fees for all applicable Residential and Arterial Street Lights required for this development. Payment shall be made to the City of Moreno Valley and collected by the Land Development Division. Fees are based upon the Advanced Energy fee rate in place at the time of payment, as set forth in the current Listing of City Fees, Charges, and Rates adopted by City Council. The Developer shall provide a copy of the receipt to the Special Districts Division *(specialdistricts@moval.org).* Any change in the project which may increase the number of street lights to be installed will require payment of additional Advanced Energy fees at the then current fee. Questions may be directed to the Special Districts Division at 951.413.3480 or specialdistricts@moval.org.

SD-17 (BP) For those areas to be maintained by the City and prior to the issuance of the first Building Permit, Planning Division (Community Development Department), Special Districts Division (the Public Works Department) and Transportation Division (the Public Works Department) shall review and approve the final median landscape/irrigation plans as designated on the tentative map or in these Conditions of Approval prior to the issuance of the first Building Permit.

SD-18 (BP) Median landscaping specified in the project's Conditions of Approval shall be constructed in compliance with the City of Moreno Valley Public Works Design Guidelines and completed prior to the issuance of 25% (or 15) of the dwelling permits for this tract or 12 months from the issuance of the first dwelling permit, whichever comes first. In cases where a phasing plan is submitted, the actual percentage of dwelling permits issued prior to the completion of the landscaping shall be subject to the review of the construction phasing plan.

Prior to Certificate of Occupancy

SD-19 (CO) Landscape and irrigation plans for median landscape areas designated to be maintained by the City shall be placed on compact disk (CD) in pdf format. The CD shall include "As Built" plans, revisions, and changes. The CD will become the property of the City of Moreno Valley and the Moreno Valley Community Services District.

LAND DEVELOPMENT DIVISION

The following are the Public Works Department – Land Development Division Conditions of Approval for this project and shall be completed at no cost to any government agency. All questions regarding the intent of the following conditions shall be referred to the Land Development Division.

General Conditions

LD1. (G) The developer shall comply with all applicable City ordinances and resolutions including the City's Municipal Code (MC) and if subdividing land, the Government Code (GC) of the State of California, specifically Sections 66410 through 66499.58, said sections also referred to as the Subdivision Map Act (SMA). [MC 9.14.010]

LD2. (G) The tentative map shall correctly show all existing easements, traveled ways, and drainage courses. Any omission may require the map or plans associated with this application to be resubmitted for further consideration. [MC 9.14.040(A)]

LD3. (G) In the event right of way or offsite easements are required to construct offsite improvements necessary for the orderly development of the surrounding area to meet the public health and safety needs, the developer shall make a good faith effort to acquire the needed right of way in accordance with the Land Development Division's administrative policy. If unsuccessful, the Developer shall enter into an agreement with the City to acquire the necessary right of way or offsite easements and complete the improvements at such time the City acquires the right of way or offsite easements which will permit the improvements to be made. The developer shall be responsible for all costs associated with the right of way or easement acquisition. [GC 66462.5]

LD4. (G) If improvements associated with this project are not initiated within two (2) years of the date of approval of the Public Improvement Agreement (PIA), the City Engineer may require that the engineer's estimate for improvements associated with the project be modified to reflect current City construction costs in effect at the time of request for an extension of time for the PIA or issuance of a permit.

LD5. (G) The developer shall monitor, supervise and control all construction and construction supportive activities, so as to prevent these activities from causing a public nuisance, including but not limited to, insuring strict adherence to the following:

a. Removal of dirt, debris, or other construction material deposited on any public street no later than the end of each working day.

b. Observance of working hours as stipulated on permits issued by the Land Development Division.

c. The construction site shall accommodate the parking of all motor vehicles used by persons working at or providing deliveries to the site.

d. All dust control measures per South Coast Air Quality Management District (SCAQMD) requirements during the grading operations.

Violation of any condition, restriction or prohibition set forth in these conditions shall subject the owner, applicant, developer or contractor(s) to remedy as noted in City Municipal Code 8.14.090. In addition, the City Engineer or Building Official may suspend all construction related activities for violation of any condition, restriction or prohibition set forth in these conditions until such time as it has been determined that all operations and activities are in conformance with these conditions.

LD6. (G) The developer shall protect downstream properties from damage caused by alteration of drainage patterns (i.e. concentration or diversion of flow, etc.). Protection shall be provided by constructing adequate drainage facilities, including, but not limited to, modifying existing facilities or by securing a drainage easement. [MC 9.14.110]

LD7. (G) Public drainage easements, when required, shall be a minimum of 25 feet wide and shall be shown on the map and plan, and noted as follows: *"Drainage Easement – no structures, obstructions, or encroachments by landfills are allowed."* In addition, the grade within the easement area shall not exceed a 3:1 (H:V) slope, unless approved by the City Engineer.

LD8. (G) Prior to any plan approval, a final detailed drainage study (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer. The study shall include existing and proposed hydrologic conditions as well as hydraulic calculations for all drainage control devices and storm drain lines. [MC 9.14.110(A.1)]. A digital (pdf) copy of the approved drainage study shall be submitted to the Land Development Division.

LD9. (G) Water quality best management practices (BMPs) designed to meet Water Quality Management Plan (WQMP) requirements for single-family residential development shall not be used as a construction BMP. Water quality BMPs shall be maintained for the entire duration of the project construction and be used to treat runoff from those developed portions of the project. Water quality BMPs shall be protected from upstream construction related runoff by having proper best management practices in place and maintained. Water quality BMPs shall be graded per the approved design plans.

LD10. (G) The final approved conditions of approval (COAs) and any applicable Mitigation Measures issued by the Planning Division shall be photographically or electronically placed on Mylar sheets and included in the Grading and Street Improvement plans.

LD11. (G) Aggregate slurry, as defined in Section 203-5 of Standard Specifications for Public Works Construction, may be required just prior to the end of the one-year warranty period of the public streets at the discretion of the City Engineer. If slurry is required, a slurry mix design shall be submitted for review and approved by the City Engineer. The latex additive shall be Ultra Pave 70 (for anionic) or Ultra Pave 65 K (for cationic) or an approved equal per the geotechnical report. The latex shall be added at the emulsion plant after weighing the asphalt and before the addition of mixing water. The latex shall be added at a rate of two to two-and-one-half (2 to 2½) parts to one-hundred

(100) parts of emulsion by volume. Any existing striping shall be removed prior to slurry application and replaced per City standards.

Prior to Grading Plan Approval

LD13. (GPA) Grading plans (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

LD14. (GPA) Landscape & Irrigation plans (prepared by a registered/licensed landscape architect) for water quality BMPs shall be submitted for review and approved by the City Engineer per the current submittal requirements, if applicable.

LD15. (GPA) The developer shall ensure compliance with the City Grading ordinance, these Conditions of Approval and the following criteria:

a. The project street and lot grading shall be designed in a manner that perpetuates the existing natural drainage patterns with respect to tributary drainage area and outlet points. Unless otherwise approved by the City Engineer, lot lines shall be located at the top of slopes.

b. Any grading that creates cut or fill slopes adjacent to the street shall provide erosion control, sight distance control, and slope easements as approved by the City Engineer.

c. All improvement plans are substantially complete and appropriate clearance letters are provided to the City.

d. A soils/geotechnical report (addressing the soil's stability and geological conditions of the site) shall be submitted to the Land Development Division for review. A digital (pdf) copy of the soils/geotechnical report shall be submitted to the Land Development Division.

LD16. (GPA) The developer shall select Low Impact Development (LID) Best Management Practices (BMPs) designed per the latest version of the Water Quality Management Plan (WQMP) - a guidance document for the Santa Ana region of Riverside County.

LD17. (GPA) For projects that will result in discharges of storm water associated with construction with a soil disturbance of one or more acres of land, the developer shall submit a Notice of Intent (NOI) and obtain a Waste Discharger's Identification number (WDID#) from the State Water Quality Control Board (SWQCB) which shall be noted on the grading plans.

LD18. (GPA) Two (2) copies of the final project-specific Water Quality Management Plan (WQMP) shall be submitted for review and approved by the City Engineer, which:

a. Addresses Site Design Best Management Practices (BMPs) such as minimizing impervious areas, maximizing permeability, minimizes directly connected impervious areas to the City's street and storm drain systems, and conserves natural areas;

b. Incorporates Source Control BMPs and provides a detailed description of their implementation;

c. Describes the long-term operation and maintenance requirements for BMPs requiring maintenance; and

d. Describes the mechanism for funding the long-term operation and maintenance of the BMPs.

A copy of the final WQMP template can be obtained on the City's Website or by contacting the Land Development Division. A digital (pdf) copy of the approved final project-specific Water Quality Management Plan (WQMP) shall be submitted to the Land Development Division.

LD19. (GPA) A Storm Water Pollution Prevention Plan (SWPPP) shall be prepared in conformance with the State's current Construction Activities Storm Water General Permit. A copy of the current SWPPP shall be kept at the project site and be available for review upon request.

LD20. (GPA) The developer shall pay all remaining plan check fees.

LD21. (GPA) Resolution of all drainage issues shall be as approved by the City Engineer.

Prior to Grading Permit

LD22. (GP) A receipt showing payment of the Area Drainage Plan (ADP) fee to Riverside County Flood Control and Water Conservation District shall be submitted. [MC 9.14.100(O)]

LD23. (GP) Security, in the form of a cash deposit (preferable), or letter of credit shall be submitted as a guarantee of the completion of the grading operations for the project. [MC 8.21.070]

LD24. (GP) Security, in the form of a cash deposit (preferable), or letter of credit shall be submitted as a guarantee of the implementation and maintenance of erosion control measures. At least twenty-five (25) percent of the required security shall be in the form of a cash deposit with the City. [MC 8.21.160(H)]

LD25. (GP) The developer shall pay all applicable inspection fees.

LD26. (GP) A digital (pdf) copy of the approved grading plans shall be submitted to the Land Development Division.

Prior to Map Approval

LD27. (MA) Final maps (prepared by a registered civil engineer and/or licensed surveyor) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

LD28. (MA) Resolution of all drainage issues shall be as approved by the City Engineer.

LD29. (MA) All street dedications shall be free of all encumbrances, irrevocably offered to the public and shall continue in force until the City accepts or abandons such offers, unless otherwise approved by the City Engineer.

LD30. (MA) The developer shall guarantee the completion of all related improvements required for this project by executing a Public Improvement Agreement (PIA) with the City and posting the required security. [MC 9.14.220]

LD31. (MA) All public improvement plans required for this project shall be approved by the City Engineer in order to execute the Public Improvement Agreement (PIA).

LD32. (MA) The developer shall enter into a Cooperative Agreement with the City and Riverside County Flood Control and Water Conservation District establishing the terms and conditions covering the inspection, operation and maintenance of Master Drainage Plan facilities required to be constructed as part of the project.

LD33. (MA) The developer shall comply with the requirements of the City Engineer based on recommendations of the Riverside County Flood Control District regarding the construction of County Master Plan Facilities.

LD34. (MA) All proposed street names shall be submitted for review and approved by the City Engineer, if applicable. [MC 9.14.090(E.2.k)]

LD35. (MA) After recordation, a digital (pdf) copy of the recorded map shall be submitted to the Land Development Division.

LD36. (MA) A copy of the Covenants, Conditions and Restrictions (CC&Rs) shall be submitted for review and approved by the City Engineer. The CC&Rs shall include, but not be limited to, access easements, reciprocal access, private and/or public utility easements as may be relevant to the project, and any water quality BMPs required by the City.

<u>Prior to Improvement Plan Approval</u>

LD37. (IPA) All public improvement plans (prepared by a licensed/registered civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

LD38. (IPA) The developer shall submit clearances from all applicable agencies, and pay all applicable plan check fees.

LD39. (IPA) The street improvement plans shall comply with current City policies, plans and applicable City standards (i.e. MVSI-160 series, etc.) throughout this project.

LD40. (IPA) The design plan and profile shall be based upon a centerline, extending beyond the project boundaries a minimum distance of 300 feet at a grade and alignment approved by the City Engineer.

LD41. (IPA) The plans shall indicate any restrictions on trench repair pavement cuts to reflect the City's moratorium on disturbing newly-constructed pavement less than three (3) years old and recently slurry sealed streets less than one (1) year old. Pavement cuts for trench repairs may be allowed for emergency repairs or as specifically approved by the City Engineer.

LD42. (IPA) Prior to improvement plan approval, all dry and wet utilities shall be shown on the plans and any crossings shall be potholed to determine actual location and elevation. Any conflicts shall be identified and addressed on the plans. The pothole survey data shall be submitted to Land Development with the public improvement plans for reference purposes only. The developer is responsible to coordinate with all affected utility companies and bear all costs of any utility relocation.

LD43. (IPA) The developer is required to bring any existing access ramps adjacent to and fronting the project to current ADA (Americans with Disabilities Act) requirements. However, when work is required in an intersection that involves or impacts existing access ramps, all access ramps in that intersection shall be retrofitted to comply with current ADA requirements, unless approved otherwise by the City Engineer.

LD44. (IPA) Drainage facilities (i.e. catch basins, etc.) with sump conditions shall be designed to convey the tributary 100-year storm flows. Secondary emergency escape shall also be provided.

LD45. (IPA) The hydrology study shall be designed to accept and properly convey all off-site drainage flowing onto or through the site. All storm drain design and improvements shall be submitted for review and approved of the City Engineer. In the event that the City Engineer permits the use of streets for drainage purposes, the provisions of current City standards shall apply. Should the quantities exceed the street capacity or the use of streets be prohibited for drainage purposes, as in the case where one travel lane in each direction shall not be used for drainage conveyance for emergency vehicle access on streets classified as minor arterials and greater, the developer shall provide adequate facilities as approved by the City Engineer. [MC 9.14.110 A.2]

<u>Prior to Encroachment Permit</u>

LD46. (EP) All work performed within public right of way requires an encroachment permit. Security (in the form of a cash deposit or other approved means) may be required as determined by the City Engineer. For non-subdivision projects, the City Engineer may require the execution of a Public Improvement Agreement (PIA) as a condition of the issuance of a construction or encroachment permit. All inspection fees shall be paid prior to issuance of construction permit. [MC 9.14.100(C.4)]

LD47. (EP) A digital (pdf) copy of all approved improvement plans shall be submitted to the Land Development Division.

LD48. (EP) All applicable inspection fees shall be paid.

Prior to Building Permit

LD49. (BP) For all subdivision projects, the map shall be recorded (excluding model homes). [MC 9.14.190]

LD50. (BP) An engineered-fill certification, rough grade certification and compaction report shall be submitted for review and approved by the City Engineer. A digital (pdf) copy of the approved compaction report shall be submitted to the Land Development Division. All pads shall meet pad elevations per approved grading plans as noted by the setting of “blue-top” markers installed by a registered land surveyor or licensed civil engineer.

Prior to Occupancy

LD51. (CO) All required as-built plans (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

LD52. (CO) The final/precise grade certification shall be submitted for review and approved by the City Engineer.

LD53. (CO) All outstanding fees shall be paid.

LD54. (CO) For commercial, industrial and multi-family projects, in compliance with Proposition 218, the developer shall agree to approve the City of Moreno Valley NPDES Regulatory Rate Schedule that is in place at the time of certificate of occupancy issuance. Under the current permit for storm water activities required as part of the National Pollutant Discharge Elimination System (NPDES) as mandated by the Federal Clean Water Act, this project is subject to the following requirements:

a. Select one of the following options to meet the financial responsibility to provide storm water utilities services for the required continuous operation, maintenance, monitoring system evaluations and enhancements, remediation and/or replacement, all in accordance with Resolution No. 2002-46.

   i. Participate in the mail ballot proceeding in compliance with Proposition 218, for the Common Interest, Commercial, Industrial and Quasi-Public Use NPDES Regulatory Rate Schedule and pay all associated costs with the ballot process; or

   ii. Establish an endowment to cover future City costs as specified in the Common Interest, Commercial, Industrial and Quasi-Public Use NPDES Regulatory Rate Schedule.

b. Notify the Special Districts Division of the intent to request building permits 90 days prior to their issuance and the financial option selected. The financial option selected shall be in place prior to the issuance of certificate of occupancy. [California Government Code & Municipal Code]

LD55. (CO) The developer shall complete all public improvements in conformance with current City standards, except as noted in the Special Conditions, including but not limited to the following:

a. Street improvements including, but not limited to: pavement, base, curb and/or gutter, cross gutters, spandrel, sidewalks, drive approaches, pedestrian ramps, street lights, signing, striping, under sidewalk drains, landscaping and irrigation, medians, redwood header boards, pavement tapers/transitions and traffic control devices as appropriate.

b. Storm drain facilities including, but not limited to: storm drain pipe, storm drain laterals, open channels, catch basins and local depressions.

c. City-owned utilities.

d. Sewer and water systems including, but not limited to: sanitary sewer, potable water and recycled water.

e. Under grounding of all existing and proposed utilities adjacent to and on-site. [MC 9.14.130]

f. Relocation of overhead electrical utility lines including, but not limited to: electrical, cable and telephone.

LD56. (CO) For commercial, industrial and multi-family projects, a “Stormwater Treatment Device and Control Measure Access and Maintenance Covenant” shall be recorded to provide public notice of the maintenance requirements to be implemented per the approved final project-specific WQMP. A boilerplate copy of the “Stormwater Treatment Device and Control Measure Access and Maintenance Covenant” can be obtained by contacting the Land Development Division.

LD57. (CO) The applicant shall ensure the following, pursuant to Section XII. I. of the 2010 NPDES Permit:

a. Field verification that structural Site Design, Source Control and Treatment Control BMPs are designed, constructed and functional in accordance with the approved Final Water Quality Management Plan (WQMP).

b. Certification of best management practices (BMPs) from a state licensed civil engineer. An original WQMP BMP Certification shall be submitted for review and approved by the City Engineer.

<u>Special Conditions</u>

LD58. Prior to final map approval, the map shall show the following:

a. The appropriate right-of-way dedication along Alessandro Boulevard as shown on the approved tentative tract map.

b. The appropriate right-of-way dedication along Chara Street as shown on the approved tentative tract map. This includes additional right-of-way to include public sidewalk, ADA ramps and parkway at the proposed project entrance.

c. The appropriate right-of-way dedication along Timo Street as shown on the approved tentative tract map. This includes full street right-of-way to include public sidewalk and parkway for the construction of the proposed cul-de-sac.

d. A 4-foot minimum pedestrian right-of-way dedication behind any driveway approach, per City Standard MVSI-112C-0, as determined by the City Engineer.

LD59. Prior to final map approval, the Developer shall guarantee the construction of the following improvements by entering into a public improvement agreement and posting security. The improvements along the project frontage shall be completed prior to occupancy of the first building or as otherwise determined by the City Engineer.

a. Alessandro Boulevard, Divided Major Arterial, City Standard MVSI-101A-0 (134-foot RW / 110-foot CC) shall be constructed to complete the half-width, plus 23 feet south of the centerline, along the entire project frontage. Improvements shall consist of, but not be limited to: asphalt base, asphalt pavement, road tapers to accommodate improvements, curb & gutter, an 18 foot wide raised median, sidewalk, drainage structures, storm drain, streetlights, pedestrian access ramps, undergrounding of overhead utility lines less than 115,000 volts, and dry and wet utilities. This includes remaining public improvements fronting APNs 479-230-010 and 479-230-009 to join the existing improvements along APN 479-230-008.

b. Chara Street, Local (modified), City Standard MVSI-107A-0 (60-foot RW / 40-foot CC) shall be constructed to half-width along the entire project's south frontage. Improvements shall consist of, but not be limited to, asphalt pavement, asphalt base, curb & gutter, sidewalk, driveway approach, drain, streetlights, pedestrian access ramps, and dry and wet utilities.

c. Timo Street, Local (modified), City Standard MVSI-107A-0 (60-foot RW / 40-foot CC) and offset cul-de-sac (modified) MVSI-163B-0 shall be fully constructed. Improvements shall consist of, but not be limited to, asphalt pavement, asphalt base, curb & gutter, sidewalk, driveway approach, and streetlights.

d. Sunnymead Master Drainage Plan Line M-16 within Alessandro Boulevard. This includes, but not limited to, construction of a 48-inch storm drain starting from the current Line M-16 terminus and continuing easterly along the project frontage to Chara Street, laterals, catch basins, and local depressions.

e. Removal of cross gutter and reconstruction of intersection at Alessandro Boulevard and Chara Street to accommodate street drainage. This includes, but not limited to, asphalt pavement, asphalt base, curb & gutter, sidewalk and ADA ramps.

LD60. Prior to issuance of a grading permit, the developer may submit a Development Impact Fee (DIF) Improvement Credit Agreement to secure credit for the construction of applicable improvements. If the developer fails to complete this agreement prior to payment of the DIF fees, no credits will be given. The developer shall pay current DIF fees adopted by the City Council. [Ord. 695 § 1.1 (part), 2005] [MC 3.38.030, 040, 050]

LD61. Prior to issuance of grading permit, the developer may submit a Transportation Uniform Mitigation Fee (TUMF) Improvement Credit Agreement to secure credit for the construction of applicable improvements. If the developer fails to complete this agreement prior to payment of the TUMF fees, no credits will be given. The developer shall pay current TUMF fees adopted by the City Council. [Ord. 835 § 2.1, 2012] [MC 3.44.060]

LD62. Prior to rough grading plan approval, this project shall demonstrate, via a final drainage study, that the increased runoff resulting from the development of this site is mitigated. During no storm event shall the flow leaving the site in the developed condition be larger than that of the pre-developed condition, unless the study demonstrates that the existing or proposed drainage facilities can accommodate the increased run-off. The drainage study shall analyze the following events: 1, 3, 6 and 24-hour duration events for the 2, 5, 10 and 100-year storm events. The applicant understands that additional detention measures may be required beyond those shown on the tentative map and preliminary drainage study.

LD63. Prior to rough grading plan approval, the Applicant shall prepare and submit for approval a final, project-specific water quality management plan (F-WQMP). The F-WQMP shall be consistent with the approved P-WQMP, as well as in full conformance with the document; “Water Quality Management Plan - A Guidance Document for the Santa Ana Region of Riverside County” dated October 22, 2012. The F-WQMP shall be submitted and approved prior to application for and issuance of grading permits. At a minimum, the F-WQMP shall include the following: Site Design BMPs; Source Control BMPs, Treatment Control BMPs, Operation and Maintenance requirements for BMPs and sources of funding for BMP implementation.

a. The Applicant has proposed to incorporate the use of an infiltration trench with filters as pretreatment. Final design and sizing details of all BMPs must be provided in the first submittal of the F-WQMP. The Applicant acknowledges that more area than currently shown on the plans may be required to treat site runoff as required by the WQMP guidance document.

b. The Applicant shall substantiate the applicable Hydrologic Condition of Concerns (HCOC) in the F-WQMP. The HCOC designates that the project will comply with HCOC mitigation criteria 3; therefore, the condition must be addressed in the F-WQMP.

c. All proposed LID BMP's shall be designed in accordance with the RCFC&WCD's Design Handbook for Low Impact Development Best Management Practices, dated September 2011.

d. The proposed LID BMP's as identified in the project-specific P-WQMP shall be incorporated into the Final WQMP.

e. The NPDES notes per City Standard Drawing No. MVFE-350-0 shall be included in the grading plans.

f. Post-construction treatment control BMPs, once placed into operation for post-construction water quality control, shall not be used to treat runoff from construction sites or unstabilized areas of the site.

LD64. Prior to precise grading plan approval, the grading plan shall show any proposed trash enclosure as dual bin (one bin for trash and one bin for recyclables) with solid covered roof.

LD65. Prior to issuance of a building permit, the precise grading plans shall be approved.

LD66. Prior to issuance of a building permit, the applicant shall schedule a walk through with a Public Works Inspector to inspect existing improvements within public right-of-way along project perimeter. The applicant may be required to install, replace and/or repair any missing, damaged or substandard improvements that do not meet current City standards.

LD67. Prior to occupancy, all overhead utility lines less than 115,000 volts fronting or within the entire project site boundary shall be placed underground per Section 9.14.130C of the City Municipal Code.

LD68. The Applicant shall, prior to building or grading permit closeout or the issuance of a certificate of occupancy, demonstrate:

a. That all structural BMPs have been constructed and installed in conformance with the approved plans and specifications;

b. That all structural BMPs described in the F-WQMP have been implemented in accordance with approved plans and specifications;

c. That the Applicant is prepared to implement all non-structural BMPs included in the F-WQMP, conditions of approval, and building/grading permit conditions; and

d. That an adequate number of copies of the approved F-WQMP are available for the future owners/occupants of the project.

TRANSPORTATION ENGINEERING DIVISION

Based on the information contained in our standard review process we recommend the following conditions of approval be placed on this project:

GENERAL CONDITIONS

TE1. Alessandro Boulevard is classified as a Divided Major Arterial (134'RW/110'CC) per City Standard Plan No. MVSI-101A-0. Any improvements undertaken by this project shall be consistent with the City's standards for this facility. Citywide Communications Conduit along project frontage on Alessandro Boulevard shall be required per City Standard Plan No. MVSI-186-0.

TE2. All project driveways shall conform to Section 9.11.080, and Table 9.11.080-14 of the City's Development Code - Design Guidelines and shall conform to City of Moreno Valley Standard No. MVSI-112C-0 for Commercial Driveway Approaches or as approved by the City Engineer.

TE3. All proposed on-site traffic signing and striping should be accordance with the 2014 California Manual on Uniform Traffic Control Devices (CAMUTCD).

TE4. Conditions of approval may be modified if project is phased or altered from any approved plans.

PRIOR TO IMPROVEMENT PLAN APPROVAL OR CONSTRUCTION PERMIT

TE5. Prior to the final approval of the street improvement plans, a signing and striping plan shall be prepared per City of Moreno Valley Standard Plans - Section 4 for all streets. End-of-road treatment per City Standard Plan No. MVLT-416A,B-0 shall be provided for Timo Street cul-de-sac.

TE6. Prior to issuance of a construction permit, construction traffic control plans prepared by a qualified, registered Civil or Traffic engineer shall be required for plan approval or as required by the City Traffic Engineer.

TE7. Prior to final approval of the street improvement and/or landscape plans, the project plans shall demonstrate that sight distance at proposed streets and driveways conforms to City Standard Plan No. MVSI-164A, B, C-0.

PRIOR TO CERTIFICATE OF OCCUPANCY OR BUILDING FINAL

TE8. (CO) Prior to issuance of a Certificate of Occupancy, any necessary signing and striping shall be installed per the approved plans and to the satisfaction of the City Traffic Engineer.

PRIOR TO ACCEPTANCE OF STREETS INTO THE CITY-MAINTAINED ROAD SYSTEM

TE9. Prior to the acceptance of streets into the City-maintained road system, all approved traffic control and signing and striping shall be installed per current City Standards and the approved plans.

FINANCIAL AND MANAGEMENT SERVICES DEPARTMENT

MORENO VALLEY UTILITY

Acknowledgement of Conditions

The following items are Moreno Valley Utility's Conditions of Approval for project PEN16-0119 (PA13-0061) & PEN16-0120 (PA13-0062); this project shall be completed at no cost to any Government Agency. All questions regarding Moreno Valley Utility's Conditions including but not limited to, intent, requests for change/modification, variance and/or request for extension of time shall be sought from Moreno Valley Utility (the Electric Utility Division) of the Public Works Department 951.413.3500. The applicant is fully responsible for communicating with Moreno Valley Utility staff regarding their conditions.

PRIOR TO ENERGIZING MVU ELECTRIC UTILITY SYSTEM AND CERTIFICATE OF OCCUPANCY

MVU-1 (R) For single family subdivisions, a three foot easement along each side yard property line shall be shown on the final map and offered for dedication to the City of Moreno Valley for public utility purposes, unless otherwise approved by the City Engineer. If the project is a multi-family development, townhome, condominium, apartment, commercial or industrial project, and it requires the installation of electric distribution facilities within common areas, a non-exclusive easement shall be provided to Moreno Valley Utility to include all such common areas. All easements shall include the rights of ingress and egress for the purpose of operation, maintenance, facility repair, and meter reading.

MVU-2 (BP) City of Moreno Valley Municipal Utility Service – Electrical Distribution: Prior to constructing the MVU Electric Utility System, the developer shall submit a detailed engineering plan showing design, location and schematics for the utility system to be approved by the City Engineer. In accordance with Government Code Section 66462, the Developer shall execute an agreement with the City providing for the installation, construction, improvement and dedication of the utility system following recordation of final map and concurrent with trenching operations and other subdivision improvements so long as said agreement incorporates the approved engineering plan and provides financial security to guarantee completion and dedication of the utility system.

The Developer shall coordinate and receive approval from the City Engineer to install, construct, improve, and dedicate to the City, or the City's designee, all utility infrastructure (including but not limited to conduit, equipment, vaults, ducts, wires, switches, conductors, transformers, and "bring-up" facilities including electrical capacity to serve the identified development and other adjoining/abutting/ or benefiting projects as determined by Moreno Valley Utility) – collectively referred to as "utility system" (to and through the development), along with any appurtenant real property easements, as determined by the City Engineer to be necessary for the distribution and /or delivery of any and all "utility services" to each lot and unit within the Tentative Map. For purposes of this condition, "utility services" shall mean electric, cable television, telecommunication (including video, voice, and data) and other similar services designated by the City Engineer. "Utility services" shall not include sewer, water, and natural gas services, which are addressed by other conditions of approval.

The City, or the City's designee, shall utilize dedicated utility facilities to ensure safe, reliable, sustainable and cost effective delivery of utility services and maintain the integrity of streets and other public infrastructure. Developer shall, at developer's sole expense, install or cause the installation of such interconnection facilities as may be necessary to connect the electrical distribution infrastructure within the project to the Moreno Valley Utility owned and controlled electric distribution system.

MVU-3 This project may be subject to a Reimbursement Agreement. The project may be responsible for a proportionate share of costs associated with electrical distribution infrastructure previously installed that directly benefits the project. Payment shall be required prior to issuance of building permits.

MVU-4 For all new projects, existing Moreno Valley Utility electrical infrastructure shall be preserved in place. The developer will be responsible, at developer expense, for any and all costs associated with the relocation of any of Moreno Valley Utility's underground electrical distribution facilities, as determined by Moreno Valley Utility, which may be in conflict with any developer planned construction on the project site.

PARKS & COMMUNITY SERVICES (PCS)

GENERAL CONDITIONS

PCS-GC-1 This project is required to supply a funding source for the continued maintenance, enhancement, and or retrofit of neighborhood parks, open spaces, linear parks, and/or trails systems. This can be achieved through annexing into Community Facilities District No. 1 (Park Maintenance). Please contact the Special Districts Division at 951.413.3480 or specialdistricts@moval.org to complete the annexation process.

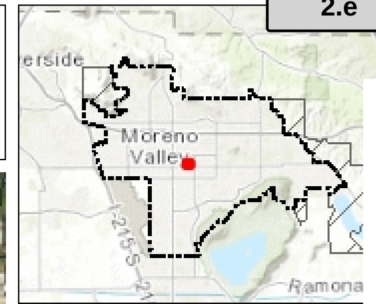
PCS-GC-2 The parcel(s) associated with this project have been incorporated into the Moreno Valley Community Services District Zone A (Parks and Community Services). All assessable parcels therein shall be subject to the annual Zone 'A' charge for operations and capital improvements. Proof of such shall be supplied to Parks and Community Services upon Final Map and at Building Permits.

PCS-GC-3 This project is subject to current Development Impact Fees.

PCS-GC-4 This project is subject to current Quimby Fees.

MORENO VALLEY
WHERE DREAMS SOAR

Aerial Photograph



Legend

Public Facilities

■ Public Facilities

★ Fire Stations

Parcels

City Boundary

Sphere of Influence

Notes

315.5 0 157.74 315.5 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere

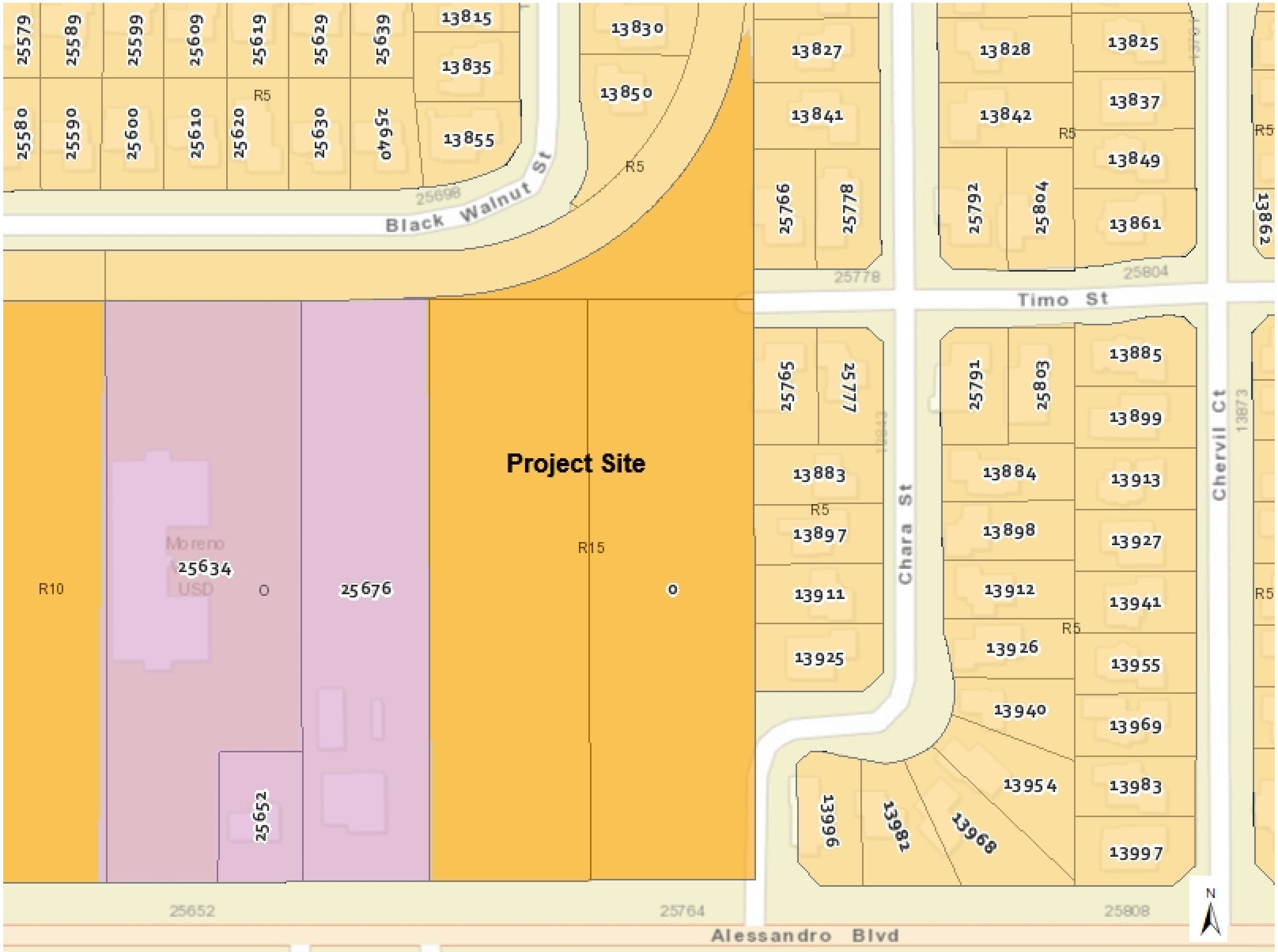
Print Date: 1/3/2017

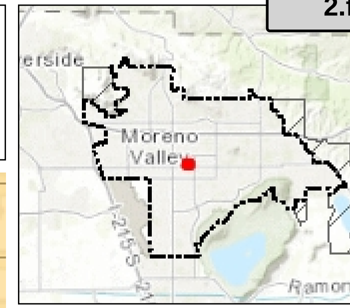
DISCLAIMER: The information shown on this map was compiled from the City of Moreno Valley GIS and Riverside County GIS. The land base and facility information on this map is for display purposes only and should not be relied upon without independent verification as to its accuracy. Riverside County and City of Moreno Valley will not be held responsible for any claims, losses or damages resulting from the use of this map.

Attachment: Aerial Photograph (2422 : PEN16-0119 Plot Plan & PEN16-0120 Tentative Tract Map 35429)

MORENO VALLEY
WHERE DREAMS SOAR

R15 Zoning Map





Legend

Zoning
- Commercial
- Industrial/Business Park
- Public Facilities
- Office
- Planned Development
- Large Lot Residential
- Residential Agriculture 2 DU/AC
- Residential 2 DU/AC
- Suburban Residential
- Multi-family
- Open Space/Park

Master Plan of Trails
- Bridge
- Improved
- Multiuse
- Proposed
- Regional
- State

- Parcels
- City Boundary
- Sphere of Influence

Notes

315.5 0 157.74 315.5 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere

Print Date: 1/3/2017

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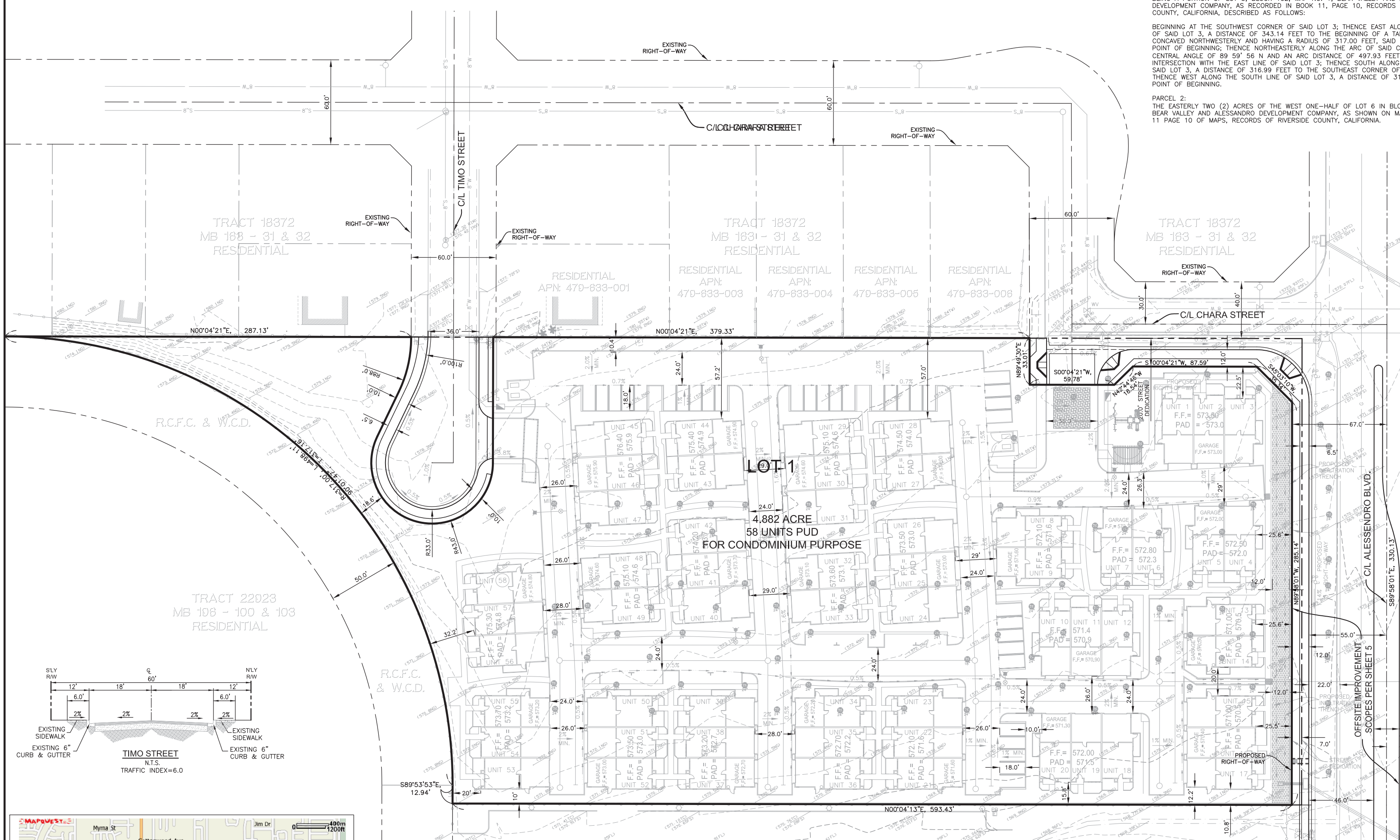
Attachment: Zoning Map (2422 : PEN16-0119 Plot Plan & PEN16-0120 Tentative Tract Map 35429)

TENTATIVE TRACT MAP 35429

CITY OF MORENO VALLEY, RIVERSIDE

FOR CONDOMINIUM PURPOSES



THIS MAP OR PLAT OF SURVEY OF THE PREMISES SHOWN HEREON IS THE SAME AS THAT DESCRIBED IN LAWYERS TITLE COMPANY FILE NUMBER 113094079, DATED SEPTEMBER 19, 2013.

LEGAL DESCRIPTION:

PARCEL 1:
BEING A PORTION OF LOT 3, BLOCK 102, MAP NO. 1, BEAR VALLEY AND ALESSANDRO DEVELOPMENT COMPANY, AS RECORDED IN BOOK 11, PAGE 10, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA, DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHWEST CORNER OF SAID LOT 3; THENCE EAST ALONG THE SOUTH LINE OF SAID LOT 3, A DISTANCE OF 343.14 FEET TO THE BEGINNING OF A TANGENT CURVE CONCAVED NORTHWESTERLY AND HAVING A RADIUS OF 317.00 FEET, SAID POINT BEING THE POINT OF BEGINNING; THENCE NORTHEASTERLY ALONG THE ARC OF SAID CURVE THROUGH A CENTRAL ANGLE OF 89 59' 56 N AND AN ARC DISTANCE OF 497.93 FEET, TO ITS INTERSECTION WITH THE EAST LINE OF SAID LOT 3; THENCE SOUTH ALONG THE EAST LINE OF SAID LOT 3, A DISTANCE OF 316.99 FEET TO THE SOUTHEAST CORNER OF SAID LOT 3; THENCE WEST ALONG THE SOUTH LINE OF SAID LOT 3, A DISTANCE OF 316.99 FEET TO THE POINT OF BEGINNING.

PARCEL 2:
THE EASTERLY TWO (2) ACRES OF THE WEST ONE-HALF OF LOT 6 IN BLOCK 102 OF THE BEAR VALLEY AND ALESSANDRO DEVELOPMENT COMPANY, AS SHOWN ON MAP ON FILE IN BOOK 11 PAGE 10 OF MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

UTILITY & SERVICE AGENCIES:

WATER/SEWER
EASTERN MUNICIPAL/WATER DISTRICT
2270 TRUMBLE ROAD
PERRIS, CA 92572-8300
(951) 928-3777

ELECTRIC
SOUTHERN CALIFORNIA EDISON
(800) 684-8123

TELEPHONE
VERIZON TELEPHONE

GAS
THE GAS COMPANY
(800) 427-2200

OWNER/DEVELOPER:

ENR RESOURCES LLC
780 SOUTH NOGALES ST.
CITY OF INDUSTRY, CA 91748
CONTACT: RALPH LIU
(626) 935-1605

ENGINEER:

WINSTON LIU, PE
W&W LAND DESIGN CONSULTANTS
2335 W. FOOTHILL BLVD., SUITE #1
UPLAND, CA 91786
PHONE (909) 608-7118
FAX (909) 946-1137

BENCH MARK:

RIVERSIDE BM # M-79 ELEV = 1,563.112
405 FEET SOUTH AND 43 FEET EAST OF PERRIS BOULEVARD AND ALLESSANDRO BOULEVARD INTERSECTION. 5 FEET NORTH OF POWER POLE #24828, A BRASS CAP IN CONCRETE POST 4" ABOVE GROUND AND STAMPED M-79 RESET 1972.

NOTE: FOR ACTUAL ELEVATION ADD 1,000.

BASIS OF BEARINGS:

BEARINGS ARE BASED ON ALESSANDRO BOULEVARD HAVING A BEARING OF NORTH 89°58'01" WEST, PER RECORD OF SURVEY MAP 92/57.

DISPOSITION NOTE:

THIS PROJECT IS CONDITIONED TO UNDERGROUND ALL OVERHEAD UTILITY LINES AND ELECTRICAL LINES LESS THAN 115KV FRONTING OR WITHIN THE PROJECT SITE.

GENERAL NOTES

PROJECT ADDRESS:	NORTHEAST CORNER SIDE OF ALESSANDRA BLVD. AND CHARA STREET, CITY OF MORENO VALLEY
ASSESSORS PARCEL NUMBER:	479-230-011, 012 & 027
EXISTING LAND USE:	MULTI-FAMILY
PROPOSED LAND USE:	MULTI-FAMILY
EXISTING ZONE:	O - R15
PROPOSED ZONING:	RESIDETIAL PUD
DEVELOPMENT AREA:	GROSS AREA: 219,716 SF, 5.044 AC NET AREA: 212,670 SF, 4.882 AC
DATE MAP PREPARED:	APRIL, 2015
NUMBERED LOTS:	ONE (1) LOT WITH 58 UNITS PUD
EXISTING TREES:	THERE ARE NO EXISTING TREES ON SITE, THERE ARE NO INDIGENOUS NATIVE OAK TREES ON SITE AS SHOWN
CONTOUR INTERVAL:	CONTOUR INTERVAL: 1 FEET

LEGEND

PROPERTY BOUNDARY
LOT LINE
CENTERLINE
OFFSITE R/W
EASEMENT LINE
DAYLIGHT LINE
STORM DRAIN
SEWER LINE
WATER LINE

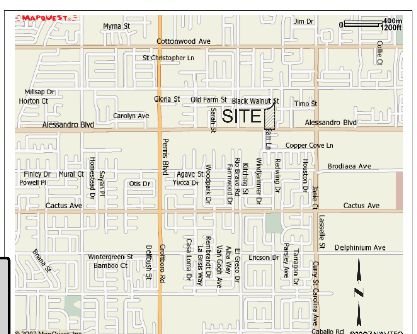
GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

FLOOD ZONE

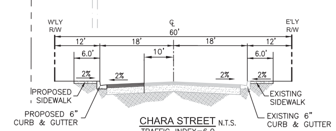
ACCORDING TO THE CITY OF MORENO VALLEY AND BASED UPON THE NATIONAL INSURANCE PROGRAM MAPS THIS SITE LIES WITHIN FLOOD ZONE X SHADED, COMMUNITY PANEL NO. 06505C0765G DATED AUGUST 08, 2008 AND PUBLISHED BY THE FEDERAL INSURANCE ADMINISTRATION.

NOTE:

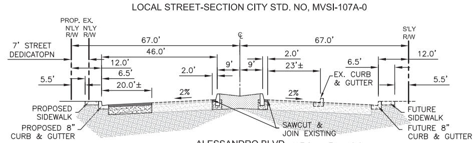
THE OWNER(S) OF PARCEL 1 HEREBY DEDICATES TO CITY OF MORENO VALLEY, A MUNICIPAL CORPORATION, A PERPETUAL NO-EXCLUSIVE EASEMENT FOR PUBLIC UTILITY PURPOSES INCLUDING INGRESS AND EGRESS FOR THE PURPOSE OF CONSTRUCTING, OPERATING, MAINTAINING AND REPARING MUNICIPAL SERVICE FACILITIES AND READING METERS OVER, UNDER, UPON, ACROSS AND WITHIN ALL COMMON AREAS OF THE REAL PROPERTY.



VICINITY MAP
N.T.S.



CHARA STREET N.T.S.
TRAFFIC INDEX=6.0
LOCAL STREET-SECTION CITY STD. NO, MVSI-107A-0



ALESSANDRO BLVD N.T.S. T.I.=10.0
DIVIDER MAJOR ARTERIAL-SECTION CITY STD. NO, MVSI-101A-0

SHEET INDEX

1) TENTATIVE TRACT MAP
2) CONCEPTUAL GRADING PLAN
3) DETAILS & CROSS SECTIONS
4) CONCEPTUAL UTILITY PLAN
5) PRELIMINARY OFFSITE IMPROVEMENT - ALESSENDRO BLVD

PA13-0061
PA13-0062

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

W&W Land Design Consultants, Inc
Civil Engineering • Subdivision • Land Planning
2335 W. FOOTHILL BLVD., SUITE 1, UPLAND, CA 91786
TEL: (909) 608-7118 • FAX: (909) 946-1137

REGISTERED PROFESSIONAL ENGINEER WEIDONG LIU No. 66242 Exp. 06-30-18 CIVIL STATE OF CALIFORNIA

CITY OF MORENO VALLEY, CALIFORNIA
TENTATIVE TRACT MAP 35429
CHARA VILLA
NORTHWEST CORNER SIDE OF ALESSANDRA BLVD. AND CHARA STREET

DRAWN BY: WW STAFF
DESIGNED BY: WW STAFF
CHECKED BY: W.L.
APPROVED BY:
CITY ENGINEER R.C.E. DATE:
SCALE: AS SHOWN
DATE: 04/15/2015

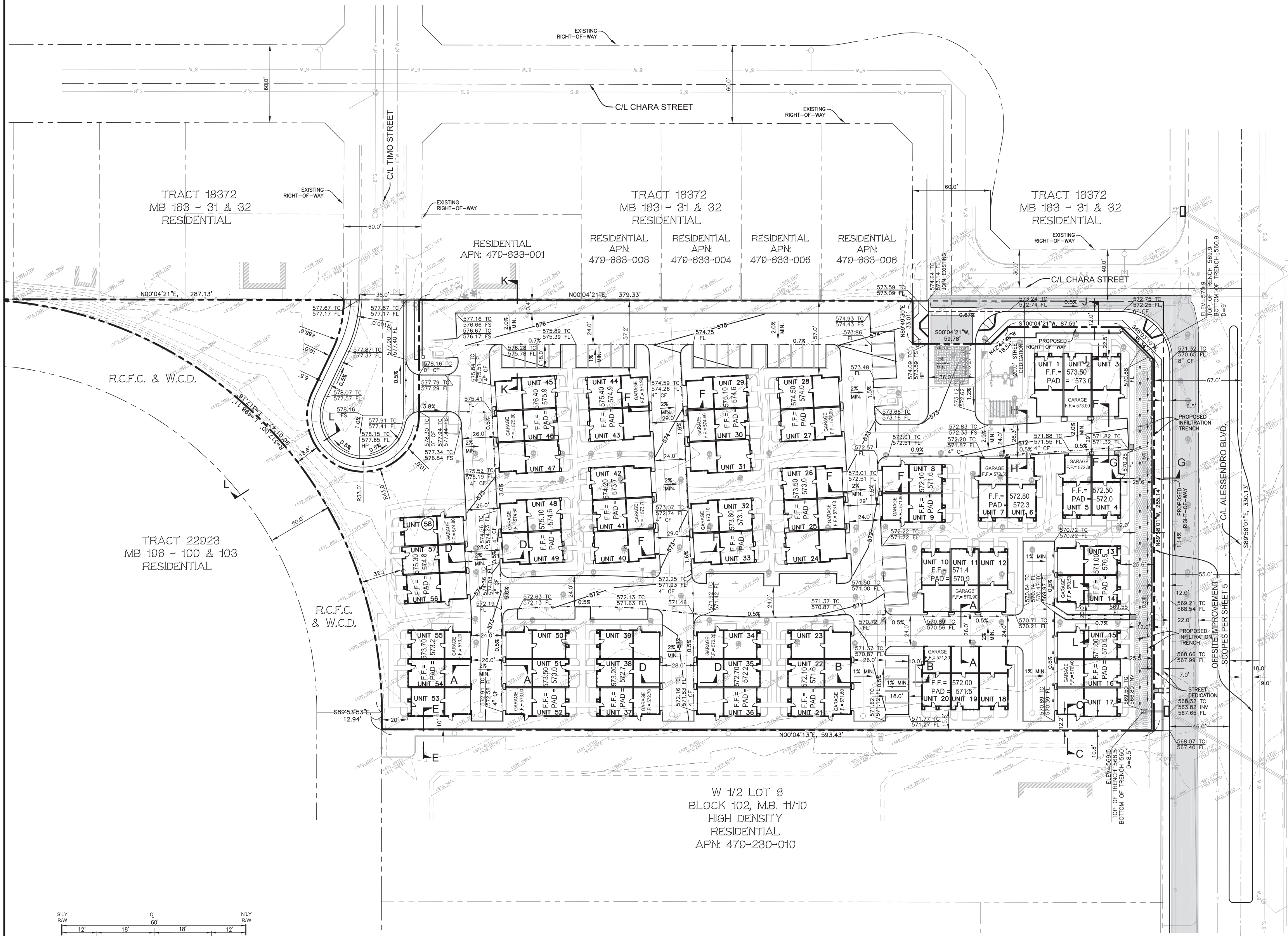
CONCEPTUAL GRADING & DRAINAGE PLAN

FOR TENTATIVE TRACT MAP 35429

IN CITY OF MORENO VALLEY, RIVERSIDE

CURVE TABLE

CURVE	DELTA	RADIUS	LENGTH	TANGENT
C1	10°18'22"	100.00'	7.99'	9.02'
C2	65°25'49"	270.00'	79.94'	44.97'



GENERAL NOTES

DEVELOPMENT AREA: GROSS AREA: 219,716 SF, 5.044 AC
NET AREA: 212,670 SF, 4.882 AC
DISTURBED AREA: 212,670 SF, 4.882 AC

EARTHWORK QUANTITIES	
EXCAVATION (CUT)	6,960 CY
FILL	+6,040 CY
SHRINKAGE (18%) +	+1,090 CY
NET EXPORT	170 CY

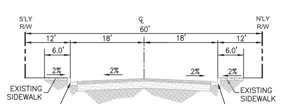
EARTHWORK QUANTITIES SHOWN ON THIS PLAN ARE APPROXIMATE ESTIMATES SHOWN FOR AGENCY FEE PURPOSES ONLY, AND ARE BASED UPON THE PLAN ELEVATIONS SHOWN AND THE GROUND ELEVATIONS WHICH EXISTED AT THE TIME OF THE TOPOGRAPHIC SURVEY.

LEGEND:

- PROPERTY BOUNDARY
- LOT LINE
- CENTERLINE
- OFFSITE R/W
- EASEMENT LINE
- STORM DRAIN
- SEWER LINE
- WATER LINE
- TC TOP OF CURB
- FL FLOWLINE
- BW BACK OF WALK
- HP HIGH POINT
- PE PAD ELEVATION
- FF FINISH FLOOR
- FS FINISH SURFACE
- GB GRADE BREAK
- BSL BUILDING SETBACK LINE
- FG PROPOSED FINISH GROUND
- NG EXISTING NATURAL GROUND
- TF TOP OF BLOCK WALL FOOTING
- TG TOP OF GRATE
- SW SEWER
- WA WATER
- INV INVERT
- EDF EDGE OF DEEPENED FOOTING
- BTM BOTTOM
- CUT FILL TRANSITION LINE
- PROPOSED DRAINAGE PATTERN
- EXISTING DRAINAGE PATTERN
- PROPOSED AC PAVEMENT
- POROUS PAVEMENT

GRAPHIC SCALE

(IN FEET)
1 inch = 30 ft.



TIMO STREET
N.T.S.
TRAFFIC INDEX=6.0

PA13-0061
PA13-0062

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

W&W Land Design Consultants, Inc
Civil Engineering · Subdivision · Land Planning
2335 W. FOOTHILL BLVD., SUITE 1, UPLAND, CA 91786
TEL: (909) 608-7118 · FAX: (909) 946-1137

REGISTERED PROFESSIONAL ENGINEER WEIDONG LIU No. 66242 Exp. 06-30-16 CIVIL STATE OF CALIFORNIA

CITY OF MORENO VALLEY, CALIFORNIA
CONCEPTUAL GRADING & DRAINAGE PLAN

DRAWN BY: WW STAFF
DESIGNED BY: WW STAFF
CHECKED BY: W.L.

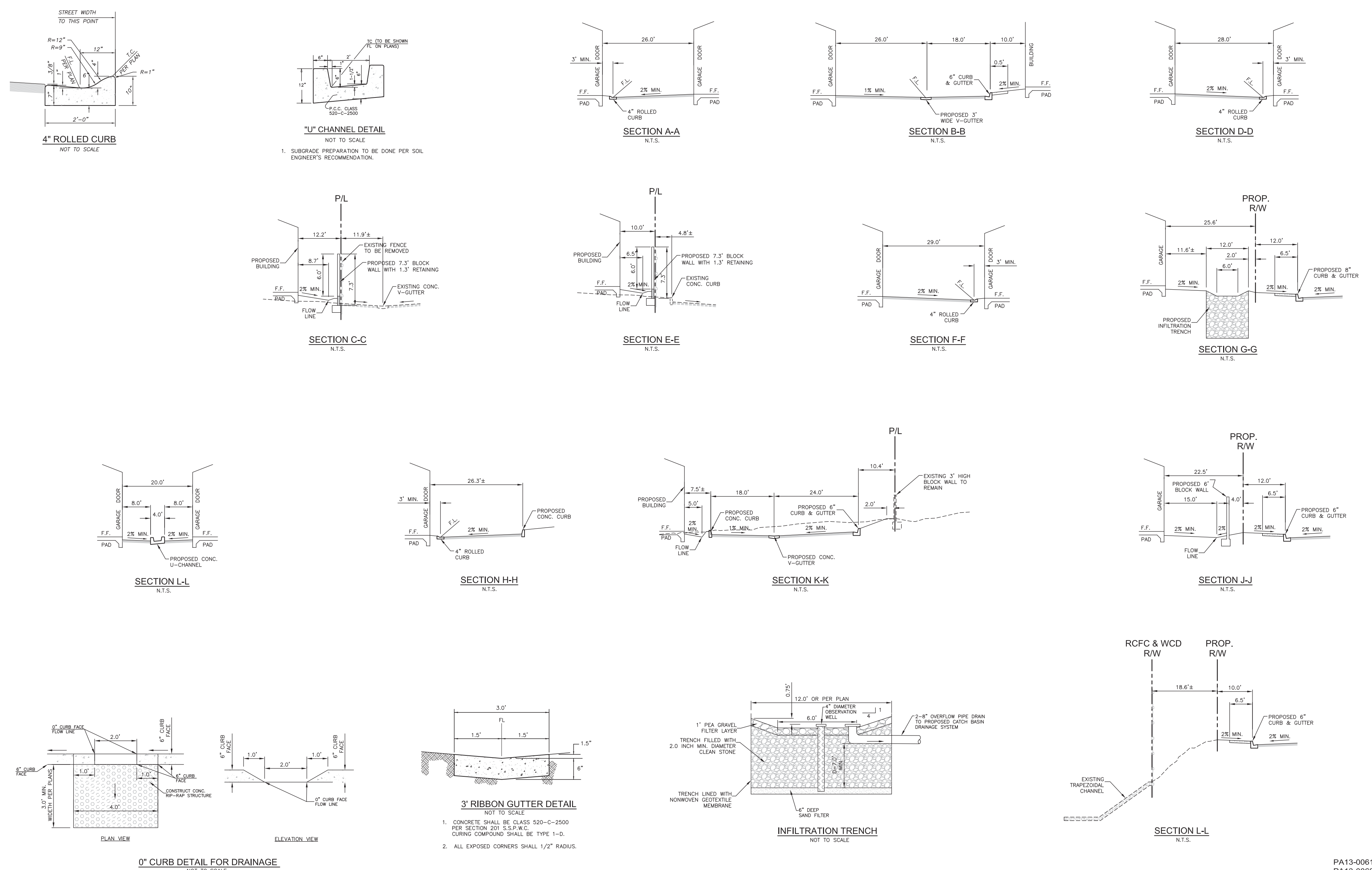
CHARA VILLA
NORTHWEST CORNER SIDE OF ALESSANDRA BLVD. AND CHARA STREET

SCALE: AS SHOWN
DATE: 04/15/2015

APPROVED BY:
CITY ENGINEER R.C.E. DATE:

5

DETAILS & CROSS SECTIONS



PA13-0061
PA13-0062

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

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2335 W. FOOTHILL BLVD., SUITE 1, UPLAND, CA 91786
TEL: (909) 608-7118 • FAX: (909) 946-1137

REGISTERED PROFESSIONAL ENGINEER
WEIDONG LIU
No. 66242
Exp. 06-30-18
CIVIL
STATE OF CALIFORNIA

CITY OF MORENO VALLEY, CALIFORNIA
DETAILS & CROSS SECTIONS

DRAWN BY: WW STAFF
DESIGNED BY: WW STAFF
CHECKED BY: W.L.

CHARA VILLA
NORTHWEST CORNER SIDE OF ALESSANDRA BLVD. AND CHARA STREET

APPROVED BY:
CITY ENGINEER R.C.E. DATE:

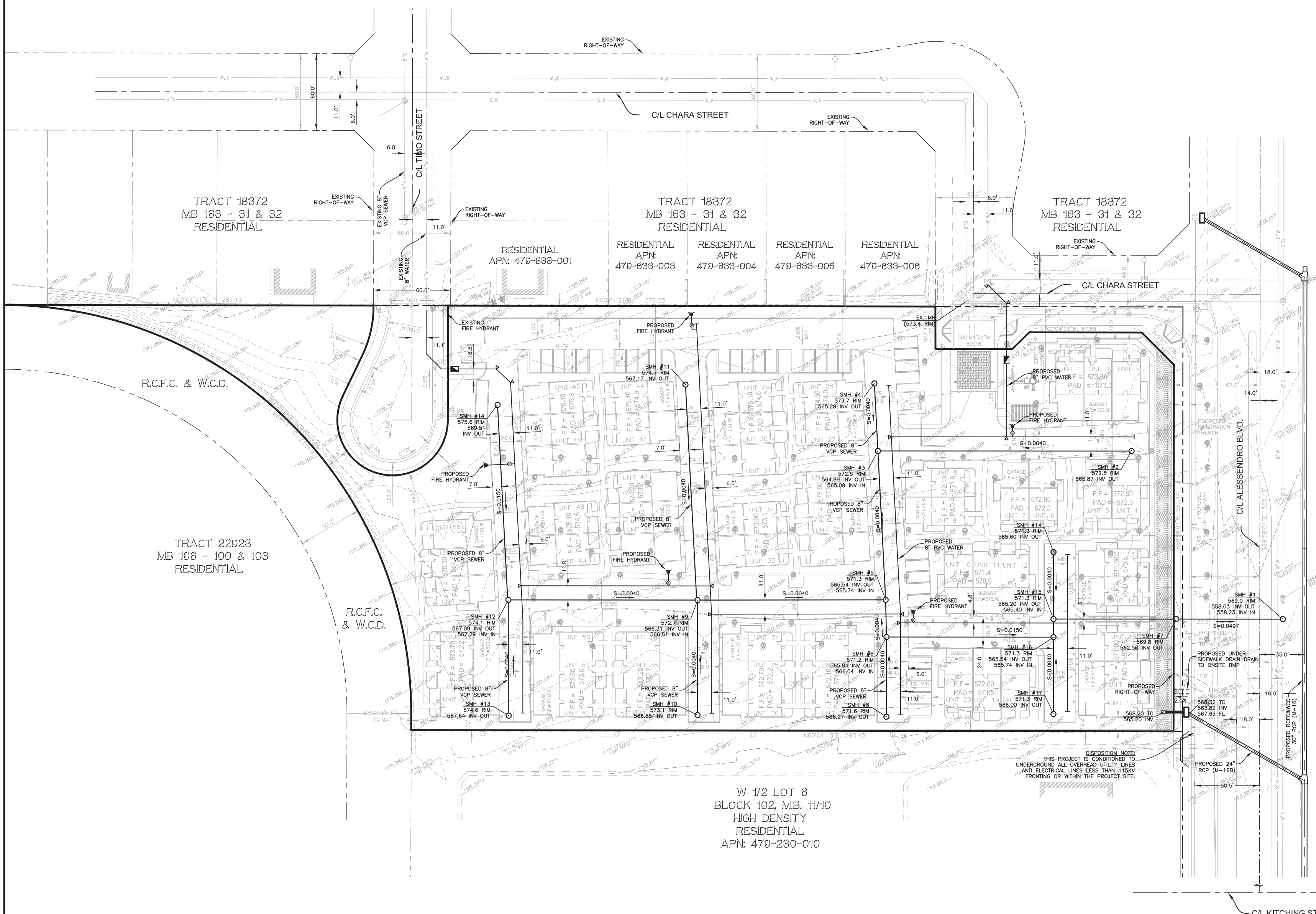
SCALE: AS SHOWN
DATE: 04/15/2015

5

CONCEPTUAL UTILITY PLAN

FOR TENTATIVE TRACT MAP 35429

IN CITY OF MORENO VALLEY, RIVERSIDE



UTILITY & SERVICE AGENCIES:

WATER/SEWER
EASTERN MUNICIPAL/WATER DISTRICT
2270 TRUMBLE ROAD
PERRIS, CA 92572-8300
(951) 928-3777

ELECTRIC
SOUTHERN CALIFORNIA EDISON
(800) 684-8123

TELEPHONE
VERIZON TELEPHONE

GAS
THE GAS COMPANY
(800) 427-2200

LEGEND

- PROPERTY BOUNDARY
- LOT LINE
- CENTERLINE
- OFFSITE R/W
- EASEMENT LINE
- STORM DRAIN
- SEWER LINE
- WATER LINE
- PROPOSED FIRE HYDRANT
- PROPOSED WATER
- PROPOSED SEWER
- EXISTING FIRE HYDRANT
- WV WATER VALVE
- PP POWER POLE
- WM WATER METER
- PB PULL-BOX
- CO SEWER CLEAN-OUT
- EXISTING STREET SIGNAL
- PARKING LIGHT
- IRR. WM IRRIGATION WATER METER
- DDC DOUBLE DETECTOR CHECK VAVLE
- SMH SEWER MANHOLE
- CB CATCH BASIN
- FDC FIRE DETECTOR CHECK VAVLE

PA13-0061
PA13-0062

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE

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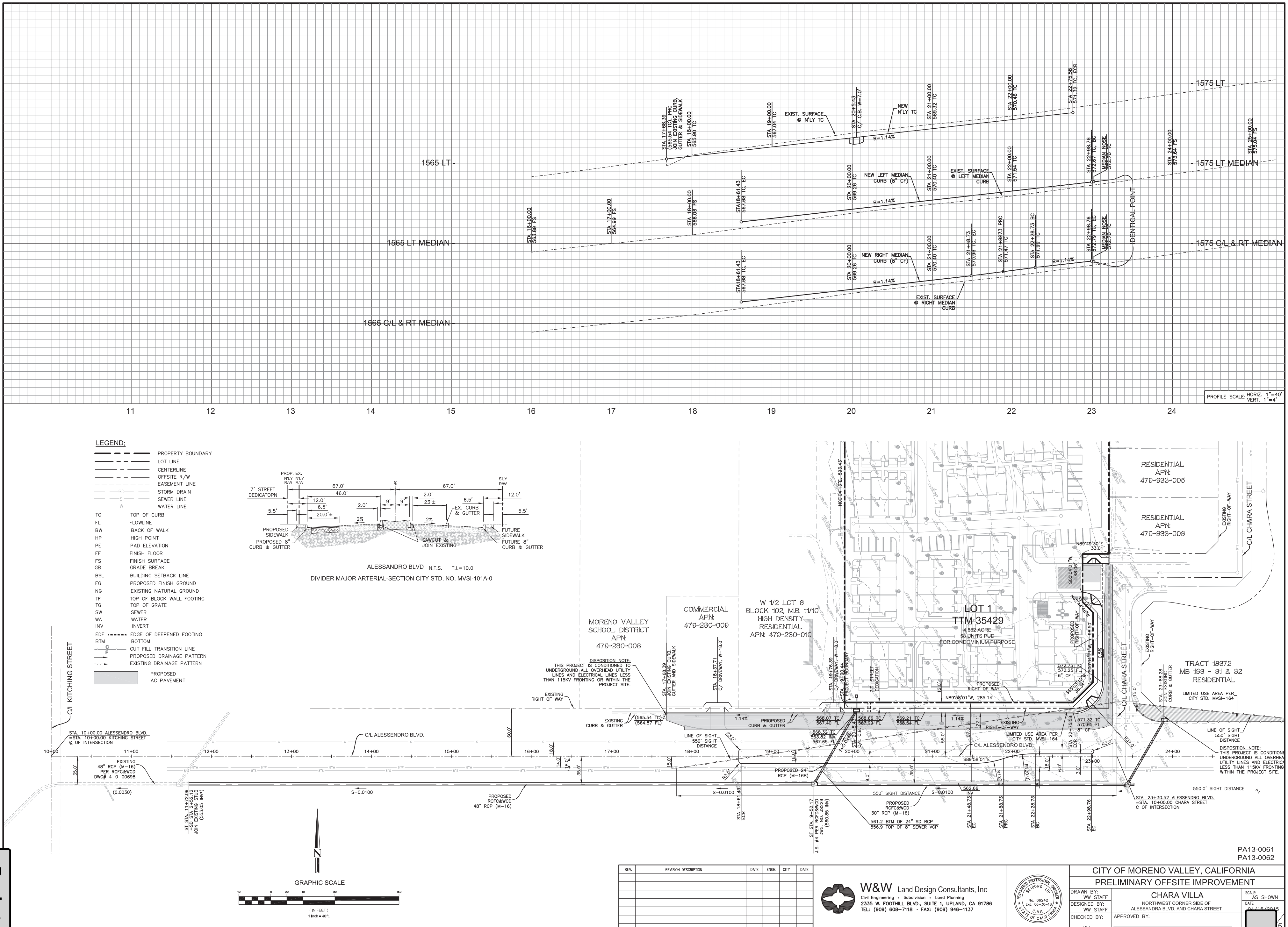
REGISTERED PROFESSIONAL ENGINEER · WEIDONG LIU · No. 66242 · Exp. 06-30-18 · CIVIL · STATE OF CALIFORNIA

CITY OF MORENO VALLEY, CALIFORNIA

CONCEPTUAL UTILITY PLAN

CHARA VILLA
NORTHWEST CORNER SIDE OF ALESSANDRA BLVD. AND CHARA STREET

DRAWN BY: WW STAFF
DESIGNED BY: WW STAFF
CHECKED BY: W.L.
APPROVED BY:
CITY ENGINEER R.C.E. DATE:
SCALE: AS SHOWN
DATE: 04/15/2015



Attachment: Tentative Tract Map and Preliminary Grading [Revision 2] (2423 : PEN16-0119 Plot Plan & PEN16-0120 Tentative Tract Map 35429)

CHARA VILLA

60 RESIDENTIAL UNITS DEVELOPMENT

ALESSANDRO BLVD.
MORENO VALLEY, CA 92553

PROJECT DATA

OWNER:
Ralph Liu
780 S. Nogales St.
City of Industry, CA 91748
T: 626 935 1605
Email: Ralph@tarhong.com

APPLICANT:
Creative Design Associates
17528 E. ROWLAND ST.
INDUSTRY, CA 91748
FAX: 626.913.8102
TEL: 626.913.8101
EMAIL: JimmyLee@cda-arc.com
CONTACT: JIMMY LEE

PROJECT ADDRESS:
NORTHEAST CORNER SIDE OF ALESSANDRO BLVD.
AND CHARA STREET
MORENO VALLEY CA 92553
ACCESSOR PARCEL NUMBER: 479-230-011,012&027

ZONING SUMMARY

ZONING
- EXISTING: R-15
- PROPOSED: R-15 (CONDITION USE PERMIT)

LOT DIMENSIONS
- APPROX. 320' x 600' SEE SITE PLAN

LOT AREA
- GROSS LOT AREA: 219,716 SF (5.044 AC)
- NET LOT AREA: 200,599 SF (4.605 AC)

PROPOSED USE:
- 58 ATTACHED HOMES

DENSITY
- MIN. REQ'D: 12 DU / AC
- MAX. ALLOWED: 15 DU/ AC
- PROVIDED: 12.6 DU/ AC

BUILDING HEIGHT
- MAX. ALLOWED: 50'-0"
- PROVIDED: 29'-0" (2 STORY)

SETBACKS

	MIN. REQ'D	PROVIDED
FRONT	25'-0"	25'-0"
SIDE (E)	10'-0"	10'-0"
SIDE (W)	10'-0"	20'-0"
REAR	20'-0"	20'-0"

FAR
- MAX. ALLOWED: 0.75
- PROVIDED: 0.42

UNIT SUMMARY: TOTAL: 58 UNITS

28 UNITS FOR TYPE A
10 UNITS FOR TYPE B
16 UNITS FOR TYPE C
04 UNITS FOR TYPE D

UNIT FLOOR AREA BREAKDOWN

FLOOR AREA BREAKDOWN:

PLAN A & Ar: 1,518 SF W/ 2 CAR GARAGE - 444 SF
PLAN B : 1,526 SF W/ 2-CAR GARAGE - 450 SF
PLAN C & Cr: 1,725 SF W/ 2-CAR GARAGE - 488 SF
PLAN D : 1,656 SF W/ BALCONY: 63 SF & 2-CAR GARAGE - 508 SF

28 UNITS FOR TYPE A=42,504 SF
10 UNITS FOR TYPE B=15,260 SF
16 UNITS FOR TYPE C=27,600 SF
04 UNITS FOR TYPE D= 6,624 SF

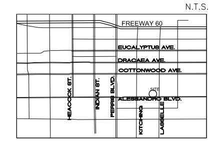
TOTAL LIVING SQUARE FEET= 91,988 SF

PARKING SUMMARY

PARKING REQUIRED: 145 STALLS
- 2.5 PER UNIT(WITH 2 COVERED)
- COVERED 58 x 2 = 116 STALLS
- GUEST 58 x 0.5 = 29 STALLS

PARKING PROVIDED: 158 STALLS
- 2.72 PER UNIT
- COVERED 58 x 2 = 116 STALLS
- GUEST 42 STALLS

VICINITY MAP



LOT COVERAGE SUMMARY:

MAX ALLOWED COVERAGE: 45.0 %

PROVIDED COVERAGE: 33.6 %

10 X BUILDING A-B-A FOOTPRINT: 3,119 SF = 31,190 SF
4 X BUILDING C-D-C FOOTPRINT: 3,413 SF = 13,652 SF
4 X BUILDING A-A FOOTPRINT: 2,067 SF = 8,286 SF
4 X BUILDING C-C FOOTPRINT: 2,313 SF = 9,252 SF

TOTAL BUILDING COVERAGE=62,380 SF / 200,599 SF = 31.09%

OPEN SPACE ANALYSIS

REQUIRED PRIVATE OPEN SPACE
- PER UNITS: 150 SF MIN.

PROVIDED PRIVATE OPEN SPACE
- 160 S.F FOR TYPE A - (4,480 SF)
- 176 S.F FOR TYPE B - (1,760 SF)
- 186 S.F FOR TYPE C - (2,976 SF)
- 260 S.F FOR TYPE D - (1,040 SF)

PROVIDED USABLE COMMON OPEN SPACE:
- A: 2,400 SF
- B: 11,680 SF

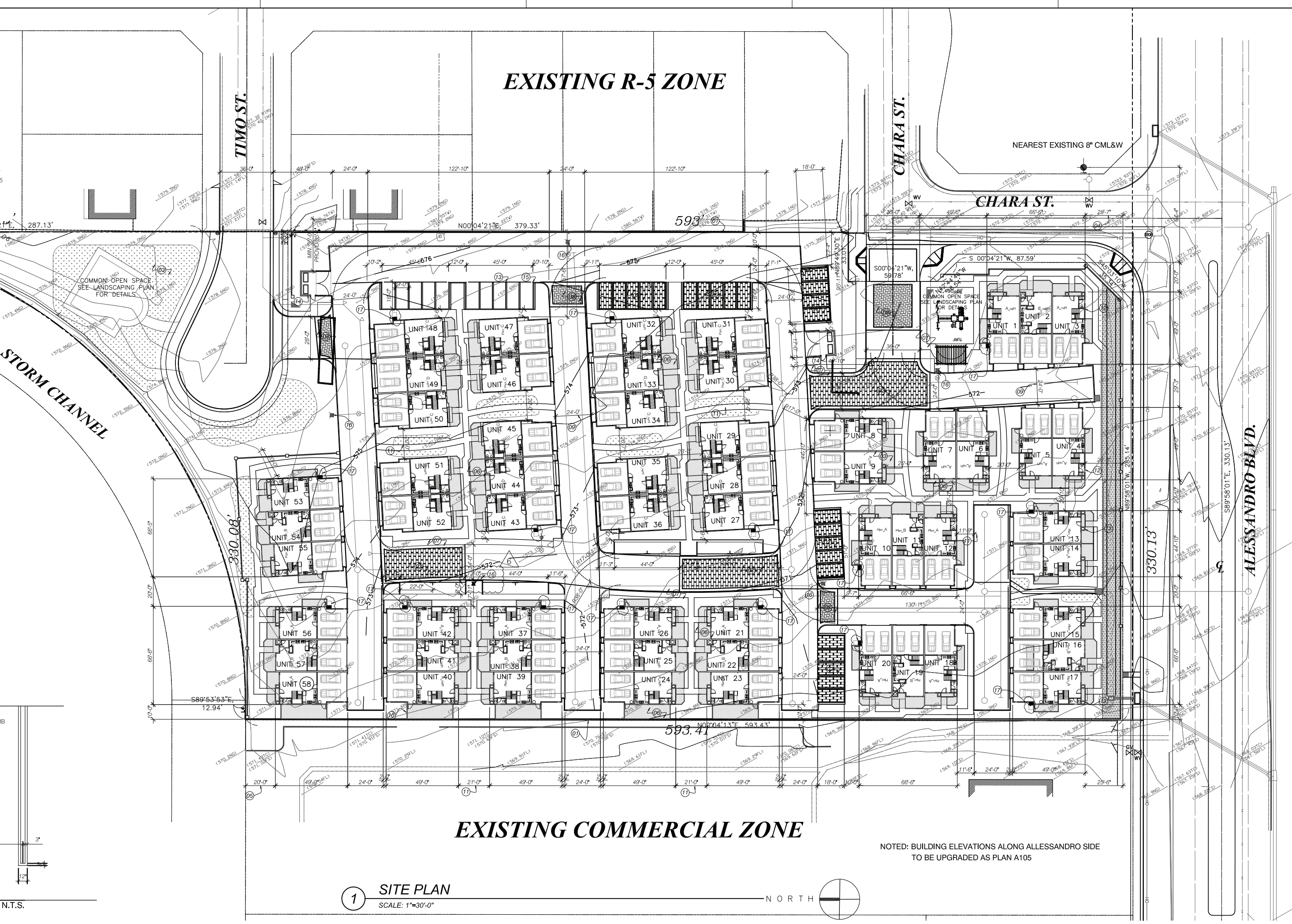
TOTAL LANDSCAPE AREA: 95,125 SF
(48.05% OF LOT AREA)

SHEET INDEX

SYMBOL LEGEND :

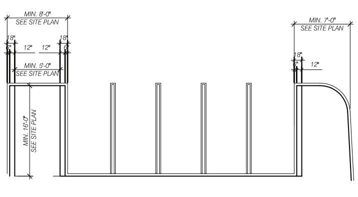
- 6' TALL DECORATIVE C.M.U. FENCE WALL AS REQUIRED
- 02 PROVIDE PERVIOUS PAVER PER DRAINAGE PURPOSE; SEE GRADING PLANS FOR DETAILS
- 03 PROVIDE OPEN SPACE AND LANDSCAPING. SEE LANDSCAPE PLAN FOR DETAILS.
- 04 PROVIDE BUILDING FRONT SETBACK MIN. 25'
- 05 PROVIDE BUILDING REAR SETBACK MIN. 20'
- 06 PROVIDE PRIVATE YARD FOR EACH UNIT. MIN. DIM, 8'-0"
- 07 PROVIDE 4' PEDESTRIAN WALKWAY. TYP.
- PROVIDE DECORATIVE PAVING-INTERLOCK PAVER PER OWNER
- 09 24' WIDE DRIVEWAY. TYPICAL.
- 10 6' HIGH VINYL FENCE. TYPICAL.
- 11 PROVIDE BUILDING SAPERATION MIN. 20'
- BUILDING ELEVATIONS FACING ALLESSANDRO BLVD TO BE UPGRADED AS PLAN 1/A105
- PARKING STRIP DETAIL SEE X/A001
- 14 TRASH ENCLOSURE TO BE FULLY COVERED AND SIMILAR MATERIALS AND COLOR TO MATCH THE RESIDENTIAL UNIT, WITH ONE BIN FOR RECYCLE AND THE OTHER FOR TRASH. SEE DETAIL Y/A105
- 15 PARKING STEP OUT SHALL HAVE AT LEAST 18" CLEARANCE. SEE DETAIL Y
- 16 NEW FIRE HYDRANT
- 17 FIRE - FDC LOCATION (FOR BLDG MORE THAN 2 UNITS) A MIN. CLR OF 36" X 36" AND HEIGHT CLEARANCE OF 78" IS REQUIRED IN FRONT OF THE FDC

FIRE DEPARTMENT NOTES:
The outside turning radius is 38 feet, inside is 17 feet. The egress gate would normally be required to have a 60' clearance from curb to gate. Other than that ladder truck apparatus could be as much as 49 feet in length. Any setback would have to allow for any easements or landscaping required by land development and planning. The egress gate setback for fire would need to be determined only if there were no other egress available such as is planned on Timo and Chara. As long as the circulation provided for these two routes of egress the other setback requirements (for LD and planning) would be ok

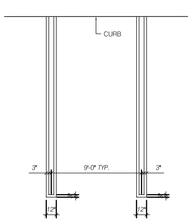


NOTED: BUILDING ELEVATIONS ALONG ALESSANDRO SIDE TO BE UPGRADED AS PLAN A105

1 SITE PLAN
SCALE: 1"=30'-0"



Y STEP OUT CLEARANCE - TYP.
N.T.S.



X PARKING STRIP
N.T.S.

CD/A
CREATIVE DESIGN ASSOCIATES
Architecture. Interior Design. Planning
T. 626.913.8101
F. 626.913.8102
17528 E. Rowland St.
City of Industry, CA 91748
www.cda-arc.com

Project:
CHARA VILLA
58 UNITS / R-15

PA13-0061

ALESSANDRO
MORENO VALLEY, CA 92553

Client:
Ralph Liu

780 S. Nogales St.
City of Industry, CA 91748

Stamp:

Drawing Title:
Site Plan/ Project Data

CDA Project No. 1350
Date: SEP. 10, 2013
Phase: PLANNING
Checked By: J.L.
Drawn By: CDA
Project No.:
Reference:
Revisions:

1 MARCH. 10, 2014
2 JANUARY 30, 2015
3 MAY 15, 2015
4 AUGUST 30, 2015
5 NOVEMBER 16, 2015
6 SEPTEMBER 13, 2016

Drawing No.: A001

2.h

CITY OF MORENO VALLEY
CONDITIONS of APPROVAL
Case No: PA13-0061, PA13-0062
APN: 482-152-047
DATE: 1/26/2016

FIRE PREVENTION BUREAU

With respect to the conditions of approval, the following fire protection measures shall be provided in accordance with Moreno Valley City Ordinances and/or recognized fire protection standards:

F1. Final fire and life safety conditions will be addressed when the Fire Prevention Bureau reviews building plans. These conditions will be based on occupancy, use, California Building Code (CBC), California Fire Code (CFC), and related codes, which are in force at the time of building plan submittal.

F2. The minimum number of fire hydrants required, as well as the location and spacing of fire hydrants, shall comply with the C.F.C., MVMC, and NFPA 24. A fire hydrant shall be located within 50 feet of the fire department connection for buildings protected with a fire sprinkler system. Fire hydrants shall not be closer than 40 feet to the structures. The size and number of outlets required for the approved fire hydrants are (6" x 4" x 2 ½") (CFC 507.5.1, 507.5.7, Appendix C, NFPA 24-7.2.3, MVMC 912.2.1)

F3. During phased construction, dead end roadways and streets which have not been completed shall have a turn-around capable of accommodating fire apparatus. (CFC 503.2 and 503.2.5)

F4. Prior to issuance of Building Permits, the applicant/developer shall provide the Fire Prevention Bureau with an approved site plan for fire lane signage and fire hydrant placement. (MVMC 8.36.050 and CFC 501.3)

F5. Prior to construction and issuance of building permits, all locations where structures are to be built shall have an approved Fire Department emergency vehicular access road (all weather surface) capable of sustaining an imposed load of 80,000 lbs. GVW, based on street standards approved by the Public Works Director and the Fire Prevention Bureau. (CFC 501.4 and MVMC 8.36.050 Section A)

F6. Prior to construction and issuance of Building Permits, fire lanes and fire apparatus access roads shall have an unobstructed width of not less than twenty-four (24) feet as approved by the Fire Prevention Bureau and an unobstructed vertical clearance of not less the thirteen (13) feet six (6) inches. (CFC 503.2.1 and MVMC 8.36.060[E])

F7. Prior to construction, all roads, driveways and private roads shall not exceed 12 percent grade. (CFC 503.2.7 and MVMC 8.36.060[G])

F8. If construction is phased, each phase shall provide an approved emergency vehicular access way for fire protection prior to any building construction. (CFC 501.4)

F9. Prior to construction, all locations where structures are to be built shall have an approved Fire Department access based on street standards approved by the Public Works Director and the Fire Prevention Bureau. (CFC 501.3)

F10. Prior to building construction, dead end roadways and streets which have not been completed shall have a turnaround capable of accommodating fire apparatus. (CFC 503.2.5)

F11. Prior to issuance of Building Permits, the applicant/developer shall participate in the Fire Impact Mitigation Program. (Fee Resolution as adopted by City Council)

F12. Plans for private water mains supplying fire sprinkler systems and/or private fire hydrants shall be submitted to the Fire Prevention Bureau for approval. (CFC 105 and CFC 3312.1)

F13. Prior to issuance of Building Permits, the applicant/developer shall furnish one copy of the water system plans to the Fire Prevention Bureau for review. Plans shall:

a) Be signed by a registered civil engineer or a certified fire protection engineer;
b) Contain a Fire Prevention Bureau approval signature block; and
c) Conform to hydrant type, location, spacing of new and existing hydrants and minimum fire flow required as determined by the Fire Prevention Bureau.

After the local water company signs the plans, the originals shall be presented to the Fire Prevention Bureau for signatures. The required water system, including fire hydrants, shall be installed, made serviceable, and be accepted by the Moreno Valley Fire Department prior to beginning construction. They shall be maintained accessible.

Existing fire hydrants on public streets are allowed to be considered available. Existing fire hydrants on adjacent properties shall not be considered available unless fire apparatus access roads extend between properties and easements are established to prevent obstruction of such roads. (CFC 507.5)

F13. Prior to issuance of Certificate of Occupancy or Building Final, "Blue Reflective Markers" shall be installed to identify fire hydrant locations in accordance with City specifications. (CFC 509.1 and MVLT 440A-0 through MVLT 440C-0)

F14. Prior to issuance of Certificate of Occupancy or Building Final, all multi-family residences shall display the address in accordance with the Riverside County Fire Department Premises Identification standard 07-01. (CFC 505.1)

F15. Prior to issuance of a Certificate of Occupancy or Building Final, a directory display monument sign shall be required for apartment, condominium, townhouse or mobile home parks. Each complex shall have an illuminated diagrammatic layout of the complex which indicates the name of the complex, all streets, building identification, unit numbers, and fire hydrant locations within the complex. Location of the sign and design specifications shall be submitted to, and approved by, the Community Development Department – Planning Division and the Fire Prevention Bureau prior to installation. (MVMC 9.12.060 [H,I])

F16. Prior to issuance of Certificate of Occupancy or Building Final, the applicant/developer shall install a fire sprinkler system based on square footage and type of construction, occupancy or use. Fire sprinkler plans shall be submitted to the Fire Prevention Bureau for approval prior to installation. (CFC Chapter 9)

F17. All exterior security emergency access gates shall be electronically operated and be provided with Knox key switches for access by emergency personnel. (CFC 506.1)

F18. The angle of approach and departure for any means of Fire Department access shall not exceed 1 ft drop in 20 ft (0.3 m drop in 6 m), and the design limitations of the fire apparatus of the Fire Department shall be subject to approval by the AHJ. (CFC 503 and MVMC 8.36.060)

F19. Prior to issuance of Certificate of Occupancy or Building Final, the applicant/developer shall install a fire alarm system monitored by an approved Underwriters Laboratory listed central station based on a requirement for monitoring the sprinkler system, occupancy or use. Fire alarm panel shall be accessible from exterior of building in an approved location. Plans shall be submitted to the Fire Prevention Bureau for approval prior to installation. (CFC Chapter 9 and MVMC 8.36.100)

F20 Approval of the safety precautions required for buildings being constructed, altered or demolished shall be required in addition to other approvals required for specific operations or processes associated with such construction, alteration or demolition. (CFC Chapter 14 & CBC Chapter 33)

F21. Prior to construction, all traffic calming designs/devices must be approved by the Fire Marshal and City Engineer.

PUBLIC WORKS DEPARTMENT – SPECIAL DISTRICTS DIVISION
CONDITIONS OF APPROVAL
CASE NO: PA13-0061 (CUP for a Planned Unit Development)
APNs: 479-230-011, -012, and -027

Conditions are standard to all or most development projects. Some special conditions, modified conditions or clarification of conditions may be included. Please review conditions as listed and contact the Division at 951.413.3480 for any questions.

Acknowledgement of Conditions

The following items are the Special Districts Division's Conditions of Approval for project **PA13-0061**; this project shall be completed at no cost to any Government Agency. All questions regarding the following Conditions including but not limited to intent, requests for change/modification, variance and/or request for extension of time shall be sought from the Special Districts Division of the Public Works Department 951.413.3480 or by emailing specialdistricts@moval.org.

General Conditions

SD-1 The parcel(s) associated with this project have been incorporated into the Moreno Valley Community Services District Zone A (Parks & Community Services) and Zone C (Arterial Street Lighting). All assessable parcels therein shall be subject to annual parcel taxes for Zone A and Zone C for operations and capital improvements.

SD-2 Plans for parkway, median, slope, and/or open space landscape areas designated in the project's Conditions of Approval for incorporation into a City coordinated landscape maintenance program, shall be prepared and submitted in accordance with the City of Moreno Valley Public Works Department Landscape Design Guidelines. The guidelines are available on the City's website at www.moval.org and or from the Special Districts Division (951.413.3480 or specialdistricts@moval.org).

SD-3 The Developer, or the Developer's successors or assignees shall be responsible for all parkway and/or median landscape maintenance for a period of one (1) year commencing from the time all items of work have been completed to the satisfaction of Special Districts staff as per the City of Moreno Valley Public Works Department Landscape Design Guidelines, or until such time as the District accepts maintenance responsibilities.

SD-4 Any damage to existing landscape areas maintained by the City of Moreno Valley due to project construction shall be repaired/replaced by the Developer, or Developer's successors in interest, at no cost to the City of Moreno Valley.

PUBLIC WORKS DEPARTMENT – SPECIAL DISTRICTS DIVISION
CONDITIONS OF APPROVAL
CASE NO: PA13-0061
APNs: 479-230-011, -012, and -027

SD-5 The ongoing maintenance of any landscaping required to be installed behind the curb on **Alessandro Blvd., Chara St., and Timo St.** shall be the responsibility of the property owner.

SD-6 Plan check fees for review of parkway/median landscape plans for improvements that shall be maintained by the City of Moreno Valley are due upon the first plan submittal. (MC 3.32.040)

SD-7 Inspection fees for the monitoring of landscape installation associated with the City of Moreno Valley maintained parkways/medians are due prior to the required pre-construction meeting. (MC 3.32.040)

SD-8 Street Light Authorization forms for all street lights that are conditioned to be installed as part of this project must be submitted to the Special Districts Division for approval, prior to street light installation. The Street Light Authorization form can be obtained from the utility company providing electric service to the project, either Moreno Valley Utility or Southern California Edison. For questions, contact the Special Districts Division at 951.413.3480 or specialdistricts@moval.org.

Prior to Building Permit Issuance

SD-9 (BP) This project has been conditioned to provide a funding source for the continued maintenance, enhancement, and or retrofit of neighborhood parks, open spaces, linear parks, and/or trails systems. The Developer shall satisfy this condition with one of the options below.

a. Participate in a special election for annexation into **Community Facilities District No. 1** and pay all associated costs with the special election process and formation, if any; or

b. Establish an endowment fund to cover future maintenance costs for new neighborhood parks.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org when submitting the application for building permit issuance of its selected financial option. If option a. is selected, the special election will require a 90 day process prior to building permit issuance. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution.

Annexation to CFD No. 1 shall be completed or proof of payment to establish the endowment fund shall be provided prior to the issuance of the first certificate of occupancy for the project.

PUBLIC WORKS DEPARTMENT – SPECIAL DISTRICTS DIVISION
CONDITIONS OF APPROVAL
CASE NO: PA13-0061
APNs: 479-230-011, -012, and -027

SD-10 (BP) This project has been identified to be included in the formation of a Community Facilities District (Mello-Roos) for **Public Safety** services, including but not limited to Police, Fire Protection, Paramedic Services, Park Rangers, and Animal Control services. The property owner(s) shall not protest the formation; however, they retain the right to object to the rate and method of maximum special tax. In compliance with Proposition 218, the property owner shall agree to approve the mail ballot proceeding (special election) for either formation of the CFD or annexation into an existing district. The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org when submitting the application for building permit issuance to determine the requirement for participation. If the first building permit is pulled prior to formation of the district, this condition will not apply. If the condition applies, the special election will require a minimum of 90 days prior to issuance of the first building permit. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution. (California Government Code Section 53313 et. seq.)

SD-11 (BP) This project is conditioned to provide a funding source for the following special financing program(s):

a. Street Lighting Services for capital improvements, energy charges, and maintenance.
b. Landscape Maintenance Services for median landscaping on Alessandro Blvd.

The Developer's responsibility is to provide a funding source for the capital improvements and the continued maintenance. The Developer shall satisfy this condition with one of the options below.

i. Participate in a special election (mail ballot proceeding) and pay all associated costs of the special election and formation, if any. Financing may be structured through a Community Services District zone, Community Facilities District, Landscape and Lighting Maintenance District, or other financing structure as determined by the City; or
ii. Establish a Property Owner's Association (POA) or Home Owner's Association (HOA) which will be responsible for any and all operation and maintenance costs

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option when submitting the application for building permit issuance. The option for participating in a special election requires approximately 90 days to

PUBLIC WORKS DEPARTMENT – SPECIAL DISTRICTS DIVISION
CONDITIONS OF APPROVAL
CASE NO: PA13-0061
APNs: 479-230-011, -012, and -027

complete the special election process. This allows adequate time to be in compliance with the provisions of Article 13C of the Caifornia Constitution.

The financial option selected shall be in place prior to the issuance of the first certificate of occupancy for the project.

SD-12 (BP) This project is conditioned for a proposed district to provide a funding source for the operation and maintenance of public improvements and/or services associated with new development in that territory. The Developer shall satisfy this condition with one of the options outlined below.

a. Participate in a special election for **maintenance/services** and pay all associated costs of the election process and formation, if any. Financing may be structured through a Community Facilities District, Landscape and Lighting Maintenance District, or other financing structure as determined by the City; or

b. Establish an endowment fund to cover the future maintenance and/or service costs.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org when submitting the application for building permit issuance. If the first building permit is pulled prior to formation of the district, this condition will not apply. If the district has been or is in the process of being formed the Developer must inform the Special Districts Division of its selected financing option (a. or b. above). The option for participating in a special election requires 90 days to complete the special election process. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution.

The financial option selected shall be in place prior to the issuance of the first certificate of occupancy for the project.

SD-13 *Residential* (BP) If Land Development, a Division of the Public Works Department, requires this project to suppy a funding source necessary to provide for, but not limited to, stormwater utilities services for the required continuous operation, maintenance, monitoring, system evaluations and enhancements, remediation and/or replacement of on-site facilities and performing annual inspections of the affected areas to ensure compliance with state mandated storm water regulations, a funding source needs to be established. The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option for the National Pollution Discharge Elimination System (NPDES) program when submitting the application for the first building permit issuance. (see Land Development's related condition). Participating in a special election the process requires a 90 day period prior to the City's issuance of a

PUBLIC WORKS DEPARTMENT – SPECIAL DISTRICTS DIVISION
CONDITIONS OF APPROVAL
CASE NO: PA13-0061
APNs: 479-230-011, -012, and -027

building permit. This allows adequate time to be in compliance with the provisions of Article 13D of the California Constitution. (California Health and Safety Code Sections 5473 through 5473.8 (Ord. 708 Section 3.1, 2006) & City of Moreno Valley Municipal Code Title 3, Section 3.50.050.)

SD-14 (BP) Prior to the issuance of the first building permit for this project, the Developer shall pay Advanced Energy fees for all applicable Residential and Arterial Street Lights required for this development. Payment shall be made to the City of Moreno Valley and collected by the Land Development Division. Fees are based upon the Advanced Energy fee rate in place at the time of payment, as set forth in the current Listing of City Fees, Charges, and Rates adopted by City Council. The Developer shall provide a copy of the receipt to the Special Districts Division (*specialdistricts@moval.org*). Any change in the project which may increase the number of street lights to be installed will require payment of additional Advanced Energy fees at the then current fee. Questions may be directed to the Special Districts Division at 951.413.3480 or specialdistricts@moval.org.

SD-15 (BP) For those areas to be maintained by the City and prior to the issuance of the first Building Permit, Planning Division (Community Development Department), Special Districts Division (the Public Works Department) and Transportation Division (the Public Works Department) shall review and approve the final median, parkway, slope, and/or open space landscape/irrigation plans as designated on the tentative map or in these Conditions of Approval prior to the issuance of the first Building Permit.

SD-16 (BP) Parkway, open space, and/or median landscaping specified in the project's Conditions of Approval shall be constructed in compliance with the City of Moreno Valley Public Works Design Guidelines and completed prior to the issuance of 25% (or 15) of the dwelling permits for this tract or 12 months from the issuance of the first dwelling permit, whichever comes first. In cases where a phasing plan is submitted, the actual percentage of dwelling permits issued prior to the completion of the landscaping shall be subject to the review of the construction phasing plan.

Prior to Certificate of Occupancy

SD-17 (CO) Landscape and irrigation plans for parkway, median, slope, and/or open space landscape areas designated to be maintained by the City shall be placed on compact disk (CD) in pdf format. The CD shall include "As Built" plans, revisions, and changes. The CD will become the property of the City of Moreno Valley and the Moreno Valley Community Services District.

CD/A
CREATIVE DESIGN ASSOCIATES
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Project:
CHARA VILLA
58 UNITS / R-15

PA13-0061
ALESSANDRO
MORENO VALLEY, CA 92553

Client:
Ralph Liu

780 S. Nogales St.
City of Industry, CA 91748

Stamp:

Drawing Title:

CONDITONALS OF APPROVAL

CDA Project No. 1350
Date: SEP. 10, 2013
Phase: PLANNING
Checked By: J.L.
Drawn By: CDA
Project No.:
Reference:
Revisions:

MARCH. 10, 2014
JANUARY 30, 2015
MAY 15, 2015
AUGUST 30, 2015
NOVEMBER 16, 2015

Drawing No.:
A-010

PUBLIC WORKS DEPARTMENT – SPECIAL DISTRICTS DIVISION
CONDITIONS OF APPROVAL
CASE NO: PA13-0062 (TTM 35429 for 58 residential units)
APNs: 479-230-011, -012, and -027

Conditions are standard to all or most development projects. Some special conditions, modified conditions or clarification of conditions may be included. Please review conditions as listed and contact the Division at 951.413.3480 for any questions.

Acknowledgement of Conditions

The following items are the Special Districts Division's Conditions of Approval for **PA13-0062**; this project shall be completed at no cost to any Government Agency. All questions regarding the following Conditions including but not limited to intent, requests for change/modification, variance and/or request for extension of time shall be sought from the Special Districts Division of the Public Works Department 951.413.3480 or by emailing specialdistricts@moval.org.

General Conditions

SD-1 The parcel(s) associated with this project have been incorporated into the Moreno Valley Community Services District Zone A (Parks & Community Services) and Zone C (Arterial Street Lighting). All assessable parcels therein shall be subject to annual parcel taxes for Zone A and Zone C for operations and capital improvements.

SD-2 Plans for parkway, median, slope, and/or open space landscape areas designated in the project's Conditions of Approval for incorporation into a City coordinated landscape maintenance program, shall be prepared and submitted in accordance with the City of Moreno Valley Public Works Department Landscape Design Guidelines. The guidelines are available on the City's website at www.moval.org/sd or from the Special Districts Division (951.413.3480 or specialdistricts@moval.org).

SD-3 The Developer, or the Developer's successors or assignees shall be responsible for all parkway and/or median landscape maintenance for a period of one (1) year commencing from the time all items of work have been completed to the satisfaction of Special Districts staff as per the City of Moreno Valley Public Works Department Landscape Design Guidelines, or until such time as the District accepts maintenance responsibilities.

SD-4 Any damage to existing landscape areas maintained by the City of Moreno Valley due to project construction shall be repaired/replaced by the Developer, or Developer's successors in interest, at no cost to the City of Moreno Valley.

SD-5 The ongoing maintenance of any landscaping required to be installed behind the curb on **Alessandro Blvd., Chara St., and Timo St.** shall be the responsibility of the property owner.

SD-6 Plan check fees for review of parkway/median landscape plans for improvements that shall be maintained by the City of Moreno Valley are due upon the first plan submittal. (MC 3.32.040)

SD-7 Inspection fees for the monitoring of landscape installation associated with the City of Moreno Valley maintained parkways/medians are due prior to the required pre-construction meeting. (MC 3.32.040)

SD-8 Street Light Authorization forms for all street lights that are conditioned to be installed as part of this project must be submitted to the Special Districts Division for approval, prior to street light installation. The Street Light Authorization form can be obtained from the utility company providing electric service to the project, either Moreno Valley Utility or Southern California Edison. For questions, contact the Special Districts Division at 951.413.3480 or specialdistricts@moval.org.

Prior to Recordation of Final Map

SD-9 (R) This project has been conditioned to provide a funding source for the continued maintenance, enhancement, and/or retrofit of parks, open spaces, linear parks, and/or trail systems. The Developer shall satisfy this condition with one of the options below.

a. Participate in a special election for annexation into **Community Facilities District No. 1** and pay all associated costs of the special election process and formation, if any; or

b. Establish an endowment fund to cover future maintenance costs for new neighborhood parks.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option prior to City Council action authorizing recordation of the final map for the development. A minimum of 90 days is needed to complete the special election process. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

Annexation to CFD No. 1 shall be completed or proof of payment to establish the endowment fund shall be provided prior to the issuance of the first building permit for this project.

SD-10 (R) This project has been identified to be included in the formation of a Community Facilities District for **Public Safety** services including but not limited to Police, Fire Protection, Paramedic Services, Park Rangers, and Animal Control services. The property owner(s) shall not protest the formation; however, they retain the right to object to the rate and method of maximum special tax. In compliance with Proposition 218, the property owner shall agree to approve the mail ballot proceeding (special election) for either formation of the CFD or annexation into an existing district that may already be established. The Developer must notify the Special Districts Division at 951.413.3480 or specialdistricts@moval.org of its intent to record the final map for the development 90 days prior to City Council action authorizing recordation of the map. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution. (California Government Code Section 53313 et. seq.)

SD-11 (R) This project is conditioned to provide a funding source for the following special financing program(s):

a. Street Lighting Services for capital improvements, energy charges, and maintenance.
b. Landscape Maintenance Services for median landscaping on Alessandro Blvd.

The Developer's responsibility is to provide a funding source for the capital improvements and the continued maintenance of the landscaped area. The Developer shall satisfy this condition with one of the options below.

i. Participate in a special election (mail ballot proceeding) and pay all associated costs of the special election and formation, if any. Financing may be structured through a Community Services District zone, Community Facilities District, Landscape and Lighting Maintenance District, or other financing structure as determined by the City; or

ii. Establish a Property Owner's Association (POA) or Home Owner's Association (HOA) which will be responsible for any and all operation and maintenance costs.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option prior to City Council action authorizing recordation of the final map for the development. The option for participating in a special election requires approximately 90 days to complete the special election process. This

allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

The financial option selected shall be in place prior to the issuance of the first building permit for this project.

SD-12 (R) This project is conditioned to provide a funding source for the operation and maintenance of public improvements and/or services associated with new development in that territory. The Developer shall satisfy this condition with one of the options below.

a. Participate in a special election for **maintenance/services** and pay all associated costs of the election process and formation, if any. Financing may be structured through a Community Facilities District, Landscape and Lighting Maintenance District, or other financing structure as determined by the City; or

b. Establish an endowment fund to cover the future maintenance and/or service costs.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option prior to City Council action authorizing recordation of the final map for the development. A minimum of 90 days is needed to complete the special election process. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

The financial option selected shall be in place prior to the issuance of the first building permit for this project.

SD-13 *Residential* (R) If Land Development, a Division of the Public Works Department, requires this project to supply a funding source necessary to provide for, but not limited to, stormwater utilities services for the required continuous operation, maintenance, monitoring, systems evaluation and enhancements of on-site facilities and performing annual inspections of the affected areas to ensure compliance with state mandated storm water regulations, a funding source needs to be established. The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option for the National Pollution Discharge Elimination System (NPDES) program (see Land Development's related condition). Participating in a special election the process requires a 90 day period prior to City Council action authorizing recordation of the final map for the development and to participate in a special election process. This allows adequate time to be in compliance with the provisions of Article 13D of the California Constitution. California

Health and Safety Code Sections 5473 through 5473.8 (Ord. 708 Section 3.1, 2006) & City of Moreno Valley Municipal Code Title 3, Section 3.50.050.)

Prior to Building Permit Issuance

SD-14 (BP) Prior to the issuance of the first building permit for this project, the Developer shall pay Advanced Energy fees for all applicable Residential and Arterial Street Lights required for this development. Payment shall be made to the City of Moreno Valley and collected by the Land Development Division. Fees are based upon the Advanced Energy fee rate in place at the time of payment, as set forth in the current Listing of City Fees, Charges, and Rates adopted by City Council. The Developer shall provide a copy of the receipt to the Special Districts Division *(specialdistricts@moval.org)*. Any change in the project which may increase the number of street lights to be installed will require payment of additional Advanced Energy fees at the then current fee. Questions may be directed to the Special Districts Division at 951.413.3480 or specialdistricts@moval.org.

SD-15 (BP) For those areas to be maintained by the City and prior to the issuance of the first Building Permit, Planning Division (Community Development Department), Special Districts Division (the Public Works Department) and Transportation Division (the Public Works Department) shall review and approve the final median, parkway, slope, and/or open space landscape/irrigation plans as designated on the tentative map or in these Conditions of Approval prior to the issuance of the first Building Permit.

SD-16 (BP) Parkway, open space, and/or median landscaping specified in the project's Conditions of Approval shall be constructed in compliance with the City of Moreno Valley Public Works Design Guidelines and completed prior to the issuance of 25% (or 15) of the dwelling permits for this tract or 12 months from the issuance of the first dwelling permit, whichever comes first. In cases where a phasing plan is submitted, the actual percentage of dwelling permits issued prior to the completion of the landscaping shall be subject to the review of the construction phasing plan.

Prior to Certificate of Occupancy

SD-17 (CO) Landscape and irrigation plans for parkway, median, slope, and/or open space landscape areas designated to be maintained by the City shall be placed on compact disk (CD) in pdf format. The CD shall include "As Built" plans, revisions, and changes. The CD will become the property of the City of Moreno Valley and the Moreno Valley Community Services District.

MORENO VALLEY
WHERE DREAMS SOAR

CITY OF MORENO VALLEY
Public Works Department
Transportation Engineering Division

MEMORANDUM

To: Gabriel Diaz, Associate Planner
From: Vincent Tran, Associate Engineer
Date: January 26, 2016
Subject: **Conditions of Approval for PA13-0061/0062** – CUP and TTM 35429 for 58 condominium units located on the northwest corner of Alessandro Boulevard and Chara Street.

Attached are the Transportation Engineering Conditions of approval for the subject project.

CITY OF MORENO VALLEY

CONDITIONS OF APPROVAL
PA13-0055
CUP and TTM 35429 for 58 condominium units located on the northwest corner of Alessandro Boulevard and Chara Street.

Note: All Special conditions are in bold lettering. All other conditions are standard to all or most development projects.

Transportation Engineering Division – Conditions of Approval

Based on the information contained in our standard review process we recommend the following conditions of approval be placed on this project:

GENERAL CONDITIONS

TE1. Alessandro Boulevard is classified as a Divided Major Arterial (134'RW/110'CC) per City Standard Plan No. MVSI-101A-0. Any improvements undertaken by this project shall be consistent with the City's standards for this facility. Citywide Communications Conduit along project frontage on Alessandro Boulevard shall be required per City Standard Plan No. MVSI-186-0.

TE2. All project driveways shall conform to Section 9.11.080, and Table 9.11.080-14 of the City's Development Code - Design Guidelines and shall conform to City of Moreno Valley Standard No. MVSI-112C-0 for Commercial Driveway Approaches or as approved by the City Engineer.

TE3. All proposed on-site traffic signing and striping should be accordance with the 2014 California Manual on Uniform Traffic Control Devices (CAMUTCD).

TE4. Conditions of approval may be modified if project is phased or altered from any approved plans.

PRIOR TO IMPROVEMENT PLAN APPROVAL OR CONSTRUCTION PERMIT

TE5. Prior to the final approval of the street improvement plans, a signing and striping plan shall be prepared per City of Moreno Valley Standard Plans - Section 4 for all streets. End-of-road treatment per City Standard Plan No. MVLT-416A,B-0 shall be provided for Timo Street cul-de-sac.

TE6. Prior to issuance of a construction permit, construction traffic control plans prepared by a qualified, registered Civil or Traffic engineer shall be required for plan approval or as required by the City Traffic Engineer.

TE7. Prior to final approval of the street improvement and/or landscape plans, the project plans shall demonstrate that sight distance at proposed streets and driveways conforms to City Standard Plan No. MVSI-164A, B, C-0.

PRIOR TO CERTIFICATE OF OCCUPANCY OR BUILDING FINAL

TE8. (CO) Prior to issuance of a Certificate of Occupancy, any necessary signing and striping shall be installed per the approved plans and to the satisfaction of the City Traffic Engineer.

PRIOR TO ACCEPTANCE OF STREETS INTO THE CITY-MAINTAINED ROAD SYSTEM

TE9. Prior to the acceptance of streets into the City-maintained road system, all approved traffic control and signing and striping shall be installed per current City Standards and the approved plans.

CD/A
CREATIVE DESIGN ASSOCIATES
Architecture. Interior Design. Planning
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17528 E. Rowland St.
City of Industry, CA 91748
www.cda-arc.com

Project:
CHARA VILLA
58 UNITS / R-15

PA13-0061
ALESSANDRO
MORENO VALLEY, CA 92553

Client:
Ralph Liu

780 S. Nogales St.
City of Industry, CA 91748

Stamp:

Drawing Title:

CONDITIONS OF APPROVAL

CDA Project No. 1350
Date: SEP. 10, 2013
Phase: PLANNING
Checked By: J.L.
Drawn By: CDA
Project No.:
Reference:
Revisions:

MARCH. 10, 2014
JANUARY 30, 2015
MAY 15, 2015
AUGUST 30, 2015
NOVEMBER 16, 2015

Drawing No.:
A-011

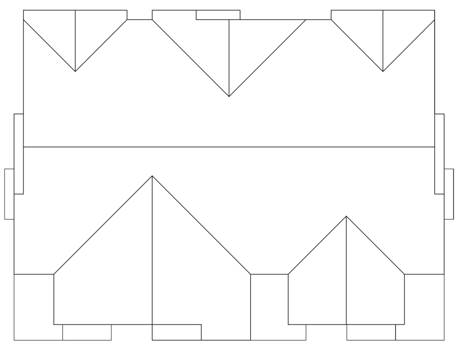
MATERIAL LEGEND

1. CONCRETE TITLE ROOF " EAGLE" DOUBLE EAGLE PONDEROSA-5645 SUNRISE BLEND	6. ANGELUS BLOCK CO. INC- SANDSTONE SHOT-BLAST S.O. TEXTURE AND PRECISION STOCK COLOR	11. ALUMINUM WINDOW CASING W/ CLEAR GLASS -	16. GARAGE DOOR-REMOTE CONTROL ROLL UP PAINT COLOR MATCH SANDSTONE (FIXED WINDOW W/ CLEAR GLASS)	21. EXTERIOR WALL MOUNTED LIGHTING FIXTURE
2. CONCRETE TITLE ROOF " EAGLE" DOUBLE EAGLE PONDEROSA-5634 KINGS CANYON BLEND	7. WINDOW TRIM - PAINT COLOR MATCH DUNN EDWARD #DEC756- WEATHERED BROWN	12. ALUMINUM DOOR CASING W/ CLEAR GLASS -	17. WOOD TRELLIS - OIL BASE PAINT COLOR MATCH DUNN EDWARD#DE6399 MOLASSES	22. ACCENT ACCESSORIES MATCH TRIM COLOR 7 OR 8
3. 7/8" EXTERIOR CEMENT PLASTER- LA HABRA SUFFOLK X-81584 (BASE COLOR)	8. WINDOW TRIM - PAINT COLOR MATCH DUNN EDWARD #DEC713- ROMAN BRICK	13. ALUMINUM SLIDING DOOR CASING W/ CLEAR GLASS -	18. BALCONY RAIL POWDER COATED FINISH- BLACK	23. CONCRETE BLOCK WALL AND CAP SPLIT FACE ANGELUS BLOCK CO. INC SEE TRASH ENCLOSURE FOR WALL PATTERN
4. 7/8" EXTERIOR CEMENT PLASTER- LA HABRA FRENCH VANILLA X-55 (BASE COLOR)	9. WOOD SHUTTER - PAINT COLOR MATCH DUNN EDWARDS #DEA147 GARNET EVENING	14. UNIT ENTRANCE DOOR - COLOR PER OWNER	19. WOOD SIDING - PAINT COLOR MATCH DUNN EDWARDS #DE6138 DARK SEPIA	24. TUBULAR STEEL FENCE MATCH 18 (SEE LANDSCAPE)
5. CORONADO STONE- ENGLISH RUBBLE NEWPORT SANDSTONE	10. WOOD SHUTTER - PAINT COLOR MATCH DUNN EDWARDS #DEC779 WOODLAWN GREEN	15. GARAGE DOOR-REMOTE CONTROL ROLL UP PAINT COLOR MATCH "DARK BROWN" (FIXED WINDOW W/ CLEAR GLASS)	20. WOOD SIDING - PAINT COLOR MATCH DUNN EDWARDS #DE6214 PIGEON GRAY	

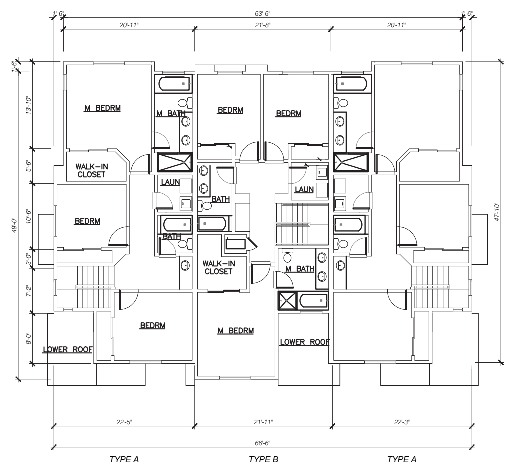
3 REAR ELEVATION (TYPE A_B_A)
SCALE: 1/8" = 1'-0"

2 SIDE ELEVATION (TYPE A_B_A)
SCALE: 1/8" = 1'-0"

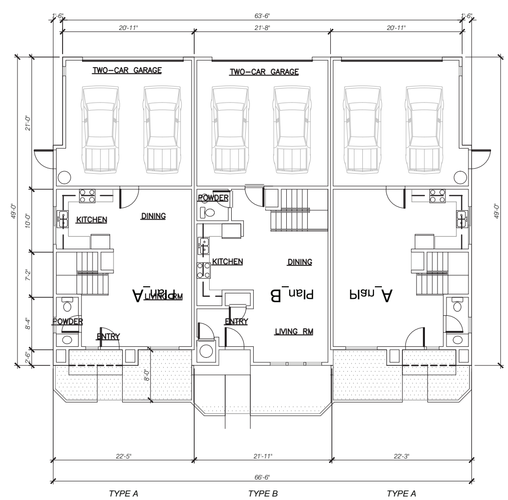
1 FRONT ELEVATION (TYPE A_B_A)
SCALE: 1/8" = 1'-0"



6 ROOF PLAN (TYPE A_B_A)
SCALE: 1/8" = 1'-0"



5 SECOND FLOOR PLAN (TYPE A_B_A)
SCALE: 1/8" = 1'-0"



4 FIRST FLOOR PLAN (TYPE A_B_A)
SCALE: 1/8" = 1'-0"

CD/A
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Project:
CHARA VILLA
58 UNITS / R-15

PA13-0061
ALESSANDRO
MORENO VALLEY, CA 92553

Client:
Ralph Liu

780 S. Nogales St.
City of Industry, CA 91748

Stamp:

Drawing Title:
TYPE A_B_A FLOOR PLANS / ELEVATIONS

CDA Project No. 1350
Date: SEP. 10, 2013
Phase: PLANNING
Checked By: J.L.
Drawn By: CDA
Project No.:
Reference:
Revisions:

1 MARCH. 10, 2014
2 JANUARY 30, 2015
3 MAY 15, 2015
4 AUGUST 30, 2015
5 NOVEMBER 16, 2015
6 SEPTEMBER 13, 2016

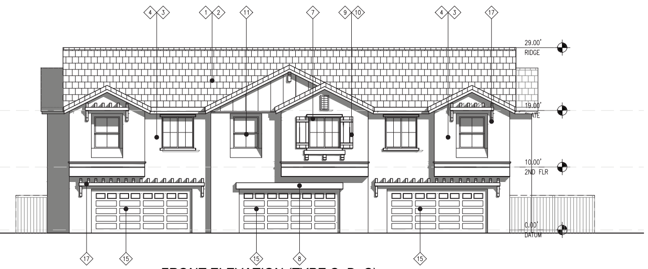
Drawing No.:
A-101

MATERIAL LEGEND

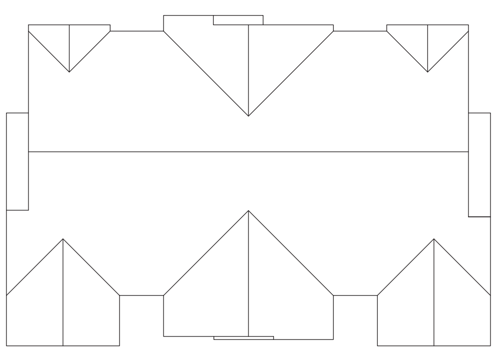
1. CONCRETE TITLE ROOF " EAGLE" DOUBLE EAGLE PONDEROSA-5645 SUNRISE BLEND	6. ANGELUS BLOCK CO. INC- SANDSTONE SHOT-BLAST S.O. TEXTURE AND PRECISION STOCK COLOR	11. ALUMINUM WINDOW CASING W/ CLEAR GLASS -	16. GARAGE DOOR-REMOTE CONTROL ROLL UP PAINT COLOR MATCH SANDSTONE (FIXED WINDOW W/ CLEAR GLASS)	21. EXTERIOR WALL MOUNTED LIGHTING FIXTURE
2. CONCRETE TITLE ROOF " EAGLE" DOUBLE EAGLE PONDEROSA-5634 KINGS CANYON BLEND	7. WINDOW TRIM - PAINT COLOR MATCH DUNN EDWARD #DEC756- WEATHERED BROWN	12. ALUMINUM DOOR CASING W/ CLEAR GLASS -	17. WOOD TRELLIS - OIL BASE PAINT COLOR MATCH DUNN EDWARD#DE6399 MOLASSES	22. ACCENT ACCESSORIES MATCH TRIM COLOR 7 OR 8
3. 7/8" EXTERIOR CEMENT PLASTER- LA HABRA SUFFOLK X-81584 (BASE COLOR)	8. WINDOW TRIM - PAINT COLOR MATCH DUNN EDWARD #DEC713- ROMAN BRICK	13. ALUMINUM SLIDING DOOR CASING W/ CLEAR GLASS -	18. BALCONY RAIL POWDER COATED FINISH- BLACK	23. CONCRETE BLOCK WALL AND CAP SPLIT FACE ANGELUS BLOCK CO. INC SEE TRASH ENCLOSURE FOR WALL PATTERN
4. 7/8" EXTERIOR CEMENT PLASTER- LA HABRA FRENCH VANILLA X-55 (BASE COLOR)	9. WOOD SHUTTER - PAINT COLOR MATCH DUNN EDWARDS #DEA147 GARNET EVENING	14. UNIT ENTRANCE DOOR - COLOR PER OWNER	19. WOOD SIDING - PAINT COLOR MATCH DUNN EDWARDS #DE6138 DARK SEPIA	24. TUBULAR STEEL FENCE MATCH 18 (SEE LANDSCAPE)
5. CORONADO STONE- ENGLISH RUBBLE NEWPORT SANDSTONE	10. WOOD SHUTTER - PAINT COLOR MATCH DUNN EDWARDS #DEC779 WOODLAWN GREEN	15. GARAGE DOOR-REMOTE CONTROL ROLL UP PAINT COLOR MATCH "DARK BROWN" (FIXED WINDOW W/ CLEAR GLASS)	20. WOOD SIDING - PAINT COLOR MATCH DUNN EDWARDS #DE6214 PIGEON GRAY	

3 REAR ELEVATION (TYPE C_D_C)
SCALE: 1/8" = 1'-0"

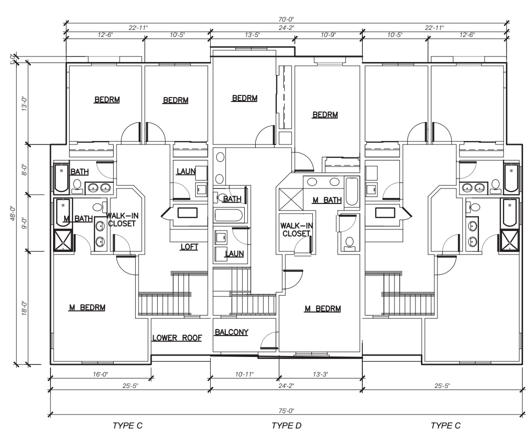
2 SIDE ELEVATION (TYPE C_D_C)
SCALE: 1/8" = 1'-0"



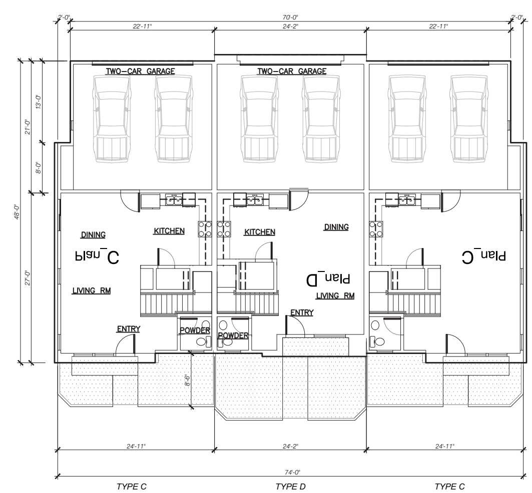
1 FRONT ELEVATION (TYPE C_D_C)
SCALE: 1/8" = 1'-0"



6 ROOF PLAN (TYPE C_D_C)
SCALE: 1/8" = 1'-0"



5 SECOND FLOOR PLAN (TYPE C_D_C)
SCALE: 1/8" = 1'-0"



4 FIRST FLOOR PLAN (TYPE C_D_C)
SCALE: 1/8" = 1'-0"

CD/A
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17528 E. Rowland St.
City of Industry, CA 91748
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Project:
CHARA VILLA
58 UNITS / R-15

PA13-0061
ALESSANDRO
MORENO VALLEY, CA 92553

Client:

Ralph Liu

780 S. Nogales St.
City of Industry, CA 91748

Stamp:

Drawing Title:

TYPE C_D_C FLOOR PLANS / ELEVATIONS

CDA Project No. 1350
Date: SEP. 10, 2013
Phase: PLANNING
Checked By: J.L.
Drawn By: CDA
Project No.:
Reference:
Revisions:

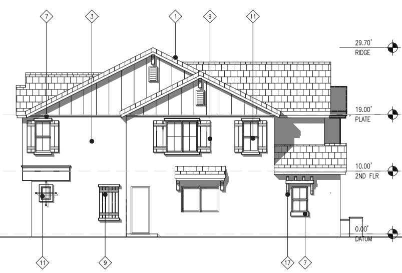
1 MARCH. 10, 2014
2 JANUARY 30, 2015
3 MAY 15, 2015
4 AUGUST 30, 2015
5 NOVEMBER 16, 2015
6 SEPTEMBER 13, 2016

Drawing No.:
A-102

MATERIAL LEGEND

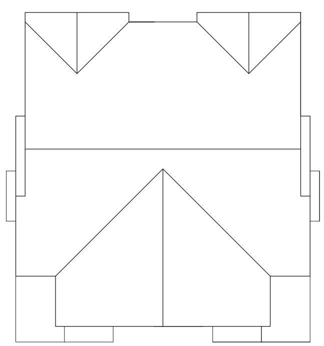
1. CONCRETE TITLE ROOF " EAGLE" DOUBLE EAGLE PONDEROSA-5645 SUNRISE BLEND	6. ANGELUS BLOCK CO. INC- SANDSTONE SHOT-BLAST S.O. TEXTURE AND PRECISION STOCK COLOR	11. ALUMINUM WINDOW CASING W/ CLEAR GLASS -	16. GARAGE DOOR-REMOTE CONTROL ROLL UP PAINT COLOR MATCH SANDSTONE (FIXED WINDOW W/ CLEAR GLASS)	21. EXTERIOR WALL MOUNTED LIGHTING FIXTURE
2. CONCRETE TITLE ROOF " EAGLE" DOUBLE EAGLE PONDEROSA-5634 KINGS CANYON BLEND	7. WINDOW TRIM - PAINT COLOR MATCH DUNN EDWARD #DEC756- WEATHERED BROWN	12. ALUMINUM DOOR CASING W/ CLEAR GLASS -	17. WOOD TRELLIS - OIL BASE PAINT COLOR MATCH DUNN EDWARD#DE6399 MOLASSES	22. ACCENT ACCESSORIES MATCH TRIM COLOR 7 OR 8
3. 7/8" EXTERIOR CEMENT PLASTER- LA HABRA SUFFOLK X-81584 (BASE COLOR)	8. WINDOW TRIM - PAINT COLOR MATCH DUNN EDWARD #DEC713- ROMAN BRICK	13. ALUMINUM SLIDING DOOR CASING W/ CLEAR GLASS -	18. BALCONY RAIL POWDER COATED FINISH- BLACK	23. CONCRETE BLOCK WALL AND CAP SPLIT FACE ANGELUS BLOCK CO. INC SEE TRASH ENCLOSURE FOR WALL PATTERN
4. 7/8" EXTERIOR CEMENT PLASTER- LA HABRA FRENCH VANILLA X-55 (BASE COLOR)	9. WOOD SHUTTER - PAINT COLOR MATCH DUNN EDWARDS #DEA147 GARNET EVENING	14. UNIT ENTRANCE DOOR - COLOR PER OWNER	19. WOOD SIDING - PAINT COLOR MATCH DUNN EDWARDS #DE6138 DARK SEPIA	24. TUBULAR STEEL FENCE MATCH 18 (SEE LANDSCAPE)
5. CORONADO STONE- ENGLISH RUBBLE NEWPORT SANDSTONE	10. WOOD SHUTTER - PAINT COLOR MATCH DUNN EDWARDS #DEC779 WOODLAWN GREEN	15. GARAGE DOOR-REMOTE CONTROL ROLL UP PAINT COLOR MATCH "DARK BROWN" (FIXED WINDOW W/ CLEAR GLASS)	20. WOOD SIDING - PAINT COLOR MATCH DUNN EDWARDS #DE6214 PIGEON GRAY	

3 REAR ELEVATION (TYPE A_A)
SCALE: 1/8" = 1'-0"

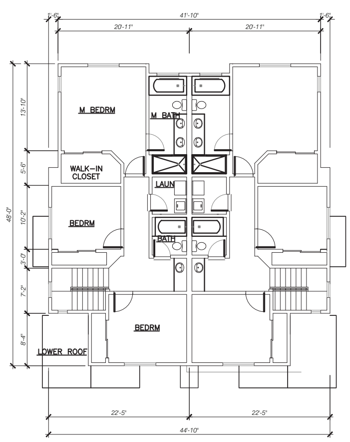


2 SIDE ELEVATION (TYPE A_A)
SCALE: 1/8" = 1'-0"

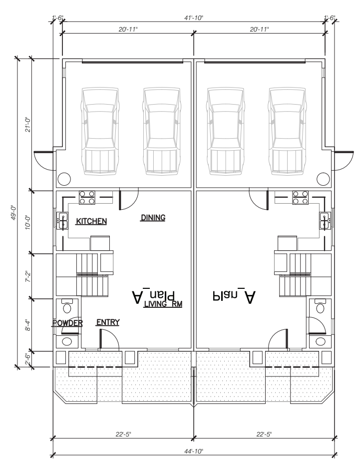
1 FRONT ELEVATION (TYPE A_A)
SCALE: 1/8" = 1'-0"



6 ROOF PLAN (TYPE A_A)
SCALE: 1/8" = 1'-0"



5 SECOND FLOOR PLAN (TYPE A_A)
SCALE: 1/8" = 1'-0"



4 FIRST FLOOR PLAN (TYPE A_A)
SCALE: 1/8" = 1'-0"

CD/A
CREATIVE DESIGN ASSOCIATES
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MORENO VALLEY, CA 92553

Client:
Ralph Liu

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City of Industry, CA 91748

Stamp:

Drawing Title:
TYPE A_A FLOOR PLANS / ELEVATIONS

CDA Project No. 1350
Date: SEP. 10, 2013
Phase: PLANNING
Checked By: J.L.
Drawn By: CDA
Project No.:
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Revisions:
1 MARCH. 10, 2014
2 JANUARY 30, 2015
3 MAY 15, 2015
4 AUGUST 30, 2015
5 NOVEMBER 16, 2015
6 SEPTEMBER 13, 2016

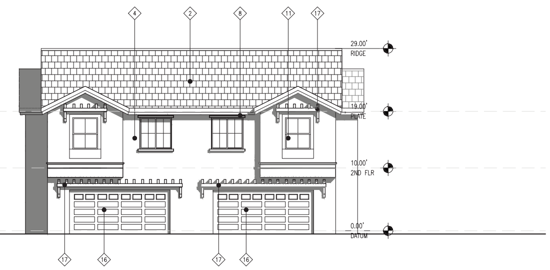
Drawing No.:
A-103

MATERIAL LEGEND

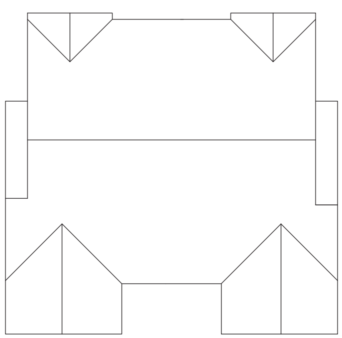
1. CONCRETE TITLE ROOF " EAGLE" DOUBLE EAGLE PONDEROSA-5645 SUNRISE BLEND	6. ANGELUS BLOCK CO. INC- SANDSTONE SHOT-BLAST S.O. TEXTURE AND PRECISION STOCK COLOR	11. ALUMINUM WINDOW CASING W/ CLEAR GLASS -	16. GARAGE DOOR-REMOTE CONTROL ROLL UP PAINT COLOR MATCH SANDSTONE (FIXED WINDOW W/ CLEAR GLASS)	21. EXTERIOR WALL MOUNTED LIGHTING FIXTURE
2. CONCRETE TITLE ROOF " EAGLE" DOUBLE EAGLE PONDEROSA-5634 KINGS CANYON BLEND	7. WINDOW TRIM - PAINT COLOR MATCH DUNN EDWARD #DEC756- WEATHERED BROWN	12. ALUMINUM DOOR CASING W/ CLEAR GLASS -	17. WOOD TRELLIS - OIL BASE PAINT COLOR MATCH DUNN EDWARD#DE6399 MOLASSES	22. ACCENT ACCESSORIES MATCH TRIM COLOR 7 OR 8
3. 7/8" EXTERIOR CEMENT PLASTER- LA HABRA SUFFOLK X-81584 (BASE COLOR)	8. WINDOW TRIM - PAINT COLOR MATCH DUNN EDWARD #DEC713- ROMAN BRICK	13. ALUMINUM SLIDING DOOR CASING W/ CLEAR GLASS -	18. BALCONY RAIL POWDER COATED FINISH- BLACK	23. CONCRETE BLOCK WALL AND CAP SPLIT FACE ANGELUS BLOCK CO. INC SEE TRASH ENCLOSURE FOR WALL PATTERN
4. 7/8" EXTERIOR CEMENT PLASTER- LA HABRA FRENCH VANILLA X-55 (BASE COLOR)	9. WOOD SHUTTER - PAINT COLOR MATCH DUNN EDWARDS #DEA147 GARNET EVENING	14. UNIT ENTRANCE DOOR - COLOR PER OWNER	19. WOOD SIDING - PAINT COLOR MATCH DUNN EDWARDS #DE6138 DARK SEPIA	24. TUBULAR STEEL FENCE MATCH 18 (SEE LANDSCAPE)
5. CORONADO STONE- ENGLISH RUBBLE NEWPORT SANDSTONE	10. WOOD SHUTTER - PAINT COLOR MATCH DUNN EDWARDS #DEC779 WOODLAWN GREEN	15. GARAGE DOOR-REMOTE CONTROL ROLL UP PAINT COLOR MATCH "DARK BROWN" (FIXED WINDOW W/ CLEAR GLASS)	20. WOOD SIDING - PAINT COLOR MATCH DUNN EDWARDS #DE6214 PIGEON GRAY	

3 REAR ELEVATION (TYPE C_C)
SCALE: 1/8" = 1'-0"

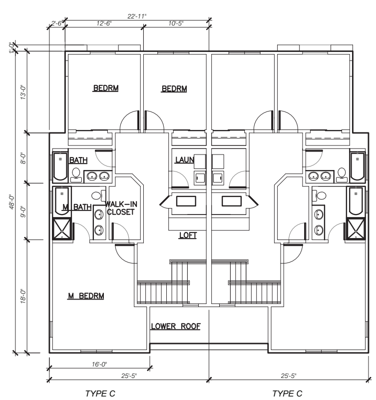
2 SIDE ELEVATION (TYPE C_C)
SCALE: 1/8" = 1'-0"



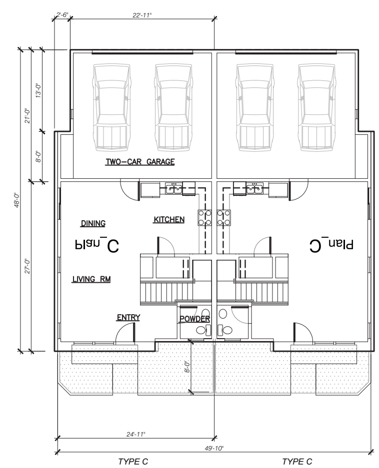
1 FRONT ELEVATION (TYPE C_C)
SCALE: 1/8" = 1'-0"



6 ROOF PLAN (TYPE C_C)
SCALE: 1/8" = 1'-0"



5 SECOND FLOOR PLAN (TYPE C_C)
SCALE: 1/8" = 1'-0"



4 FIRST FLOOR PLAN (TYPE C_C)
SCALE: 1/8" = 1'-0"

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Project:
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58 UNITS / R-15

PA13-0061
ALESSANDRO
MORENO VALLEY, CA 92553

Client:
Ralph Liu

780 S. Nogales St.
City of Industry, CA 91748

Stamp:

Drawing Title:
TYPE C_C FLOOR PLANS / ELEVATIONS

CDA Project No. 1350
Date: SEP. 10, 2013
Phase: PLANNING
Checked By: J.L.
Drawn By: CDA
Project No.:
Reference:
Revisions:

1 MARCH. 10, 2014
2 JANUARY 30, 2015
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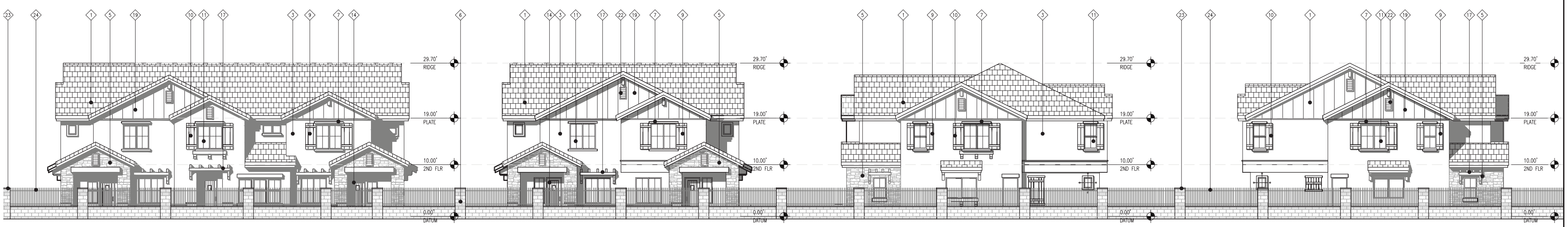
4 AUGUST 30, 2015
5 NOVEMBER 16, 2015
6 SEPTEMBER 13, 2016

Drawing No.:
A-104

MATERIAL LEGEND

1. CONCRETE TITLE ROOF " EAGLE" DOUBLE EAGLE PONDEROSA-5645 SUNRISE BLEND	6. ANGELUS BLOCK CO. INC- SANDSTONE SHOT-BLAST S.O. TEXTURE AND PRECISION STOCK COLOR	11. ALUMINUM WINDOW CASING W/ CLEAR GLASS -	16. GARAGE DOOR-REMOTE CONTROL ROLL UP PAINT COLOR MATCH SANDSTONE (FIXED WINDOW W/ CLEAR GLASS)	21. EXTERIOR WALL MOUNTED LIGHTING FIXTURE
2. CONCRETE TITLE ROOF " EAGLE" DOUBLE EAGLE PONDEROSA-5634 KINGS CANYON BLEND	7. WINDOW TRIM - PAINT COLOR MATCH DUNN EDWARD #DEC756- WEATHERED BROWN	12. ALUMINUM DOOR CASING W/ CLEAR GLASS -	17. WOOD TRELLIS - OIL BASE PAINT COLOR MATCH DUNN EDWARD#DE6399 MOLASSES	22. ACCENT ACCESSORIES MATCH TRIM COLOR 7 OR 8
3. 7/8" EXTERIOR CEMENT PLASTER- LA HABRA SUFFOLK X-81584 (BASE COLOR)	8. WINDOW TRIM - PAINT COLOR MATCH DUNN EDWARD #DEC713- ROMAN BRICK	13. ALUMINUM SLIDING DOOR CASING W/ CLEAR GLASS -	18. BALCONY RAIL POWDER COATED FINISH- BLACK	23. CONCRETE BLOCK WALL AND CAP SPLIT FACE ANGELUS BLOCK CO. INC SEE TRASH ENCLOSURE FOR WALL PATTERN
4. 7/8" EXTERIOR CEMENT PLASTER- LA HABRA FRENCH VANILLA X-55 (BASE COLOR)	9. WOOD SHUTTER - PAINT COLOR MATCH DUNN EDWARDS #DEA147 GARNET EVENING	14. UNIT ENTRANCE DOOR - COLOR PER OWNER	19. WOOD SIDING - PAINT COLOR MATCH DUNN EDWARDS #DE6138 DARK SEPIA	24. TUBULAR STEEL FENCE MATCH 18 (SEE LANDSCAPE)
5. CORONADO STONE- ENGLISH RUBBLE NEWPORT SANDSTONE	10. WOOD SHUTTER - PAINT COLOR MATCH DUNN EDWARDS #DEC779 WOODLAWN GREEN	15. GARAGE DOOR-REMOTE CONTROL ROLL UP PAINT COLOR MATCH "DARK BROWN" (FIXED WINDOW W/ CLEAR GLASS)	20. WOOD SIDING - PAINT COLOR MATCH DUNN EDWARDS #DE6214 PIGEON GRAY	



UNIT 15, 16, 17 FRONT ELEVATION
SCALE: 1/8" = 1'-0" TYPE ABA

UNIT 13, 14 FRONT ELEVATION
SCALE: 1/8" = 1'-0" TYPE AA

UNIT 4 SIDE ELEVATION
SCALE: 1/8" = 1'-0" TYPE AA

UNIT 3 SIDE ELEVATION
SCALE: 1/8" = 1'-0" TYPE ABA

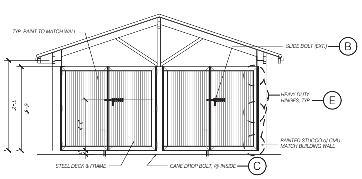
1 BUILDING ELEVATIONS ALONG ALLESSANDRO BLVD.
SCALE: 1/8" = 1'-0"

NOTE:

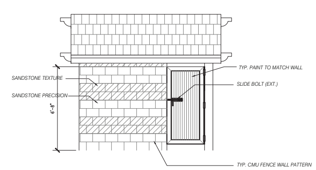
TRASH ENCLOSURES SHALL BE LOCATED IN AREA ACCESSIBLE TO TRASH VEHICLES. THE NUMBER AND LOCATION OF TRASH ENCLOSURES SHALL BE SUBJECT TO CITY PLANNER REVIEW AND APPROVAL, PRIOR TO ISSUANCE OF BUILDING PERMITS.

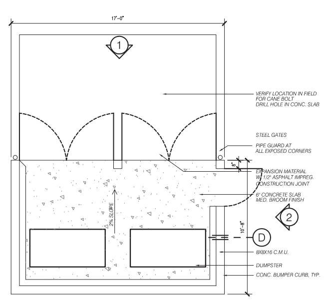
THE TRASH ENCLOSURES FOR INDUSTRIAL PROJECTS SHALL HAVE THE FOLLOWING DESIGN FEATURES:

ARCHITECTURALLY INTEGRATED INTO THE DESIGN OF THE PROJECT; SEPARATE PEDESTRIAN ACCESS; TRASH BINS WITH COUNTERWEIGHTED LIDS; AND, SOLID VIEW OBSTRUCTING DECORATIVE GATES PLACED ON A CONTINUOUS STEEL FRAME.

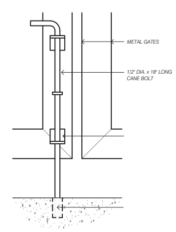


A FRONT ELEVATION





Y TRASH ENCLOSURE
SCALE : 1/4"=1'-0"



C CANE BOLT

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ASSOCIATES
Architecture. Interior Design. Plann
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F. 626.913.8102
17528 E. Rowland St.
City of Industry, CA 91748
www.cda-arc.com

Project:
CHARA VILLA
58 UNITS / R-15

PA13-0061

ALESSANDRO
MORENO VALLEY, CA 92553

Client:

Ralph Liu

780 S. Nogales St.
City of Industry, CA 91748

Stamp:

Drawing Title:

UPGRADE STREET FACING ELEVATIONS

CDA Project No. 1350
Date: SEP. 10, 2013
Phase: PLANNING
Checked By: J.L.
Drawn By: CDA
Project No.:
Reference:
Revisions:

1 MARCH. 10, 2014
2 JANUARY 30, 2015
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4 AUGUST 30, 2015
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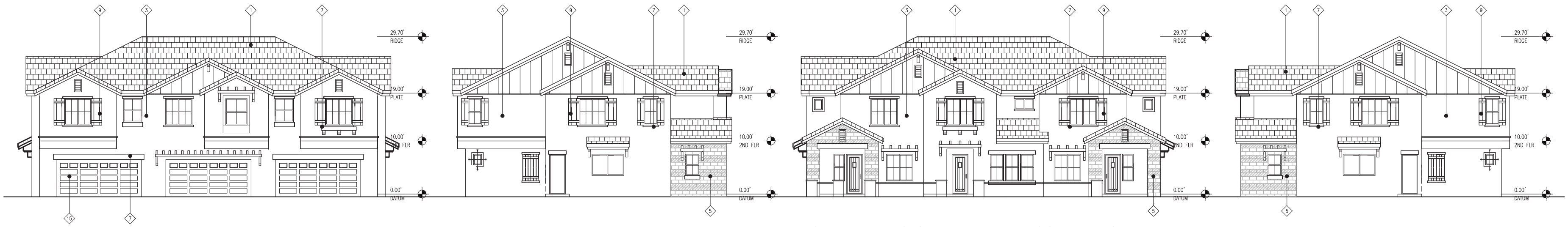
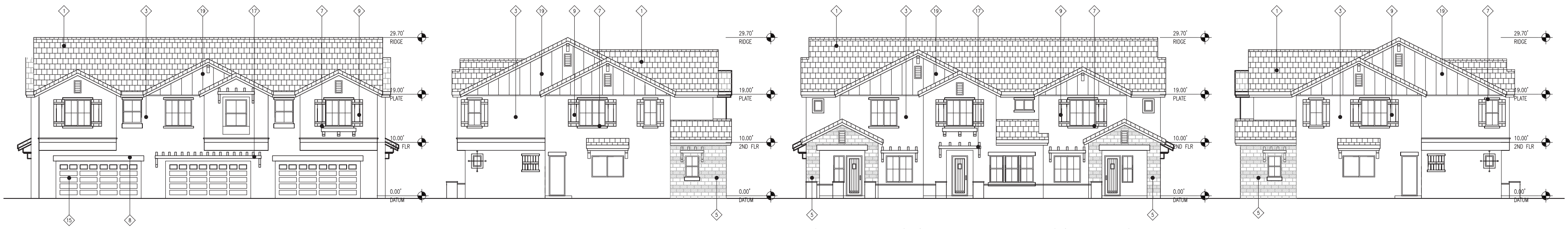
6 SEPTEMBER 13, 2016

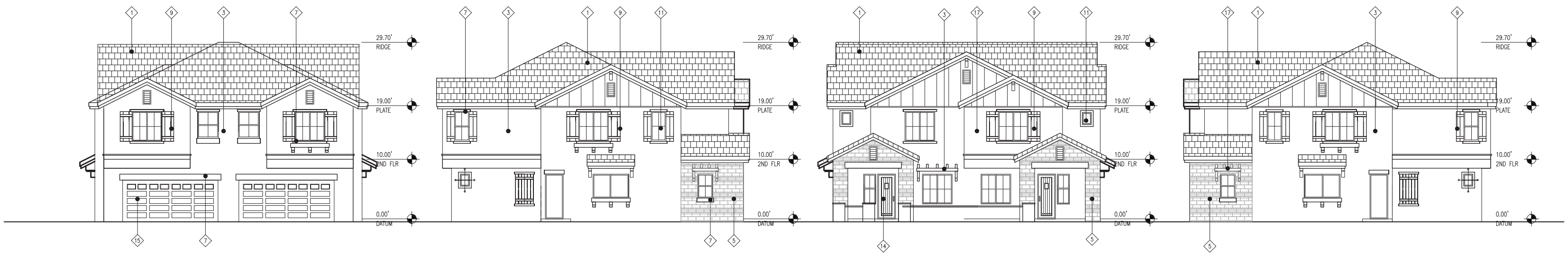
Drawing No.:
A-105



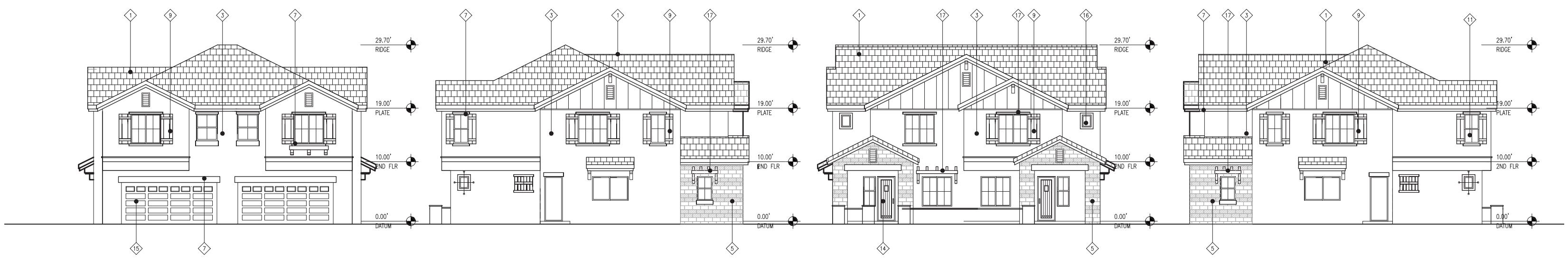
1 UPGRADE ELEVATIONS-UNIT 1, 2, 3 BUILDING (TYPE A-B-A)
SCALE: 1/8" = 1'-0"



2 UPGRADE ELEVATIONS- UNIT 15,16,17 BUILDING (TYPE A-B-A)
SCALE: 1/8" = 1'-0"



3 UPGRADE ELEVATIONS- UNIT 4,5 BUILDING (TYPE A-A)
SCALE: 1/8" = 1'-0"



4 UPGRADE ELEVATIONS-UNIT 13, 14 BUILDING (TYPE A-A)
SCALE: 1/8" = 1'-0"

MATERIAL LEGEND

1. CONCRETE TITLE ROOF " EAGLE" DOUBLE EAGLE PONDEROSA-5645 SUNRISE BLEND	6. ANGELUS BLOCK CO. INC- SANDSTONE SHOT-BLAST S.O. TEXTURE AND PRECISION STOCK COLOR	11. ALUMINUM WINDOW CASING W/ CLEAR GLASS -	16. GARAGE DOOR-REMOTE CONTROL ROLL UP PAINT COLOR MATCH SANDSTONE (FIXED WINDOW W/ CLEAR GLASS)	21. EXTERIOR WALL MOUNTED LIGHTING FIXTURE
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3. 7/8" EXTERIOR CEMENT PLASTER- LA HABRA SUFFOLK X-81584 (BASE COLOR)	8. WINDOW TRIM - PAINT COLOR MATCH DUNN EDWARD #DEC713- ROMAN BRICK	13. ALUMINUM SLIDING DOOR CASING W/ CLEAR GLASS -	18. BALCONY RAIL POWDER COATED FINISH- BLACK	23. CONCRETE BLOCK WALL AND CAP SPLIT FACE ANGELUS BLOCK CO. INC SEE TRASH ENCLOSURE FOR WALL PATTERN
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UPGRADE STREET FACING ELEVATIONS

CDA Project No. 1350
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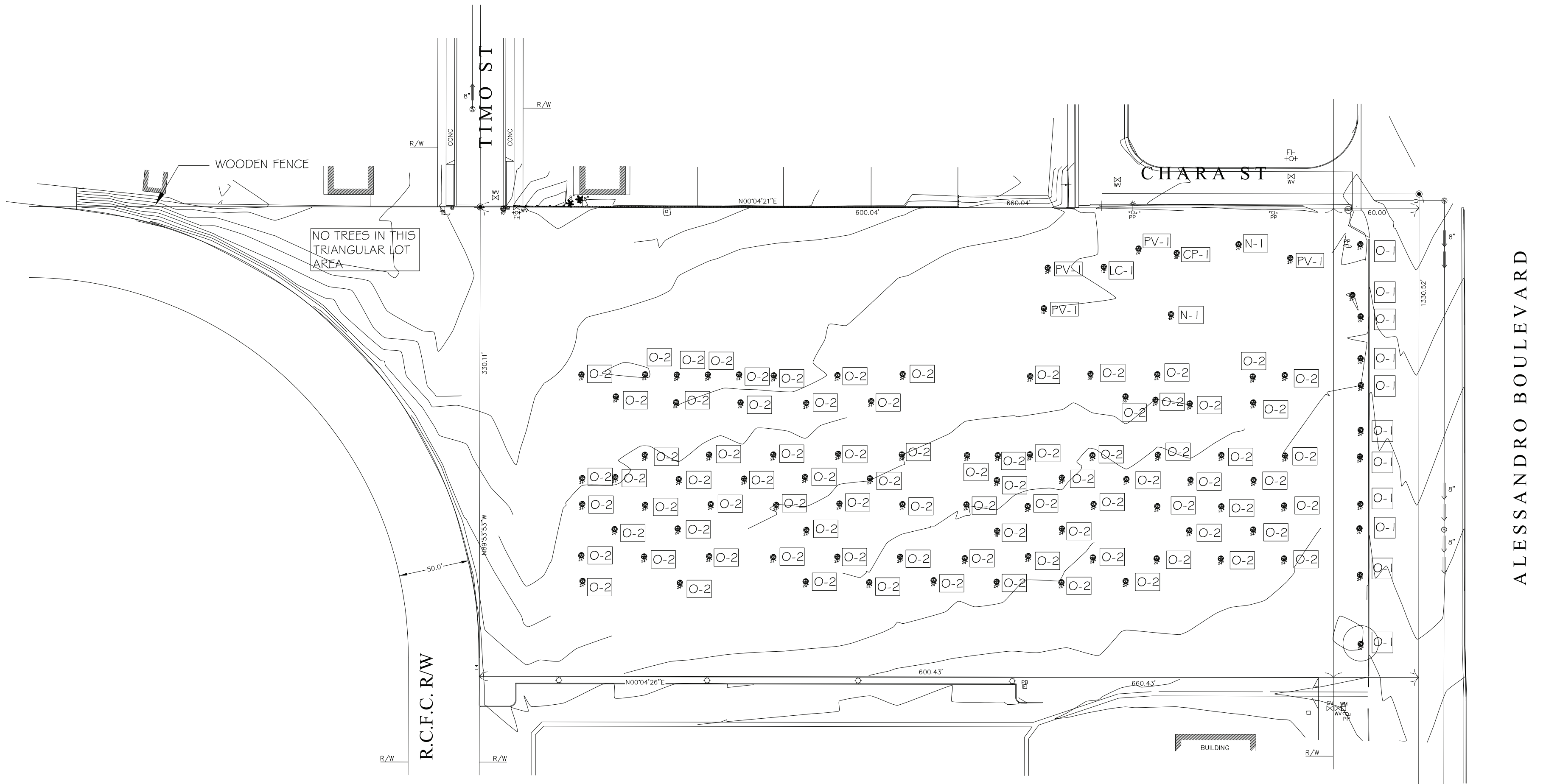
3 MAY 15, 2015
4 AUGUST 30, 2015
5 NOVEMBER 16, 2015
6 SEPTEMBER 13, 2016

Drawing No.:
A-106



TREE SURVEY LEGEND:	TOTAL NUMBER OF TREES TO BE REMOVED: 92
O-1 - OLIVE TREE TO REMAIN AND TO BE PROTECTED DURING CONSTRUCTION	TOTAL NUMBER OF TREES TO BE PLANTED AS REPLACEMENTS: (EITHER) 276 - 24" BOX, OR 92 - 36" BOX
O-2 - OLIVE TREE TO BE REMOVED AND REPLACED WITH APPROVED TREE	NO PROTECTED SPECIES OF TREES EXIST ON THIS SITE

PV-1 - PALO VERDE TREE TO BE REMOVED AND REPLACED
CP-1 - CALIFORNIA PEPPER TO BE REMOVED AND REPLACED
L-1 - LELAND CYPRESS TREE TO BE REMOVED AND REPLACED
N-1 - TREE THAT IS LONG-DEAD AND NOT TO BE REPLACED.

NOTE ON REPLACEMENT: ALL TREES THAT ARE SHOWN TO BE REMOVED HAVE A TRUNK CALIPER GREATER THAN 4" WILL BE REPLACED WITH APPROVED TREES AT THE RATIO OF 3:1 WITH 24" BOX TREE, OR 1:1 WITH 36" BOX TREE.

SEE PHOTOGRAPHIC TREE SURVEY FOR CONDITIONS OF UNIQUE AND TYPICAL TREES.

NORTH
SCALE - 1" = 25'-0"

EXISTING TREE SURVEY AND CONDITIONS

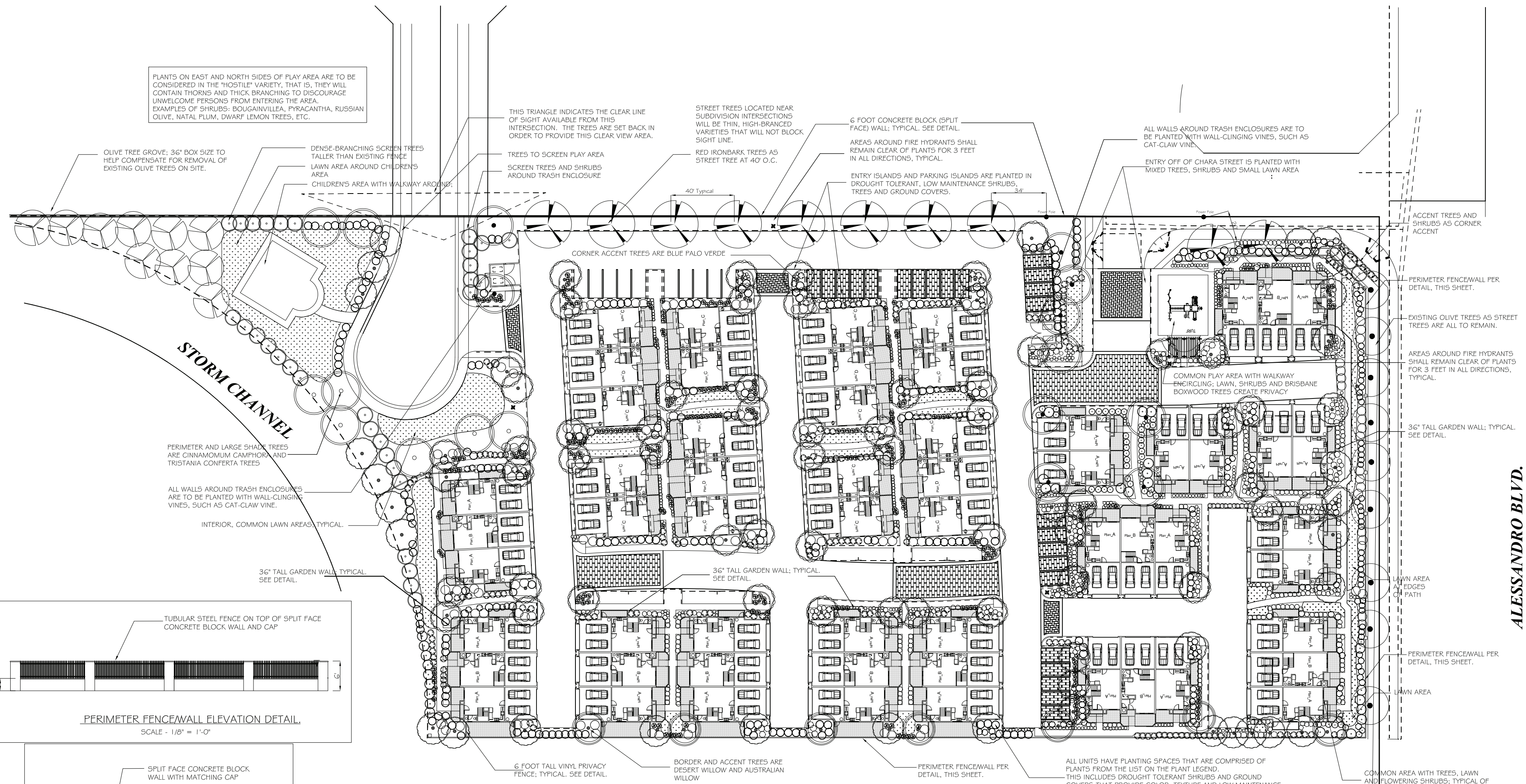
Revisions By

Carey B. Orwig, ASLA Landscape Architecture and Planning
California License # 2551 (714) 449-9300
2601 E. Chapman Ave. #211 Fullerton, California 92831

CHARA VILLA - 60 RESIDENTIAL UNITS
ALESSANDRO BLVD.
MORENO VALLEY, CALIFORNIA 92553

Date 1/29/15
Scale 1" = 25'-0"
Drawn by CBO
Job Name Chara
Sheet

2.h

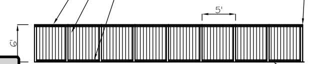


TUBULAR STEEL FENCE ON TOP OF SPLIT FACE CONCRETE BLOCK WALL AND CAP

PERIMETER FENCE/WALL ELEVATION DETAIL
SCALE - 1/8" = 1'-0"

SPLIT FACE CONCRETE BLOCK WALL WITH MATCHING CAP

GARDEN WALL ELEVATION AND DETAIL
SCALE - 1/8" = 1'-0"



VINYL PRIVACY FENCE ELEVATION AND DETAIL
SCALE - 1/8" = 1'-0"

PLANT LEGEND

NOTE ON TREE REPLACEMENT: ALL TREES THAT ARE TO BE REMOVED AND HAVE A TRUNK CALIPER (DBH) OF 4" OR GREATER WILL BE REPLACED WITH APPROVED TREES AT THE RATIO OF 3:1 WITH 24" BOX TREES, OR 1:1 WITH 36" BOX TREES.
TOTAL NUMBER OF TREES TO BE REMOVED: 92
TOTAL NUMBER OF TREES TO BE PLANTED AS REPLACEMENTS: EITHER 276- 24" BOX, OR 92-36" BOX.

TREES

Sym.	Scientific Name	Common Name
	Olea europaea	Olive
	Cercidium floridum	Blue Palo Verde
	Chilopsis linearis	Desert Willow
	Eucalyptus sideroxylon	Red Ironbark
	Geijera parviflora	Australian Willow
	Cinnamomum camphora	Camphor Tree
	Tristania conferta	Brisbane Boxwood

SHRUBS AND GROUND COVERS

Scientific Name	Common Name
Anisodontea hypomandarum	Pink Mallow
Callistemon 'Little John'	Dwarf Bottlebrush
Ceanothus 'Skylark'	Skylark California Lilac
Cistus 'Sunset'	Sunset Rock rose
Dianella tasmanica 'variegata'	Variegated Dianella
Grevillea 'Bonfire'	Bonfire Hummingbird Bush
Loropetalum chinense 'Shang hi'	Purple Diamond Fringe Flower
Pittosporum 'Silver Sheen'	Silver Sheen
Thevetia peruviana	Yellow oleander
Dymondia margaretae	Dymondia ground cover
Gazania 'Mitsuwa Yellow'	Yellow spreading Gazania

TOTAL LANDSCAPED AREA - 104,445 S.F.
TOTAL AREA IN TURF - 12,650 S.F.
% OF LANDSCAPED AREA IN TURF - 12.1%
MAXIMUM ALLOWED TURF AREA 50%

NOTE ON STREET TREE LOCATIONS: STREET TREES ARE INSTALLED A MINIMUM OF ONE FOOT AND A MAXIMUM OF TWO FEET ON THE PRIVATE SIDE OF THE PROPERTY LINE.
TREES ARE BEST LOCATED TO AVOID POWER LINES AND STILL RETAIN THE INTEGRITY OF THE STREET TREE THEME.

NOTE ON TRANSFORMER CABINET AND BACKFLOW PREVENTION DEVICES:
ONCE THE LOCATIONS OF THIS EQUIPMENT IS DETERMINED, CARE WILL BE TAKEN TO SCREEN BOTH THE TRANSFORMER AND BFP WITH SUFFICIENT SHRUB PLANTING TO PROVIDE COMPLETE SCREENING AT THE PLANTS' MATURITY.

Revisions	By
4/23/15	
5/21/15	
11/12/15	
3/7/16	
3/14/16	

Carey B. Orwig, ASLA Landscape Architecture and Planning
California License # 2551 (714) 449-9300
2601 E. Chapman Ave. #211 Fullerton, California 92831

CHARA VILLA - 60 RESIDENTIAL UNITS
ALESSANDRO BLVD.
MORENO VALLEY, CALIFORNIA 92553

Date 4/0314
Scale 1" = 25'-0"
Drawn by CBO
Job Name Chara
Sheet

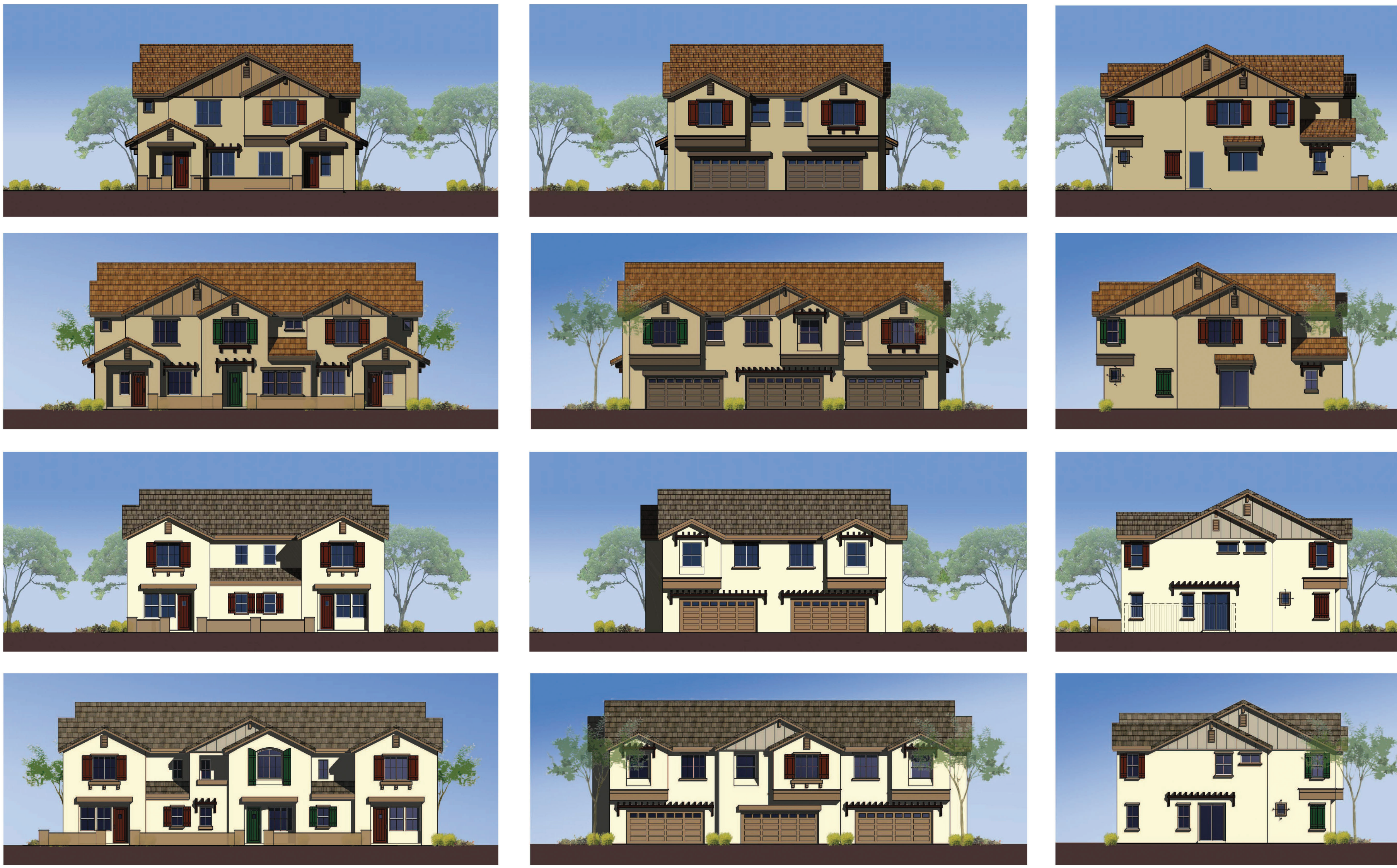
ALESSANDRO BLVD ELEVATION

BLDG A-A

BLDG A-B-A

BLDG C-C

BLDG C-D-C



BUILDING COLOR ELEVATIONS

SCALE: 1/8" = 1'-0"

CLIENT:
RALPH LIU
780 S. NOGALES ST.
CITY OF INDUSTRY, CA91748

PA13-0061
ALESSANDRO
MORENO VALLEY, CA92553

PROJECT:
CHARA VILLA
58 UNITS/R-15

17528 E ROWLAND ST.
CITY OF INDUSTRY, CA 91748
TEL: 626-913-8101
WWW.CDA-ARC.COM

CDA
CREATIVE DESIGN ASSOCIATES

2.i

Attachment: Color Elevations [Revision 1] (2422 : PEN16-0119 Plot Plan & PEN16-0120 Tentative Tract Map 35429)

CHARA VILLA 60 UNITS

ALESSANDRO, MORENO VALLEY, CA 92553

1 CONCRETE TITLE ROOF
"EAGLE" DOUBLE EAGLE
PONDEROSA 5645
SUNRISE BLEND

3 7/8" EXTERIOR CEMENT
PLASTER
LA HABRA SUFFOLK
X-81584 (BASE COLOR)

7 WINDOW TRIM PAINT
COLOR MATCH DUNN
EDWARD #DEC756
WEATHERED BROWN

9 WOOD SHUTTER
PAINT COLOR MATCH
DUNN EDWARDS
DEA147 GARNET
EVENING (UNIT A&C)

10 WOOD SHUTTER
PAINT COLOR MATCH
DUNN EDWARDS
DEC779 WOODLAWN
GREEN (UNIT B&D)

14 UNIT ENTRANCE
DOOR PAINT
COLOR MATCH
BUILDING SHUTTER
COLOR 7 OR 8

15 GARAGE DOOR AMARR
HERITAGE-SHORT PANEL.
PAINT COLOR MATCH
"DARK BROWN"

17 WOOD TRELLIS-
PAINT COLOR MATCH
DUNN EDWARDS
DE6399 - MOLASSES

19 WOOD SIDING
PAINT COLOR MATCH
DUNN EDWARDS
DE6138 - DARK SEPIA

BUILDING AA OR ABA

CD/A
CREATIVE DESIGN
ASSOCIATES

Architecture. Interior Design. Planning.
T. 626.913.8101
F. 626.913.8102
...d St.
...1748
...com

CHARA VILLA 60 UNITS

ALESSANDRO, MORENO VALLEY, CA 92553

2 CONCRETE TITLE ROOF "EAGLE" DOUBLE EAGLE PONDEROSA 5634 KINGS CANYON BLEND

4 7/8" EXTERIOR CEMENT PLASTER LA HABRA FRENCH VANILLA X-55 (BASE COLOR)

8 WINDOW TRIM PAINT COLOR MATCH DUNN EDWARDS DEC713 ROMAN BRICK

9 / 14 WOOD SHUTTER PAINT COLOR MATCH DUNN EDWARDS DEA147 GARNET EVENING (UNIT A&C)

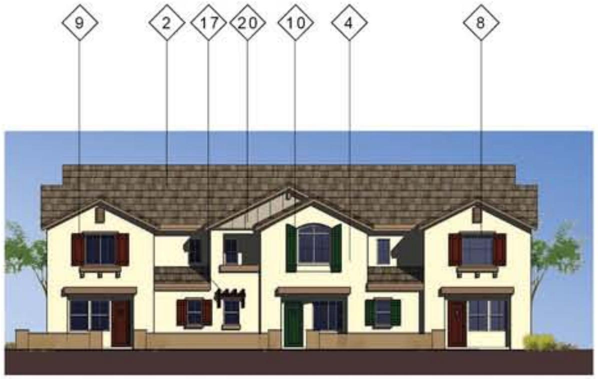
10 / 14 WOOD SHUTTER PAINT COLOR MATCH DUNN EDWARDS DEC779 WOODLAWN GREEN (UNIT B&D)

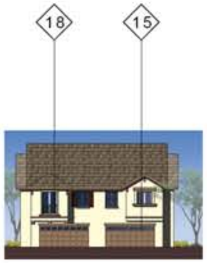
18 BALCONY RAIL- POWDER COATED FINISH- BLACK

15 GARAGE DOOR - AMARR HERITAGE, LONG PANEL. PAINT COLOR MATCH "SANDSTONE"

17 WOOD TRELLIS - OIL BASE PAINT COLOR MATCH DUNN EDWARD DE6399 - MOLASSES

20 WOOD SIDING PAINT COLOR MATCH DUNN EDWARDS DE6214 - PIGEON GRAY





BUILDING CC OR CDC

CD/A
CREATIVE DESIGN ASSOCIATES

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.8102
d St.
1748
.com

CHARA VILLA 60 UNITS

ALESSANDRO, MORENO VALLEY, CA 92553

COLOR AND MATERIALS BASED ON UNIT A&B

5 CORONADO STONE-
ENGLISH RUBBLE
NEWPORT SANDSTONE

6 ANGELUS BLOCK CO.INC- SANDSTONE
SHOT-BLAST S.O TEXTURE AND PRECISION STOCK COLOR

23 ANGELUS BLOCK CO.INC- CAP

24 TUBULAR STEEL
FENCE MATCH 18

5 24 23 6

BUILDING ABA- On Alesandro

CD/A
CREATIVE DESIGN
ASSOCIATES

Architecture. Interior Design. Planning.
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.8102
d St.
1748
.com

Attachment: Material Board III [Revision 1] (2422 : PEN16-0119 Plot Plan & PEN16-0120 Tentative Tract Map 35429)

PLANNING COMMISSION

STAFF REPORT

Meeting Date: January 26, 2017

LEGACY PARK PROJECT

Case:	PEN16-0092 (PA16-0018) – General Plan Amendment PEN16-0093 (PA16-0019) – Zone Change PEN16-0094 (PA14-0052) – Conditional Use Permit PEN16-0095 (PA14-0052) –Tentative Tract Map 36760
Applicant:	Mission Pacific Land Company
Owner:	MPLC Legacy 75 Associates, LP
Representative:	Rick Engineering Company
Location:	Southeast corner of Indian Street and Gentian Avenue
Case Planner:	Jeff Bradshaw
Council District:	4

SUMMARY

The Mission Pacific Land Company, has proposed The Legacy Park project to develop a 221 single family residential lot Planned Unit Development on approximately 53 acres at the southeast corner of Indian Street and Gentian Avenue and on the west side of the California Aqueduct. The project as proposed requires legislative actions by the City Council for a General Plan Amendment and Zone Change in order to change the land use and zoning designation for the 15 acre western portion of the project site from Residential 30 (R30) to Residential 5 (R5). In addition, the applicant is seeking approval of a Tentative Tract Map and Conditional Use Permit to allow for the Planned Unit Development, which set out the neighborhood design, lot configurations, park and open space, and design guidelines.

PROJECT DESCRIPTION

The Legacy Park project proposes to develop a 221 unit single family residential lot Planned Unit Development on approximately 53 vacant acres at the southeast corner of Indian Street and Gentian Avenue. Current zoning on the project site is a mix of R30 and R5 zoning. The proposed project will result in an overall density of 4.17 dwelling units per gross acre. In order to achieve the desired product type and density, the project requires a General Plan Amendment and Zone Change to convert the present R30 zoning on the western 15 acre portion of the project area to R5 to match the current zoning on the remainder of the project area, and requires a Conditional Use Permit to allow for the flexibility afforded in the City Municipal Code for Planned Unit Developments (MC Section 9.03.060). The Tentative Tract Map serves as the instrument to subdivide the property into the intended lot configurations and infrastructure systems needed.

Project

General Plan Amendment/Zone Change

The project site is comprised of three Assessor's Parcel Numbers totaling 53 acres. Assessor's Parcel Numbers 485-220-023 and 485-220-032 (collectively approximately 38 acres) making up the eastern portion of the project area are currently designated R5 on the General Plan Land Use map, and zoned R5 in the City Zoning Atlas. Assessor's Parcel Number 485-220-040 (approximately 15 acres) makes up the western portion of the project area and is currently zoned R30 in the City Zoning Atlas.

Properties to the west and northwest of the project area have a General Plan land use designation of R10 and Zoning designation of RS-10. The properties to the north of the project area have both a General Plan land use designation and Zoning designation of R5. Properties south of the project area have General Plan land use and Zoning designations as R30 and Public (P). The property east of the project area has a General Plan land use and Zoning designation as Commercial and Community Commercial respectively.

The applicant proposes to change the General Plan designation for approximately 15 acres of the site from Residential 30 (maximum of 30 dwelling units acre) to Residential 5 (maximum of five dwelling units per acre) and the zoning district from R30 to R5. This allows for the entire site to be developed as a lower density high quality planned community through application for a Planned Unit Development (PUD), which PUD would be governed with well-developed design guidelines that ensure opportunity for greater innovation in housing products and unique development standards not otherwise available within the typical underlying zoning regulations.

The 15 acre portion of the project site was previously designated R5 and was changed to R30 in 2013 as part of an effort by the City to meet its 2008-2014 State-mandated Regional Housing Needs Assessment (RHNA) numbers, as well as provide a wider range of housing choices for the burgeoning Moreno Valley workforce. Other areas within the City were also changed at that time to R30 along Alessandro Boulevard at Day Street, Alessandro Boulevard at Elsworth Street, Alessandro Boulevard and Morrison Street and Perris Boulevard at Iris Avenue. Additionally, there have been individual projects that have established R30 designations on a per project basis.

Staff has examined the proposed change and determined that there is a sufficient inventory of R 30 designated land within the City of Moreno Valley so that the modification of the 15 acres of R30 land to R5 will not place the City in jeopardy of maintaining zoning areas to satisfy State-mandated Regional Housing Needs Assessment (RHNA) numbers.

Conditional Use Permit

Municipal Code Section 9.03.060 requires that a Conditional Use Permit be approved for all Planned Unit Developments (PUD). One of the stated purposes of the PUD is to provide greater innovation in housing development and greater diversity of housing choices than would otherwise be possible with strict application of the underlying site development regulations contained in Title 9 of the Municipal Code. Planned unit developments may deviate from the site development standards of the applicable zoning district regarding lot area, lot dimensions, lot coverage, setbacks, and building height. Any such deviation(s) must be to the minimum degree necessary to achieve one or more of the stated purposes of the PUD section.

The PUD for the Legacy Park project application will establish minimum lot sizes of 4,000 and 5,000 square feet. Seventy-six of the lots fall within the 4,000 square foot minimum, and based on the current layout have an average lot size of 4,848 square feet. One-hundred and forty-five lots fall within the 5,000 square foot minimum, and based on the current layout have an average lot size of 6,291 square feet. As a whole, based on the layout and lot mix the overall average lot size calculates out to approximately 5,800 square feet as compared to the 7,200 square feet typically required in R5 zone property. The PUD guidelines further establish unique development standards along with architectural guidelines for development of a 221 lot planned residential community. The Design Guidelines for the project as proposed outline the specific and desired site development standards, architectural styles of the buildings, and criteria for community walls, fences and landscape, including hardscape and common area elements.

The following development standards are proposed for this PUD:

Legacy Park Standards

Minimum Lot Size	4,000 SF	5,000 SF
Number of Plans	3	4
Number of Homes	76	145
Number of Elevations	3	4
Min. Lot Width (at setback line)	50’	50’

Min. Lot Depth*	80’	100’
Typical House Width	40’	40’
Max. Building height	2-story or 35’	2-story or 35’
Front Setbacks		
Street-facing Garage**	18’	18’
Two-story Living Space	12’	12’
Single-story Living Space	10’	10’
Porch***/ Portico	4’	4’
Rear Setbacks****		
Two-story Living Space	10’	15’
Two-story Deck	10’	15’
Single-story Living Space	5’	10’
California Rooms (has up to 3 sides)	5’	10’
Patio Cover or Trellis	5’	10’
Side Setbacks		
Typical Condition	5’	5’
Side Street	10’	10’
Min. Distance Between Living Spaces	10’	10’
Max. Coverage (including garage)	50%	50%
Note: All setbacks are considered minimums as measured from the right-of-way.		
*Except at knuckles and cul-de-sacs. **Garages shall be 20’ along D Street and L Street. ***Minimum porch depth shall be 6’. ****Rear setbacks measured from lot line not landscaped easement.		

Amenities unique to the PUD include pocket parks, landscape paseos, trail connections to the adjacent Juan Bautista de Anza trail, decorative treatment in Street L at major intersections, and a median in Street L at Gentian.

The project as designed and conditioned satisfies the requirements for a PUD as set forth in Municipal Code Section 9.03.060. Findings in support of the Conditional Use Permit for the PUD have been prepared in Resolution 2017-10 attached to this staff report.

<u>Tentative Tract Map 36760</u>

Tentative Tract Map 36760 proposes to subdivide the 53 acres into 221 single family residential tract lots with additional lettered lots for basins for storm water/water quality treatment, a segment of the Juan Bautista de Anza trail over the California Aqueduct, public streets, pocket parks, and a 2.0 acres neighborhood park site.

Consistent with City General Plan Policies 4.2.1 and 4.2.14 the City’s Master Plan of Trails and the Master Plan of Parks, this project has been conditioned to construct and then convey to the City a segment of the Juan Bautista De Anza trail within the adjacent California Aqueduct easement and to construct and convey to the City a public park of approximately 2.0 acres in size with numerous amenities. These amenities include play equipment, a picnic shelter, a gazebo, large group barbeques, concrete picnic tables and benches, concrete waste/recycle containers; drinking fountains, walkway security lighting, decorative concrete walkways, and a decomposed granite walking path.

In addition, a condition of approval has been crafted and include in Exhibit A to the project Resolution requiring a four-foot (4') high tubular steel fence be erected surrounding the park. The developer participated in discussions with City staff regarding the design of the public park including this requirement for perimeter fencing and there are still some interests with respect to accessibility, appearance, connectivity and compatibility with the residential neighborhood being weighed against the safety and security interests that are the present key drivers for fencing. Fencing of the park is an interest we feel warrants particular attention and discussion by the Planning Commission. Design input and consideration could include suggestions on adjustments to the conceptual park design layout, enhanced flow into and around the park with the neighborhood, removal of visual and physical barriers, right-sizing fencing, thoughts on landscape elements that can meet safety and security interests, and ideas to bring the park out to the street so to speak to activate it, draw people, ensure good visibility, thereby making it a defensible space.

The proposed subdivision has been designed for consistency with the City's R5 zone and with the proposed development standards of the Legacy Park PUD.

Site

The project site is located at the southeast corner of Indian Street and Gentian Avenue and on the west side of the California Aqueduct. The site totals approximately 53 acres with mostly flat topography. The project site is comprised of three parcels and is mostly rectangular in shape with a triangular shaped parcel located along the California Aqueduct. The California Aqueduct runs along the site's eastern property line in a diagonal northwest/southeast alignment.

There is no sensitive habitat or riparian area within the project site and no rock outcroppings, trees or historic structures.

Surrounding Area

The project site is bounded by existing single-family tract homes to the west and northwest in an RS-10, a zone that allows for minimum lot sizes of 4,500 square feet. The property immediate to the north is zoned R5 and has been subdivided with a recorded map, Tract Map 22180. This tract is approved for single-family residential development. Grading for that project is underway. Existing single-family tract homes are located further to the north in an R5 zone. Southwest of the project site are single-family homes in another R5 zone. March Middle School and Rainbow Elementary School are located immediately to the south. Some vacant and some developed land (non-conforming single-family residences) make up the R30 zone located south of the project site's eastern area.

The California Aqueduct borders the property along its eastern property line with vacant Community Commercial zoned property to the east. This commercially zoned site to the east was recently approved for development as a Walmart retail center. Additional existing commercial retail establishments are located southeast of the project area at the intersection of Perris Boulevard and Iris Avenue. The City Corporate Yard is located approximately 1,400 feet to the east across Perris Boulevard. March Air Reserve Base is located approximately three-quarters of a mile to the west of the project site.

Access/Parking

Access to the project site is gained via local streets connecting to Indian Street and Gentian Avenue, as well as along Street L where is connects to the future segment of Santiago Drive and Emma Lane that will connect to Perris Boulevard. The project will be conditioned to complete off-site improvements and extend Santiago Drive to Perris Boulevard. All interior circulation throughout the project will be by public local streets.

The project includes garage parking for the residents. As designed and conditioned, the project satisfies all parking requirements of the City's Municipal Code.

Design/Landscaping

As stated previously, the PUD for this project proposes unique development standards for Tentative Tract Map 36760 including site development standards and architectural requirements to establish consistent and desired architectural styles. The design guidelines also outline criteria for community walls, fences and landscape.

This project, as designed and conditioned and set forth in the PUD guidelines, achieves development objectives of the City General Plan, City Landscape Standards and the Legacy Park Design Guidelines.

REVIEW PROCESS

The project was originally reviewed by the Project Review Staff Committee (PRSC) in October 2014. Modifications were required to the subdivision design and requests were made for required technical studies.

Revised plans were submitted in October 2015, May 2016, September 2016, October 2016, and November 2016. The design of the subdivision evolved as the developer worked with staff to incorporate a neighborhood park and public interior roadways (as opposed to private streets) into the design of the project.

Upon review of final drafts of required technical studies, the tract map, preliminary grading plan, and completion of the Initial Study / Mitigated Negative Declaration in December 2016, a determination was made to schedule this project for a Planning Commission public hearing on January 26, 2017.

ENVIRONMENTAL

An Initial Study was prepared which examined the potential of the proposed project to have an impact on the environment. The Initial Study provides information in support of the findings for a Mitigated Negative Declaration. The proposed project will not have a significant effect on the environment with the implementation of mitigation measures. Studies prepared for this project included an air quality study, greenhouse gas study, traffic study, a cultural resource assessment, a biological assessment, a preliminary hydrology study and a preliminary water quality management plan, and geotechnical studies.

Public notice of the availability of the Initial Study / Mitigated Negative Declaration for public review was published in the newspaper 20 days in advance of the Planning Commission public hearing. The public notification is consistent with the requirements of the California Environmental Quality Act (CEQA) Guidelines.

Based upon the findings and recommendations identified in technical studies prepared for this project and the completed Initial Study, it was determined that mitigation is necessary to reduce potential biological resources and traffic impacts to a less than significant level. No other environmental factors considered were identified to be impacted.

A mitigation monitoring program has been prepared to ensure implementation of the mitigation measures for potential biological resource and traffic impact (see Attachment 8). Additional conditions of approval are incorporated in the program to ensure compliance with City General Plan policies and other standard requirements related to Noise and Cultural Resources.

NOTIFICATION

The public hearing notice for this project was published in the local newspaper on January 6, 2017. Public notice was sent to all property owners of record within 300 feet of the project site on January 12, 2017. The public hearing notice for this project was posted on the project site on January 13, 2017.

As of the date of report preparation, staff has received no phone calls or correspondence in response to the noticing for this project.

REVIEW AGENCY COMMENTS

During the course of the plan review phase of the entitlement processing the following potentially affected reviewing agencies were engage in the process and all requisite responses and coordination has taken place with no outstanding issues. Where applicable, conditions of approval have been included in the project Resolutions to address concerns from the responding agencies.

Agency	Response Date	Comments
Moreno Valley Utility	September 22, 2014	Will serve notice
Val Verde Unified School District	October 1, 2014	Comment letter
Riverside County Flood Control	November 2, 2015	Comment letter
Airport Land Use Commission	May 10, 2016	Consistency Letter

Furthermore, the City complied with the requirements of State Assembly Bill 52 and State Bill 18 which require notice to Native American tribal groups, and conducted consultation if requested. The City coordinated with all participating Native American tribal groups requesting consultation for this project and has incorporated conditions of approval and mitigation measures as appropriate in the mitigation monitoring program.

STAFF RECOMMENDATION

Staff recommends that the Planning Commission:

1. **APPROVE** Resolution No. 2017-08 and thereby **RECOMMEND** that the City Council:

   - **ADOPT** a Mitigated Negative Declaration for General Plan Amendment application PEN16-0092, pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

   - **APPROVE** General Plan Amendment application PEN16-0092 based on the findings contained in this resolution, and as shown on the attachment included as Exhibit A.

2. **APPROVE** Resolution No. 2017-09 and thereby **RECOMMEND** that the City Council:

   - **ADOPT** a Mitigated Negative Declaration for Zone Change application PEN16-0093, pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

   - **APPROVE** Zone Change application PEN16-0093 based on the findings contained in this resolution, and as shown on the attachment included as Exhibit A.

3. **APPROVE** Resolution No. 2017-10 and thereby **RECOMMEND** that the City Council:

   - **ADOPT** a Mitigated Negative Declaration for Conditional Use Permit application PEN16-0094, pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

- **APPROVE** the Mitigation Monitoring and Reporting Program prepared for Conditional Use Permit PEN16-0094 pursuant to the California Environmental Quality Act (CEQA) Guidelines, included as Exhibit A; and

- **APPROVE** Conditional Use Permit application PEN16-0094 based on the findings contained in this resolution, and subject to the attached conditions of approval included as Exhibit A.

4. **APPROVE** Resolution No. 2017-11 and thereby **RECOMMEND** that the City Council:

   - **ADOPT** a Mitigated Negative Declaration for Tentative Tract Map 36760 (PEN16-0095), pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

   - **APPROVE** the Mitigation Monitoring and Reporting Program prepared for Tentative Tract Map 36760 (PEN16-0095) pursuant to the California Environmental Quality Act (CEQA) Guidelines, included as Exhibit A; and

   - **APPROVE** Tentative Tract Map 36760 (PEN16-0095) based on the findings contained in this resolution, and subject to the attached conditions of approval included as Exhibit A.

Prepared by:
Jeffrey Bradshaw
Associate Planner

Approved by:
Allen Brock
Community Development Director

ATTACHMENTS

1. Public Hearing Notice
2. PC Resolution 2017-08
3. Exhibit A to Resolution 2017-08
4. PC Resolution 2017-09
5. Exhibit A to Resolution 2017-09
6. PC Resolution 2017-10
7. Exhibit A to Resolution 2017-10
8. Exhibit B to Resolution 2017-10
9. PC Resolution 2017-11
10. Exhibit A to Resolution 2017-11
11. Exhibit B to Resolution 2017-11
12. Mitigated Negative Declaration
13. Initial Study Checklist
14. Mitigation Monitoring Program

15. Aerial Photograph
16. Tentative Tract Map 36760 / PUD Exhibit
17. Conceptual Landscape Plan
18. Park Plan
19. Tract 36760 Design Guidelines
20. Air Quality Study
21. Biological Report
22. Cultural Resource Study
23. Geotechnical Study
24. Updated Geotechnical Study
25. Greenhouse Gas Analysis
26. Preliminary Hydrology Study
27. Preliminary Water Quality Management Plan
28. Traffic Study

This may affect your property

Notice of PUBLIC HEARING

Notice is hereby given that a Public Hearing will be held by the Planning Commission of the City of Moreno Valley on the following item(s):

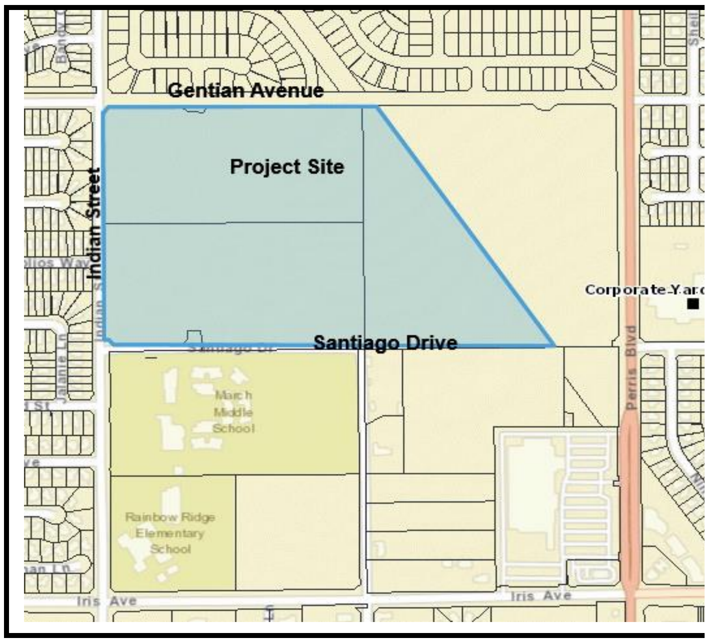
Project: PEN16-0092 (PA16-0018) – General Plan Amendment
PEN16-0093 (PA16-0019) – Zone Change
PEN16-0094 (PA14-0052) – Conditional Use Permit
PEN16-0095 (PA14-0053) – TTM 36760

Applicant: Mission Pacific Land Company
Owner: MPLC Legacy 75 Associates, LP
Representative: Rick Engineering Company
A.P. No: 485-220-023, -032, and -040
Location: Southeast corner Gentian Avenue and Indian Street
Proposal: General Plan Amendment from Residential 30 to Residential 5 and Zone Change from R30 to R5 for a 15.06 acre portion of a 53 acre site. This project includes Tentative Tract Map 36760 to subdivide the 53 acre site into a total of 221 single family residential lots and a Conditional Use Permit for a Planned Unit Development (PUD). The PUD application will establish minimum lot sizes of 4,000 and 5,000 square feet and establish unique lot widths and setback standards along with architectural guidelines.
Council District: 4

The project has been evaluated against criteria set forth in the California Environmental Quality Act (CEQA) Guidelines and it was determined that the project will not have a significant effect on the environment with the incorporation of mitigation measures. A Mitigated Negative Declaration is recommended. Mitigation measures have been required of the project that will reduce potential impacts to a less than significant level.

A public hearing before the Planning Commission has been scheduled for the proposed project. Any person interested in commenting on the proposal and recommended environmental determination may speak at the hearing or provide written testimony at or prior to the hearing. The project application, supporting plans and environmental documents may be inspected at the Community Development Department at 14177 Frederick Street, Moreno Valley, California during normal business hours (7:30 a.m. to 5:30 p.m., Monday through Thursday and 7:30 a.m. to 4:30 p.m., Friday), or you may telephone (951) 413-3206 for further information.

The Planning Commission, at the Hearing or during deliberations, could approve changes or alternatives to the proposal. If you challenge any of these items in court, you may be limited to raising only those items you or someone else raised at the Public Hearing described in this notice or in written correspondence delivered to the Planning Commission at, or prior to, the Public Hearing.



LOCATION N ↑

PLANNING COMMISSION HEARING

City Council Chamber, City Hall
14177 Frederick Street
Moreno Valley, Calif. 92553

DATE AND TIME: January 26, 2017, 7:00 p.m.
CONTACT PLANNER: Jeff Bradshaw
PHONE: (951) 413-3224

Upon request and in compliance with the Americans with Disabilities Act of 1990, any person with a disability who requires a modification or accommodation in order to participate in a meeting should direct such request to Guy Pegan, ADA Coordinator, at 951.413.3120 at least 48 hours before the meeting. The 48-hour notification will enable the City to make reasonable arrangements to ensure accessibility to this meeting.

Attachment: Public Hearing Notice (2444 : Legacy Park Project)

PLANNING COMMISSION RESOLUTION NO. 2017-08

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY RECOMMENDING THAT THE CITY COUNCIL APPROVE APPLICATION NO. PEN16-0092 (PA16-0018): AN AMENDMENT TO THE GENERAL PLAN LAND USE MAP, CHANGING THE LAND USE DESIGNATION FROM RESIDENTIAL 30 TO RESIDENTIAL 5 FOR APPROXIMATELY 15 ACRES GENERALLY LOCATED ON THE SOUTH SIDE OF GENTIAN AVENUE AND THE WEST SIDE OF THE CALIFORNIA AQUEDUCT (ASSESSOR'S PARCEL NUMBER: 485-220-040).

WHEREAS, the applicant, Mission Pacific Land Company, filed Application No. PEN16-0092, requesting an amendment to the Moreno Valley General Plan, as described in the title of this resolution and the attached Exhibit A.

WHEREAS, on January 26, 2017, the Planning Commission of the City of Moreno Valley held a public hearing to consider the subject applications and all of the environmental documentation prepared for the project.

WHEREAS, all legal prerequisites to the adoption of this Resolution have occurred.

WHEREAS, the Planning Commission considered the initial study prepared for the project for the purpose of compliance with the California Environmental Quality Act (CEQA). Based on the initial study, it was determined that the project impacts are less than significant with mitigation and approval of a Mitigated Negative Declaration is recommended.

NOW, THEREFORE, BE IT RESOLVED, it is hereby found, determined and resolved by the Planning Commission of the City of Moreno Valley as follows:

A. This Planning Commission hereby specifically finds that all of the facts set forth above in this Resolution are true and correct.

B. Based upon substantial evidence presented to this Planning Commission during the above-referenced meeting, including written and oral staff reports, and the record from the public hearing, this Planning Commission hereby specifically finds as follows:

1. **Conformance with General Plan Policies –** The proposed general plan amendment is consistent with the General Plan, and its goals, objectives, policies and programs.

   FACT: The project includes four applications – a General Plan Amendment, a Zone Change, a Conditional Use Permit and a

Tentative Tract Map. The project proposes to develop a 221 lot planned residential community on approximately 53 acres. The General Plan Amendment application proposes to change the General Plan designation for approximately 15 acres from Residential 30 to Residential 5.

The project site is bounded by existing single-family tract homes to west and northwest in the RS-10 zone with minimum lot sizes of 4,500 square feet. The property immediately to the north is zoned R5 and has been subdivided with a recorded map, Tract Map 22180. Further to the north are existing single-family tract homes in the R5 zone. Southwest of the project site are single-family homes in the R5 zone. March Middle School and Rainbow Elementary School are located immediately to the south. Vacant and developed land (non-conforming single-family residences) in the R30 zone is located to the southeast of the project site.

The property is bounded by California Aqueduct along the eastern property line with vacant Community Commercial zoned property to the east. The site to the east was recently approved for development as a Walmart retail center. Additional commercial exiting retail centers are located to the southeast at the intersection of Perris Boulevard and Iris Avenue in the Community Commercial zone. March Air Reserve Base is located approximately three-quarters of a mile to the west with the City Corporate Yard located approximately 1,400 feet to the east.

The change in the General Plan designation from Residential 30 to Residential 5 for the 15 acre portion of the project site reflects reconsideration of land use patterns in this area of the community. The change will also allow the potential for a planned residential community consistent with the R5 zoning designation.

The General Plan Amendment will not conflict with any General Plan policies. Consistent with General Plan Community Goals 2.1 and 2.4, the proposed General Plan Amendment will establish a single family land use designation that is compatible with surrounding residential land uses and will promote development of the site's undeveloped parcels.

2. **Health, Safety and Welfare –** The proposed general plan amendment will not be detrimental to the public health, safety or welfare.

FACT: The proposed General Plan Amendment will not result in unacceptable levels of protection from natural and man-made hazards to life, health, and property and is therefore consistent with General Goal 9.6.1. The project site is located approximately 2,000 feet south of the Kennedy Park Fire Station and within close proximity to emergency services which is consistent with General Plan Goal 9.6.2

which requires emergency services that are adequate to meet minor emergency and major catastrophic situations. The proposed General Plan Amendment will not allow for development that would be inconsistent with General Plan Objective 6.1 to minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage due to seismic ground shaking and secondary effects or General Plan Objective 6.2 to minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage, and to minimize nuisances due to flooding.

The California Environmental Quality Act (CEQA) is a statewide environmental law contained in Public Resources Code §§21000-21177. CEQA applies to most public agency decisions to carry out, authorize, or approve actions that have the potential to affect the environment. CEQA requires that public agencies analyze and acknowledge the environmental consequences of their discretionary actions and consider alternatives and mitigation measures that could avoid or reduce significant adverse impacts to the environment when avoidance or reduction is feasible. The CEQA compliance process provides public agencies and the general public an opportunity to comment on a proposed project's environmental effects. The proposed project is not exempt from CEQA. It was determined that an Initial Study would be prepared to determine whether the proposed project may have a significant effect on the environment.

The Mitigated Negative Declaration is an informational document that provides the City, other public agencies, and the public at-large with an objective assessment of the potential environmental impacts that could result from implementation of the proposed project.

An Initial Study / Mitigated Negative Declaration were prepared which assessed the potential of the proposed General Plan Amendment and the related Zone Change, Conditional Use Permit and Tentative Tract Map applications to impact the environment. The project proposes to develop a 221 lot planned residential community on approximately 53 acres. The project site is located at the southeast corner of the intersection of Indian Street and Gentian Avenue.

The Initial Study provided the documentation of the factual basis for the finding in the Mitigated Negative Declaration that the proposed project will not have a significant effect on the environment with the implementation of mitigation measures. The City as the Lead Agency has prepared a Mitigated Negative Declaration (MND) pursuant to Sections 15070 et seq. of the State CEQA Guidelines.

The Mitigated Negative Declaration is an informational document that provides the City, other public agencies, and the public at-large with an objective assessment of the potential environmental impacts that could result from implementation of the proposed project. The preparation and review of the Initial Study/Mitigated Negative Declaration reflects the independent judgment of the City.

The Mitigated Negative Declaration has been considered by the Planning Commission and prepared as there is no evidence that the proposed project will have a significant impact on public health or be materially injurious to surrounding properties of the environment as a whole.

BE IT FURTHER RESOLVED that the Planning Commission **HEREBY APPROVES** Resolution No. 2017-08, and **RECOMMENDS** that the City Council:

1. **ADOPT** a Mitigated Negative Declaration for Application No. PEN16-0092 pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

2. **APPROVE** General Plan Amendment Application No. PEN16-0092, based on the findings contained in this resolution.

APPROVED this 26th day of January, 2017.

Brian Lowell
Chair, Planning Commission

ATTEST:

Richard J. Sandzimier, Planning Official
Secretary to the Planning Commission

APPROVED AS TO FORM:

City Attorney

ATTACHED: General Plan Amendment Map

GENERAL PLAN AMENDMENT
Application No. PEN16-0092
APN's 485-220-040
Resolution No. 2017-08

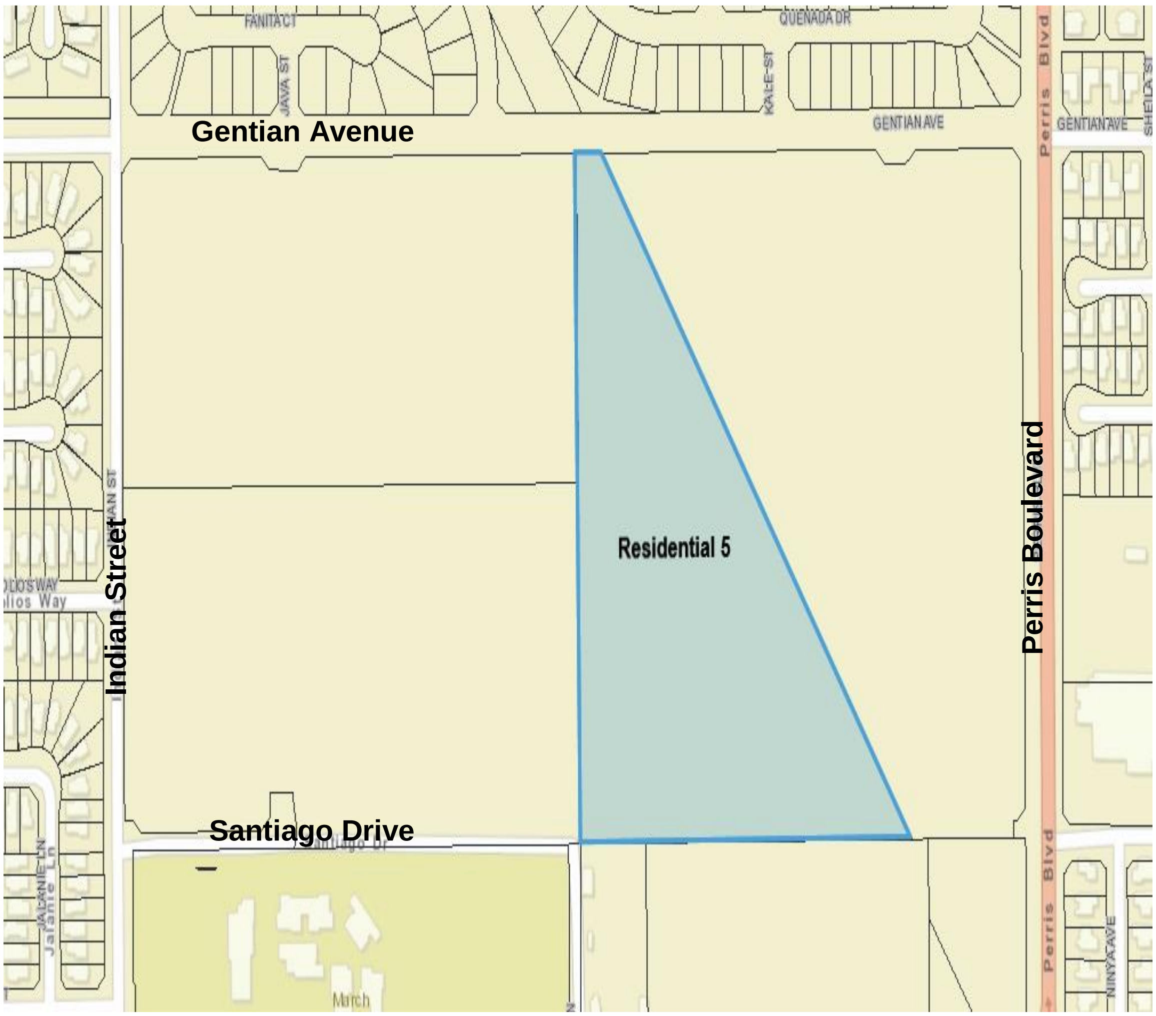


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Exhibit A to ATT 2

PLANNING COMMISSION RESOLUTION NO. 2017-09

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY RECOMMENDING THAT THE CITY COUNCIL APPROVE ZONE CHANGE APPLICATION NO. PEN16-0093 (PA16-0019): AN AMENDMENT TO THE OFFICIAL ZONING ATLAS, CHANGING THE ZONING CLASSIFICATION FROM R30 TO R5 FOR APPROXIMATELY 15 ACRES GENERALLY LOCATED ON THE SOUTH SIDE OF GENTIAN AVENUE AND THE WEST SIDE OF THE CALIFORNIA AQUEDUCT (ASSESSOR'S PARCEL NUMBER: 485-220-040).

WHEREAS, the applicant, Mission Pacific Land Company filed Application No. PEN16-0093, requesting an amendment to Pages 124 and 139 of the Official Zoning Atlas to the zoning classification for certain property, as described in the title of this resolution and the attached Exhibit A; and

WHEREAS, on January 26, 2017, the Planning Commission of the City of Moreno Valley held a public hearing to consider the subject applications and all of the environmental documentation prepared for the project; and

WHEREAS, all legal prerequisites to the adoption of this Resolution have occurred; and

WHEREAS, the Planning Commission considered the initial study prepared for the project for the purpose of compliance with the California Environmental Quality Act (CEQA). Based on the initial study, it was determined that the project impacts are less than significant with mitigation and approval of a Mitigated Negative Declaration is recommended.

NOW, THEREFORE, BE IT RESOLVED, it is hereby found and determined and resolved by the Planning Commission of the City of Moreno Valley as follows:

A. This Planning Commission hereby specifically finds that all of the facts set forth above in this Resolution are true and correct.

B. Based upon substantial evidence presented to this Planning Commission during the above-referenced meeting, including written and oral staff reports, and the record from the public hearing, this Planning Commission hereby specifically finds as follows:

1. **Conformance with General Plan Policies –** The proposed General Plan Amendment and Change of Zone is consistent with the General Plan, and its goals, objectives, policies and programs.

FACT: The project includes four applications; a General Plan Amendment, a Zone Change, a Conditional Use Permit and a Tentative Tract Map. The project proposes to develop a 221 lot planned residential community on approximately 53 acres. The Zone Change application proposes to change the zoning district for approximately 15 acres from R30 to R5.

The project site is bounded by existing single-family tract homes to west and northwest in the RS-10 zone with minimum lot sizes of 4,500 square feet. The property immediately to the north is zoned R5 and has been subdivided with a recorded map, Tract Map 22180. Further to the north are existing single-family tract homes in the R5 zone. Southwest of the project site are single-family homes in the R5 zone. March Middle School and Rainbow Elementary School are located immediately to the south. Vacant and developed land (non-conforming single-family residences) in the R30 zone is located to the southeast of the project site.

The property is bound by the California Aqueduct along the eastern property line with vacant Community Commercial zoned property to the east. The site to the east was recently approved for development as a Walmart retail center. Additional commercial exiting retail centers are located to the southeast at the intersection of Perris Boulevard and Iris Avenue in the Community Commercial zone. March Air Reserve Base is located approximately three-quarters of a mile to the west with the City Corporate Yard located approximately 1,400 feet to the east.

Consistent with General Plan Community Goals 2.1 and 2.4, the proposed Zone Change will establish a single family land use zoning designation that is compatible with surrounding residential land uses and will promote development of the site's undeveloped parcels.

Upon approval of a General Plan Amendment from R30 to R15 on the approximately 15 acre site, the Change of Zone will be consistent with the General Plan designation for the property.

2. **Conformance with the Zoning Regulations –** The proposed zoning is consistent with the purposes and intent of Title 9 of the City of Moreno Valley Municipal Code.

   FACT: As proposed, the Change of Zone from R30 to R5 for the 15 acre portion of the project site is consistent with the purposes and intent of Title 9. A residential development under the R5 would continue to further the comprehensive and orderly development of the site and surrounding areas.

The area surrounding the site has been developed primarily with single family residential land uses. Vacant and developed land (non-conforming single-family residences) in the R30 zone is located to the southeast of the project site. Commercial land uses have been developed to the east along Perris Boulevard and to the southeast at the intersection of Perris Boulevard and Iris Avenue.

Existing single-family residences are located to west, southwest and north of the project site. Vacant R5 zoned land is located immediately to the north. The vacant land has a recorded map (Tract 22180) which is currently under development with approved construction plans on file with the City. March Middle School and Rainbow Elementary School are located immediately to the south of the project site.

The proposed Zone Change to R5 is compatible with the established zoning designations of the parcels in the area. The change from the existing R30 to R5 for the 15 acre portion of the project site reflects reconsideration of land use patterns in this area of the community. The change will also allow the potential for a planned community consistent with the R5 zoning designation.

3. **Health, Safety and Welfare –** The proposal will not be detrimental to the public health, safety or welfare.

FACT: The proposed Zone Change will not result in unacceptable levels of protection from natural and man-made hazards to life, health, and property and is therefore consistent with General Goal 9.6.1. The project site is located approximately 2,000 feet south of the Kennedy Park Fire Station and within close proximity to emergency services which is consistent with General Plan Goal 9.6.2 which requires emergency services that are adequate to meet minor emergency and major catastrophic situations. The proposed Zone Change will not allow for development that would be inconsistent with General Plan Objective 6.1 to minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage due to seismic ground shaking and secondary effects or General Plan Objective 6.2 to minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage, and to minimize nuisances due to flooding.

The proposed Zone Change will not adversely affect the public health, safety or general welfare. The California Environmental Quality Act (CEQA) is a statewide environmental law contained in Public Resources Code §§21000-21177. CEQA applies to most public agency decisions to carry out, authorize, or approve actions that have the potential to affect the environment. CEQA requires that public agencies analyze and acknowledge the environmental consequences of their discretionary actions and consider alternatives and mitigation measures that could avoid or reduce significant adverse impacts to the environment when avoidance or reduction is feasible. The CEQA compliance process provides public agencies and the general public an opportunity to comment on a proposed project's environmental effects.

The Mitigated Negative Declaration is an informational document that provides the City, other public agencies, and the public at-large with an objective assessment of the potential environmental impacts that could result from implementation of the proposed project.

An Initial Study / Mitigated Negative Declaration was prepared which assessed the potential of the proposed General Plan Amendment and the related Zone Change, Conditional Use Permit and Tentative Tract Map applications to impact the environment. The project proposes to develop a 221 lot planned residential community on approximately 53 acres. The project site is located at the southeast corner of the intersection of Indian Street and Gentian Avenue.

The Initial Study provided the documentation of the factual basis for the finding in the Mitigated Negative Declaration that the proposed project will not have a significant effect on the environment with the implementation of mitigation measures. The City as the Lead Agency has prepared a Mitigated Negative Declaration (MND) pursuant to Sections 15070 et seq. of the State CEQA Guidelines. The preparation and review of the Initial Study/Mitigated Negative Declaration reflects the independent judgment of the City.

The Mitigated Negative Declaration has been considered by the Planning Commission and there is no evidence that the proposed project will have a significant impact on public health or be materially injurious to surrounding properties of the environment as a whole.

BE IT FURTHER RESOLVED that the Planning Commission **HEREBY APPROVES** Resolution No. 2017-09, and **RECOMMENDS** that the City Council:

1. **ADOPT** a Negative Declaration for Application No. PEN16-0093 pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

2. **APPROVE** Change of Zone Application No. PEN16-0093, based on the findings contained in this resolution.

APPROVED this 26th day of January, 2017.

____
Brian Lowell
Chair, Planning Commission

ATTEST:

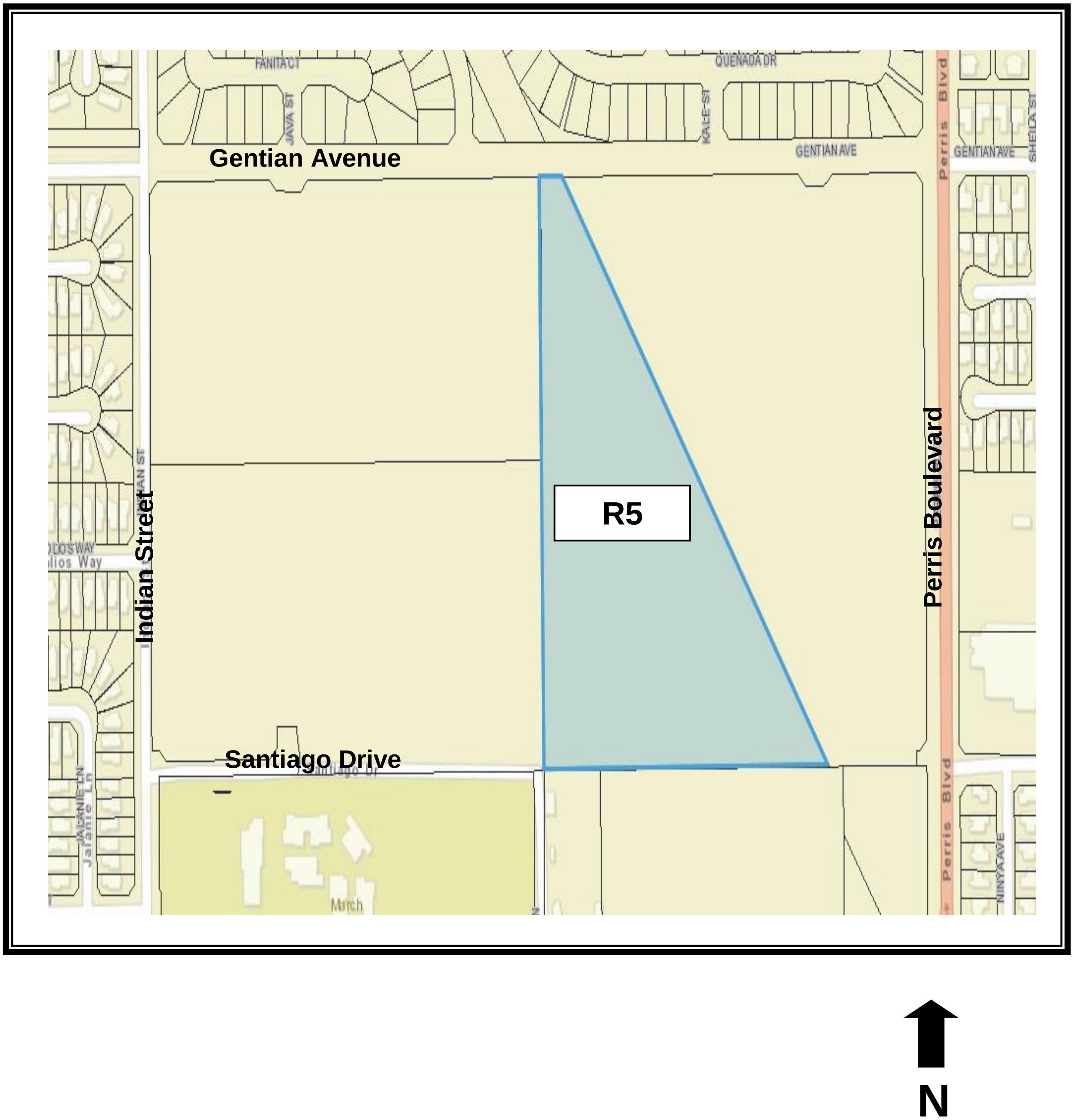
____
Richard J. Sandzimier, Planning Official
Secretary to the Planning Commission

APPROVED AS TO FORM:

____
City Attorney

ATTACHED: Zone Change Map

ZONE CHANGE
Application No. PEN16-0093
APN's 485-220-040
Resolution No. 2017-09



Attachment: Exhibit A to Resolution 2017-09 (2444 : Legacy Park Project)

Exhibit A to ATT 3

PLANNING COMMISSION RESOLUTION NO. 2017-10

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY RECOMMENDING THAT THE CITY COUNCIL APPROVE CONDITIONAL USE PERMIT APPLICATION NO. PEN16-0094 (PA14-0052) FOR A PLANNED UNIT DEVELOPMENT FOR A 221 LOT SINGLE FAMILY RESIDENTIAL SUBDIVISION LOCATED SOUTHEASTERLY OF THE CORNER OF INDIAN STREET AND GENTIAN AVENUE (ASSESSOR'S PARCEL NUMBERS: 485-220-023, 485-220-032, AND 485-220-040).

WHEREAS, the applicant, Mission Pacific Land Company, has filed an application for the approval of Conditional Use Permit PEN16-0094 for development of a Planned Unit Development (PUD). The PUD application will establish unique development standards, including allowing for minimum lot sizes of 4,000 and 5,000 square feet, and architectural guidelines; and

WHEREAS, the application has been evaluated in accordance with established City of Moreno Valley (City) procedures, and with consideration of the General Plan and other applicable regulations; and

WHEREAS, the City has prepared an Initial Study and Mitigated Negative Declaration consistent with the California Environmental Quality Act (CEQA) based on a thorough analysis of potential environmental impacts; and

WHEREAS, upon completion of a thorough development review process the project was appropriately agendized and noticed for a public hearing before the Planning Commission of the City of Moreno Valley (Planning Commission); and

WHEREAS, the public hearing notice for this project was published in the local newspaper on January 6, 2017. Public notice was sent to all property owners of record within 300 feet of the project site on January 12, 2017. The public hearing notice for this project was also posted on the project site on January 13, 2017; and

WHEREAS, on January 26, 2017, the Planning Commission held a public hearing to consider the application; and

WHEREAS, all legal prerequisites to the adoption of this Resolution have occurred; and

WHEREAS, pursuant to Government Code Section 66020(d)(1), **NOTICE IS HEREBY GIVEN** that this project is subject to certain fees, dedications, reservations and other exactions as provided herein.

NOW, THEREFORE, BE IT RESOLVED, it is hereby found, determined and resolved by the Planning Commission as follows:

A. This Planning Commission hereby specifically finds that all of the facts set forth above in this Resolution are true and correct.

B. Based upon substantial evidence presented to this Planning Commission during the above-referenced meeting on January 26, 2017, including written and oral staff reports, public testimony and the record from the public hearing, this Planning Commission hereby specifically finds as follows:

1. **Conformance with General Plan Policies –** The proposed use is consistent with the General Plan, and its goals, objectives, policies and programs.

   FACT: General Plan Objective 2.2 states that it is the intent of the City to provide a wide range of residential opportunities and dwelling types to meet the demands of present and future residents of all socioeconomic groups. The existing residential land use designation for the site allows for development of single family residences consistent with this objective.

   The project site is bounded by existing single-family tract homes to the west and northwest in the RS-10 zone with minimum lot sizes of 4,500 square feet. The property immediately to the north is zoned R5 and has been subdivided with a recorded map, Tract Map 22180. Further to the north are existing single-family tract homes in the R5 zone. Southwest of the project site are single-family homes in the R5 zone. March Middle School and Rainbow Elementary School are located immediately to the south. Vacant and developed land (non-conforming single-family residences) in the R30 zone is located to the southeast of the project site.

   The property is bounded by the California Aqueduct along the eastern property line with vacant Community Commercial zoned property to the east. The site to the east was recently approved for development as a Walmart retail center. Additional commercial existing retail centers are located to the southeast at the intersection of Perris Boulevard and Iris Avenue in the Community Commercial zone. March Air Reserve Base is located approximately three-quarters of a mile to the west with the City Corporate Yard located approximately 1,400 feet to the east.

   Consistent with City General Plan Policies 4.2.1 and 4.2.14 the City's Master Plan of Trails and the Master Plan of Parks, this project has been conditioned to construct and then convey to the City a segment of the Juan Bautista De Anza trail within the adjacent California Aqueduct and to construct and convey to the City a public park of approximately 2.0 acres in size with amenities that would include play equipment, a picnic shelter, a gazebo, large group barbeques, concrete picnic tables and benches, concrete waste/recycle containers; drinking fountains, walkway security lighting, decorative concrete walkways, decomposed granite walking path; and tubular steel fencing surrounding the park.

The project as designed and conditioned will achieve the objectives of the City of Moreno Valley's General Plan. Subject to approval of a General Plan Amendment from R30 to R5, the proposed project is consistent with the General Plan and does not conflict with the goals, objectives, policies, and programs established within the Plan.

2. **Conformance with Zoning Regulations –** The proposed use complies with all applicable zoning and other regulations.

FACT: The project site is located generally at the southeast corner of Indian Street and Gentian Avenue. The majority of the site is zoned R5. The applicant is proposing to change a 15 acre portion of the site from R30 to R5. The project site is bounded by existing single-family tract homes to west and northwest in the RS-10 zone with minimum lot sizes of 4,500 square feet. The property immediately to the north is zoned R5 and has been subdivided with a recorded map, Tract Map 22180. Further to the north are existing single-family tract homes in the R5 zone. Southwest of the project site are single-family homes in the R5 zone. March Middle School and Rainbow Elementary School are located immediately to the south. Vacant and developed land (non-conforming single-family residences) in the R30 zone is located to the southeast of the project site.

The proposal for a Planned Unit Development requires approval of a Conditional Use Permit per Municipal Code Section 9.03.060. The Planned Unit Development establishes unique zoning standards along with design guidelines that will allow for a quality, well designed project that will be consistent with the intent of Title 9 which is to protect and promote the public health, safety and welfare of present and future residents of the City.

The project is designed in accordance with the applicable provisions of Section 9.03 Residential Districts, Section 9.16.130 Design Guidelines for single family residences, and Section 9.03.060 Planned Unit Developments of the City's Municipal Code. The project has also been designed for consistency with the Legacy Park Design Guidelines. The project as designed and conditioned would comply with all applicable zoning and other regulations.

3. **Health, Safety and Welfare –** The proposed use will not be detrimental to the public health, safety or welfare or materially injurious to properties or improvements in the vicinity.

FACT: The proposed master plot plan as designed and conditioned will provide acceptable levels of protection from natural and man-made hazards to life, health, and property consistent with General Goal 9.6.1. The project site is located approximately 2,000 feet south of the Kennedy Park Fire Station and within close proximity to emergency services which is consistent with General Plan Goal 9.6.2 which requires emergency services that are adequate to meet minor emergency and major catastrophic situations.

The proposed project as designed and conditioned will result in a development that will minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage due to seismic ground shaking and flooding as provided for in General Plan Objective 6.1 and General Plan Objective 6.2.

The project has been designed consistent with the City's Municipal Code Section 9.03 Residential Districts and will satisfy all City requirements related to light and noise. Planning staff prepared an Initial Study and Mitigated Negative Declaration in accordance with the provisions of the California Environmental Quality Act (CEQA) based on a thorough analysis of potential environmental impacts. With the implementation of mitigation measures, the project will not result in a significant impact. The Mitigated Negative Declaration represents the City's independent judgment and analysis.

4. **Location, Design and Operation –** The location, design and operation of the proposed project will be compatible with existing and planned land uses in the vicinity.

FACT: The project site is bounded by existing single-family tract homes to west and northwest in the RS-10 zone with minimum lot sizes of 4,500 square feet. The property immediately to the north is zoned R5 and has been subdivided with a recorded map, Tract Map 22180. Further to the north are existing single-family tract homes in the R5 zone. Southwest of the project site are single-family homes in the R5 zone. March Middle School and Rainbow Elementary School are located immediately to the south. Vacant and developed land (non-conforming single-family residences) in the R30 zone is located to the southeast of the project site.

The property is bounded by the California Aqueduct along the eastern property line with vacant Community Commercial zoned property to the east. The site to the east was recently approved for development as a Walmart retail center. Additional commercial existing retail centers are located to the southeast at the intersection of Perris Boulevard and Iris Avenue in the Community Commercial zone. March Air Reserve Base is located approximately three-quarters of a mile to the west with the City Corporate Yard located approximately 1,400 feet to the east.

As designed and conditioned and with the implementation of required mitigation measures, the Planned Unit Development is compatible with existing and proposed land uses in the vicinity.

FEES, DEDICATIONS, RESERVATIONS, AND OTHER EXACTIONS

1. FEES

Impact, mitigation and other fees are due and payable under currently applicable ordinances and resolutions. These fees may include but are not limited to: Development Impact Fee, Transportation Uniform Mitigation Fee (TUMF), Multi-species Habitat Conservation Plan (MSHCP) Mitigation Fee, Stephens Kangaroo Habitat Conservation fee, Underground Utilities in lieu Fee, Area Drainage Plan fee, Bridge and Thoroughfare Mitigation fee (Future) and Traffic Signal Mitigation fee. The final amount of fees payable is dependent upon information provided by the applicant and will be determined at the time the fees become due and payable.

Unless otherwise provided for by this Resolution, all impact fees shall be calculated and collected at the time and in the manner provided in Chapter 3.32 of the City of Moreno Valley Municipal Code or as so provided in the applicable ordinances and resolutions. The City expressly reserves the right to amend the fees and the fee calculations consistent with applicable law.

2. DEDICATIONS, RESERVATIONS, AND OTHER EXACTIONS

The adopted Conditions of Approval for PEN16-0094, incorporated herein by reference, may include dedications, reservations, and exactions pursuant to Government Code Section 66020 (d) (1).

3. CITY RIGHT TO MODIFY/ADJUST; PROTEST LIMITATIONS

The City expressly reserves the right to establish, modify or adjust any fee, dedication, reservation or other exaction to the extent permitted and as authorized by law.

Pursuant to Government Code Section 66020(d)(1), NOTICE IS FURTHER GIVEN that the 90 day period to protest the imposition of any impact fee, dedication, reservation, or other exaction described in this Resolution begins on the effective date of this Resolution and any such protest must be in a manner that complies with Section 66020(a) and failure to timely follow this procedure will bar any subsequent legal action to attack, review, set aside, void or annul imposition.

The right to protest the fees, dedications, reservations, or other exactions does not apply to planning, zoning, grading, or other similar application processing fees or service fees in connection with this project and it does not apply to any fees, dedication, reservations, or other exactions of which a notice has been given similar to this, nor does it revive challenges to any fees for which the applicable statute of limitations has previously expired.

BE IT FURTHER RESOLVED that the Planning Commission **HEREBY APPROVES** Resolution No. 2017-10, and **RECOMMENDS** that the City Council:

1. **ADOPT** a Mitigated Negative Declaration for Conditional Use Permit PEN16-0094, pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

2. **APPROVE** the Mitigation Monitoring and Reporting Program prepared for Conditional Use Permit PEN16-0094 pursuant to the California Environmental Quality Act (CEQA) Guidelines, included as Exhibit A; and

3. **APPROVE** Conditional Use Permit PEN16-0094 based on the findings contained in this resolution, and subject to the attached conditions of approval included as Exhibit B.

APPROVED this 26th day of January, 2017.

____
Brian Lowell
Chair, Planning Commission

ATTEST:

____
Richard J. Sandzimier, Planning Official
Secretary to the Planning Commission

APPROVED AS TO FORM:

____
City Attorney

EXHIBIT A

Legacy Park Project – Mitigation Monitoring and Reporting Program

Conditional Use Permit PEN16-0094 / Tentative Tract Map 36760 (PEN16-0095)

Introduction

This Mitigation Monitoring and Reporting Program has been prepared for use in implementing mitigation for the Mitigated Negative Declaration (MND) for The Legacy Park (Conditional Use Permit PEN16-0094 and Tentative Tract Map 36760). The program has been prepared in compliance with State law and the MND prepared for the project.

The California Environmental Quality Act (CEQA) requires adoption of a reporting or monitoring program for those measures places on a project to mitigated or avoid adverse effects on the environment (Public Resources Code Section 21081.6). The law states that the reporting or monitoring program shall be designed to ensure compliance during project implementation.

The monitoring program contains the following elements:

- 1. The mitigation measures are recorded with the action and procedure necessary to ensure compliance. In some instances, one action may be used to verify implementation of several mitigation measures.
- 2. A procedure for compliance and verification has been outlined for each action necessary. This procedure designates who will take action, what action will be taken and when, and to whom and when compliance will be reported.
- 3. The program has been designed to be flexible. As monitoring progresses, changes to compliance procedures may be necessary based upon recommendations by those responsible for the program. As changes are made, new monitoring compliance procedures are records will be developed and incorporated into the program.

Mitigation Monitoring and Responsibilities

As the Leady Agency, the City of Moreno Valley is responsible for ensuring full compliance with the mitigation measures adopted for the proposed project. The City will monitor and report on all mitigation activities. Mitigation measures will be implemented at different stages of development throughout the project. In this regards, the responsibilities for implementation have been assigned to the Applicant, Contractor, or a combination thereof. If during the course of project implementation, any of the mitigation measures identified herein cannot be successfully implemented, the City shall be immediately informed, and the City will then inform any affected responsible agencies. The City, in conjunction with any affected responsible agencies, will then determine if modification to the project is required and/or whether alternative mitigation is appropriate.

Mitigation Monitoring and Reporting Program Checklist

Project: Legacy Park Project (Conditional Use Permit PEN16-0094 and Tentative Tract Map 36760)

Applicant: Mission Pacific Land Company

Date: January 18, 2017

Mitigation Measure No.	Responsible for Monitoring	Monitoring Frequency	Timing of Verification	Method of Verification	Verified Date/Initials	Sanctions for Non-Compliance
Traffic/Transportation						
TR-1: Prior to the issuance of building permits, the Project applicant shall participate in the City's DIF and County TUMF fee programs by paying the requisite fees at the time of building permit, and in addition pay the Project's fair share amount of $43,497 for improvements at the intersections of Indian Street at Cactus Avenue and Indian Street at Gentian Avenue as identified in Table 1-5 that are consistent with the improvements shown on Table 6-3, or as otherwise agreed to by the City and Project Applicant. Project fair share payment shall only be collected if the City creates a fee program that includes the improvements the fair share contribution is intended to construct.	City of Moreno Valley Transportation Engineering Division and Planning Division	Ongoing during construction	Prior to Building Final	Review of paid DIF invoice and receipt		Withhold Building Final
TR-2: Prior to the final approval of the street improvement plans, traffic signal plans will be required for a new traffic signal located at the intersection of Perris Boulevard and Santiago Drive. Prior to issuance of Certificate of Occupancy, the traffic signal and Perris Boulevard and Santiago Drive shall be completed per the approved plans to the satisfaction of the City Engineer.	City of Moreno Valley Transportation Engineering Division , Land Development and Planning Division	Ongoing during construction	Prior to Building Final	Final Inspection of signal improvements		Withhold Building Final

Mitigation Measure No.	Responsible for Monitoring	Monitoring Frequency	Timing of Verification	Method of Verification	Verified Date/Initials	Sanctions for Non-Compliance
Biological Resources						
BR-1. A qualified biologist will conduct a pre-construction presence/absence survey for burrowing owls within 14 days prior to site disturbance. If burrowing owls are detected onsite, the owls will be relocated/excluded from the site outside of the breeding season following accepted protocols, and subject to the approval of the RCA and wildlife agencies.	City of Moreno Valley Planning Division	Ongoing during grading plan check	Prior to Issuance of a grading permit	Review of and approval of pre-construction survey		Withhold Grading Permit
BR-2. As feasible, vegetation clearing should be conducted outside of the nesting season, which is generally identified as February 1 through September 15. If avoidance of the nesting season is not feasible, then a qualified biologist shall conduct a nesting bird survey within three days prior to any disturbance of the site, including disking, demolition activities, and grading. If active nests are identified, the biologist shall establish suitable buffers around the nests, and the buffer areas shall be avoided until the nests are no longer occupied and the juvenile birds can survive independently from the nests.	City of Moreno Valley Planning Division	Ongoing during grading plan check	Prior to Issuance of a grading permit	Review of and approval of survey		Withhold Grading Permit
Mitigation Measure No.	**Responsible for Monitoring**	**Monitoring Frequency**	**Timing of Verification**	**Method of Verification**	**Verified Date/Initials**	**Sanctions for Non-Compliance**
Cultural Resources						
CR-1: Prior to the issuance of a grading permit, the Project Applicant shall provide evidence to the City of Moreno Valley that a professional archaeological monitor has been retained by the Applicant to conduct monitoring of all mass grading and trenching activities and that the monitor has the authority to temporarily halt and redirect earthmoving activities in the event that suspected archaeological resources are unearthed during Project construction. The Project archaeologist, with input from the	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations.	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order

appropriate Tribe, shall prepare a Cultural Resources Monitoring Plan (CRMP) to document protocols for inadvertent finds, to determine potential protection measures from further damage and destruction for any identified archaeological resource(s)/ tribal cultural resources (TCRs), outline the process for monitoring and for completion of the final Phase IV Monitoring Report. If any archaeological and/or TCRs are identified during monitoring, these will also be documented and addressed per standard archaeological protocols in the Phase IV report, with the exception of human remains which will be addressed per CUL-5. The Project Archaeologist shall attend the pregrading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.						
CR-2: At least 30 days prior to the issuance of a grading permit, the Applicant shall contact the appropriate Luiseño tribe to develop a Cultural Resources Treatment Agreement and shall provide evidence to the City of Moreno Valley that the professionally qualified Luiseño Native American monitor(s) has been secured from the interested tribe(s), and that the monitor shall be allowed to monitor all mass grading and trenching activities. The Tribal representative(s) shall attend the pre-grading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations.	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order
CR-3: If, during mass grading and trenching activities, the Archaeologist or Tribal representatives suspect that an archaeological resource and/or TCR may have been unearthed, the monitor identifying the potential resources, in consultation with the other monitor as appropriate, shall immediately halt and redirect grading operations in a 100-foot radius around the find to allow identification	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order

and evaluation of the suspected resource. The Native American monitor(s) or appropriate representative(s) and the archaeological monitor shall evaluate the suspected resource and make a determination of significance pursuant to California Public Resources Code Section 21083.2. The archaeological monitor and tribal monitor(s) or appropriate representative(s), the Project Applicant, and the City Planning Division shall confer regarding mitigation of the discovered resource(s). All sacred sites, should they be encountered within the Project area, shall be avoided and preserved as the preferred mitigation, if feasible.						
CR-4: Prior to grading permit issuance, the City shall verify that the following note is included on the Grading Plan: "If any suspected archaeological resources are discovered during ground-disturbing activities and the archaeological monitor or Tribal representatives are not present, the construction supervisor is obligated to halt work in a 100-foot radius around the find and call the project archaeologist and the Tribal representatives to the site to assess the significance of the find."	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order
CR-5: If human remains are encountered, California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the Riverside County Coroner has made the necessary findings as to origin. Further, pursuant to California Public Resources Code Section 5097.98(b), remains shall be left in place and free from disturbance until a final decision as to the treatment and disposition has been made by the Coroner. If the Riverside County Coroner determines the remains to be Native American, the California Native American Heritage Commission must be contacted within 24 hours. The Native American Heritage Commission must then	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order

immediately notify the "most likely descendant(s)" of receiving notification of the discovery. The most likely descendant(s) shall then make recommendations within 48 hours, and engage in consultations concerning the treatment of the remains as provided in Public Resources Code §5097.98.						
CR-6: Prior to construction involving excavation four feet or more below existing surface grade, the construction contractor shall provide evidence that a qualified paleontologist has been retained, and that the paleontologist(s) shall be present during all grading and other significant ground-disturbing activities that reach four feet or more below existing surface grade. In the event fossiliferous deposits are encountered, the following measures shall be implemented: • Monitoring shall be conducted by qualified paleontological monitor(s) of excavation in areas identified as likely to contain paleontological resources, including very old alluvial fan deposits. Paleontological monitors shall be equipped to salvage fossils as they are unearthed, to avoid construction delays, and to remove samples of sediments that are likely to contain the remains of small fossil invertebrates and vertebrates. Monitors shall be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring may be reduced if the potentially fossiliferous units are determined upon exposure and examination by qualified paleontological personnel to have low potential to contain fossil resources.	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order

• Paleontological monitoring of any earthmoving will be conducted by a monitor, under direct guidance of a qualified paleontologist. Earthmoving in areas of the parcel where previously undisturbed sediments are buried, but not otherwise disturbed, will not be monitored. • If too few fossil remains are found after 50 percent of the planned-for earthmoving has been completed, monitoring can be reduced or discontinued in those areas at the Project paleontologist's direction. • Preparation of recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. • Identification and curation of specimens into a professional, fully accredited museum repository with permanent retrievable storage. The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities. • Preparation or a report of findings with and appended itemized inventory of specimens. The report and inventory, when submitted to the city along with confirmation of the curation of recovered of recovered specimens into an established, accredited museum repository, will signify completion of the program to mitigate impacts to paleontological resources.						

Mitigation Measure No.	**Responsible for Monitoring**	**Monitoring Frequency**	**Timing of Verification**	**Method of Verification**	**Verified Date/Initials**	**Sanctions for Non-Compliance**
Noise						
N-1: Construction activities shall be operated in a manner that limits noise impacts on surrounding uses (General Plan Policy 6.5.2). In order to limit noise impacts on surrounding property, the construction contractor will ensure the following: • All construction equipment powered by gasoline or diesel engines will be required to have sound-control devices at least as effective as those originally provided by the manufacturer; no equipment will be permitted to have an unmuffled exhaust. • Mobile noise-generating equipment and machinery will be shut off when not in use; • Construction vehicles assessing the site will be required to use the shortest possible route to and from local freeways, provided the routes do not expose additional receptors to noise	City of Moreno Valley Engineering and Building and Safety Planning Division	Once prior to Grading and during grading and construction operations.	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order
N-2: The staging of construction equipment and the construction trailer shall be placed as far as possible from the existing single-family residences located to the west and south and the schools to the south.	City of Moreno Valley Engineering and Building and Safety Planning Division	Once prior to Grading and during grading and construction operations.	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order

EXHIBIT B

CITY OF MORENO VALLEY
CONDITIONS OF APPROVAL
TENTATIVE TRACT MAP 36760 (PEN16-0095)
CONDITIONAL USE PERMIT PEN16-0094
A.P.N.: 485-220-023, 485-220-032, AND 485-220-040

Approval Date:
Expiration Date:

COMMUNITY DEVELOPMENT DEPARTMENT

Planning Division

For questions regarding any Planning condition of approval, please contact the Planning Division at (951) 413-3206.

P1. Tentative Tract Map 36760 (PEN16-0095) has been approved for development of a 221 lot subdivision in the R5 zone.

P2. Conditional Use Permit PEN16-0094 for a Planned Unit Development (Legacy Park) has been approved with Design Guidelines to establish unique development standards, architectural standards, fence and walls, and common area pathways and landscape area for Tentative Tract Map 36760 in the R5 zone. The PUD allows for minimum lot sizes of 4,000 square feet (76 lots) and 5,000 square feet (145 lots) in two distinct areas of the tract map.

P3. Conditional Use Permit PEN16-0094 and Tentative Tract Map 36760 (PEN16-0095) are approved subject to approval of a General Plan Amendment from Residential 30 to Residential 5 and a Zone Change from R30 to R5.

P4. Conditional Use Permit PEN16-0094 establishes the following development standards for single-family residential development in Tentative Tract Map 36760:

- Minimum Lot Size – 4,000 square feet (50’ x 80’)
- Minimum Lot Size -- 5,000 square feet (50’ x 100’)
- Maximum Lot Coverage – 50%

Timing Mechanisms for Conditions (see abbreviation at beginning of affected condition):

R - Map Recordation
GPA – Grading Plan Approval
BP - Building Permits
MR – Map Recordation
AOS – Acceptance of Streets
CP – Construction Permit
GP - Grading Permits
BF – Building Final
P - Any permit
MA – Map Approval
WP - Water Improvement Plans
IPA – Improvement Plan Approval
SI – Street Improvements

Governing Document (see abbreviation at the end of the affected condition):

GP - General Plan
MC - Municipal Code
Ord - Ordinance
Res - Resolution
UBC - Uniform Building Code
SBM - Subdivision Map Act
MC – Municipal Code
CEQA - California Environmental Quality Act
Ldscp - Landscape Development Guidelines and Specs
UFC - Uniform Fire Code

- Maximum Height – 2-story or 35 feet

P5. Tentative Tract Map 36760 and Conditional Use Permit PEN16-0094 are approved for the use of decorative concrete treatments within the public right-of-way at key intersections of Street L within the project.

P6. This approval shall comply with all applicable requirements of the City of Moreno Valley Municipal Code.

P7. This tentative map shall expire three years after the approval date of this tentative map unless extended as provided by the City of Moreno Valley Municipal Code; otherwise it shall become null and void and of no effect whatsoever in the event the applicant or any successor in interest fails to properly file a final map before the date of expiration. (MC 9.02.230, 9.14.050, 080)

P8. The site shall be developed in accordance with the approved tentative map on file in the Community Development Department -Planning Division, the Municipal Code regulations, General Plan, and the Legacy Park Design Guidelines (PEN16-0094), and the conditions of approval contained herein. (MC 9.14.020)

P9. A drought tolerant, low water using landscape palette shall be utilized throughout the tract to the extent feasible.

P10. All undeveloped portions of the site shall be maintained in a manner that provides for the control of weeds, erosion and dust. (MC 9.02.030)

P11. All landscaped areas shall be maintained in a healthy and thriving condition, free from weeds, trash and debris. (MC 9.02.030)

P12. (BP) Enhanced architectural treatments shall be included on the approved plans for all homes having side and/or reverse frontages to public streets or open space areas.

P13. All site plans, grading plans, landscape and irrigation plans, and street improvement plans shall be coordinated for consistency with this approval.

<u>PRIOR TO GRADING</u>

P14. (GP) Prior to issuance of grading permits, the developer shall pay the applicable Stephen's' Kangaroo Rat (SKR) Habitat Conservation Plan mitigation fee. (Ord)

P15. (GP) Prior to the issuance of grading permits, final erosion control landscape and irrigation plans for all cut or fill slopes over 3 feet in height shall be submitted to the Planning Division for review and approval for the phase in process. The plans shall be designed in accordance with the slope erosion plan as required by the City Engineer for that phase. Man-made slopes greater than 10 feet in height shall be "land formed" to conform to the natural terrain and shall be landscaped and stabilized to minimize visual scarring. (GP Objective 1.5, MC 9.08.080, DG)

P16. (GP) Prior to approval of precise grading plan, final front and street side yard landscape and irrigation plans shall be submitted to the Planning Division for review. The plans shall be prepared in accordance with the City's Municipal Code and landscape specifications, and include required street trees.

P17. (GP) If potential historic, archaeological, or paleontological resources are uncovered during excavation or construction activities at the project site, work in the affected area will cease immediately and a qualified person (meeting the Secretary of the Interior's standards (36CFR61)) shall be consulted by the applicant to evaluate the find, and as appropriate recommend alternative measures to avoid, minimize or mitigate negative effects on the historic, prehistoric, or paleontological resource. Determinations and recommendations by the consultant shall be implemented as deemed appropriate by the Community Development Director, in consultation with the State Historic Preservation Officer (SHPO) and any and all affected Native American Tribes before any further work commences in the affected area.

If human remains are discovered, work in the affected area shall cease immediately and the County Coroner shall be notified. If it is determined that the remains are potentially Native American, the California Native American Heritage Commission and any and all affected Native American Indians tribes such as the Morongo Band of Mission Indians or the Pechanga Band of Luiseno Indians shall be notified and appropriate measures provided by State law shall be implemented. (GP Objective 23.3, DG, CEQA).

P18. (GP) Prior to issuance of grading permits, landscape plans for front yards, street trees, common areas, reverse frontage parkways and basins, common area lighting and fences and walls, shall be submitted to the Planning Division for review subject to the requirements of the Legacy Park Design Guidelines the City of Moreno Valley Municipal Code.

P19. (GP) Prior to issuance of grading permits, plans for any security gate system shall be submitted to the Planning Division for review and approval.

P20. (GP) Prior to the issuance of grading permits, mitigation measures contained in the Mitigation Monitoring Program approved with this project shall be implemented as provided therein. A mitigation monitoring fee, as provided by City ordinance, shall be paid by the applicant within 30 days of project or tentative map approval. No City permit or approval shall be issued until such fee is paid. (CEQA)

PRIOR TO RECORDATION OF FINAL MAP

P22. (R) Prior to final map recordation, subdivision phasing (including any proposed common open space or improvement phasing, if applicable), shall be subject to the Planning Division approval. Any proposed phasing shall provide for adequate vehicular access to all lots in each phase as determined by the City Transportation Engineer or designee and shall substantially conform to all intent and purpose of the subdivision approval. (MC 9.14.080)

P23. (R) Prior to final map recordation any required trail easements shall be provided.

P24. (R) Prior to recordation of the final subdivision map, the developer shall submit for review and approval the following documents to the Planning Division which shall demonstrate that the project will be developed and maintained in accordance with the intent and purpose of the approval:

a. The document to convey title
b. Deed restrictions, easements, or Covenants, Conditions and Restrictions to be recorded

The approved documents shall be recorded at the same time that the subdivision map is recorded. The documents shall contain provisions for general maintenance and ownership of common area pathways and landscape, common area lighting, and common recreation areas. The approved documents shall also contain a provision, which provides that they may not be terminated and/or substantially amended without the consent of the City and the developer's successor-in-interest. (MC 9.14.090)

In addition, the following deed restrictions and disclosures shall be included within the document and grant deed of the properties:

- The developer and homeowners association shall promote the use of native plants and trees and drought tolerant species to the extent feasible.

PRIOR TO BUILDING PERMIT

P25. (BP) Prior to issuance of building permits, the developer or developer's successor-in-interest shall pay all applicable impact fees, including but not limited to Transportation Uniform Mitigation fees (TUMF), Multi-species Habitat Conservation Plan (MSHCP) mitigation fees, and the City's adopted Development Impact Fees. (Ord)

P26. (BP) Prior to issuance of building permits, final front and street side yard landscape and irrigation plans, private slope landscape plans, basin landscape plans, common area lighting and fence and wall plans shall be approved.

PRIOR TO BUILDING FINAL

P27. (BF) Prior to the issuance of Certificates of Occupancy or building final all private and common area landscape and irrigation, common area lighting, and fence and walls shall be installed. Landscaping on lots not yet having dwelling units shall be maintained by the developer weed and disease free. (MC 9.03.040)

Mitigation Measures

Traffic

TR-1: Prior to the issuance of building permits, the Project applicant shall participate in the City's DIF and County TUMF fee programs by paying the requisite fees at the time of building permit, and in addition pay the Project's fair share amount of $43,497 for improvements at the intersections of Indian Street at Cactus Avenue and Indian Street at Gentian Avenue as identified in Table 1-5 that are consistent with the improvements shown on Table 6-3, or as otherwise agreed to by the City and Project Applicant. Project fair share payment shall only be collected if the City creates a fee program that includes the improvements the fair share contribution is intended to construct.

TR-2: Prior to the final approval of the street improvement plans, traffic signal plans will be required for a new traffic signal located at the intersection of Perris Boulevard and Santiago Drive. Prior to issuance of Certificate of Occupancy, the traffic signal and Perris Boulevard and Santiago Drive shall be completed per the approved plans to the satisfaction of the City Engineer.

Biological Resources

BR-1. A qualified biologist will conduct a pre-construction presence/absence survey for burrowing owls within 14 days prior to site disturbance. If burrowing owls are detected onsite, the owls will be relocated/excluded from the site outside of the breeding season following accepted protocols, and subject to the approval of the RCA and wildlife agencies.

BR-2. As feasible, vegetation clearing should be conducted outside of the nesting season, which is generally identified as February 1 through September 15. If avoidance of the nesting season is not feasible, then a qualified biologist shall conduct a nesting bird survey within three days prior to any disturbance of the site, including disking, demolition activities, and grading. If active nests are identified, the biologist shall establish suitable buffers around the nests, and the buffer areas shall be avoided until the nests are no longer occupied and the juvenile birds can survive independently from the nests.

Cultural Resources

CR-1: Prior to the issuance of a grading permit, the Project Applicant shall provide evidence to the City of Moreno Valley that a professional archaeological monitor has been retained by the Applicant to conduct monitoring of all mass grading and trenching activities and that the monitor has the authority to temporarily halt and redirect earthmoving activities in the event that suspected archaeological resources are unearthed during Project construction. The Project archaeologist, with input from the appropriate Tribe, shall prepare a Cultural Resources Monitoring Plan (CRMP) to document protocols for inadvertent finds, to determine potential protection measures from further damage and destruction for any identified archaeological resource(s)/ tribal cultural resources (TCRs), outline the process for monitoring and for completion of the final Phase IV Monitoring Report. If any archaeological and/or TCRs are identified during monitoring, these will also be documented and addressed per standard archaeological protocols in the Phase IV report, with the exception of human remains which will be addressed per CUL-5. The Project Archaeologist shall attend the pregrading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.

CR-2: At least 30 days prior to the issuance of a grading permit, the Applicant shall contact the appropriate Luiseño tribe to develop a Cultural Resources Treatment Agreement and shall provide evidence to the City of Moreno Valley that the professionally qualified Luiseño Native American monitor(s) has been secured from the interested tribe(s), and that the monitor shall be allowed to monitor all mass grading and trenching activities. The Tribal representative(s) shall attend the pre-grading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.

CR-3: If, during mass grading and trenching activities, the Archaeologist or Tribal representatives suspect that an archaeological resource and/or TCR may have been unearthed, the monitor identifying the potential resources, in consultation with the other monitor as appropriate, shall immediately halt and redirect grading operations in a 100-foot radius around the find to allow identification and evaluation of the suspected resource. The Native American monitor(s) or appropriate representative(s) and the archaeological monitor shall evaluate the suspected resource and make a determination of significance pursuant to California Public Resources Code Section 21083.2. The archaeological monitor and tribal monitor(s) or appropriate representative(s), the Project Applicant, and the City Planning Division shall confer regarding mitigation of the discovered resource(s). All sacred sites, should they be encountered within the Project area, shall be avoided and preserved as the preferred mitigation, if feasible.

CR-4: Prior to grading permit issuance, the City shall verify that the following note is included on the Grading Plan:

> "If any suspected archaeological resources are discovered during ground-disturbing activities and the archaeological monitor or Tribal representatives are not present, the construction supervisor is obligated to halt work in a 100-foot radius around the find and call the project archaeologist and the Tribal representatives to the site to assess the significance of the find."

CR-5: If human remains are encountered, California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the Riverside County Coroner has made the necessary findings as to origin. Further, pursuant to California Public Resources Code Section 5097.98(b), remains shall be left in place and free from disturbance until a final decision as to the treatment and disposition has been made by the Coroner. If the Riverside County Coroner determines the remains to be Native American, the California Native American Heritage Commission must be contacted within 24 hours. The Native American Heritage Commission must then immediately notify the "most likely descendant(s)" of receiving notification of the discovery. The most likely descendant(s) shall then make recommendations within 48 hours, and engage in consultations concerning the treatment of the remains as provided in Public Resources Code §5097.98.

CR-6: Prior to construction involving excavation four feet or more below existing surface grade, the construction contractor shall provide evidence that a qualified paleontologist has been retained, and that the paleontologist(s) shall be present during all grading and other significant ground-disturbing activities that reach four feet or more below existing surface grade. In the event fossiliferous deposits are encountered, the following measures shall be implemented:

- Monitoring shall be conducted by qualified paleontological monitor(s) of excavation in areas identified as likely to contain paleontological resources, including very old alluvial fan deposits. Paleontological monitors shall be equipped to salvage fossils as they are unearthed, to avoid construction delays, and to remove samples of sediments that are likely to contain the remains of small fossil invertebrates and vertebrates. Monitors shall be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring may be reduced if the potentially fossiliferous units are determined upon exposure and examination by qualified paleontological personnel to have low potential to contain fossil resources.

- Paleontological monitoring of any earthmoving will be conducted by a monitor, under direct guidance of a qualified paleontologist. Earthmoving in areas of the parcel where previously undisturbed sediments are buried, but not otherwise disturbed, will not be monitored.

- If too few fossil remains are found after 50 percent of the planned-for earthmoving has been completed, monitoring can be reduced or discontinued in those areas at the Project paleontologist's direction.

- Preparation of recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates.

- Identification and curation of specimens into a professional, fully accredited museum repository with permanent retrievable storage. The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities.

- Preparation or a report of findings with and appended itemized inventory of specimens. The report and inventory, when submitted to the city along with confirmation of the curation of recovered of recovered specimens into an established, accredited museum repository, will signify completion of the program to mitigate impacts to paleontological resources.

<u>Noise</u>

N-1: Construction activities shall be operated in a manner that limits noise impacts on surrounding uses (General Plan Policy 6.5.2). In order to limit noise impacts on surrounding property, the construction contractor will ensure the following:

- All construction equipment powered by gasoline or diesel engines will be required to have sound-control devices at least as effective as those originally provided by the manufacturer; no equipment will be permitted to have an unmuffled exhaust.
- Mobile noise-generating equipment and machinery will be shut off when not in use;

Construction vehicles assessing the site will be required to use the shortest possible route to and from local freeways, provided the routes do not expose additional receptors to noise.

N-2: The staging of construction equipment and the construction trailer shall be placed as far as possible from the existing single-family residences located to the west and south and the schools to the south.

Building and Safety Division

The following are general comments generated on the information provided and do not constitute a complete list of potential items or issues for this project proposal. Fee estimates for plan review and permits can be obtained by contacting the Building and Safety Division at 951.413.3350.

B1. All new structures shall be designed in conformance to the latest design standards adopted by the State of California in the California Building Code, (CBC) Part 2, Title 24, California Code of Regulations including requirements for allowable area, occupancy separations, fire suppression systems, etc. The current code edition is the 2016 CBC.

B2. The proposed project may be classified as an R-3/U occupancy and shall comply with the 2016 California Residential Code (CRC).

B3. Building plans submitted shall be signed and sealed by a California licensed design professional as required by the State Business and Professions Code.

B4. The proposed development may be subject to the payment of required development fees as required by the City's Fee Ordinance at the time an application is submitted or prior to the issuance of permits as determined by the City.

B5. The proposed project may be subject to approval by the Water District serving this location and all applicable fees and charges shall be paid to the District prior to permit issuance. Contact the appropriate water district for details.

B6. Prior to final inspection, all plans shall be placed on a CD Rom for reference and verification. Plans will include "as built" plans, revisions and changes. The CD will also include Title 24 energy calculations, structural calculations and all other pertinent information. It will be the responsibility of the developer and or the building or property owner(s) to bear all costs required for this process. The CD will be presented to the Building and Safety Division for review prior to final inspection and building occupancy. The CD will become the property of the Moreno Valley Building and Safety Division. In addition, a site plan showing the path of travel from public right of way with elevations will be required.

SCHOOL DISTRICT

S1. (BP) Prior to issuance of building permits, the developer shall provide to the Community & Economic Development Director a written certification by the affected school district that either: (1) the project has complied with the fee or other exaction levied on the project by the governing board of the district, pursuant to Government Code Section 65996; or (2) the fee or other requirement does not apply to the project.

UNITED STATES POSTAL SERVICE

PO1. (BP) Prior to the issuance of building permits, the developer shall contact the U.S. Postal Service to determine the appropriate type and location of mailboxes.

FIRE PREVENTION BUREAU

With respect to the conditions of approval, the following fire protection measures shall be provided in accordance with Moreno Valley City Ordinances and/or recognized fire protection standards:

F1. Prior to issuance of Certificate of Occupancy or Building Final, “Blue Reflective Markers” shall be installed to identify fire hydrant locations in accordance with City specifications. (CFC 509.1 and MVLT 440A-0 through MVLT 440C-0)

F2. During phased construction, dead end roadways and streets which have not been completed shall have a turn-around capable of accommodating fire apparatus. (CFC 503.1 and 503.2.5)

F3. If construction is phased, each phase shall provide an approved emergency vehicular access way for fire protection prior to any building construction. (CFC 501.4)

F4. Prior to construction and issuance of building permits, all locations where structures are to be built shall have an approved Fire Department emergency vehicular access road (all weather surface) capable of sustaining an imposed load of 80,000 lbs. GVW, based on street standards approved by the Public Works Director and the Fire Prevention Bureau. (CFC 501.4 and MV City Standard Engineering Plan 108d)

F5. Prior to construction and issuance of Building Permits, fire lanes and fire apparatus access roads shall have an unobstructed width of not less than twenty–four (24) feet as approved by the Fire Prevention Bureau and an unobstructed vertical clearance of not less the thirteen (13) feet six (6) inches. (CFC 503.2.1 and MVMC 8.36.060[E])

F6. Prior to construction, all roads, driveways and private roads shall not exceed 12 percent grade. (CFC 503.2.7 and MVMC 8.36.060[G])

F7. Prior to construction, all locations where structures are to be built shall have an approved Fire Department access based on street standards approved by the Public Works Director and the Fire Prevention Bureau. (CFC 501.4)

F8. Prior to building construction, dead end roadways and streets which have not been completed shall have a turnaround capable of accommodating fire apparatus. (CFC 503.2.5)

F9. The angle of approach and departure for any means of Fire Department access shall not exceed 1 ft drop in 20 ft (0.3 m drop in 6 m), and the design limitations of the fire apparatus of the Fire Department shall be subject to approval by the AHJ. (CFC 503 and MVMC 8.36.060)

F10. Prior to issuance of the building permit for development, independent paved access to the nearest paved road, maintained by the City shall be designed and constructed by the developer within the public right of way in accordance with City Standards. (MVMC 8.36.060, CFC 501.4)

F11. Prior to construction, “private” driveways over 150 feet in length shall have a turn-around as determined by the Fire Prevention Bureau capable of accommodating fire apparatus. Driveway grades shall not exceed 12 percent. (CFC 503 and MVMC 8.36.060, CFC 501.4)

F12. Prior to issuance of Certificate of Occupancy or Building Final, all <u>residential dwellings</u> shall display street numbers in a prominent location on the street side of the residence in such a position that the numbers are easily visible to approaching emergency vehicles. The numbers shall be located consistently on each dwelling throughout the development. The numerals shall be no less than four (4) inches in height and shall be low voltage lighted fixtures. (CFC 505.1, MVMC 8.36.060[I])

F13. Prior to issuance of Building Permits, the applicant/developer shall participate in the Fire Impact Mitigation Program. (Fee Resolution as adopted by City Council)

F14. Prior to issuance of Certificate of Occupancy or Building Final, the applicant/developer shall install a fire sprinkler system based on square footage and type of construction, occupancy or use. Fire sprinkler plans shall be submitted to the Fire Prevention Bureau for approval prior to installation. (CFC Chapter 9, MVMC 8.36.100[D])

F15. Prior to issuance of Building Permits, the applicant/developer shall furnish one copy of the water system plans to the Fire Prevention Bureau for review. Plans shall:

a) Be signed by a registered civil engineer or a certified fire protection engineer;
b) Contain a Fire Prevention Bureau approval signature block; and
c) Conform to hydrant type, location, spacing of new and existing hydrants and minimum fire flow required as determined by the Fire Prevention Bureau.

The required water system, including fire hydrants, shall be installed, made serviceable, and be accepted by the Moreno Valley Fire Department prior to beginning construction. They shall be maintained accessible.

Existing fire hydrants on public streets are allowed to be considered available. Existing fire hydrants on adjacent properties shall not be considered available unless fire apparatus access roads extend between properties and easements are established to prevent obstruction of such roads. (CFC 507, 501.3)

F16. Prior to construction, all traffic calming designs/devices must be approved by the Fire Marshal and City Engineer.

F17. Single Family Dwellings. Schedule "A" fire prevention approved standard fire hydrants (6” x 4” x 2 ½”) shall be located at each intersection of all residential streets. Hydrants shall be spaced no more than 500 feet apart in any direction so that no point on the street is more than 250 feet from a hydrant. Minimum fire flow shall be 1000 GPM for 1 hour duration of 20 PSI. Where new water mains are extended along streets where hydrants are not needed for protection of structures or similar fire problems, serving one and two-family residential developments, standard fire hydrants shall be provided at spacing not to exceed 1000 feet along the tract boundary for transportation hazards. (CFC 507.3, Appendix B, MVMC 8.36.060).

PUBLIC WORKS DEPARTMENT

Land Development Division

The following are the Public Works Department – Land Development Division Conditions of Approval for this project and shall be completed at no cost to any government agency. All questions regarding the intent of the following conditions shall be referred to the Land Development Division.

General Conditions

LD1. (G) The developer shall comply with all applicable City ordinances and resolutions including the City's Municipal Code (MC) and if subdividing land, the Government Code (GC) of the State of California, specifically Sections 66410 through 66499.58, said sections also referred to as the Subdivision Map Act (SMA). [MC 9.14.010]

LD2. (G) The tentative map shall correctly show all existing easements, traveled ways, and drainage courses. Any omission may require the map or plans associated with this application to be resubmitted for further consideration. [MC 9.14.040(A)]

LD3. (G) In the event right of way or offsite easements are required to construct offsite improvements necessary for the orderly development of the surrounding area to meet the public health and safety needs, the developer shall make a good faith effort to acquire the needed right of way in accordance with the Land Development Division's administrative policy. If unsuccessful, the Developer shall enter into an agreement with the City to acquire the necessary right of way or offsite easements and complete the improvements at such time the City acquires the right of way or offsite easements which will permit the improvements to be made. The developer shall be responsible for all costs associated with the right of way or easement acquisition. [GC 66462.5]

LD4. (G) If improvements associated with this project are not initiated within two (2) years of the date of approval of the Public Improvement Agreement (PIA), the City Engineer may require that the engineer's estimate for improvements associated with the project be modified to reflect current City construction costs in effect at the time of request for an extension of time for the PIA or issuance of a permit.

LD5. (G) The developer shall monitor, supervise and control all construction and construction supportive activities, so as to prevent these activities from causing a public nuisance, including but not limited to, insuring strict adherence to the following:

a. Removal of dirt, debris, or other construction material deposited on any public street no later than the end of each working day.

b. Observance of working hours as stipulated on permits issued by the Land Development Division.

c. The construction site shall accommodate the parking of all motor vehicles used by persons working at or providing deliveries to the site.

d. All dust control measures per South Coast Air Quality Management District (SCAQMD) requirements during the grading operations.

Violation of any condition, restriction or prohibition set forth in these conditions shall subject the owner, applicant, developer or contractor(s) to remedy as noted in City Municipal Code 8.14.090. In addition, the City Engineer or Building Official may suspend all construction related activities for violation of any condition, restriction or prohibition set forth in these conditions until such time as it has been determined that all operations and activities are in conformance with these conditions.

LD6. (G) The developer shall protect downstream properties from damage caused by alteration of drainage patterns (i.e. concentration or diversion of flow, etc.). Protection shall be provided by constructing adequate drainage facilities, including, but not limited to, modifying existing facilities or by securing a drainage easement. [MC 9.14.110]

LD7. (G) Public drainage easements, when required, shall be a minimum of 25 feet wide and shall be shown on the map and plan, and noted as follows: *"Drainage Easement – no structures, obstructions, or encroachments by landfills are allowed."* In addition, the grade within the easement area shall not exceed a 3:1 (H:V) slope, unless approved by the City Engineer.

LD8. (G) For single family residential subdivisions, all lots shall drain toward the street unless otherwise approved by the City Engineer. Residential lot drainage to the street shall be by side yard swales, and must be directed to a driveway or drainage devices located outside the right of way in accordance with City Standard MVSI-154-0. No cross-lot or over the sidewalk drainage shall be allowed.

LD9. (G) Prior to any plan approval, a final detailed drainage study (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer. The study shall include existing and proposed hydrologic conditions as well as hydraulic calculations for all drainage control devices and storm drain lines. [MC 9.14.110(A.1)]. A digital (pdf) copy of the approved drainage study shall be submitted to the Land Development Division.

LD10. (G) Water quality best management practices (BMPs) designed to meet Water Quality Management Plan (WQMP) requirements for single-family residential development shall not be used as a construction BMP. Water quality BMPs shall be maintained for the entire duration of the project construction and be used to treat runoff from those developed portions of the project. Water quality BMPs shall be protected from upstream construction related runoff by having proper best management practices in place and maintained. Water quality BMPs shall be graded per the approved design plans and once landscaping and irrigation has been installed, it and its maintenance shall be turned over to an established Homeowner's Association (HOA). The Homeowner's Association shall enter into an agreement with the City for basin maintenance.

LD11. (G) The final approved conditions of approval (COAs) and any applicable Mitigation Measures issued by the Planning Division shall be photographically or electronically placed on Mylar sheets and included in the Grading and Street Improvement plans.

LD12. (G) Aggregate slurry, as defined in Section 203-5 of Standard Specifications for Public Works Construction, may be required just prior to the end of the one-year warranty period of the public streets at the discretion of the City Engineer. If slurry is required, a slurry mix design shall be submitted for review and approved by the City Engineer. The latex additive shall be Ultra Pave 70 (for anionic) or Ultra Pave 65 K (for cationic) or an approved equal per the geotechnical report. The latex shall be added at the emulsion plant after weighing the asphalt and before the addition of mixing water. The latex shall be added at a rate of two to two-and-one-half (2 to 2½) parts to one-hundred (100) parts of emulsion by volume. Any existing striping shall be removed prior to slurry application and replaced per City standards.

<u>Prior to Grading Plan Approval</u>

LD13. (GPA) Grading plans (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

LD14. (GPA) Landscape & Irrigation plans (prepared by a registered/licensed landscape architect) for water quality BMPs shall be submitted for review and approved by the City Engineer per the current submittal requirements, if applicable.

LD15. (GPA) The developer shall ensure compliance with the City Grading ordinance, these Conditions of Approval and the following criteria:

a. The project street and lot grading shall be designed in a manner that perpetuates the existing natural drainage patterns with respect to tributary drainage area and outlet points. Unless otherwise approved by the City Engineer, lot lines shall be located at the top of slopes.

b. Any grading that creates cut or fill slopes adjacent to the street shall provide erosion control, sight distance control, and slope easements as approved by the City Engineer.

c. All improvement plans are substantially complete and appropriate clearance letters are provided to the City.

d. A soils/geotechnical report (addressing the soil's stability and geological conditions of the site) shall be submitted to the Land Development Division for review. A digital (pdf) copy of the soils/geotechnical report shall be submitted to the Land Development Division.

LD16. (GPA) The developer shall select Low Impact Development (LID) Best Management Practices (BMPs) designed per the latest version of the Water Quality Management Plan (WQMP) - a guidance document for the Santa Ana region of Riverside County.

LD17. (GPA) For projects that will result in discharges of storm water associated with construction with a soil disturbance of one or more acres of land, the developer shall submit a Notice of Intent (NOI) and obtain a Waste Discharger's Identification number (WDID#) from the State Water Quality Control Board (SWQCB) which shall be noted on the grading plans.

LD18. (GPA) Two (2) copies of the final project-specific Water Quality Management Plan (WQMP) shall be submitted for review and approved by the City Engineer, which:

a. Addresses Site Design Best Management Practices (BMPs) such as minimizing impervious areas, maximizing permeability, minimizes directly connected impervious areas to the City's street and storm drain systems, and conserves natural areas;

b. Incorporates Source Control BMPs and provides a detailed description of their implementation;

c. Describes the long-term operation and maintenance requirements for BMPs requiring maintenance; and

d. Describes the mechanism for funding the long-term operation and maintenance of the BMPs.

A copy of the final WQMP template can be obtained on the City's Website or by contacting the Land Development Division. A digital (pdf) copy of the approved final project-specific Water Quality Management Plan (WQMP) shall be submitted to the Land Development Division.

LD19. (GPA) A Storm Water Pollution Prevention Plan (SWPPP) shall be prepared in conformance with the State's current Construction Activities Storm Water General Permit. A copy of the current SWPPP shall be kept at the project site and be available for review upon request.

LD20. (GPA) The developer shall pay all remaining plan check fees.

LD21. (GPA) Resolution of all drainage issues shall be as approved by the City Engineer.

<u>Prior to Grading Permit</u>

LD22. (GP) The developer shall submit recorded slope easements from adjacent property owners in all areas where grading resulting in slopes is proposed to take place outside of the project boundaries. For all other offsite grading, written permission from adjacent property owners shall be submitted.

LD23. (GP) A receipt showing payment of the Area Drainage Plan (ADP) fee to Riverside County Flood Control and Water Conservation District shall be submitted. [MC 9.14.100(O)]

LD24. (GP) Security, in the form of a cash deposit (preferable), or letter of credit shall be submitted as a guarantee of the completion of the grading operations for the project. [MC 8.21.070]

LD25. (GP) Security, in the form of a cash deposit (preferable), or letter of credit shall be submitted as a guarantee of the implementation and maintenance of erosion control measures. At least twenty-five (25) percent of the required security shall be in the form of a cash deposit with the City. [MC 8.21.160(H)]

LD26. (GP) The developer shall pay all applicable inspection fees.

LD27. (GP) A digital (pdf) copy of the approved grading plans shall be submitted to the Land Development Division.

Prior to Map Approval

LD28. (MA) Final maps (prepared by a registered civil engineer and/or licensed surveyor) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

LD29. (MA) Resolution of all drainage issues shall be as approved by the City Engineer.

LD30. (MA) A copy of the Covenants, Conditions and Restrictions (CC&Rs) shall be submitted for review and approved by the City Engineer. The CC&Rs shall include, but not be limited to, access easements, reciprocal access, private and/or public utility easements as may be relevant to the project. In addition, for single-family residential development, bylaws and articles of incorporation shall also be included as part of the maintenance agreement for any water quality BMPs.

LD31. (MA) All street dedications shall be free of all encumbrances, irrevocably offered to the public and shall continue in force until the City accepts or abandons such offers, unless otherwise approved by the City Engineer.

LD32. (MA) The developer shall guarantee the completion of all related improvements required for this project by executing a Public Improvement Agreement (PIA) with the City and posting the required security. [MC 9.14.220]

LD33. (MA) All public improvement plans required for this project shall be approved by the City Engineer in order to execute the Public Improvement Agreement (PIA).

LD34. (MA) The developer shall enter into a Cooperative Agreement with the City and Riverside County Flood Control and Water Conservation District establishing the terms and conditions covering the inspection, operation and maintenance of Master Drainage Plan facilities required to be constructed as part of the project.

LD35. (MA) The developer shall comply with the requirements of the City Engineer based on recommendations of the Riverside County Flood Control District regarding the construction of County Master Plan Facilities.

LD36. (MA) If the project involves the subdivision of land, maps may be developed in phases with the approval of the City Engineer. Financial security shall be provided for all public improvements associated with each phase of the map. The boundaries of any multiple map increment shall be subject to the approval of the City Engineer. If the project does not involve the subdivision of land and it is necessary to dedicate right of way/easements, the developer shall make the appropriate offer of dedication by separate instrument. In either case, the City

Engineer may require the dedication and construction of necessary utility, street or other improvements beyond the project boundary, if the improvements are needed for circulation, parking, access, or for the welfare or safety of the public. [MC 9.14.080(B)(C), GC 66412 & 66462.5]

LD37. (MA) All proposed street names shall be submitted for review and approved by the City Engineer, if applicable. [MC 9.14.090(E.2.k)]

LD38. (MA) Under the current permit for storm water activities required as part of the National Pollutant Discharge Elimination System (NPDES) as mandated by the Federal Clean Water Act, this project is subject to the following requirements:

a. Establish a Home Owners Association (HOA) to finance the maintenance of the “Water Quality BMPs”. Any lots which are identified as “Water Quality BMPs” shall be owned in fee by the HOA.

b. Dedicate a maintenance easement to the City of Moreno Valley.

c. Execute a maintenance agreement between the City of Moreno Valley and the HOA, which shall be approved by City Council.

d. Establish a trust fund per the terms of the maintenance agreement.

e. Provide a certificate of insurance per the terms of the maintenance agreement.

f. Select one of the following options to meet the financial responsibility to provide storm water utilities services for the required continuous operation, maintenance, monitoring system evaluations and enhancements, remediation and/or replacement, all in accordance with Resolution No. 2002-46.

   i. Participate in the mail ballot proceeding in compliance with Proposition 218, for the Residential NPDES Regulatory Rate Schedule and pay all associated costs with the ballot process, or

   ii. Establish an endowment to cover future maintenance costs for the Residential NPDES Regulatory Rate Schedule.

g. Notify the Special Districts Division of the intent to record the final map 90 days prior to City Council action authorizing recordation of the final map and the financial option selected. The final option selected shall be in place prior to the issuance of certificate of occupancy. [California Government Code & Municipal Code]

LD39. (MA) After recordation, a digital (pdf) copy of the recorded map shall be submitted to the Land Development Division.

Prior to Improvement Plan Approval

LD40. (IPA) All public improvement plans (prepared by a licensed/registered civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

LD41. (IPA) The developer shall submit clearances from all applicable agencies, and pay all applicable plan check fees.

LD42. (IPA) The street improvement plans shall comply with current City policies, plans and applicable City standards (i.e. MVSI-160 series, etc.) throughout this project.

LD43. (IPA) The design plan and profile shall be based upon a centerline, extending beyond the project boundaries a minimum distance of 300 feet at a grade and alignment approved by the City Engineer.

LD44. (IPA) The plans shall indicate any restrictions on trench repair pavement cuts to reflect the City's moratorium on disturbing newly-constructed pavement less than three (3) years old and recently slurry sealed streets less than one (1) year old. Pavement cuts for trench repairs may be allowed for emergency repairs or as specifically approved by the City Engineer.

LD45. (IPA) All dry and wet utilities shall be shown on the plans and any crossings shall be potholed to determine actual location and elevation. Any conflicts shall be identified and addressed on the plans. The pothole survey data shall be submitted to Land Development with the public improvement plans for reference purposes only. The developer is responsible to coordinate with all affected utility companies and bear all costs of any utility relocation.

LD46. (IPA) The developer is required to bring any existing access ramps adjacent to and fronting the project to current ADA (Americans with Disabilities Act) requirements. However, when work is required in an intersection that involves or impacts existing access ramps, all access ramps in that intersection shall be retrofitted to comply with current ADA requirements, unless approved otherwise by the City Engineer.

LD47. (IPA) Drainage facilities (i.e. catch basins, etc.) with sump conditions shall be designed to convey the tributary 100-year storm flows. Secondary emergency escape shall also be provided.

LD48. (IPA) The hydrology study shall be designed to accept and properly convey all off-site drainage flowing onto or through the site. All storm drain design and improvements shall be submitted for review and approved of the City Engineer. In the event that the City Engineer permits the use of streets for drainage purposes, the provisions of current City standards shall apply. Should the quantities exceed the street capacity or the use of streets be prohibited for drainage purposes, as in the case where one travel lane in each direction shall not be used for drainage conveyance for emergency vehicle access on streets classified as minor arterials and greater, the developer shall provide adequate facilities as approved by the City Engineer. [MC 9.14.110 A.2]

Prior to Encroachment Permit

LD49. (EP) All work performed within public right of way requires an encroachment permit. Security (in the form of a cash deposit or other approved means) may be required as determined by the City Engineer. For non-subdivision projects, the City Engineer may require the execution of a Public Improvement

Agreement (PIA) as a condition of the issuance of a construction or encroachment permit. All inspection fees shall be paid prior to issuance of construction permit. [MC 9.14.100(C.4)]

LD50. (EP) A digital (pdf) copy of all approved improvement plans shall be submitted to the Land Development Division.

LD51. (EP) All applicable inspection fees shall be paid.

Prior to Building Permit

LD52. (BP) For all subdivision projects, the map shall be recorded (excluding model homes). [MC 9.14.190]

LD53. (BP) Certification to the line, grade, flow test, and system invert elevations for the water quality control BMPs shall be submitted or review and approved by the City Engineer (excluding models homes).

LD54. (BP) An engineered-fill certification, rough grade certification and compaction report shall be submitted for review and approved by the City Engineer. A digital (pdf) copy of the approved compaction report shall be submitted to the Land Development Division. All pads shall meet pad elevations per approved grading plans as noted by the setting of "blue-top" markers installed by a registered land surveyor or licensed civil engineer.

Prior to Occupancy

LD55. (CO) All required as-built plans (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

LD56. (CO) The engineered final/precise grade certification shall be submitted for review and approved by the City Engineer.

LD57. (CO) All outstanding fees shall be paid.

LD58. (CO) The developer shall complete all public improvements in conformance with current City standards, except as noted in the Special Conditions, including but not limited to the following:

a. Street improvements including, but not limited to: pavement, base, curb and/or gutter, cross gutters, spandrel, sidewalks, drive approaches, pedestrian ramps, street lights, signing, striping, under sidewalk drains, landscaping and irrigation, medians, redwood header boards, pavement tapers/transitions and traffic control devices as appropriate.

b. Storm drain facilities including, but not limited to: storm drain pipe, storm drain laterals, open channels, catch basins and local depressions.

c. City-owned utilities.

d. Sewer and water systems including, but not limited to: sanitary sewer, potable water and recycled water.

e. Under grounding of all existing and proposed utilities adjacent to and on-site. [MC 9.14.130]

f. Relocation of overhead electrical utility lines including, but not limited to: electrical, cable and telephone.

LD59. (CO) For residential subdivisions, prior to releasing the last 20% or last 5 permitted structures (whichever is greater, unless otherwise determined by the City Engineer) of any Map Phase, punch list work for improvements and capping of streets in that phase shall be completed and approved for acceptance by the City Engineer.

LD60. (CO) The Developer shall comply with the following water quality related items:

a. Notify the Land Development Division prior to construction and installation of all structural BMPs so that an inspection can be performed.

b. Demonstrate that all structural BMPs described in the approved final project-specific WQMP have been constructed and installed in conformance with the approved plans and specifications;

c. Demonstrate that Developer is prepared to implement all non-structural BMPs described in the approved final project-specific WQMP; and

d. Demonstrate that an adequate number of copies of the approved final project-specific WQMP are available for future owners/occupants.

e. Clean and repair the water quality BMP's, including re-grading to approved civil drawings if necessary.

f. Provide City with updated Engineer's Line and Grade Certification.

g. Obtain approval and complete installation of the irrigation and landscaping.

LD61. (CO) The applicant shall ensure the following, pursuant to Section XII. I. of the 2010 NPDES Permit:

a. Field verification that structural Site Design, Source Control and Treatment Control BMPs are designed, constructed and functional in accordance with the approved Final Water Quality Management Plan (WQMP).

b. Certification of best management practices (BMPs) from a state licensed civil engineer. An original WQMP BMP Certification shall be submitted for review and approved by the City Engineer.

<u>Special Conditions</u>

LD62. (GP) Prior to the payment of the Development Impact Fee (DIF), the developer may enter into a DIF Improvement Credit Agreement to secure credit for the construction of applicable improvements. The Agreement must submitted prior to the issuance of a grading permit and must be approved by the City Council prior to receiving credit for applicable improvements. If the developer fails to complete this agreement prior to the timing specified above, no credits will be given. The developer shall pay current DIF fees adopted by the City Council. [Ord. 695 § 1.1 (part), 2005] [MC 3.38.030, 040, 050]

LD63. (GP) Prior to the payment of the Transportation Uniform Mitigation Fee (TUMF), the developer may enter into a TUMF Improvement Credit Agreement to secure credit for the construction of applicable improvements. The Agreement must submitted prior to the issuance of a grading permit and must be approved by the City Council prior to receiving credit for applicable improvements. If the developer fails to complete this agreement by the timing specified above, no credits will be given. The developer shall pay current TUMF fees adopted by the City Council. [Ord. 835 § 2.1, 2012] [MC 3.44.060]

LD64. Prior to final map approval, the map shall show the following:

a. The appropriate right-of-way dedication along Indian Street frontage shown as Lot S on the tentative tract map. This includes right-of-way required for a bus turn-out as conditioned by the Transportation Engineering Division.
b. The appropriate right-of-way dedication on Santiago Drive frontage shown as Lots Q and R on the tentative tract map.
c. The appropriate right-of-way dedication on Gentian Street frontage shown as Lot D on the tentative parcel map.
d. A 10-foot landscape easement along the east side of Indian Street and south side of Gentian Avenue.
e. A 1.5-foot landscape easement along the north side of Santiago Drive.

LD65. Prior to final map approval, the Developer shall guarantee the construction of the following improvements by entering into a public improvement agreement and posting security. The improvements along the project frontage shall be completed prior to occupancy of the first building or as otherwise determined by the City Engineer:

a. Indian Street, Minor Arterial, City Standard MVSI-105A-0 (88-foot RW / 64-foot CC) shall be constructed to complete the half-width along the entire project's east frontage. Remaining improvements shall consist of, but not be limited to pavement and base, sidewalk, catch basin, streetlights, pedestrian access ramps, and dry and wet utilities. In addition, the applicant will be required to install, replace and/or repair any missing, damaged or substandard improvements that do not meet current City standards.
b. Santiago Drive (east), Collector, City Standard MVSI-106B-0 (66-foot RW / 44-foot CC) shall be constructed to half-width plus an additional 12 feet south of the centerline from Street "L" to the project easterly boundary and half-width plus an additional 18 feet south of the centerline from the project easterly boundary to Perris Boulevard. Improvements shall consist of, but not be limited to, pavement and base, curb, gutter, sidewalk, driveway approaches, catch basins, storm drain, streetlights, pedestrian access ramps, and dry and wet utilities.
c. Santiago Drive (west), Collector, City Standard MVSI-106B-0 (66-foot RW / 44-foot CC) shall be constructed to full-width between Indian Street and

Street "N". Improvements shall consist of, but not be limited to, pavement and base, curb, gutter, sidewalk, driveway approaches, catch basins, storm drain, streetlights, pedestrian access ramps, and dry and wet utilities.

d. Gentian Street, Minor Arterial (modified), City Standard MVSI-105A-0 (88-foot RW / 64-foot CC) shall be constructed to half-width plus an additional 18 feet north of the centerline, along the entire project's north frontage. Improvements shall consist of, but not be limited to, a raised median, pavement and base, curb, gutter, sidewalk, catch basins, streetlights, pedestrian access ramps, dry and wet utilities.

e. Street "D", Local Street (modified), City Standard MVSI-107A-0 (56-foot RW / 36-foot CC) shall be constructed to full-width as shown on the tentative map. Improvements shall consist of, but not be limited to, pavement and base, curb, gutter, sidewalk, catch basins, storm drain streetlights, pedestrian access ramps, dry and wet utilities.

f. Street "L", Collector (modified), City Standard MVSI-106B-0 (66-foot RW / 40-foot CC) shall be constructed to full-width as shown on the tentative map. Improvements shall consist of, but not be limited to, pavement and base, curb, gutter, sidewalk, catch basins, storm drain, streetlights, pedestrian access ramps, dry and wet utilities.

g. Streets "A", "B", "C", "E", "F", "G", "H", "I", "J", "K" "M", "N", "O", and "P", Local Street, City Standard MVSI-107A-0 (56-foot RW / 36-foot CC) shall be constructed to full-width as shown on the tentative map. Improvements shall consist of, but not be limited to, pavement and base, curb, gutter, sidewalk, catch basins, storm drain streetlights, pedestrian access ramps, dry and wet utilities.

h. All knuckles and cul-de-sacs shall be constructed per City Standards MVSI-162-0 and MVSI-163A-0, respectively.

i. Sunnymead Master Drainage Plan (MDP) Line M-2 within the public right-of-way in Santiago Drive, Perris Boulevard and Iris Avenue or an alignment as approved by both the RCFC&WCD and the City. This includes, but not limited to, construction of a 39-inch minimum storm drain, laterals, catch basins/inlets, and local depressions as needed.

j. The intersection of Perris Boulevard and Santiago Drive shall be fully improved to the ultimate right-of-way and street width in order to construct a traffic signal required by the Transportation Engineering Division condition TE8.

LD66. Lettered Lots "AA" and "DD" shall be designated for water quality bio-retention purposes and shall be reserved in fee title for the owner, heirs and assigns.

LD67. Lettered Lots "CC" and "HH" shall be designated for park purposes and reserved per the Parks and Community Services Department requirements.

LD68. Lettered Lots "BB", "EE", "FF", "GG", "II", "JJ", "KK", "LL" "MM", and "NN", shall be designated open space and reserved in fee title for the owner, heirs and assigns.

LD69. Lettered Lots “BB”, “EE”, and “FF” shall show a 25-foot drainage easement for storm drain maintenance purposes.

LD70. Prior to the final map approval, the developer shall secure the following:

a. Additional right-of-way along the south side of Santiago Drive (east) between Street “L” and approximately 650 feet east of Street “L” for the construction of an eastbound travel lane as shown on the tentative map. The dedication shall be submitted for review, approval, and recorded.
b. Additional right-of-way between Indian Street and Street “N” for the full construction of Santiago Drive (west) as shown on the tentative map. The dedication shall be submitted for review, approval, and recorded.
c. Vacation of a portion of the south side of Santiago Drive (west), including utilities and drainage easements, as shown on the approved tentative tract map and as approved by City Engineer

LD71. Prior to rough grading plan approval, this project shall demonstrate, via a final drainage study, that the increased runoff resulting from the development of this site is mitigated. During no storm event shall the flow leaving the site in the developed condition be larger than that of the pre-developed condition, unless the study demonstrates that the existing or proposed drainage facilities can accommodate the increased run-off. The drainage study shall analyze the following events: 1, 3, 6 and 24-hour duration events for the 2, 5, 10 and 100-year storm events. The applicant understands that additional detention measures may be required beyond those shown on the tentative map and preliminary drainage study.

LD72. Prior to rough grading plan approval, the Applicant shall prepare and submit for approval a final, project-specific water quality management plan (F-WQMP). The F-WQMP shall be consistent with the approved P-WQMP, as well as in full conformance with the document; “Water Quality Management Plan - A Guidance Document for the Santa Ana Region of Riverside County” dated October 22, 2012. The F-WQMP shall be submitted and approved prior to application for and issuance of grading permits. At a minimum, the F-WQMP shall include the following: stormwater BMPs; LID principles; Source control BMPs; Operation and Maintenance requirements for BMPs; and sources of funding for BMP implementation.

a. The Applicant has proposed to incorporate the use of two (2) bio-retention basins. Final design and sizing details of all BMPs must be provided in the first submittal of the F-WQMP. The Applicant acknowledges that more area than currently shown on the plans may be required to treat site runoff as required by the WQMP guidance document.
b. All proposed LID BMP’s shall be designed in accordance with the RCFC&WCD’s Design Handbook for Low Impact Development Best Management Practices, dated September 2011.
c. The proposed LID BMP’s as identified in the project-specific P-WQMP shall be incorporated into the Final WQMP.

d. The NPDES notes per City Standard Drawing No. MVFE-350-0 shall be included in grading plans.
e. Post-construction treatment control BMPs, once placed into operation for post-construction water quality control, shall not be used to treat runoff from construction sites or unstabilized areas of the site.

LD73. Prior to precise grading plan approval, emergency overflow area(s) shall be shown at all applicable drainage improvement locations in the event that the drainage improvement fails or exceeds full capacity. This may include, but not be limited to, an emergency spillway in the proposed detention basin(s).

LD74. Prior to issuance of a building permit, the precise grading plans shall be approved.

LD75. Prior to street improvement plan approval, all dry and wet utilities shall be shown on the plans and any crossings shall be potholed to determine actual location and elevation. Any conflicts shall be identified and addressed on the plans. The pothole survey data shall be submitted to Land Development with the public improvement plans for reference purposes only. The developer is responsible to coordinate with all affected utility companies and bear all costs of any utility relocation.

LD76. Prior to occupancy, all overhead utility lines less than 115,000 volts fronting or within the entire project site boundary shall be placed underground per Section 9.14.130C of the City Municipal Code.

LD77. The Applicant shall, prior to building or grading permit closeout or the issuance of a certificate of occupancy, demonstrate:

a. That all structural BMPs have been constructed and installed in conformance with the approved plans and specifications;
b. That all structural BMPs described in the F-WQMP have been implemented in accordance with approved plans and specifications;
c. That the Applicant is prepared to implement all non-structural BMPs included in the F-WQMP, conditions of approval, and building/grading permit conditions; and
d. That an adequate number of copies of the approved F-WQMP are available for the future owners/occupants of the project.

LD78. Prior to occupancy, as-built street improvement plans, storm drain plans and precise grading plans shall be submitted for review and approved.

Special Districts Division

Conditions are standard to all or most development projects. Some special conditions, modified conditions or clarification of conditions may be included. Please review conditions as listed and contact the Division at 951.413.3480 for any questions.

Acknowledgement of Conditions

The following are the Special Districts Division's Conditions of Approval for PA14-0052 and PA14-0053; this project shall be completed at no cost to any Government Agency. All questions regarding the following Conditions including but not limited to intent, requests for change/modification, variance and/or request for extension of time shall be sought from the Special Districts Division of the Public Works Department 951.413.3480 or by emailing specialdistricts@moval.org.

General Conditions

SD-1 The parcel(s) associated with this project have been incorporated into the Moreno Valley Community Services District Zone A (Parks & Community Services) and Zone C (Arterial Street Lighting). All assessable parcels therein shall be subject to annual parcel taxes for Zone A and Zone C for operations and capital improvements.

SD-2 Plans for external parkway and median landscape areas designated in the project's Conditions of Approval for incorporation into a City coordinated landscape maintenance program, shall be prepared and submitted in accordance with the City of Moreno Valley Public Works Department Landscape Design Guidelines. The guidelines are available on the City's website at www.moval.org/sd or from the Special Districts Division (951.413.3480 or specialdistricts@moval.org).

SD-3 In the event the City of Moreno Valley determines that funds authorized by any Proposition 218 mail ballot proceeding are insufficient to meet the costs for external parkway maintenance and utility charges, the City shall have the right, at its option, to terminate the grant of any or all parkway maintenance easements. This power of termination, should it be exercised, shall be exercised in the manner provided by law to quit claim and abandon the property so conveyed to the District, and to revert to the Developer or the Developer's successors in interest, all rights, title, and interest in said parkway areas, including but not limited to responsibility for perpetual maintenance of said areas.

SD-4 The Developer, or the Developer's successors or assignees shall be responsible for all parkway and median landscape maintenance for a period of one (1) year commencing from the time all items of work have been completed to the satisfaction of Special Districts staff as per the City of Moreno Valley Public Works Department Landscape Design Guidelines, or until such time as the District accepts maintenance responsibilities.

SD-5 Any damage to existing landscape areas maintained by the City of Moreno Valley due to project construction shall be repaired/replaced by the Developer, or Developer's successors in interest, at no cost to the City of Moreno Valley.

SD-6 The ongoing maintenance of any internal parkway landscaping required to be installed within the tract shall be the responsibility of the Home Owner's Association.

SD-7 Plan check fees for review of parkway/median landscape plans for improvements that shall be maintained by the City of Moreno Valley are due upon the first plan submittal. (MC 3.32.040)

SD-8 Inspection fees for the monitoring of landscape installation associated with the City of Moreno Valley maintained parkways/medians are due prior to the required pre-construction meeting. (MC 3.32.040)

SD-9 Street Light Authorization forms for all street lights that are conditioned to be installed as part of this project must be submitted to the Special Districts Division for approval, <u>prior to</u> street light installation. The Street Light Authorization form can be obtained from the utility company providing electric service to the project, either Moreno Valley Utility or Southern California Edison. For questions, contact the Special Districts Division at 951.413.3480 or specialdistricts@moval.org.

SD-10 Parkway and median landscape areas maintained as part of the City of Moreno Valley Community Facilities District 2014-01 shall be required to have independent utility systems, including but not limited to water, electric, and telephone services. An independent irrigation controller and pedestal will also be required. Combining utility systems with existing or future landscape areas not associated with the City of Moreno Valley Community Facilities District (CFD) landscaping will not be permitted.

<u>Prior to Grading Permit</u>

SD-11 This project is included within the future annexation boundaries for Community Facilities District No. 7 (CFD No. 7) – Improvement Area No. 3. <u>If Bonds have been sold for CFD No. 7 – Improvement Area No. 3</u>, then the Local Component portion of the Area Drainage Plan (ADP) fee for Riverside County Flood Control and Water Conservation District (RCFCWCD) has been allocated toward the debt service payments on CFD No. 7 bonds and/or paid directly for acquisition of RCFCD facilities.

In order for the Developer to meet its financial obligation, it must notify the Special Districts Division when submitting the application for grading permit and select one of the funding options outlined below.

Or

If a grading permit is not required, the Developer must notify the Special Districts Division at 951.413.3480 or specialdistricts@moval.org when submitting the application for building permit issuance and select one of the funding options outlined below.

a. Participate in a special election to annex into CFD No. 7 and pay the equivalent to the Local Component portion of the ADP fee including interest as a special tax levied annually on the Riverside County property tax bill; or

b. Pay the Local Component portion of the ADP fee directly to the City of Moreno Valley, Special Districts Division which shall be used for any authorized purpose for CFD No. 7.

If the funding option selected is participation in a special election, a minimum of 90 days is needed to complete the special election process. This allows adequate time to complete the special election process in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

Annexation to CFD No. 7 shall be completed or proof of payment of the Local Component portion of the ADP fee shall be provided to the Special Districts Division prior to the issuance of the first building permit for this project.

Prior to Recordation of Final Map

SD-12 (R) This project has been conditioned to provide a funding source for the continued maintenance, enhancement, and/or retrofit of parks, open spaces, linear parks, and/or trail systems. The Developer shall satisfy this condition with one of the options below.

a. Participate in a special election for annexation into Community Facilities District No. 1 and pay all associated costs of the special election process and formation, if any; or

b. Establish an endowment fund to cover future maintenance costs for new neighborhood parks.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option prior to City Council action authorizing recordation of the final map for the development. A minimum of 90 days is needed to complete the special election process. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

Annexation to CFD No. 1 shall be completed or proof of payment to establish the endowment fund shall be provided prior to the issuance of the first building permit for this project.

SD-13 (R) This project has been identified to be included in the formation of a Community Facilities District for Public Safety services including but not limited to Police, Fire Protection, Paramedic Services, Park Rangers, and Animal Control services. The property owner(s) shall not protest the formation; however, they retain the right to object to the rate and method of maximum special tax. In compliance with Proposition 218, the property owner shall agree to approve the mail ballot proceeding (special election) for either formation of the CFD or annexation into an existing district that may already be established. The Developer must notify the Special Districts Division at 951.413.3480 or specialdistricts@moval.org of its intent to record the final map for the development 90 days prior to City Council action authorizing recordation of the map. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution. (California Government Code Section 53313 et. seq.)

SD-14 (R) This project is conditioned to provide a funding source for the following special financing program(s):

a. Street Lighting Services for capital improvements, energy charges, and maintenance.
b. Landscape Maintenance Services for external parkway and median landscaping on Indian Street, Gentian Avenue, and Santiago Drive.

The Developer's responsibility is to provide a funding source for the capital improvements and the continued maintenance of the landscaped area. The Developer shall satisfy this condition with one of the options below.

i. Participate in a special election (mail ballot proceeding) and pay all associated costs of the special election and formation, if any. Financing may be structured through a Community Services District zone, Community Facilities District, Landscape and Lighting Maintenance District, or other financing structure as determined by the City; or

ii. Establish a Property Owner's Association or Home Owner's Association which will be responsible for any and all operation and maintenance costs.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option prior to City Council action authorizing recordation of the final map for the development. The option for participating in a special election requires approximately 90 days to complete the special election process. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

The financial option selected shall be in place prior to the issuance of the first building permit for this project.

SD-15 (R) This project is conditioned to provide a funding source for the operation and maintenance of public improvements and/or services associated with new development in that territory. The Developer shall satisfy this condition with one of the options below.

a. Participate in a special election for maintenance/services and pay all associated costs of the election process and formation, if any. Financing may be structured through a Community Facilities District, Landscape and Lighting Maintenance District, or other financing structure as determined by the City; or

b. Establish an endowment fund to cover the future maintenance and/or service costs.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option prior to City Council action authorizing recordation of the final map for the development. A minimum of 90 days is needed to complete the special election process. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

The financial option selected shall be in place prior to the issuance of the first building permit for the project.

SD-16 *Residential* (R) If Land Development, a Division of the Public Works Department, requires this project to supply a funding source necessary to provide for, but not limited to, stormwater utilities services for the required continuous operation, maintenance, monitoring, systems evaluation and enhancements of on-site facilities and performing annual inspections of the affected areas to ensure compliance with state mandated storm water regulations, a funding source needs to be established. The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option for the National Pollution Discharge Elimination System (NPDES) program (see Land Development's related condition). Participating in a special election the process requires a 90 day period prior to City Council action authorizing recordation of the final map for the development and to participate in a special election process. This allows adequate time to be in compliance with the provisions of Article 13D of the California Constitution. California Health and Safety Code Sections 5473 through 5473.8 (Ord. 708 Section 3.1, 2006) & City of Moreno Valley Municipal Code Title 3, Section 3.50.050.)

SD-17 (R) Easements for reverse frontage parkway areas abutting Indian Street, Gentian Avenue, and Santiago Drive shall be 6 ft. or to top of parkway facing slope or to face of perimeter tract wall, whichever is greater. Easements shall be dedicated to the City of Moreno Valley for landscape maintenance purposes, and shall be depicted on the final map, and an offer of their dedication made thereon.

SD-18 (R) Prior to the recordation of the final map, the Developer shall provide all necessary documents to convey to the City the required easements for parkway and/or slope maintenance as specified on the tentative map or in these Conditions of Approval.

Prior to Building Permit Issuance

SD-19 (BP) Prior to the issuance of the first building permit for this project, the Developer shall pay Advanced Energy fees for all applicable Residential and Arterial Street Lights required for this development. Payment shall be made to the City of Moreno Valley and collected by the Land Development Division. Fees are based upon the Advanced Energy fee rate in place at the time of payment, as set forth in the current Listing of City Fees, Charges, and Rates adopted by City Council. The Developer shall provide a copy of the receipt to the Special Districts Division *(specialdistricts@moval.org).* Any change in the project which may increase the number of street lights to be installed will require payment of additional Advanced Energy fees at the then current fee. Questions may be directed to the Special Districts Division at 951.413.3480 or specialdistricts@moval.org.

SD-20 (BP) For those areas to be maintained by the City and prior to the issuance of the first Building Permit, Planning Division (Community Development Department), Special Districts Division (the Public Works Department) and Transportation Division (the Public Works Department) shall review and approve the final median and external parkway landscape/irrigation plans as designated on the tentative map or in these Conditions of Approval prior to the issuance of the first Building Permit.

SD-21 (BP) External parkway and median landscaping specified in the project's Conditions of Approval shall be constructed in compliance with the City of Moreno Valley Public Works Design Guidelines and completed prior to the issuance of 25% (or 55) of the dwelling permits for this tract or 12 months from the issuance of the first dwelling permit, whichever comes first. In cases where a phasing plan is submitted, the actual percentage of dwelling permits issued prior to the completion of the landscaping shall be subject to the review of the construction phasing plan.

Prior to Certificate of Occupancy

SD-22 (CO) Landscape and irrigation plans for parkway, median, slope, and/or open space landscape areas designated to be maintained by the City shall be placed on compact disk (CD) in pdf format. The CD shall include "As Built" plans, revisions, and changes. The CD will become the property of the City of Moreno Valley and the Moreno Valley Community Services District.

Transportation Engineering Division

GENERAL CONDITIONS

TE1. Indian Street is classified as a Minor Arterial (88'RW/64'CC) per City Standard Plan No. MVSI-105A-0. Traffic Signal Interconnect along project frontage shall be required per City Standard Plan No. MVSI-186-0. Any improvements undertaken by this project shall be consistent with the City's standards for this facility.

TE2. Gentian Avenue is classified as a Minor Arterial (88'RW/64'CC) per City Standard Plan No. MVSI-105A-0, modified for a raised median. Traffic Signal Interconnect along project frontage shall be required per City Standard Plan No. MVSI-186-0. Any improvements undertaken by this project shall be consistent with the City's standards for this facility.

TE3. Santiago Drive is designated as a Collector (66'RW/44'CC) per City Standard Plan No. MVSI-106B-0. Any improvements undertaken by this project shall be consistent with the City's standards for this facility.

TE4. Interior street (A-P, except L) is designated as a Local Street (56'RW/36'CC) per City Standard Plan No. MVSI-107A-0. Any improvements undertaken by this project shall be consistent with the City's standards for this facility.

TE5. Sight distance at the proposed roadways and driveways shall conform to City of Moreno Valley Standard No. MVSI-164A,B,C-0 at the time of preparation of final grading, landscape, and street improvement plans.

TE6. Conditions of approval may be modified if project is phased or altered from any approved plans.

PRIOR TO IMPROVEMENT PLAN APPROVAL OR CONSTRUCTION PERMIT

TE7. Prior to the final approval of the street improvement plans, traffic signal modification plans shall be required for the existing traffic signal located at Indian Street and Santiago Drive intersection. Modifications may include, but not limited to, new signal poles, new pull boxes, new traffic detector loops or video detection system, relocation of signal controller cabinet, etc.

TE8. Prior to the final approval of the street improvement plans, traffic signal plans will be required for a new traffic signal located at the intersection of Perris Boulevard and Santiago Drive.

TE9. Prior to the final approval of the street improvement plans, a signing and striping plan shall be prepared per the latest edition of the California Manual on Uniform Traffic Control Devices (CAMUTCD) and City of Moreno Valley Standard Plans for Indian Street, Gentian Avenue, Santiago Drive, and all interior streets A-P.

TE10. Prior to the final approval of the street improvement plans, the intersection of Indian Street and Gentian Avenue shall be designed to provide the following (at a minimum):

- Northbound: One left turn lane, two through lanes;
- Southbound: One left turn lane, two through lanes;
- Eastbound: One left turn lane, one shared through/right turn lane;
- Westbound: One left turn lane, one shared through/right turn lane.

TE11. Prior to issuance of a construction permit, construction traffic control plans prepared by a qualified, registered Civil or Traffic Engineer shall be required for plan approval or as required by the City Traffic Engineer.

TE12. Prior to final approval of the street improvement plans, the project plans shall demonstrate that sight distance at proposed streets and driveways conforms to City Standard Plan No. MVSI-164A-0 through MVSI-164C-0.

PRIOR TO CERTIFICATE OF OCCUPANCY OR BUILDING FINAL

TE13. (CO) Prior to issuance of Certificate of Occupancy, improvements identified in TE7, TE8, TE9, and TE10 shall be completed per the approved plans to the satisfaction of the City Engineer.

TE14. (CO) Prior to issuance of Certificate of Occupancy, all signing and striping shall be installed per current City Standards and the approved plans.

PRIOR TO ACCEPTANCE OF STREETS INTO THE CITY-MAINTAINED ROAD SYSTEM

TE15. Prior to acceptance of streets into the City-maintained road system, all approved signing and striping shall be installed per current City Standards and the approved plans.

PARKS AND COMMUNITY SERVICES DEPARTMENT

Acknowledgement of Conditions

The following items are Parks and Community Services Department Conditions of Approval for project PEN16-0094 AND PEN16-0095 (Tract 36760); this project shall be completed at no cost to any Government Agency. All questions regarding Parks and Community Services Department Conditions including but not limited to: intent, requests for change/modification, variance and/or request for extension of time shall be sought from the Parks and Community Services Department 951.413.3280. The applicant is fully responsible for communicating with the Parks and Community Services Department project manager regarding the conditions.

Specific Conditions of Approval

PCS1. The developer shall construct a 2-acre (approximate) active park, per these CONDITIONS OF APPROVAL, BONDS, and the PUBLIC FACILITIES FEE CREDIT AGREEMENT for TRACT 36760 (PA14-0052/53) and ASSOCIATED CUP/PUD, FOR DEDICATION AND CONSTRUCTION OF PUBLIC PARK. The developer shall additionally dedicate and construct a BIKEWAY LINEAR PARK WITHIN THE DWR RIGHT-OF-WAY, per these CONDITIONS OF APPROVAL and BONDS for TRACT 36760 (PA14-0052/53) and ASSOCIATED CUP/PUD.

Appropriate Quimby and Parkland Facility Fee credits will be credited to Tract 36760 for the dedication and construction of the active park.

A neighborhood park shall be located within the site per the Conditions of Approval for Tract 36760. The park shall be constructed to the latest edition of the City of Moreno Valley Parks and Community Services Department “Park Specification Guide”, “GREENBOOK FOR PUBLIC WORKS CONSTRUCTION”, CALIFORNIA BUILDING CODE”, and “City Standard Plans”. Additionally, the developer shall comply with the following:

a. Minimum site amenities shall include: separate play equipment for ages 2 to 5 and 5 to 12 on; one (1) 30’ x 50’ picnic shelter and one (1) 24’ hexagon gazebo; large group barbeques; concrete picnic tables, concrete benches; concrete waste/recycle containers; two (2) drinking fountains (Std. MVGF-615B-0); lighted monument signs; LED walkway security lighting; conduit and wiring for security cameras; 10’ wide decorative concrete walkways; stabilized decomposed granite walking path; combination of 24” and 30” boxed trees, 5-gallon sized shrubs; 1-gallon sized ground cover; sodded turfgrass; Calsense irrigation controller; 4’ tall tubular steel fencing surrounding the park; anti-graffiti coating on all adjacent walls, restroom, and monument sign(s); and other amenities typical of parks. All drainage from the park shall be contained in the tract’s water quality basin.

b. The park and bikeway/linear park design shall be fully completed and approved in conjunction with the grading plans. Construction shall commence prior to the issuance of 30% of building permits for residential units and be completed prior to the issuance of 70% of building permits for residential units.

c. The developer shall enter into a Facilities Fee Credit Agreement to obtain credit/reimbursement of Quimby and Parkland Facilities Development Impact Fees (DIF).

d. The park and bikeway/linear park shall be shown as lettered lots and dedicated in fee to the Moreno Valley Community Services District, on the Final Map.

PCS2. A bikeway/linear park shall be designated for Tract 36760, per the Bikeway Master Plan. The bikeway shall have an adjacent walkway for pedestrians. Access points from the tract and the adjacent commercial center to the bikeway/walkway shall be provided. Planters, automated (Calsense) irrigation, turf areas, waste containers, and three-rail PVC fencing typical of parks shall be included in the design. Additionally, the developer shall comply with the following:

PCS3. Any recreational amenities within the pocket park located on Gentian Avenue and adjacent to the DWR aqueduct shall be reviewed and approved by Parks and Community Services. Dedication of such facilities to the CSD shall be at the discretion of the CSD.

<u>STANDARD CONDITIONS:</u>

PCS4. A restriction shall be placed on lots that back up to City/CSD owned or maintained parks, trails, bikeways, and landscaped areas, preventing openings or gates accessing the City/CSD owned or maintained property. This shall be documented through Covenants, Conditions, and Restrictions (CC&R's). A copy of the CC&R's with this restriction noted shall be submitted and approved by the Director of Parks and Community Services or his/her designee, prior to the recordation of the Final Map.

PSC5. Within the improvements for PCS, the applicant shall show all existing and planned easements on all maps and plans. Easements on City/CSD owned or maintained parks, trails, bikeways, and landscape shall be identified on each of these plans with the instrument number of the recorded easement.

PCS6. The following plans require PCS written approval: Tentative tract/parcel maps; rough grading plans (including all Delta changes); Final Map; precise grading plans; street improvement plans; traffic signal plans; fence and wall plans; landscape plans for areas adjacent to bikeways; trail improvement plans. PCS will not approve any permits without review and approval of the above items.

PCS7. Prior to recordation of the Final Map, the applicant shall post security to guarantee construction or modification of parks, trails and/or bikeways for the City/CSD. Copies of said documentation shall be provided to PCS, prior to the approval of the Final Map.

PCS8. Detailed final plans (mylars, PDF, and AutoCAD file on a DVD-R) for parks, trails/bikeways, fencing, and adjoining landscaped areas shall be submitted to and approved by the Director of Parks and Community Services, or his/her designee, prior to the issuance of any building permits. All plans are to include a profile showing grade changes.

PSC9. Applicable plan check and inspection fees shall be paid, per the approved City fee schedule.

PCS10. This project may be required to supply a funding source for the continued maintenance, enhancement, and or retrofit of neighborhood parks, open spaces, linear parks, and/or trails systems. This can be achieved through annexing into Community Facilities District No. 1 (Park Maintenance). Please contact the Special Districts Division at 951.413.3480 or specialdistricts@moval.org to complete the annexation process.

PCS11. The parcel(s) associated with this project have been incorporated into the Moreno Valley Community Services District Zone A (Parks and Community Services). All assessable parcels therein shall be subject to the annual Zone ‘A’ charge for operations and capital improvements. Proof of such shall be supplied to Parks and Community Services upon Final Map and at Building Permits.

PSC12. This project is subject to current Development Impact Fees, at time of building permit issuance (unless exempted in a Public Facilities Fee Credit Agreement).

PCS13. This project is subject to current Quimby Fees, at time of building permit issuance (unless exempted in a Public Facilities Fee Credit Agreement).

MORENO VALLEY UTILITY

Acknowledgement of Conditions

The following items are Moreno Valley Utility's Conditions of Approval for project PEN16-0094 AND PEN16-0095; this project shall be completed at no cost to any Government Agency. All questions regarding Moreno Valley Utility's Conditions including but not limited to, intent, requests for change/modification, variance and/or request for extension of time shall be sought from Moreno Valley Utility (the Electric Utility Division) of the Finance and Management Services Department 951.413.3500, mvuengineering@moval.org. The applicant is fully responsible for communicating with Moreno Valley Utility staff regarding their conditions.

PRIOR TO ENERGIZING MVU ELECTRIC UTILITY SYSTEM AND CERTIFICATE OF OCCUPANCY

MVU-1 (R) This project requires the installation of electric distribution facilities. A non-exclusive easement shall be provided to Moreno Valley Utility and shall include the rights of ingress and egress for the purpose of operation, maintenance, facility repair, and meter reading.

MVU-2 (BP) City of Moreno Valley Municipal Utility Service – Electrical Distribution: Prior to constructing the MVU Electric Utility System, the developer shall submit a detailed engineering plan showing design, location and schematics for the utility system to be approved by the City Engineer. In accordance with Government Code Section 66462, the Developer shall execute an agreement with the City providing for the installation, construction, improvement and dedication of the utility system following recordation of final map and concurrent with trenching operations and other subdivision improvements so long as said agreement incorporates the approved engineering plan and provides financial security to guarantee completion and dedication of the utility system.

The Developer shall coordinate and receive approval from the City Engineer to install, construct, improve, and dedicate to the City, or the City's designee, all utility infrastructure (including but not limited to conduit, equipment, vaults, ducts, wires, switches, conductors, transformers, and "bring-up" facilities including electrical capacity to serve the identified development and other adjoining/abutting/ or benefiting projects as determined by Moreno Valley Utility) – collectively referred to as "utility system" (to and through the development), along with any appurtenant real property easements, as determined by the City Engineer to be necessary for the distribution and /or delivery of any and all "utility services" to each lot and unit within the Tentative Map. For purposes of this condition, "utility services" shall mean electric, cable television, telecommunication (including video, voice, and data) and other similar services designated by the City Engineer. "Utility services" shall not include sewer, water, and natural gas services, which are addressed by other conditions of approval.

The City, or the City's designee, shall utilize dedicated utility facilities to ensure safe, reliable, sustainable and cost effective delivery of utility services and maintain the integrity of streets and other public infrastructure. Developer shall, at developer's sole expense, install or cause the installation of such interconnection facilities as may be necessary to connect the electrical distribution infrastructure within the project to the Moreno Valley Utility owned and controlled electric distribution system.

MVU-3 This project is subject to a Reimbursement Agreement and is responsible for a proportionate share of costs associated with electrical distribution infrastructure previously installed that directly benefits the project.
Payment shall be required prior to issuance of building permits.

MVU-4 For all new projects, existing Moreno Valley Utility electrical infrastructure shall be preserved in place. The developer will be responsible, at developer expense, for any and all costs associated with the relocation of any of Moreno Valley Utility's underground electrical distribution facilities, as determined by Moreno Valley Utility, which may be in conflict with any developer planned construction on the project site.

POLICE DEPARTMENT

PD1. Prior to the start of any construction, temporary security fencing shall be erected. The fencing shall be a minimum of six (6) feet high with locking, gated access and shall remain through the duration of construction. Security fencing is required if there is: construction, unsecured structures, unenclosed storage of materials and/or equipment, and/or the condition of the site constitutes a public hazard as determined by the Public Works Department. If security fencing is required, it shall remain in place until the project is completed or the above conditions no longer exist. (DC 9.08.080)

PD2. (GP) Prior to the issuance of grading permits, a temporary project identification sign shall be erected on the site in a secure and visible manner. The sign shall be conspicuously posted at the site and remain in place until occupancy of the project. The sign shall include the following:

a. The name (if applicable) and address of the development.

b. The developer's name, address, and a 24-hour emergency telephone number. (MC 9.08.080)

PD3. (CO) Prior to the issuance of a Certificate of Occupancy, an Emergency Contact information Form for the project shall be completed at the permit counter of the Community Development Department - Building Division for routing to the Police Department. (MC 9.08.080)

PLANNING COMMISSION RESOLUTION NO. 2017-11

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY RECOMMENDING THAT THE CITY COUNCIL APPROVE TENTATIVE TRACT MAP 36760 (APPLICATION PEN16-0095 / PA14-0053) TO SUBDIVIDE THE APPROXIMATELY 53 ACRES LOCATED WITHIN ASSESSOR'S PARCEL NUMBERS 485-220-023, 485-220-032, AND 485-220-040 INTO 221 SINGLE FAMLY RESIDENTIAL LOTS LOCATED SOUTHERLY OF THE SOUTHEAST CORNER OF INDIAN STREET AND GENTIAN AVENUE.

WHEREAS, the applicant, Mission Pacific Land Company, has filed an application for the approval of Tentative Tract Map 36760 (application PEN16-0095), a proposal to subdivide the approximately 53 acres located within Assessor's Parcel Numbers 485-220-023, 485-220-032, and 485-220-040 into 221 single family lots as described in the title of this Resolution;

WHEREAS, the application has been evaluated in accordance with established City of Moreno Valley (City) procedures, and with consideration of the General Plan and other applicable regulations; and

WHEREAS, the City has prepared an Initial Study and Mitigated Negative Declaration consistent with the California Environmental Quality Act (CEQA) based on a thorough analysis of potential environmental impacts. The Mitigated Negative Declaration represents the City's independent judgment and analysis; and

WHEREAS, upon completion of a thorough development review process the project was appropriately agendized and noticed for a public hearing before the Planning Commission of the City of Moreno Valley (Planning Commission); and

WHEREAS, the public hearing notice for this project was published in the local newspaper on January 6, 2017. Public notice was sent to all property owners of record within 300 feet of the project site on January 12, 2017. The public hearing notice for this project was also posted on the project site on January 13, 2017; and

WHEREAS, on January 26, 2017, the Planning Commission held a public hearing to consider the application; and

WHEREAS, all legal prerequisites to the adoption of this Resolution have occurred; and

WHEREAS, pursuant to Government Code Section 66020(d)(1), **NOTICE IS HEREBY GIVEN** that this project is subject to certain fees, dedications, reservations and other exactions as provided herein.

NOW, THEREFORE, BE IT RESOLVED, it is hereby found, determined and resolved by the Planning Commission of the City of Moreno Valley as follows:

A. This Planning Commission hereby specifically finds that all of the facts set forth above in this Resolution are true and correct.

B. Based upon substantial evidence presented to this Planning Commission during the above-referenced meeting on May 12, 2016, including written and oral staff reports, and the record from the public hearing, this Planning Commission hereby specifically finds as follows:

1. That the proposed map is consistent with applicable general and specific plans and the zoning ordinance;

FACT: General Plan Objective 2.2 states that it is the intent of the City to provide a wide range of residential opportunities and dwelling types to meet the demands of present and future residents of all socioeconomic groups. The proposed project has a Residential land use designation that would allow for development of single family residences consistent with this objective.

The project site is located generally at the southeast corner of Indian Street and Gentian Avenue. The majority of the site is zoned R5. The applicant is proposing to change a 15 acre portion of the site from R30 to R5. The project site is bounded by existing single-family tract homes to west and northwest in the RS-10 zone with minimum lot sizes of 4,500 square feet. The property immediately to the north is zoned R5 and has been subdivided with a recorded map, Tract Map 22180. Further to the north are existing single-family tract homes in the R5 zone. Southwest of the project site are single-family homes in the R5 zone. March Middle School and Rainbow Elementary School are located immediately to the south. Vacant and developed land (non-conforming single-family residences) in the R30 zone is located to the southeast of the project site.

The project is designed in accordance with the provisions of Chapter 9.03 Residential Districts, Section 9.16.130 Design Guidelines and Section 9.14 Land Divisions of the City's Municipal Code. The project as designed and conditioned would comply with all applicable zoning and other regulations.

2. That the design or improvement of the proposed subdivision is consistent with applicable general and specific plans;

FACT: General Plan Objective 2.2 states that it is the intent of the City to provide a wide range of residential opportunities and dwelling types to meet the demands of present and future residents of all socioeconomic groups. The proposed project has a residential land use designation that would allow for development of single family residences consistent with this objective.

The project site is bounded by existing single-family tract homes to west and northwest in the RS-10 zone with minimum lot sizes of 4,500 square feet. The property immediately to the north is zoned R5 and has been subdivided with a recorded map, Tract Map 22180. Further to the north are existing single-family tract homes in the R5 zone. Southwest of the project site are single-family homes in the R5 zone with March Middle School and Rainbow Elementary School located immediately to the south. Vacant and developed land (non-conforming single-family residences) in the R30 zone is located to the southeast of the project site.

The property is bounded by the California Aqueduct along the eastern property line with vacant Community Commercial zoned property to the east. The site to the east was recently approved for development as a Walmart retail center. Additional commercial existing retail centers are located to the southeast at the intersection of Perris Boulevard and Iris Avenue in the Community Commercial zone. March Air Reserve Base is located approximately three-quarters of a mile to the west with the City Corporate Yard located approximately 1,400 feet to the east.

Consistent with City General Plan Policies 4.2.1 and 4.2.14 the City's Master Plan of Trails and the Master Plan of Parks, this project has been conditioned to construct and then convey to the City a segment of the Juan Bautista De Anza trail within the adjacent California Aqueduct and to construct and convey to the City a public park of approximately 2.0 acres in size with amenities that would include play equipment, a picnic shelter, a gazebo, large group barbeques, concrete picnic tables and benches, concrete waste/recycle containers; drinking fountains, walkway security lighting, decorative concrete walkways, decomposed granite walking path; and tubular steel fencing surrounding the park.

Subject to approval of a General Plan Amendment from R30 to R5, the proposed project is consistent with the General Plan and does not conflict with the goals, objectives, policies, and programs established within the Plan. The project as designed and conditioned will achieve the objectives of the City of Moreno Valley's General Plan.

3. That the site is physically suitable for the type of development;

FACT: The project site is located at the southeast corner of Indian Street and Gentian Avenue on the west side of the California Aqueduct. The zoning for the majority of the site is R5. The applicant proposes a General Plan Amendment and Zone Change for a 15 acre portion of the site from R30 to R5 in order to develop a 221 lot single family planned community. The project site is rectangular in shape with a triangular shaped parcel adjacent to the California Aqueduct and is comprised of flat topography. Overall, the project site is well suited for the proposed subdivision.

4. That the site of the proposed land division is physically suitable for the proposed density of the development;

   FACT: The project site is rectangular in shape with a triangular shaped parcel adjacent to the California Aqueduct and is comprise of flat topography. The tentative tract map is designed in accordance with the provisions of the City's Municipal Code Section 9.14 Land Divisions. The approximately 53 acre project site is physically suitable for the proposed density of the development.

5. That the design of the subdivision or the proposed improvements are not likely to cause substantial environmental damage or substantially and avoidably injure fish or wildlife or their habitat;

   FACT: There are no existing trees, streambeds, drainage features or riparian vegetation on the project site. Based upon information from the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) Full Report and review of the MSHCP Plan, there are no identified candidate, sensitive or special status species associated with the project site. An Initial Study and Mitigated Negative Declaration have been prepared for the project concluding that with the implementation of mitigation measures, project impacts are reduced to a less than significant impact. Therefore, the tentative tract map will not cause substantial environmental damage or substantially and avoidably injure fish or wildlife or their habitat

6. That the design of the subdivision or type of improvements is not likely to cause serious public health problems;

   FACT: As conditioned, the proposed parcel map would not cause serious public health problems. The Eastern Municipal Water District will provide water and sewer services to the project site. There are no known hazardous conditions associated with the property, the design of the land division or the type of improvements.

   The tentative tract map as designed and conditioned will provide protection from natural and man-made hazards to life, health, and property and is therefore consistent with General Goal 9.6.1. The project site is located approximately 2,000 feet south of the Kennedy Park Fire Station and within close proximity to emergency services which is consistent with General Plan Goal 9.6.2 which requires emergency services that are adequate to meet minor emergency and major catastrophic situations.

   The tentative tract map as designed and conditioned will be consistent with General Plan Objective 6.1 and General Plan Objective 6.2 which are intended to protect residents from physical injury and property damage due to seismic groundshaking, and nuisances due to flooding.

The tentative tract map has been designed consistently with the City's Municipal Code Section 9.14 Land Divisions and meets all City requirements related to subdividing a property.

7. That the design of the subdivision or the type of improvements will not conflict with easements, acquired by the public at large, for access through or use of, property within the proposed subdivision;

FACT: The tentative tract map has been designed to accommodate and not conflict with existing easements on the subject site including utility, storm drain and California Aqueduct easements.

8. That the proposed land division and the associated design and improvements are consistent with applicable ordinances of the city.

FACT: The land division proposed by Tentative Tract Map No. 36760 is consistent with the City's Municipal Code Section 9.14 Land Divisions. The subdivision as designed and conditioned is consistent with applicable ordinances of the city.

FEES, DEDICATIONS, RESERVATIONS, AND OTHER EXACTIONS

1. FEES

Impact, mitigation and other fees are due and payable under currently applicable ordinances and resolutions. These fees may include but are not limited to: Development Impact Fee, Transportation Uniform Mitigation Fee (TUMF), Multi-species Habitat Conservation Plan (MSHCP) Mitigation Fee, Stephens Kangaroo Habitat Conservation fee, Underground Utilities in lieu Fee, Area Drainage Plan fee, Bridge and Thoroughfare Mitigation fee (Future) and Traffic Signal Mitigation fee. The final amount of fees payable is dependent upon information provided by the applicant and will be determined at the time the fees become due and payable.

Unless otherwise provided for by this Resolution, all impact fees shall be calculated and collected at the time and in the manner provided in Chapter 3.32 of the City of Moreno Valley Municipal Code or as so provided in the applicable ordinances and resolutions. The City expressly reserves the right to amend the fees and the fee calculations consistent with applicable law.

2. DEDICATIONS, RESERVATIONS, AND OTHER EXACTIONS

The adopted Conditions of Approval for PEN16-0095, incorporated herein by reference, may include dedications, reservations, and exactions pursuant to Government Code Section 66020 (d) (1).

3. CITY RIGHT TO MODIFY/ADJUST; PROTEST LIMITATIONS

The City expressly reserves the right to establish, modify or adjust any fee, dedication, reservation or other exaction to the extent permitted and as authorized by law.

Pursuant to Government Code Section 66020(d)(1), NOTICE IS FURTHER GIVEN that the 90 day period to protest the imposition of any impact fee, dedication, reservation, or other exaction described in this Resolution begins on the effective date of this Resolution and any such protest must be in a manner that complies with Section 66020(a) and failure to timely follow this procedure will bar any subsequent legal action to attack, review, set aside, void or annul imposition.

The right to protest the fees, dedications, reservations, or other exactions does not apply to planning, zoning, grading, or other similar application processing fees or service fees in connection with this project and it does not apply to any fees, dedication, reservations, or other exactions of which a notice has been given similar to this, nor does it revive challenges to any fees for which the applicable statute of limitations has previously expired.

BE IT FURTHER RESOLVED that the Planning Commission **HEREBY APPROVES** Resolution No. 2017-11, and **RECOMMENDS** that the City Council:

1. **ADOPT** a Mitigated Negative Declaration for Tentative Tract Map 36760 (application PEN16-0095), pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

2. **APPROVE** the Mitigation Monitoring and Reporting Program prepared for Conditional Use Permit PEN16-0095 pursuant to the California Environmental Quality Act (CEQA) Guidelines, included as Exhibit A; and

3. **APPROVE** Tentative Tract Map 36760 (application PEN16-0095) based on the findings contained in this resolution, and subject to the attached conditions of approval included as Exhibit B.

APPROVED this 26th day of January, 2017.

____
Brian Lowell
Chair, Planning Commission

ATTEST:

____
Richard J. Sandzimier, Planning Official
Secretary to the Planning Commission

APPROVED AS TO FORM:

____
City Attorney

EXHIBIT A

Legacy Park Project – Mitigation Monitoring and Reporting Program

Conditional Use Permit PEN16-0094 / Tentative Tract Map 36760 (PEN16-0095)

Introduction

This Mitigation Monitoring and Reporting Program has been prepared for use in implementing mitigation for the Mitigated Negative Declaration (MND) for The Legacy Park (Conditional Use Permit PEN16-0094 and Tentative Tract Map 36760). The program has been prepared in compliance with State law and the MND prepared for the project.

The California Environmental Quality Act (CEQA) requires adoption of a reporting or monitoring program for those measures places on a project to mitigated or avoid adverse effects on the environment (Public Resources Code Section 21081.6). The law states that the reporting or monitoring program shall be designed to ensure compliance during project implementation.

The monitoring program contains the following elements:

- 1. The mitigation measures are recorded with the action and procedure necessary to ensure compliance. In some instances, one action may be used to verify implementation of several mitigation measures.
- 2. A procedure for compliance and verification has been outlined for each action necessary. This procedure designates who will take action, what action will be taken and when, and to whom and when compliance will be reported.
- 3. The program has been designed to be flexible. As monitoring progresses, changes to compliance procedures may be necessary based upon recommendations by those responsible for the program. As changes are made, new monitoring compliance procedures are records will be developed and incorporated into the program.

Mitigation Monitoring and Responsibilities

As the Leady Agency, the City of Moreno Valley is responsible for ensuring full compliance with the mitigation measures adopted for the proposed project. The City will monitor and report on all mitigation activities. Mitigation measures will be implemented at different stages of development throughout the project. In this regards, the responsibilities for implementation have been assigned to the Applicant, Contractor, or a combination thereof. If during the course of project implementation, any of the mitigation measures identified herein cannot be successfully implemented, the City shall be immediately informed, and the City will then inform any affected responsible agencies. The City, in conjunction with any affected responsible agencies, will then determine if modification to the project is required and/or whether alternative mitigation is appropriate.

Mitigation Monitoring and Reporting Program Checklist

Project: Legacy Park Project (Conditional Use Permit PEN16-0094 and Tentative Tract Map 36760)

Applicant: Mission Pacific Land Company

Date: January 18, 2017

Mitigation Measure No.	**Responsible for Monitoring**	**Monitoring Frequency**	**Timing of Verification**	**Method of Verification**	**Verified Date/Initials**	**Sanctions for Non-Compliance**
Traffic/Transportation						
TR-1: Prior to the issuance of building permits, the Project applicant shall participate in the City's DIF and County TUMF fee programs by paying the requisite fees at the time of building permit, and in addition pay the Project's fair share amount of $43,497 for improvements at the intersections of Indian Street at Cactus Avenue and Indian Street at Gentian Avenue as identified in Table 1-5 that are consistent with the improvements shown on Table 6-3, or as otherwise agreed to by the City and Project Applicant. Project fair share payment shall only be collected if the City creates a fee program that includes the improvements the fair share contribution is intended to construct.	City of Moreno Valley Transportation Engineering Division and Planning Division	Ongoing during construction	Prior to Building Final	Review of paid DIF invoice and receipt		Withhold Building Final
TR-2: Prior to the final approval of the street improvement plans, traffic signal plans will be required for a new traffic signal located at the intersection of Perris Boulevard and Santiago Drive. Prior to issuance of Certificate of Occupancy, the traffic signal and Perris Boulevard and Santiago Drive shall be completed per the approved plans to the satisfaction of the City Engineer.	City of Moreno Valley Transportation Engineering Division , Land Development and Planning Division	Ongoing during construction	Prior to Building Final	Final Inspection of signal improvements		Withhold Building Final

Mitigation Measure No.	Responsible for Monitoring	Monitoring Frequency	Timing of Verification	Method of Verification	Verified Date/Initials	Sanctions for Non-Compliance
Biological Resources						
BR-1. A qualified biologist will conduct a pre-construction presence/absence survey for burrowing owls within 14 days prior to site disturbance. If burrowing owls are detected onsite, the owls will be relocated/excluded from the site outside of the breeding season following accepted protocols, and subject to the approval of the RCA and wildlife agencies.	City of Moreno Valley Planning Division	Ongoing during grading plan check	Prior to Issuance of a grading permit	Review of and approval of pre-construction survey		Withhold Grading Permit
BR-2. As feasible, vegetation clearing should be conducted outside of the nesting season, which is generally identified as February 1 through September 15. If avoidance of the nesting season is not feasible, then a qualified biologist shall conduct a nesting bird survey within three days prior to any disturbance of the site, including disking, demolition activities, and grading. If active nests are identified, the biologist shall establish suitable buffers around the nests, and the buffer areas shall be avoided until the nests are no longer occupied and the juvenile birds can survive independently from the nests.	City of Moreno Valley Planning Division	Ongoing during grading plan check	Prior to Issuance of a grading permit	Review of and approval of survey		Withhold Grading Permit
Mitigation Measure No.	**Responsible for Monitoring**	**Monitoring Frequency**	**Timing of Verification**	**Method of Verification**	**Verified Date/Initials**	**Sanctions for Non-Compliance**
Cultural Resources						
CR-1: Prior to the issuance of a grading permit, the Project Applicant shall provide evidence to the City of Moreno Valley that a professional archaeological monitor has been retained by the Applicant to conduct monitoring of all mass grading and trenching activities and that the monitor has the authority to temporarily halt and redirect earthmoving activities in the event that suspected archaeological resources are unearthed during Project construction. The Project archaeologist, with input from the	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations.	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order

appropriate Tribe, shall prepare a Cultural Resources Monitoring Plan (CRMP) to document protocols for inadvertent finds, to determine potential protection measures from further damage and destruction for any identified archaeological resource(s)/ tribal cultural resources (TCRs), outline the process for monitoring and for completion of the final Phase IV Monitoring Report. If any archaeological and/or TCRs are identified during monitoring, these will also be documented and addressed per standard archaeological protocols in the Phase IV report, with the exception of human remains which will be addressed per CUL-5. The Project Archaeologist shall attend the pregrading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.						
CR-2: At least 30 days prior to the issuance of a grading permit, the Applicant shall contact the appropriate Luiseño tribe to develop a Cultural Resources Treatment Agreement and shall provide evidence to the City of Moreno Valley that the professionally qualified Luiseño Native American monitor(s) has been secured from the interested tribe(s), and that the monitor shall be allowed to monitor all mass grading and trenching activities. The Tribal representative(s) shall attend the pre-grading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations.	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order
CR-3: If, during mass grading and trenching activities, the Archaeologist or Tribal representatives suspect that an archaeological resource and/or TCR may have been unearthed, the monitor identifying the potential resources, in consultation with the other monitor as appropriate, shall immediately halt and redirect grading operations in a 100-foot radius around the find to allow identification	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order

and evaluation of the suspected resource. The Native American monitor(s) or appropriate representative(s) and the archaeological monitor shall evaluate the suspected resource and make a determination of significance pursuant to California Public Resources Code Section 21083.2. The archaeological monitor and tribal monitor(s) or appropriate representative(s), the Project Applicant, and the City Planning Division shall confer regarding mitigation of the discovered resource(s). All sacred sites, should they be encountered within the Project area, shall be avoided and preserved as the preferred mitigation, if feasible.						
CR-4: Prior to grading permit issuance, the City shall verify that the following note is included on the Grading Plan: "If any suspected archaeological resources are discovered during ground-disturbing activities and the archaeological monitor or Tribal representatives are not present, the construction supervisor is obligated to halt work in a 100-foot radius around the find and call the project archaeologist and the Tribal representatives to the site to assess the significance of the find."	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order
CR-5: If human remains are encountered, California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the Riverside County Coroner has made the necessary findings as to origin. Further, pursuant to California Public Resources Code Section 5097.98(b), remains shall be left in place and free from disturbance until a final decision as to the treatment and disposition has been made by the Coroner. If the Riverside County Coroner determines the remains to be Native American, the California Native American Heritage Commission must be contacted within 24 hours. The Native American Heritage Commission must then	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order

immediately notify the "most likely descendant(s)" of receiving notification of the discovery. The most likely descendant(s) shall then make recommendations within 48 hours, and engage in consultations concerning the treatment of the remains as provided in Public Resources Code §5097.98.						
CR-6: Prior to construction involving excavation four feet or more below existing surface grade, the construction contractor shall provide evidence that a qualified paleontologist has been retained, and that the paleontologist(s) shall be present during all grading and other significant ground-disturbing activities that reach four feet or more below existing surface grade. In the event fossiliferous deposits are encountered, the following measures shall be implemented: • Monitoring shall be conducted by qualified paleontological monitor(s) of excavation in areas identified as likely to contain paleontological resources, including very old alluvial fan deposits. Paleontological monitors shall be equipped to salvage fossils as they are unearthed, to avoid construction delays, and to remove samples of sediments that are likely to contain the remains of small fossil invertebrates and vertebrates. Monitors shall be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring may be reduced if the potentially fossiliferous units are determined upon exposure and examination by qualified paleontological personnel to have low potential to contain fossil resources.	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order

• Paleontological monitoring of any earthmoving will be conducted by a monitor, under direct guidance of a qualified paleontologist. Earthmoving in areas of the parcel where previously undisturbed sediments are buried, but not otherwise disturbed, will not be monitored. • If too few fossil remains are found after 50 percent of the planned-for earthmoving has been completed, monitoring can be reduced or discontinued in those areas at the Project paleontologist's direction. • Preparation of recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. • Identification and curation of specimens into a professional, fully accredited museum repository with permanent retrievable storage. The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities. • Preparation or a report of findings with and appended itemized inventory of specimens. The report and inventory, when submitted to the city along with confirmation of the curation of recovered of recovered specimens into an established, accredited museum repository, will signify completion of the program to mitigate impacts to paleontological resources.						

Mitigation Measure No.	**Responsible for Monitoring**	**Monitoring Frequency**	**Timing of Verification**	**Method of Verification**	**Verified Date/Initials**	**Sanctions for Non-Compliance**
Noise						
N-1: Construction activities shall be operated in a manner that limits noise impacts on surrounding uses (General Plan Policy 6.5.2). In order to limit noise impacts on surrounding property, the construction contractor will ensure the following: • All construction equipment powered by gasoline or diesel engines will be required to have sound-control devices at least as effective as those originally provided by the manufacturer; no equipment will be permitted to have an unmuffled exhaust. • Mobile noise-generating equipment and machinery will be shut off when not in use; • Construction vehicles assessing the site will be required to use the shortest possible route to and from local freeways, provided the routes do not expose additional receptors to noise	City of Moreno Valley Engineering and Building and Safety Planning Division	Once prior to Grading and during grading and construction operations.	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order
N-2: The staging of construction equipment and the construction trailer shall be placed as far as possible from the existing single-family residences located to the west and south and the schools to the south.	City of Moreno Valley Engineering and Building and Safety Planning Division	Once prior to Grading and during grading and construction operations.	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order

EXHIBIT B

CITY OF MORENO VALLEY
CONDITIONS OF APPROVAL
TENTATIVE TRACT MAP 36760 (PEN16-0095)
CONDITIONAL USE PERMIT PEN16-0094
A.P.N.: 485-220-023, 485-220-032, AND 485-220-040

Approval Date:
Expiration Date:

COMMUNITY DEVELOPMENT DEPARTMENT

Planning Division

For questions regarding any Planning condition of approval, please contact the Planning Division at (951) 413-3206.

P1. Tentative Tract Map 36760 (PEN16-0095) has been approved for development of a 221 lot subdivision in the R5 zone.

P2. Conditional Use Permit PEN16-0094 for a Planned Unit Development (Legacy Park) has been approved with Design Guidelines to establish unique development standards, architectural standards, fence and walls, and common area pathways and landscape area for Tentative Tract Map 36760 in the R5 zone. The PUD allows for minimum lot sizes of 4,000 square feet (76 lots) and 5,000 square feet (145 lots) in two distinct areas of the tract map.

P3. Conditional Use Permit PEN16-0094 and Tentative Tract Map 36760 (PEN16-0095) are approved subject to approval of a General Plan Amendment from Residential 30 to Residential 5 and a Zone Change from R30 to R5.

P4. Conditional Use Permit PEN16-0094 establishes the following development standards for single-family residential development in Tentative Tract Map 36760:

- Minimum Lot Size – 4,000 square feet (50' x 80')
- Minimum Lot Size -- 5,000 square feet (50' x 100')
- Maximum Lot Coverage – 50%

Timing Mechanisms for Conditions (see abbreviation at beginning of affected condition):

R - Map Recordation	GP - Grading Permits
GPA – Grading Plan Approval	BF – Building Final
BP - Building Permits	P - Any permit
MR – Map Recordation	MA – Map Approval
AOS – Acceptance of Streets	WP - Water Improvement Plans
CP – Construction Permit	IPA – Improvement Plan Approval
	SI – Street Improvements

Governing Document (see abbreviation at the end of the affected condition):

GP - General Plan	MC – Municipal Code
MC - Municipal Code	CEQA - California Environmental Quality Act
Ord - Ordinance	Ldscp - Landscape Development Guidelines and Specs
Res - Resolution	UFC - Uniform Fire Code
UBC - Uniform Building Code	
SBM - Subdivision Map Act	

- Maximum Height – 2-story or 35 feet

P5. Tentative Tract Map 36760 and Conditional Use Permit PEN16-0094 are approved for the use of decorative concrete treatments within the public right-of-way at key intersections of Street L within the project.

P6. This approval shall comply with all applicable requirements of the City of Moreno Valley Municipal Code.

P7. This tentative map shall expire three years after the approval date of this tentative map unless extended as provided by the City of Moreno Valley Municipal Code; otherwise it shall become null and void and of no effect whatsoever in the event the applicant or any successor in interest fails to properly file a final map before the date of expiration. (MC 9.02.230, 9.14.050, 080)

P8. The site shall be developed in accordance with the approved tentative map on file in the Community Development Department -Planning Division, the Municipal Code regulations, General Plan, and the Legacy Park Design Guidelines (PEN16-0094), and the conditions of approval contained herein. (MC 9.14.020)

P9. A drought tolerant, low water using landscape palette shall be utilized throughout the tract to the extent feasible.

P10. All undeveloped portions of the site shall be maintained in a manner that provides for the control of weeds, erosion and dust. (MC 9.02.030)

P11. All landscaped areas shall be maintained in a healthy and thriving condition, free from weeds, trash and debris. (MC 9.02.030)

P12. (BP) Enhanced architectural treatments shall be included on the approved plans for all homes having side and/or reverse frontages to public streets or open space areas.

P13. All site plans, grading plans, landscape and irrigation plans, and street improvement plans shall be coordinated for consistency with this approval.

<u>PRIOR TO GRADING</u>

P14. (GP) Prior to issuance of grading permits, the developer shall pay the applicable Stephen's' Kangaroo Rat (SKR) Habitat Conservation Plan mitigation fee. (Ord)

P15. (GP) Prior to the issuance of grading permits, final erosion control landscape and irrigation plans for all cut or fill slopes over 3 feet in height shall be submitted to the Planning Division for review and approval for the phase in process. The plans shall be designed in accordance with the slope erosion plan as required by the City Engineer for that phase. Man-made slopes greater than 10 feet in height shall be "land formed" to conform to the natural terrain and shall be landscaped and stabilized to minimize visual scarring. (GP Objective 1.5, MC 9.08.080, DG)

P16. (GP) Prior to approval of precise grading plan, final front and street side yard landscape and irrigation plans shall be submitted to the Planning Division for review. The plans shall be prepared in accordance with the City's Municipal Code and landscape specifications, and include required street trees.

P17. (GP) If potential historic, archaeological, or paleontological resources are uncovered during excavation or construction activities at the project site, work in the affected area will cease immediately and a qualified person (meeting the Secretary of the Interior's standards (36CFR61)) shall be consulted by the applicant to evaluate the find, and as appropriate recommend alternative measures to avoid, minimize or mitigate negative effects on the historic, prehistoric, or paleontological resource. Determinations and recommendations by the consultant shall be implemented as deemed appropriate by the Community Development Director, in consultation with the State Historic Preservation Officer (SHPO) and any and all affected Native American Tribes before any further work commences in the affected area.

If human remains are discovered, work in the affected area shall cease immediately and the County Coroner shall be notified. If it is determined that the remains are potentially Native American, the California Native American Heritage Commission and any and all affected Native American Indians tribes such as the Morongo Band of Mission Indians or the Pechanga Band of Luiseno Indians shall be notified and appropriate measures provided by State law shall be implemented. (GP Objective 23.3, DG, CEQA).

P18. (GP) Prior to issuance of grading permits, landscape plans for front yards, street trees, common areas, reverse frontage parkways and basins, common area lighting and fences and walls, shall be submitted to the Planning Division for review subject to the requirements of the Legacy Park Design Guidelines the City of Moreno Valley Municipal Code.

P19. (GP) Prior to issuance of grading permits, plans for any security gate system shall be submitted to the Planning Division for review and approval.

P20. (GP) Prior to the issuance of grading permits, mitigation measures contained in the Mitigation Monitoring Program approved with this project shall be implemented as provided therein. A mitigation monitoring fee, as provided by City ordinance, shall be paid by the applicant within 30 days of project or tentative map approval. No City permit or approval shall be issued until such fee is paid. (CEQA)

PRIOR TO RECORDATION OF FINAL MAP

P22. (R) Prior to final map recordation, subdivision phasing (including any proposed common open space or improvement phasing, if applicable), shall be subject to the Planning Division approval. Any proposed phasing shall provide for adequate vehicular access to all lots in each phase as determined by the City Transportation Engineer or designee and shall substantially conform to all intent and purpose of the subdivision approval. (MC 9.14.080)

P23. (R) Prior to final map recordation any required trail easements shall be provided.

P24. (R) Prior to recordation of the final subdivision map, the developer shall submit for review and approval the following documents to the Planning Division which shall demonstrate that the project will be developed and maintained in accordance with the intent and purpose of the approval:

a. The document to convey title
b. Deed restrictions, easements, or Covenants, Conditions and Restrictions to be recorded

The approved documents shall be recorded at the same time that the subdivision map is recorded. The documents shall contain provisions for general maintenance and ownership of common area pathways and landscape, common area lighting, and common recreation areas. The approved documents shall also contain a provision, which provides that they may not be terminated and/or substantially amended without the consent of the City and the developer's successor-in-interest. (MC 9.14.090)

In addition, the following deed restrictions and disclosures shall be included within the document and grant deed of the properties:

- The developer and homeowners association shall promote the use of native plants and trees and drought tolerant species to the extent feasible.

PRIOR TO BUILDING PERMIT

P25. (BP) Prior to issuance of building permits, the developer or developer's successor-in-interest shall pay all applicable impact fees, including but not limited to Transportation Uniform Mitigation fees (TUMF), Multi-species Habitat Conservation Plan (MSHCP) mitigation fees, and the City's adopted Development Impact Fees. (Ord)

P26. (BP) Prior to issuance of building permits, final front and street side yard landscape and irrigation plans, private slope landscape plans, basin landscape plans, common area lighting and fence and wall plans shall be approved.

PRIOR TO BUILDING FINAL

P27. (BF) Prior to the issuance of Certificates of Occupancy or building final all private and common area landscape and irrigation, common area lighting, and fence and walls shall be installed. Landscaping on lots not yet having dwelling units shall be maintained by the developer weed and disease free. (MC 9.03.040)

Mitigation Measures

Traffic

TR-1: Prior to the issuance of building permits, the Project applicant shall participate in the City's DIF and County TUMF fee programs by paying the requisite fees at the time of building permit, and in addition pay the Project's fair share amount of $43,497 for improvements at the intersections of Indian Street at Cactus Avenue and Indian Street at Gentian Avenue as identified in Table 1-5 that are consistent with the improvements shown on Table 6-3, or as otherwise agreed to by the City and Project Applicant. Project fair share payment shall only be collected if the City creates a fee program that includes the improvements the fair share contribution is intended to construct.

TR-2: Prior to the final approval of the street improvement plans, traffic signal plans will be required for a new traffic signal located at the intersection of Perris Boulevard and Santiago Drive. Prior to issuance of Certificate of Occupancy, the traffic signal and Perris Boulevard and Santiago Drive shall be completed per the approved plans to the satisfaction of the City Engineer.

Biological Resources

BR-1. A qualified biologist will conduct a pre-construction presence/absence survey for burrowing owls within 14 days prior to site disturbance. If burrowing owls are detected onsite, the owls will be relocated/excluded from the site outside of the breeding season following accepted protocols, and subject to the approval of the RCA and wildlife agencies.

BR-2. As feasible, vegetation clearing should be conducted outside of the nesting season, which is generally identified as February 1 through September 15. If avoidance of the nesting season is not feasible, then a qualified biologist shall conduct a nesting bird survey within three days prior to any disturbance of the site, including disking, demolition activities, and grading. If active nests are identified, the biologist shall establish suitable buffers around the nests, and the buffer areas shall be avoided until the nests are no longer occupied and the juvenile birds can survive independently from the nests.

<u>Cultural Resources</u>

CR-1: Prior to the issuance of a grading permit, the Project Applicant shall provide evidence to the City of Moreno Valley that a professional archaeological monitor has been retained by the Applicant to conduct monitoring of all mass grading and trenching activities and that the monitor has the authority to temporarily halt and redirect earthmoving activities in the event that suspected archaeological resources are unearthed during Project construction. The Project archaeologist, with input from the appropriate Tribe, shall prepare a Cultural Resources Monitoring Plan (CRMP) to document protocols for inadvertent finds, to determine potential protection measures from further damage and destruction for any identified archaeological resource(s)/ tribal cultural resources (TCRs), outline the process for monitoring and for completion of the final Phase IV Monitoring Report. If any archaeological and/or TCRs are identified during monitoring, these will also be documented and addressed per standard archaeological protocols in the Phase IV report, with the exception of human remains which will be addressed per CUL-5. The Project Archaeologist shall attend the pregrading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.

CR-2: At least 30 days prior to the issuance of a grading permit, the Applicant shall contact the appropriate Luiseño tribe to develop a Cultural Resources Treatment Agreement and shall provide evidence to the City of Moreno Valley that the professionally qualified Luiseño Native American monitor(s) has been secured from the interested tribe(s), and that the monitor shall be allowed to monitor all mass grading and trenching activities. The Tribal representative(s) shall attend the pre-grading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.

CR-3: If, during mass grading and trenching activities, the Archaeologist or Tribal representatives suspect that an archaeological resource and/or TCR may have been unearthed, the monitor identifying the potential resources, in consultation with the other monitor as appropriate, shall immediately halt and redirect grading operations in a 100-foot radius around the find to allow identification and evaluation of the suspected resource. The Native American monitor(s) or appropriate representative(s) and the archaeological monitor shall evaluate the suspected resource and make a determination of significance pursuant to California Public Resources Code Section 21083.2. The archaeological monitor and tribal monitor(s) or appropriate representative(s), the Project Applicant, and the City Planning Division shall confer regarding mitigation of the discovered resource(s). All sacred sites, should they be encountered within the Project area, shall be avoided and preserved as the preferred mitigation, if feasible.

CR-4: Prior to grading permit issuance, the City shall verify that the following note is included on the Grading Plan:

> "If any suspected archaeological resources are discovered during ground-disturbing activities and the archaeological monitor or Tribal representatives are not present, the construction supervisor is obligated to halt work in a 100-foot radius around the find and call the project archaeologist and the Tribal representatives to the site to assess the significance of the find."

CR-5: If human remains are encountered, California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the Riverside County Coroner has made the necessary findings as to origin. Further, pursuant to California Public Resources Code Section 5097.98(b), remains shall be left in place and free from disturbance until a final decision as to the treatment and disposition has been made by the Coroner. If the Riverside County Coroner determines the remains to be Native American, the California Native American Heritage Commission must be contacted within 24 hours. The Native American Heritage Commission must then immediately notify the "most likely descendant(s)" of receiving notification of the discovery. The most likely descendant(s) shall then make recommendations within 48 hours, and engage in consultations concerning the treatment of the remains as provided in Public Resources Code §5097.98.

CR-6: Prior to construction involving excavation four feet or more below existing surface grade, the construction contractor shall provide evidence that a qualified paleontologist has been retained, and that the paleontologist(s) shall be present during all grading and other significant ground-disturbing activities that reach four feet or more below existing surface grade. In the event fossiliferous deposits are encountered, the following measures shall be implemented:

- Monitoring shall be conducted by qualified paleontological monitor(s) of excavation in areas identified as likely to contain paleontological resources, including very old alluvial fan deposits. Paleontological monitors shall be equipped to salvage fossils as they are unearthed, to avoid construction delays, and to remove samples of sediments that are likely to contain the remains of small fossil invertebrates and vertebrates. Monitors shall be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring may be reduced if the potentially fossiliferous units are determined upon exposure and examination by qualified paleontological personnel to have low potential to contain fossil resources.

- Paleontological monitoring of any earthmoving will be conducted by a monitor, under direct guidance of a qualified paleontologist. Earthmoving in areas of the parcel where previously undisturbed sediments are buried, but not otherwise disturbed, will not be monitored.

- If too few fossil remains are found after 50 percent of the planned-for earthmoving has been completed, monitoring can be reduced or discontinued in those areas at the Project paleontologist's direction.

- Preparation of recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates.

- Identification and curation of specimens into a professional, fully accredited museum repository with permanent retrievable storage. The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities.

- Preparation or a report of findings with and appended itemized inventory of specimens. The report and inventory, when submitted to the city along with confirmation of the curation of recovered of recovered specimens into an established, accredited museum repository, will signify completion of the program to mitigate impacts to paleontological resources.

Noise

N-1: Construction activities shall be operated in a manner that limits noise impacts on surrounding uses (General Plan Policy 6.5.2). In order to limit noise impacts on surrounding property, the construction contractor will ensure the following:

- All construction equipment powered by gasoline or diesel engines will be required to have sound-control devices at least as effective as those originally provided by the manufacturer; no equipment will be permitted to have an unmuffled exhaust.
- Mobile noise-generating equipment and machinery will be shut off when not in use;

Construction vehicles assessing the site will be required to use the shortest possible route to and from local freeways, provided the routes do not expose additional receptors to noise.

N-2: The staging of construction equipment and the construction trailer shall be placed as far as possible from the existing single-family residences located to the west and south and the schools to the south.

Building and Safety Division

The following are general comments generated on the information provided and do not constitute a complete list of potential items or issues for this project proposal. Fee estimates for plan review and permits can be obtained by contacting the Building and Safety Division at 951.413.3350.

B1. All new structures shall be designed in conformance to the latest design standards adopted by the State of California in the California Building Code, (CBC) Part 2, Title 24, California Code of Regulations including requirements for allowable area, occupancy separations, fire suppression systems, etc. The current code edition is the 2016 CBC.

B2. The proposed project may be classified as an R-3/U occupancy and shall comply with the 2016 California Residential Code (CRC).

B3. Building plans submitted shall be signed and sealed by a California licensed design professional as required by the State Business and Professions Code.

B4. The proposed development may be subject to the payment of required development fees as required by the City's Fee Ordinance at the time an application is submitted or prior to the issuance of permits as determined by the City.

B5. The proposed project may be subject to approval by the Water District serving this location and all applicable fees and charges shall be paid to the District prior to permit issuance. Contact the appropriate water district for details.

B6. Prior to final inspection, all plans shall be placed on a CD Rom for reference and verification. Plans will include "as built" plans, revisions and changes. The CD will also include Title 24 energy calculations, structural calculations and all other pertinent information. It will be the responsibility of the developer and or the building or property owner(s) to bear all costs required for this process. The CD will be presented to the Building and Safety Division for review prior to final inspection and building occupancy. The CD will become the property of the Moreno Valley Building and Safety Division. In addition, a site plan showing the path of travel from public right of way with elevations will be required.

SCHOOL DISTRICT

S1. (BP) Prior to issuance of building permits, the developer shall provide to the Community & Economic Development Director a written certification by the affected school district that either: (1) the project has complied with the fee or other exaction levied on the project by the governing board of the district, pursuant to Government Code Section 65996; or (2) the fee or other requirement does not apply to the project.

UNITED STATES POSTAL SERVICE

PO1. (BP) Prior to the issuance of building permits, the developer shall contact the U.S. Postal Service to determine the appropriate type and location of mailboxes.

FIRE PREVENTION BUREAU

With respect to the conditions of approval, the following fire protection measures shall be provided in accordance with Moreno Valley City Ordinances and/or recognized fire protection standards:

F1. Prior to issuance of Certificate of Occupancy or Building Final, "Blue Reflective Markers" shall be installed to identify fire hydrant locations in accordance with City specifications. (CFC 509.1 and MVLT 440A-0 through MVLT 440C-0)

F2. During phased construction, dead end roadways and streets which have not been completed shall have a turn-around capable of accommodating fire apparatus. (CFC 503.1 and 503.2.5)

F3. If construction is phased, each phase shall provide an approved emergency vehicular access way for fire protection prior to any building construction. (CFC 501.4)

F4. Prior to construction and issuance of building permits, all locations where structures are to be built shall have an approved Fire Department emergency vehicular access road (all weather surface) capable of sustaining an imposed load of 80,000 lbs. GVW, based on street standards approved by the Public Works Director and the Fire Prevention Bureau. (CFC 501.4 and MV City Standard Engineering Plan 108d)

F5. Prior to construction and issuance of Building Permits, fire lanes and fire apparatus access roads shall have an unobstructed width of not less than twenty–four (24) feet as approved by the Fire Prevention Bureau and an unobstructed vertical clearance of not less the thirteen (13) feet six (6) inches. (CFC 503.2.1 and MVMC 8.36.060[E])

F6. Prior to construction, all roads, driveways and private roads shall not exceed 12 percent grade. (CFC 503.2.7 and MVMC 8.36.060[G])

F7. Prior to construction, all locations where structures are to be built shall have an approved Fire Department access based on street standards approved by the Public Works Director and the Fire Prevention Bureau. (CFC 501.4)

F8. Prior to building construction, dead end roadways and streets which have not been completed shall have a turnaround capable of accommodating fire apparatus. (CFC 503.2.5)

F9. The angle of approach and departure for any means of Fire Department access shall not exceed 1 ft drop in 20 ft (0.3 m drop in 6 m), and the design limitations of the fire apparatus of the Fire Department shall be subject to approval by the AHJ. (CFC 503 and MVMC 8.36.060)

F10. Prior to issuance of the building permit for development, independent paved access to the nearest paved road, maintained by the City shall be designed and constructed by the developer within the public right of way in accordance with City Standards. (MVMC 8.36.060, CFC 501.4)

F11. Prior to construction, “private” driveways over 150 feet in length shall have a turn-around as determined by the Fire Prevention Bureau capable of accommodating fire apparatus. Driveway grades shall not exceed 12 percent. (CFC 503 and MVMC 8.36.060, CFC 501.4)

F12. Prior to issuance of Certificate of Occupancy or Building Final, all residential dwellings shall display street numbers in a prominent location on the street side of the residence in such a position that the numbers are easily visible to approaching emergency vehicles. The numbers shall be located consistently on each dwelling throughout the development. The numerals shall be no less than four (4) inches in height and shall be low voltage lighted fixtures. (CFC 505.1, MVMC 8.36.060[I])

F13. Prior to issuance of Building Permits, the applicant/developer shall participate in the Fire Impact Mitigation Program. (Fee Resolution as adopted by City Council)

F14. Prior to issuance of Certificate of Occupancy or Building Final, the applicant/developer shall install a fire sprinkler system based on square footage and type of construction, occupancy or use. Fire sprinkler plans shall be submitted to the Fire Prevention Bureau for approval prior to installation. (CFC Chapter 9, MVMC 8.36.100[D])

F15. Prior to issuance of Building Permits, the applicant/developer shall furnish one copy of the water system plans to the Fire Prevention Bureau for review. Plans shall:

a) Be signed by a registered civil engineer or a certified fire protection engineer;
b) Contain a Fire Prevention Bureau approval signature block; and
c) Conform to hydrant type, location, spacing of new and existing hydrants and minimum fire flow required as determined by the Fire Prevention Bureau.

The required water system, including fire hydrants, shall be installed, made serviceable, and be accepted by the Moreno Valley Fire Department prior to beginning construction. They shall be maintained accessible.

Existing fire hydrants on public streets are allowed to be considered available. Existing fire hydrants on adjacent properties shall not be considered available unless fire apparatus access roads extend between properties and easements are established to prevent obstruction of such roads. (CFC 507, 501.3)

F16. Prior to construction, all traffic calming designs/devices must be approved by the Fire Marshal and City Engineer.

F17. Single Family Dwellings. Schedule "A" fire prevention approved standard fire hydrants (6” x 4” x 2 ½”) shall be located at each intersection of all residential streets. Hydrants shall be spaced no more than 500 feet apart in any direction so that no point on the street is more than 250 feet from a hydrant. Minimum fire flow shall be 1000 GPM for 1 hour duration of 20 PSI. Where new water mains are extended along streets where hydrants are not needed for protection of structures or similar fire problems, serving one and two-family residential developments, standard fire hydrants shall be provided at spacing not to exceed 1000 feet along the tract boundary for transportation hazards. (CFC 507.3, Appendix B, MVMC 8.36.060).

PUBLIC WORKS DEPARTMENT

Land Development Division

The following are the Public Works Department – Land Development Division Conditions of Approval for this project and shall be completed at no cost to any government agency. All questions regarding the intent of the following conditions shall be referred to the Land Development Division.

General Conditions

LD1. (G) The developer shall comply with all applicable City ordinances and resolutions including the City's Municipal Code (MC) and if subdividing land, the Government Code (GC) of the State of California, specifically Sections 66410 through 66499.58, said sections also referred to as the Subdivision Map Act (SMA). [MC 9.14.010]

LD2. (G) The tentative map shall correctly show all existing easements, traveled ways, and drainage courses. Any omission may require the map or plans associated with this application to be resubmitted for further consideration. [MC 9.14.040(A)]

LD3. (G) In the event right of way or offsite easements are required to construct offsite improvements necessary for the orderly development of the surrounding area to meet the public health and safety needs, the developer shall make a good faith effort to acquire the needed right of way in accordance with the Land Development Division's administrative policy. If unsuccessful, the Developer shall enter into an agreement with the City to acquire the necessary right of way or offsite easements and complete the improvements at such time the City acquires the right of way or offsite easements which will permit the improvements to be made. The developer shall be responsible for all costs associated with the right of way or easement acquisition. [GC 66462.5]

LD4. (G) If improvements associated with this project are not initiated within two (2) years of the date of approval of the Public Improvement Agreement (PIA), the City Engineer may require that the engineer's estimate for improvements associated with the project be modified to reflect current City construction costs in effect at the time of request for an extension of time for the PIA or issuance of a permit.

LD5. (G) The developer shall monitor, supervise and control all construction and construction supportive activities, so as to prevent these activities from causing a public nuisance, including but not limited to, insuring strict adherence to the following:

a. Removal of dirt, debris, or other construction material deposited on any public street no later than the end of each working day.

b. Observance of working hours as stipulated on permits issued by the Land Development Division.

c. The construction site shall accommodate the parking of all motor vehicles used by persons working at or providing deliveries to the site.

d. All dust control measures per South Coast Air Quality Management District (SCAQMD) requirements during the grading operations.

Violation of any condition, restriction or prohibition set forth in these conditions shall subject the owner, applicant, developer or contractor(s) to remedy as noted in City Municipal Code 8.14.090. In addition, the City Engineer or Building Official may suspend all construction related activities for violation of any condition, restriction or prohibition set forth in these conditions until such time as it has been determined that all operations and activities are in conformance with these conditions.

LD6. (G) The developer shall protect downstream properties from damage caused by alteration of drainage patterns (i.e. concentration or diversion of flow, etc.). Protection shall be provided by constructing adequate drainage facilities, including, but not limited to, modifying existing facilities or by securing a drainage easement. [MC 9.14.110]

LD7. (G) Public drainage easements, when required, shall be a minimum of 25 feet wide and shall be shown on the map and plan, and noted as follows: *"Drainage Easement – no structures, obstructions, or encroachments by landfills are allowed."* In addition, the grade within the easement area shall not exceed a 3:1 (H:V) slope, unless approved by the City Engineer.

LD8. (G) For single family residential subdivisions, all lots shall drain toward the street unless otherwise approved by the City Engineer. Residential lot drainage to the street shall be by side yard swales, and must be directed to a driveway or drainage devices located outside the right of way in accordance with City Standard MVSI-154-0. No cross-lot or over the sidewalk drainage shall be allowed.

LD9. (G) Prior to any plan approval, a final detailed drainage study (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer. The study shall include existing and proposed hydrologic conditions as well as hydraulic calculations for all drainage control devices and storm drain lines. [MC 9.14.110(A.1)]. A digital (pdf) copy of the approved drainage study shall be submitted to the Land Development Division.

LD10. (G) Water quality best management practices (BMPs) designed to meet Water Quality Management Plan (WQMP) requirements for single-family residential development shall not be used as a construction BMP. Water quality BMPs shall be maintained for the entire duration of the project construction and be used to treat runoff from those developed portions of the project. Water quality BMPs shall be protected from upstream construction related runoff by having proper best management practices in place and maintained. Water quality BMPs shall be graded per the approved design plans and once landscaping and irrigation has been installed, it and its maintenance shall be turned over to an established Homeowner's Association (HOA). The Homeowner's Association shall enter into an agreement with the City for basin maintenance.

LD11. (G) The final approved conditions of approval (COAs) and any applicable Mitigation Measures issued by the Planning Division shall be photographically or electronically placed on Mylar sheets and included in the Grading and Street Improvement plans.

LD12. (G) Aggregate slurry, as defined in Section 203-5 of Standard Specifications for Public Works Construction, may be required just prior to the end of the one-year warranty period of the public streets at the discretion of the City Engineer. If slurry is required, a slurry mix design shall be submitted for review and approved by the City Engineer. The latex additive shall be Ultra Pave 70 (for anionic) or Ultra Pave 65 K (for cationic) or an approved equal per the geotechnical report. The latex shall be added at the emulsion plant after weighing the asphalt and before the addition of mixing water. The latex shall be added at a rate of two to two-and-one-half (2 to 2½) parts to one-hundred (100) parts of emulsion by volume. Any existing striping shall be removed prior to slurry application and replaced per City standards.

<u>Prior to Grading Plan Approval</u>

LD13. (GPA) Grading plans (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

LD14. (GPA) Landscape & Irrigation plans (prepared by a registered/licensed landscape architect) for water quality BMPs shall be submitted for review and approved by the City Engineer per the current submittal requirements, if applicable.

LD15. (GPA) The developer shall ensure compliance with the City Grading ordinance, these Conditions of Approval and the following criteria:

a. The project street and lot grading shall be designed in a manner that perpetuates the existing natural drainage patterns with respect to tributary drainage area and outlet points. Unless otherwise approved by the City Engineer, lot lines shall be located at the top of slopes.

b. Any grading that creates cut or fill slopes adjacent to the street shall provide erosion control, sight distance control, and slope easements as approved by the City Engineer.

c. All improvement plans are substantially complete and appropriate clearance letters are provided to the City.

d. A soils/geotechnical report (addressing the soil's stability and geological conditions of the site) shall be submitted to the Land Development Division for review. A digital (pdf) copy of the soils/geotechnical report shall be submitted to the Land Development Division.

LD16. (GPA) The developer shall select Low Impact Development (LID) Best Management Practices (BMPs) designed per the latest version of the Water Quality Management Plan (WQMP) - a guidance document for the Santa Ana region of Riverside County.

LD17. (GPA) For projects that will result in discharges of storm water associated with construction with a soil disturbance of one or more acres of land, the developer shall submit a Notice of Intent (NOI) and obtain a Waste Discharger's Identification number (WDID#) from the State Water Quality Control Board (SWQCB) which shall be noted on the grading plans.

LD18. (GPA) Two (2) copies of the final project-specific Water Quality Management Plan (WQMP) shall be submitted for review and approved by the City Engineer, which:

a. Addresses Site Design Best Management Practices (BMPs) such as minimizing impervious areas, maximizing permeability, minimizes directly connected impervious areas to the City's street and storm drain systems, and conserves natural areas;

b. Incorporates Source Control BMPs and provides a detailed description of their implementation;

c. Describes the long-term operation and maintenance requirements for BMPs requiring maintenance; and

d. Describes the mechanism for funding the long-term operation and maintenance of the BMPs.

A copy of the final WQMP template can be obtained on the City's Website or by contacting the Land Development Division. A digital (pdf) copy of the approved final project-specific Water Quality Management Plan (WQMP) shall be submitted to the Land Development Division.

LD19. (GPA) A Storm Water Pollution Prevention Plan (SWPPP) shall be prepared in conformance with the State's current Construction Activities Storm Water General Permit. A copy of the current SWPPP shall be kept at the project site and be available for review upon request.

LD20. (GPA) The developer shall pay all remaining plan check fees.

LD21. (GPA) Resolution of all drainage issues shall be as approved by the City Engineer.

Prior to Grading Permit

LD22. (GP) The developer shall submit recorded slope easements from adjacent property owners in all areas where grading resulting in slopes is proposed to take place outside of the project boundaries. For all other offsite grading, written permission from adjacent property owners shall be submitted.

LD23. (GP) A receipt showing payment of the Area Drainage Plan (ADP) fee to Riverside County Flood Control and Water Conservation District shall be submitted. [MC 9.14.100(O)]

LD24. (GP) Security, in the form of a cash deposit (preferable), or letter of credit shall be submitted as a guarantee of the completion of the grading operations for the project. [MC 8.21.070]

LD25. (GP) Security, in the form of a cash deposit (preferable), or letter of credit shall be submitted as a guarantee of the implementation and maintenance of erosion control measures. At least twenty-five (25) percent of the required security shall be in the form of a cash deposit with the City. [MC 8.21.160(H)]

LD26. (GP) The developer shall pay all applicable inspection fees.

LD27. (GP) A digital (pdf) copy of the approved grading plans shall be submitted to the Land Development Division.

Prior to Map Approval

LD28. (MA) Final maps (prepared by a registered civil engineer and/or licensed surveyor) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

LD29. (MA) Resolution of all drainage issues shall be as approved by the City Engineer.

LD30. (MA) A copy of the Covenants, Conditions and Restrictions (CC&Rs) shall be submitted for review and approved by the City Engineer. The CC&Rs shall include, but not be limited to, access easements, reciprocal access, private and/or public utility easements as may be relevant to the project. In addition, for single-family residential development, bylaws and articles of incorporation shall also be included as part of the maintenance agreement for any water quality BMPs.

LD31. (MA) All street dedications shall be free of all encumbrances, irrevocably offered to the public and shall continue in force until the City accepts or abandons such offers, unless otherwise approved by the City Engineer.

LD32. (MA) The developer shall guarantee the completion of all related improvements required for this project by executing a Public Improvement Agreement (PIA) with the City and posting the required security. [MC 9.14.220]

LD33. (MA) All public improvement plans required for this project shall be approved by the City Engineer in order to execute the Public Improvement Agreement (PIA).

LD34. (MA) The developer shall enter into a Cooperative Agreement with the City and Riverside County Flood Control and Water Conservation District establishing the terms and conditions covering the inspection, operation and maintenance of Master Drainage Plan facilities required to be constructed as part of the project.

LD35. (MA) The developer shall comply with the requirements of the City Engineer based on recommendations of the Riverside County Flood Control District regarding the construction of County Master Plan Facilities.

LD36. (MA) If the project involves the subdivision of land, maps may be developed in phases with the approval of the City Engineer. Financial security shall be provided for all public improvements associated with each phase of the map. The boundaries of any multiple map increment shall be subject to the approval of the City Engineer. If the project does not involve the subdivision of land and it is necessary to dedicate right of way/easements, the developer shall make the appropriate offer of dedication by separate instrument. In either case, the City

Engineer may require the dedication and construction of necessary utility, street or other improvements beyond the project boundary, if the improvements are needed for circulation, parking, access, or for the welfare or safety of the public. [MC 9.14.080(B)(C), GC 66412 & 66462.5]

LD37. (MA) All proposed street names shall be submitted for review and approved by the City Engineer, if applicable. [MC 9.14.090(E.2.k)]

LD38. (MA) Under the current permit for storm water activities required as part of the National Pollutant Discharge Elimination System (NPDES) as mandated by the Federal Clean Water Act, this project is subject to the following requirements:

a. Establish a Home Owners Association (HOA) to finance the maintenance of the “Water Quality BMPs”. Any lots which are identified as “Water Quality BMPs” shall be owned in fee by the HOA.

b. Dedicate a maintenance easement to the City of Moreno Valley.

c. Execute a maintenance agreement between the City of Moreno Valley and the HOA, which shall be approved by City Council.

d. Establish a trust fund per the terms of the maintenance agreement.

e. Provide a certificate of insurance per the terms of the maintenance agreement.

f. Select one of the following options to meet the financial responsibility to provide storm water utilities services for the required continuous operation, maintenance, monitoring system evaluations and enhancements, remediation and/or replacement, all in accordance with Resolution No. 2002-46.

   i. Participate in the mail ballot proceeding in compliance with Proposition 218, for the Residential NPDES Regulatory Rate Schedule and pay all associated costs with the ballot process, or

   ii. Establish an endowment to cover future maintenance costs for the Residential NPDES Regulatory Rate Schedule.

g. Notify the Special Districts Division of the intent to record the final map 90 days prior to City Council action authorizing recordation of the final map and the financial option selected. The final option selected shall be in place prior to the issuance of certificate of occupancy. [California Government Code & Municipal Code]

LD39. (MA) After recordation, a digital (pdf) copy of the recorded map shall be submitted to the Land Development Division.

Prior to Improvement Plan Approval

LD40. (IPA) All public improvement plans (prepared by a licensed/registered civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

LD41. (IPA) The developer shall submit clearances from all applicable agencies, and pay all applicable plan check fees.

LD42. (IPA) The street improvement plans shall comply with current City policies, plans and applicable City standards (i.e. MVSI-160 series, etc.) throughout this project.

LD43. (IPA) The design plan and profile shall be based upon a centerline, extending beyond the project boundaries a minimum distance of 300 feet at a grade and alignment approved by the City Engineer.

LD44. (IPA) The plans shall indicate any restrictions on trench repair pavement cuts to reflect the City's moratorium on disturbing newly-constructed pavement less than three (3) years old and recently slurry sealed streets less than one (1) year old. Pavement cuts for trench repairs may be allowed for emergency repairs or as specifically approved by the City Engineer.

LD45. (IPA) All dry and wet utilities shall be shown on the plans and any crossings shall be potholed to determine actual location and elevation. Any conflicts shall be identified and addressed on the plans. The pothole survey data shall be submitted to Land Development with the public improvement plans for reference purposes only. The developer is responsible to coordinate with all affected utility companies and bear all costs of any utility relocation.

LD46. (IPA) The developer is required to bring any existing access ramps adjacent to and fronting the project to current ADA (Americans with Disabilities Act) requirements. However, when work is required in an intersection that involves or impacts existing access ramps, all access ramps in that intersection shall be retrofitted to comply with current ADA requirements, unless approved otherwise by the City Engineer.

LD47. (IPA) Drainage facilities (i.e. catch basins, etc.) with sump conditions shall be designed to convey the tributary 100-year storm flows. Secondary emergency escape shall also be provided.

LD48. (IPA) The hydrology study shall be designed to accept and properly convey all off-site drainage flowing onto or through the site. All storm drain design and improvements shall be submitted for review and approved of the City Engineer. In the event that the City Engineer permits the use of streets for drainage purposes, the provisions of current City standards shall apply. Should the quantities exceed the street capacity or the use of streets be prohibited for drainage purposes, as in the case where one travel lane in each direction shall not be used for drainage conveyance for emergency vehicle access on streets classified as minor arterials and greater, the developer shall provide adequate facilities as approved by the City Engineer. [MC 9.14.110 A.2]

<u>Prior to Encroachment Permit</u>

LD49. (EP) All work performed within public right of way requires an encroachment permit. Security (in the form of a cash deposit or other approved means) may be required as determined by the City Engineer. For non-subdivision projects, the City Engineer may require the execution of a Public Improvement

Agreement (PIA) as a condition of the issuance of a construction or encroachment permit. All inspection fees shall be paid prior to issuance of construction permit. [MC 9.14.100(C.4)]

LD50. (EP) A digital (pdf) copy of all approved improvement plans shall be submitted to the Land Development Division.

LD51. (EP) All applicable inspection fees shall be paid.

Prior to Building Permit

LD52. (BP) For all subdivision projects, the map shall be recorded (excluding model homes). [MC 9.14.190]

LD53. (BP) Certification to the line, grade, flow test, and system invert elevations for the water quality control BMPs shall be submitted or review and approved by the City Engineer (excluding models homes).

LD54. (BP) An engineered-fill certification, rough grade certification and compaction report shall be submitted for review and approved by the City Engineer. A digital (pdf) copy of the approved compaction report shall be submitted to the Land Development Division. All pads shall meet pad elevations per approved grading plans as noted by the setting of “blue-top” markers installed by a registered land surveyor or licensed civil engineer.

Prior to Occupancy

LD55. (CO) All required as-built plans (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

LD56. (CO) The engineered final/precise grade certification shall be submitted for review and approved by the City Engineer.

LD57. (CO) All outstanding fees shall be paid.

LD58. (CO) The developer shall complete all public improvements in conformance with current City standards, except as noted in the Special Conditions, including but not limited to the following:

a. Street improvements including, but not limited to: pavement, base, curb and/or gutter, cross gutters, spandrel, sidewalks, drive approaches, pedestrian ramps, street lights, signing, striping, under sidewalk drains, landscaping and irrigation, medians, redwood header boards, pavement tapers/transitions and traffic control devices as appropriate.

b. Storm drain facilities including, but not limited to: storm drain pipe, storm drain laterals, open channels, catch basins and local depressions.

c. City-owned utilities.

d. Sewer and water systems including, but not limited to: sanitary sewer, potable water and recycled water.

e. Under grounding of all existing and proposed utilities adjacent to and on-site. [MC 9.14.130]

f. Relocation of overhead electrical utility lines including, but not limited to: electrical, cable and telephone.

LD59. (CO) For residential subdivisions, prior to releasing the last 20% or last 5 permitted structures (whichever is greater, unless otherwise determined by the City Engineer) of any Map Phase, punch list work for improvements and capping of streets in that phase shall be completed and approved for acceptance by the City Engineer.

LD60. (CO) The Developer shall comply with the following water quality related items:

a. Notify the Land Development Division prior to construction and installation of all structural BMPs so that an inspection can be performed.

b. Demonstrate that all structural BMPs described in the approved final project-specific WQMP have been constructed and installed in conformance with the approved plans and specifications;

c. Demonstrate that Developer is prepared to implement all non-structural BMPs described in the approved final project-specific WQMP; and

d. Demonstrate that an adequate number of copies of the approved final project-specific WQMP are available for future owners/occupants.

e. Clean and repair the water quality BMP's, including re-grading to approved civil drawings if necessary.

f. Provide City with updated Engineer's Line and Grade Certification.

g. Obtain approval and complete installation of the irrigation and landscaping.

LD61. (CO) The applicant shall ensure the following, pursuant to Section XII. I. of the 2010 NPDES Permit:

a. Field verification that structural Site Design, Source Control and Treatment Control BMPs are designed, constructed and functional in accordance with the approved Final Water Quality Management Plan (WQMP).

b. Certification of best management practices (BMPs) from a state licensed civil engineer. An original WQMP BMP Certification shall be submitted for review and approved by the City Engineer.

<u>Special Conditions</u>

LD62. (GP) Prior to the payment of the Development Impact Fee (DIF), the developer may enter into a DIF Improvement Credit Agreement to secure credit for the construction of applicable improvements. The Agreement must submitted prior to the issuance of a grading permit and must be approved by the City Council prior to receiving credit for applicable improvements. If the developer fails to complete this agreement prior to the timing specified above, no credits will be given. The developer shall pay current DIF fees adopted by the City Council. [Ord. 695 § 1.1 (part), 2005] [MC 3.38.030, 040, 050]

LD63. (GP) Prior to the payment of the Transportation Uniform Mitigation Fee (TUMF), the developer may enter into a TUMF Improvement Credit Agreement to secure credit for the construction of applicable improvements. The Agreement must submitted prior to the issuance of a grading permit and must be approved by the City Council prior to receiving credit for applicable improvements. If the developer fails to complete this agreement by the timing specified above, no credits will be given. The developer shall pay current TUMF fees adopted by the City Council. [Ord. 835 § 2.1, 2012] [MC 3.44.060]

LD64. Prior to final map approval, the map shall show the following:

a. The appropriate right-of-way dedication along Indian Street frontage shown as Lot S on the tentative tract map. This includes right-of-way required for a bus turn-out as conditioned by the Transportation Engineering Division.
b. The appropriate right-of-way dedication on Santiago Drive frontage shown as Lots Q and R on the tentative tract map.
c. The appropriate right-of-way dedication on Gentian Street frontage shown as Lot D on the tentative parcel map.
d. A 10-foot landscape easement along the east side of Indian Street and south side of Gentian Avenue.
e. A 1.5-foot landscape easement along the north side of Santiago Drive.

LD65. Prior to final map approval, the Developer shall guarantee the construction of the following improvements by entering into a public improvement agreement and posting security. The improvements along the project frontage shall be completed prior to occupancy of the first building or as otherwise determined by the City Engineer:

a. Indian Street, Minor Arterial, City Standard MVSI-105A-0 (88-foot RW / 64-foot CC) shall be constructed to complete the half-width along the entire project's east frontage. Remaining improvements shall consist of, but not be limited to pavement and base, sidewalk, catch basin, streetlights, pedestrian access ramps, and dry and wet utilities. In addition, the applicant will be required to install, replace and/or repair any missing, damaged or substandard improvements that do not meet current City standards.
b. Santiago Drive (east), Collector, City Standard MVSI-106B-0 (66-foot RW / 44-foot CC) shall be constructed to half-width plus an additional 12 feet south of the centerline from Street "L" to the project easterly boundary and half-width plus an additional 18 feet south of the centerline from the project easterly boundary to Perris Boulevard. Improvements shall consist of, but not be limited to, pavement and base, curb, gutter, sidewalk, driveway approaches, catch basins, storm drain, streetlights, pedestrian access ramps, and dry and wet utilities.
c. Santiago Drive (west), Collector, City Standard MVSI-106B-0 (66-foot RW / 44-foot CC) shall be constructed to full-width between Indian Street and

Street “N”. Improvements shall consist of, but not be limited to, pavement and base, curb, gutter, sidewalk, driveway approaches, catch basins, storm drain, streetlights, pedestrian access ramps, and dry and wet utilities.

d. Gentian Street, Minor Arterial (modified), City Standard MVSI-105A-0 (88-foot RW / 64-foot CC) shall be constructed to half-width plus an additional 18 feet north of the centerline, along the entire project’s north frontage. Improvements shall consist of, but not be limited to, a raised median, pavement and base, curb, gutter, sidewalk, catch basins, streetlights, pedestrian access ramps, dry and wet utilities.
e. Street “D”, Local Street (modified), City Standard MVSI-107A-0 (56-foot RW / 36-foot CC) shall be constructed to full-width as shown on the tentative map. Improvements shall consist of, but not be limited to, pavement and base, curb, gutter, sidewalk, catch basins, storm drain streetlights, pedestrian access ramps, dry and wet utilities.
f. Street “L”, Collector (modified), City Standard MVSI-106B-0 (66-foot RW / 40-foot CC) shall be constructed to full-width as shown on the tentative map. Improvements shall consist of, but not be limited to, pavement and base, curb, gutter, sidewalk, catch basins, storm drain, streetlights, pedestrian access ramps, dry and wet utilities.
g. Streets “A”, “B”, “C”, “E”, “F”, “G”, “H”, “I”, “J”, “K” “M”, “N”, “O”, and “P”, Local Street, City Standard MVSI-107A-0 (56-foot RW / 36-foot CC) shall be constructed to full-width as shown on the tentative map. Improvements shall consist of, but not be limited to, pavement and base, curb, gutter, sidewalk, catch basins, storm drain streetlights, pedestrian access ramps, dry and wet utilities.
h. All knuckles and cul-de-sacs shall be constructed per City Standards MVSI-162-0 and MVSI-163A-0, respectively.
i. Sunnymead Master Drainage Plan (MDP) Line M-2 within the public right-of-way in Santiago Drive, Perris Boulevard and Iris Avenue or an alignment as approved by both the RCFC&WCD and the City. This includes, but not limited to, construction of a 39-inch minimum storm drain, laterals, catch basins/inlets, and local depressions as needed.
j. The intersection of Perris Boulevard and Santiago Drive shall be fully improved to the ultimate right-of-way and street width in order to construct a traffic signal required by the Transportation Engineering Division condition TE8.

LD66. Lettered Lots “AA” and “DD” shall be designated for water quality bio-retention purposes and shall be reserved in fee title for the owner, heirs and assigns.

LD67. Lettered Lots “CC” and “HH” shall be designated for park purposes and reserved per the Parks and Community Services Department requirements.

LD68. Lettered Lots “BB”, “EE”, “FF”, “GG”, “II”, “JJ”, “KK”, “LL” “MM”, and “NN”, shall be designated open space and reserved in fee title for the owner, heirs and assigns.

LD69. Lettered Lots “BB”, “EE”, and “FF” shall show a 25-foot drainage easement for storm drain maintenance purposes.

LD70. Prior to the final map approval, the developer shall secure the following:

a. Additional right-of-way along the south side of Santiago Drive (east) between Street “L” and approximately 650 feet east of Street “L” for the construction of an eastbound travel lane as shown on the tentative map. The dedication shall be submitted for review, approval, and recorded.
b. Additional right-of-way between Indian Street and Street “N” for the full construction of Santiago Drive (west) as shown on the tentative map. The dedication shall be submitted for review, approval, and recorded.
c. Vacation of a portion of the south side of Santiago Drive (west), including utilities and drainage easements, as shown on the approved tentative tract map and as approved by City Engineer

LD71. Prior to rough grading plan approval, this project shall demonstrate, via a final drainage study, that the increased runoff resulting from the development of this site is mitigated. During no storm event shall the flow leaving the site in the developed condition be larger than that of the pre-developed condition, unless the study demonstrates that the existing or proposed drainage facilities can accommodate the increased run-off. The drainage study shall analyze the following events: 1, 3, 6 and 24-hour duration events for the 2, 5, 10 and 100-year storm events. The applicant understands that additional detention measures may be required beyond those shown on the tentative map and preliminary drainage study.

LD72. Prior to rough grading plan approval, the Applicant shall prepare and submit for approval a final, project-specific water quality management plan (F-WQMP). The F-WQMP shall be consistent with the approved P-WQMP, as well as in full conformance with the document; “Water Quality Management Plan - A Guidance Document for the Santa Ana Region of Riverside County” dated October 22, 2012. The F-WQMP shall be submitted and approved prior to application for and issuance of grading permits. At a minimum, the F-WQMP shall include the following: stormwater BMPs; LID principles; Source control BMPs; Operation and Maintenance requirements for BMPs; and sources of funding for BMP implementation.

a. The Applicant has proposed to incorporate the use of two (2) bio-retention basins. Final design and sizing details of all BMPs must be provided in the first submittal of the F-WQMP. The Applicant acknowledges that more area than currently shown on the plans may be required to treat site runoff as required by the WQMP guidance document.
b. All proposed LID BMP’s shall be designed in accordance with the RCFC&WCD’s Design Handbook for Low Impact Development Best Management Practices, dated September 2011.
c. The proposed LID BMP’s as identified in the project-specific P-WQMP shall be incorporated into the Final WQMP.

d. The NPDES notes per City Standard Drawing No. MVFE-350-0 shall be included in grading plans.
e. Post-construction treatment control BMPs, once placed into operation for post-construction water quality control, shall not be used to treat runoff from construction sites or unstabilized areas of the site.

LD73. Prior to precise grading plan approval, emergency overflow area(s) shall be shown at all applicable drainage improvement locations in the event that the drainage improvement fails or exceeds full capacity. This may include, but not be limited to, an emergency spillway in the proposed detention basin(s).

LD74. Prior to issuance of a building permit, the precise grading plans shall be approved.

LD75. Prior to street improvement plan approval, all dry and wet utilities shall be shown on the plans and any crossings shall be potholed to determine actual location and elevation. Any conflicts shall be identified and addressed on the plans. The pothole survey data shall be submitted to Land Development with the public improvement plans for reference purposes only. The developer is responsible to coordinate with all affected utility companies and bear all costs of any utility relocation.

LD76. Prior to occupancy, all overhead utility lines less than 115,000 volts fronting or within the entire project site boundary shall be placed underground per Section 9.14.130C of the City Municipal Code.

LD77. The Applicant shall, prior to building or grading permit closeout or the issuance of a certificate of occupancy, demonstrate:

a. That all structural BMPs have been constructed and installed in conformance with the approved plans and specifications;
b. That all structural BMPs described in the F-WQMP have been implemented in accordance with approved plans and specifications;
c. That the Applicant is prepared to implement all non-structural BMPs included in the F-WQMP, conditions of approval, and building/grading permit conditions; and
d. That an adequate number of copies of the approved F-WQMP are available for the future owners/occupants of the project.

LD78. Prior to occupancy, as-built street improvement plans, storm drain plans and precise grading plans shall be submitted for review and approved.

Special Districts Division

Conditions are standard to all or most development projects. Some special conditions, modified conditions or clarification of conditions may be included. Please review conditions as listed and contact the Division at 951.413.3480 for any questions.

Acknowledgement of Conditions

The following are the Special Districts Division's Conditions of Approval for PA14-0052 and PA14-0053; this project shall be completed at no cost to any Government Agency. All questions regarding the following Conditions including but not limited to intent, requests for change/modification, variance and/or request for extension of time shall be sought from the Special Districts Division of the Public Works Department 951.413.3480 or by emailing specialdistricts@moval.org.

General Conditions

SD-1 The parcel(s) associated with this project have been incorporated into the Moreno Valley Community Services District Zone A (Parks & Community Services) and Zone C (Arterial Street Lighting). All assessable parcels therein shall be subject to annual parcel taxes for Zone A and Zone C for operations and capital improvements.

SD-2 Plans for external parkway and median landscape areas designated in the project's Conditions of Approval for incorporation into a City coordinated landscape maintenance program, shall be prepared and submitted in accordance with the City of Moreno Valley Public Works Department Landscape Design Guidelines. The guidelines are available on the City's website at www.moval.org/sd or from the Special Districts Division (951.413.3480 or specialdistricts@moval.org).

SD-3 In the event the City of Moreno Valley determines that funds authorized by any Proposition 218 mail ballot proceeding are insufficient to meet the costs for external parkway maintenance and utility charges, the City shall have the right, at its option, to terminate the grant of any or all parkway maintenance easements. This power of termination, should it be exercised, shall be exercised in the manner provided by law to quit claim and abandon the property so conveyed to the District, and to revert to the Developer or the Developer's successors in interest, all rights, title, and interest in said parkway areas, including but not limited to responsibility for perpetual maintenance of said areas.

SD-4 The Developer, or the Developer's successors or assignees shall be responsible for all parkway and median landscape maintenance for a period of one (1) year commencing from the time all items of work have been completed to the satisfaction of Special Districts staff as per the City of Moreno Valley Public Works Department Landscape Design Guidelines, or until such time as the District accepts maintenance responsibilities.

SD-5 Any damage to existing landscape areas maintained by the City of Moreno Valley due to project construction shall be repaired/replaced by the Developer, or Developer's successors in interest, at no cost to the City of Moreno Valley.

SD-6 The ongoing maintenance of any internal parkway landscaping required to be installed within the tract shall be the responsibility of the Home Owner's Association.

SD-7 Plan check fees for review of parkway/median landscape plans for improvements that shall be maintained by the City of Moreno Valley are due upon the first plan submittal. (MC 3.32.040)

SD-8 Inspection fees for the monitoring of landscape installation associated with the City of Moreno Valley maintained parkways/medians are due prior to the required pre-construction meeting. (MC 3.32.040)

SD-9 Street Light Authorization forms for all street lights that are conditioned to be installed as part of this project must be submitted to the Special Districts Division for approval, prior to street light installation. The Street Light Authorization form can be obtained from the utility company providing electric service to the project, either Moreno Valley Utility or Southern California Edison. For questions, contact the Special Districts Division at 951.413.3480 or specialdistricts@moval.org.

SD-10 Parkway and median landscape areas maintained as part of the City of Moreno Valley Community Facilities District 2014-01 shall be required to have independent utility systems, including but not limited to water, electric, and telephone services. An independent irrigation controller and pedestal will also be required. Combining utility systems with existing or future landscape areas not associated with the City of Moreno Valley Community Facilities District (CFD) landscaping will not be permitted.

Prior to Grading Permit

SD-11 This project is included within the future annexation boundaries for Community Facilities District No. 7 (CFD No. 7) – Improvement Area No. 3. If Bonds have been sold for CFD No. 7 – Improvement Area No. 3, then the Local Component portion of the Area Drainage Plan (ADP) fee for Riverside County Flood Control and Water Conservation District (RCFCWCD) has been allocated toward the debt service payments on CFD No. 7 bonds and/or paid directly for acquisition of RCFCD facilities.

In order for the Developer to meet its financial obligation, it must notify the Special Districts Division when submitting the application for grading permit and select one of the funding options outlined below.

Or

If a grading permit is not required, the Developer must notify the Special Districts Division at 951.413.3480 or specialdistricts@moval.org when submitting the application for building permit issuance and select one of the funding options outlined below.

a. Participate in a special election to annex into CFD No. 7 and pay the equivalent to the Local Component portion of the ADP fee including interest as a special tax levied annually on the Riverside County property tax bill; or

b. Pay the Local Component portion of the ADP fee directly to the City of Moreno Valley, Special Districts Division which shall be used for any authorized purpose for CFD No. 7.

If the funding option selected is participation in a special election, a minimum of 90 days is needed to complete the special election process. This allows adequate time to complete the special election process in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

Annexation to CFD No. 7 shall be completed or proof of payment of the Local Component portion of the ADP fee shall be provided to the Special Districts Division prior to the issuance of the first building permit for this project.

Prior to Recordation of Final Map

SD-12 (R) This project has been conditioned to provide a funding source for the continued maintenance, enhancement, and/or retrofit of parks, open spaces, linear parks, and/or trail systems. The Developer shall satisfy this condition with one of the options below.

a. Participate in a special election for annexation into Community Facilities District No. 1 and pay all associated costs of the special election process and formation, if any; or

b. Establish an endowment fund to cover future maintenance costs for new neighborhood parks.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option prior to City Council action authorizing recordation of the final map for the development. A minimum of 90 days is needed to complete the special election process. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

Annexation to CFD No. 1 shall be completed or proof of payment to establish the endowment fund shall be provided prior to the issuance of the first building permit for this project.

SD-13 (R) This project has been identified to be included in the formation of a Community Facilities District for Public Safety services including but not limited to Police, Fire Protection, Paramedic Services, Park Rangers, and Animal Control services. The property owner(s) shall not protest the formation; however, they retain the right to object to the rate and method of maximum special tax. In compliance with Proposition 218, the property owner shall agree to approve the mail ballot proceeding (special election) for either formation of the CFD or annexation into an existing district that may already be established. The Developer must notify the Special Districts Division at 951.413.3480 or specialdistricts@moval.org of its intent to record the final map for the development 90 days prior to City Council action authorizing recordation of the map. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution. (California Government Code Section 53313 et. seq.)

SD-14 (R) This project is conditioned to provide a funding source for the following special financing program(s):

a. Street Lighting Services for capital improvements, energy charges, and maintenance.
b. Landscape Maintenance Services for external parkway and median landscaping on Indian Street, Gentian Avenue, and Santiago Drive.

The Developer's responsibility is to provide a funding source for the capital improvements and the continued maintenance of the landscaped area. The Developer shall satisfy this condition with one of the options below.

i. Participate in a special election (mail ballot proceeding) and pay all associated costs of the special election and formation, if any. Financing may be structured through a Community Services District zone, Community Facilities District, Landscape and Lighting Maintenance District, or other financing structure as determined by the City; or

ii. Establish a Property Owner's Association or Home Owner's Association which will be responsible for any and all operation and maintenance costs.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option prior to City Council action authorizing recordation of the final map for the development. The option for participating in a special election requires approximately 90 days to complete the special election process. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

The financial option selected shall be in place prior to the issuance of the first building permit for this project.

SD-15 (R) This project is conditioned to provide a funding source for the operation and maintenance of public improvements and/or services associated with new development in that territory. The Developer shall satisfy this condition with one of the options below.

a. Participate in a special election for maintenance/services and pay all associated costs of the election process and formation, if any. Financing may be structured through a Community Facilities District, Landscape and Lighting Maintenance District, or other financing structure as determined by the City; or

b. Establish an endowment fund to cover the future maintenance and/or service costs.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option prior to City Council action authorizing recordation of the final map for the development. A minimum of 90 days is needed to complete the special election process. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

The financial option selected shall be in place prior to the issuance of the first building permit for the project.

SD-16 *Residential* (R) If Land Development, a Division of the Public Works Department, requires this project to supply a funding source necessary to provide for, but not limited to, stormwater utilities services for the required continuous operation, maintenance, monitoring, systems evaluation and enhancements of on-site facilities and performing annual inspections of the affected areas to ensure compliance with state mandated storm water regulations, a funding source needs to be established. The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option for the National Pollution Discharge Elimination System (NPDES) program (see Land Development's related condition). Participating in a special election the process requires a 90 day period prior to City Council action authorizing recordation of the final map for the development and to participate in a special election process. This allows adequate time to be in compliance with the provisions of Article 13D of the California Constitution. California Health and Safety Code Sections 5473 through 5473.8 (Ord. 708 Section 3.1, 2006) & City of Moreno Valley Municipal Code Title 3, Section 3.50.050.)

SD-17 (R) Easements for reverse frontage parkway areas abutting Indian Street, Gentian Avenue, and Santiago Drive shall be 6 ft. or to top of parkway facing slope or to face of perimeter tract wall, whichever is greater. Easements shall be dedicated to the City of Moreno Valley for landscape maintenance purposes, and shall be depicted on the final map, and an offer of their dedication made thereon.

SD-18 (R) Prior to the recordation of the final map, the Developer shall provide all necessary documents to convey to the City the required easements for parkway and/or slope maintenance as specified on the tentative map or in these Conditions of Approval.

Prior to Building Permit Issuance

SD-19 (BP) Prior to the issuance of the first building permit for this project, the Developer shall pay Advanced Energy fees for all applicable Residential and Arterial Street Lights required for this development. Payment shall be made to the City of Moreno Valley and collected by the Land Development Division. Fees are based upon the Advanced Energy fee rate in place at the time of payment, as set forth in the current Listing of City Fees, Charges, and Rates adopted by City Council. The Developer shall provide a copy of the receipt to the Special Districts Division *(specialdistricts@moval.org).* Any change in the project which may increase the number of street lights to be installed will require payment of additional Advanced Energy fees at the then current fee. Questions may be directed to the Special Districts Division at 951.413.3480 or specialdistricts@moval.org.

SD-20 (BP) For those areas to be maintained by the City and prior to the issuance of the first Building Permit, Planning Division (Community Development Department), Special Districts Division (the Public Works Department) and Transportation Division (the Public Works Department) shall review and approve the final median and external parkway landscape/irrigation plans as designated on the tentative map or in these Conditions of Approval prior to the issuance of the first Building Permit.

SD-21 (BP) External parkway and median landscaping specified in the project's Conditions of Approval shall be constructed in compliance with the City of Moreno Valley Public Works Design Guidelines and completed prior to the issuance of 25% (or 55) of the dwelling permits for this tract or 12 months from the issuance of the first dwelling permit, whichever comes first. In cases where a phasing plan is submitted, the actual percentage of dwelling permits issued prior to the completion of the landscaping shall be subject to the review of the construction phasing plan.

Prior to Certificate of Occupancy

SD-22 (CO) Landscape and irrigation plans for parkway, median, slope, and/or open space landscape areas designated to be maintained by the City shall be placed on compact disk (CD) in pdf format. The CD shall include "As Built" plans, revisions, and changes. The CD will become the property of the City of Moreno Valley and the Moreno Valley Community Services District.

Transportation Engineering Division

GENERAL CONDITIONS

TE1. Indian Street is classified as a Minor Arterial (88’RW/64’CC) per City Standard Plan No. MVSI-105A-0. Traffic Signal Interconnect along project frontage shall be required per City Standard Plan No. MVSI-186-0. Any improvements undertaken by this project shall be consistent with the City’s standards for this facility.

TE2. Gentian Avenue is classified as a Minor Arterial (88’RW/64’CC) per City Standard Plan No. MVSI-105A-0, modified for a raised median. Traffic Signal Interconnect along project frontage shall be required per City Standard Plan No. MVSI-186-0. Any improvements undertaken by this project shall be consistent with the City’s standards for this facility.

TE3. Santiago Drive is designated as a Collector (66’RW/44’CC) per City Standard Plan No. MVSI-106B-0. Any improvements undertaken by this project shall be consistent with the City’s standards for this facility.

TE4. Interior street (A-P, except L) is designated as a Local Street (56’RW/36’CC) per City Standard Plan No. MVSI-107A-0. Any improvements undertaken by this project shall be consistent with the City’s standards for this facility.

TE5. Sight distance at the proposed roadways and driveways shall conform to City of Moreno Valley Standard No. MVSI-164A,B,C-0 at the time of preparation of final grading, landscape, and street improvement plans.

TE6. Conditions of approval may be modified if project is phased or altered from any approved plans.

PRIOR TO IMPROVEMENT PLAN APPROVAL OR CONSTRUCTION PERMIT

TE7. Prior to the final approval of the street improvement plans, traffic signal modification plans shall be required for the existing traffic signal located at Indian Street and Santiago Drive intersection. Modifications may include, but not limited to, new signal poles, new pull boxes, new traffic detector loops or video detection system, relocation of signal controller cabinet, etc.

TE8. Prior to the final approval of the street improvement plans, traffic signal plans will be required for a new traffic signal located at the intersection of Perris Boulevard and Santiago Drive.

TE9. Prior to the final approval of the street improvement plans, a signing and striping plan shall be prepared per the latest edition of the California Manual on Uniform Traffic Control Devices (CAMUTCD) and City of Moreno Valley Standard Plans for Indian Street, Gentian Avenue, Santiago Drive, and all interior streets A-P.

TE10. Prior to the final approval of the street improvement plans, the intersection of Indian Street and Gentian Avenue shall be designed to provide the following (at a minimum):

- Northbound: One left turn lane, two through lanes;
- Southbound: One left turn lane, two through lanes;
- Eastbound: One left turn lane, one shared through/right turn lane;
- Westbound: One left turn lane, one shared through/right turn lane.

TE11. Prior to issuance of a construction permit, construction traffic control plans prepared by a qualified, registered Civil or Traffic Engineer shall be required for plan approval or as required by the City Traffic Engineer.

TE12. Prior to final approval of the street improvement plans, the project plans shall demonstrate that sight distance at proposed streets and driveways conforms to City Standard Plan No. MVSI-164A-0 through MVSI-164C-0.

PRIOR TO CERTIFICATE OF OCCUPANCY OR BUILDING FINAL

TE13. (CO) Prior to issuance of Certificate of Occupancy, improvements identified in TE7, TE8, TE9, and TE10 shall be completed per the approved plans to the satisfaction of the City Engineer.

TE14. (CO) Prior to issuance of Certificate of Occupancy, all signing and striping shall be installed per current City Standards and the approved plans.

PRIOR TO ACCEPTANCE OF STREETS INTO THE CITY-MAINTAINED ROAD SYSTEM

TE15. Prior to acceptance of streets into the City-maintained road system, all approved signing and striping shall be installed per current City Standards and the approved plans.

PARKS AND COMMUNITY SERVICES DEPARTMENT

Acknowledgement of Conditions

The following items are Parks and Community Services Department Conditions of Approval for project PEN16-0094 AND PEN16-0095 (Tract 36760); this project shall be completed at no cost to any Government Agency. All questions regarding Parks and Community Services Department Conditions including but not limited to: intent, requests for change/modification, variance and/or request for extension of time shall be sought from the Parks and Community Services Department 951.413.3280. The applicant is fully responsible for communicating with the Parks and Community Services Department project manager regarding the conditions.

Specific Conditions of Approval

PCS1. The developer shall construct a 2-acre (approximate) active park, per these CONDITIONS OF APPROVAL, BONDS, and the PUBLIC FACILITIES FEE CREDIT AGREEMENT for TRACT 36760 (PA14-0052/53) and ASSOCIATED CUP/PUD, FOR DEDICATION AND CONSTRUCTION OF PUBLIC PARK. The developer shall additionally dedicate and construct a BIKEWAY LINEAR PARK WITHIN THE DWR RIGHT-OF-WAY, per these CONDITIONS OF APPROVAL and BONDS for TRACT 36760 (PA14-0052/53) and ASSOCIATED CUP/PUD.

Appropriate Quimby and Parkland Facility Fee credits will be credited to Tract 36760 for the dedication and construction of the active park.

A neighborhood park shall be located within the site per the Conditions of Approval for Tract 36760. The park shall be constructed to the latest edition of the City of Moreno Valley Parks and Community Services Department “Park Specification Guide”, “GREENBOOK FOR PUBLIC WORKS CONSTRUCTION”, CALIFORNIA BUILDING CODE”, and “City Standard Plans”. Additionally, the developer shall comply with the following:

a. Minimum site amenities shall include: separate play equipment for ages 2 to 5 and 5 to 12 on; one (1) 30’ x 50’ picnic shelter and one (1) 24’ hexagon gazebo; large group barbeques; concrete picnic tables, concrete benches; concrete waste/recycle containers; two (2) drinking fountains (Std. MVGF-615B-0); lighted monument signs; LED walkway security lighting; conduit and wiring for security cameras; 10’ wide decorative concrete walkways; stabilized decomposed granite walking path; combination of 24” and 30” boxed trees, 5-gallon sized shrubs; 1-gallon sized ground cover; sodded turfgrass; Calsense irrigation controller; 4’ tall tubular steel fencing surrounding the park; anti-graffiti coating on all adjacent walls, restroom, and monument sign(s); and other amenities typical of parks. All drainage from the park shall be contained in the tract’s water quality basin.

b. The park and bikeway/linear park design shall be fully completed and approved in conjunction with the grading plans. Construction shall commence prior to the issuance of 30% of building permits for residential units and be completed prior to the issuance of 70% of building permits for residential units.

c. The developer shall enter into a Facilities Fee Credit Agreement to obtain credit/reimbursement of Quimby and Parkland Facilities Development Impact Fees (DIF).

d. The park and bikeway/linear park shall be shown as lettered lots and dedicated in fee to the Moreno Valley Community Services District, on the Final Map.

PCS2. A bikeway/linear park shall be designated for Tract 36760, per the Bikeway Master Plan. The bikeway shall have an adjacent walkway for pedestrians. Access points from the tract and the adjacent commercial center to the bikeway/walkway shall be provided. Planters, automated (Calsense) irrigation, turf areas, waste containers, and three-rail PVC fencing typical of parks shall be included in the design. Additionally, the developer shall comply with the following:

PCS3. Any recreational amenities within the pocket park located on Gentian Avenue and adjacent to the DWR aqueduct shall be reviewed and approved by Parks and Community Services. Dedication of such facilities to the CSD shall be at the discretion of the CSD.

<u>STANDARD CONDITIONS:</u>

PCS4. A restriction shall be placed on lots that back up to City/CSD owned or maintained parks, trails, bikeways, and landscaped areas, preventing openings or gates accessing the City/CSD owned or maintained property. This shall be documented through Covenants, Conditions, and Restrictions (CC&R's). A copy of the CC&R's with this restriction noted shall be submitted and approved by the Director of Parks and Community Services or his/her designee, prior to the recordation of the Final Map.

PSC5. Within the improvements for PCS, the applicant shall show all existing and planned easements on all maps and plans. Easements on City/CSD owned or maintained parks, trails, bikeways, and landscape shall be identified on each of these plans with the instrument number of the recorded easement.

PCS6. The following plans require PCS written approval: Tentative tract/parcel maps; rough grading plans (including all Delta changes); Final Map; precise grading plans; street improvement plans; traffic signal plans; fence and wall plans; landscape plans for areas adjacent to bikeways; trail improvement plans. PCS will not approve any permits without review and approval of the above items.

PCS7. Prior to recordation of the Final Map, the applicant shall post security to guarantee construction or modification of parks, trails and/or bikeways for the City/CSD. Copies of said documentation shall be provided to PCS, prior to the approval of the Final Map.

PCS8. Detailed final plans (mylars, PDF, and AutoCAD file on a DVD-R) for parks, trails/bikeways, fencing, and adjoining landscaped areas shall be submitted to and approved by the Director of Parks and Community Services, or his/her designee, prior to the issuance of any building permits. All plans are to include a profile showing grade changes.

PSC9. Applicable plan check and inspection fees shall be paid, per the approved City fee schedule.

PCS10. This project may be required to supply a funding source for the continued maintenance, enhancement, and or retrofit of neighborhood parks, open spaces, linear parks, and/or trails systems. This can be achieved through annexing into Community Facilities District No. 1 (Park Maintenance). Please contact the Special Districts Division at 951.413.3480 or specialdistricts@moval.org to complete the annexation process.

PCS11. The parcel(s) associated with this project have been incorporated into the Moreno Valley Community Services District Zone A (Parks and Community Services). All assessable parcels therein shall be subject to the annual Zone 'A' charge for operations and capital improvements. Proof of such shall be supplied to Parks and Community Services upon Final Map and at Building Permits.

PSC12. This project is subject to current Development Impact Fees, at time of building permit issuance (unless exempted in a Public Facilities Fee Credit Agreement).

PCS13. This project is subject to current Quimby Fees, at time of building permit issuance (unless exempted in a Public Facilities Fee Credit Agreement).

MORENO VALLEY UTILITY

Acknowledgement of Conditions

The following items are Moreno Valley Utility's Conditions of Approval for project PEN16-0094 AND PEN16-0095; this project shall be completed at no cost to any Government Agency. All questions regarding Moreno Valley Utility's Conditions including but not limited to, intent, requests for change/modification, variance and/or request for extension of time shall be sought from Moreno Valley Utility (the Electric Utility Division) of the Finance and Management Services Department 951.413.3500, mvuengineering@moval.org. The applicant is fully responsible for communicating with Moreno Valley Utility staff regarding their conditions.

PRIOR TO ENERGIZING MVU ELECTRIC UTILITY SYSTEM AND CERTIFICATE OF OCCUPANCY

MVU-1 (R) This project requires the installation of electric distribution facilities. A non-exclusive easement shall be provided to Moreno Valley Utility and shall include the rights of ingress and egress for the purpose of operation, maintenance, facility repair, and meter reading.

MVU-2 (BP) City of Moreno Valley Municipal Utility Service – Electrical Distribution: Prior to constructing the MVU Electric Utility System, the developer shall submit a detailed engineering plan showing design, location and schematics for the utility system to be approved by the City Engineer. In accordance with Government Code Section 66462, the Developer shall execute an agreement with the City providing for the installation, construction, improvement and dedication of the utility system following recordation of final map and concurrent with trenching operations and other subdivision improvements so long as said agreement incorporates the approved engineering plan and provides financial security to guarantee completion and dedication of the utility system.

The Developer shall coordinate and receive approval from the City Engineer to install, construct, improve, and dedicate to the City, or the City's designee, all utility infrastructure (including but not limited to conduit, equipment, vaults, ducts, wires, switches, conductors, transformers, and "bring-up" facilities including electrical capacity to serve the identified development and other adjoining/abutting/ or benefiting projects as determined by Moreno Valley Utility) – collectively referred to as "utility system" (to and through the development), along with any appurtenant real property easements, as determined by the City Engineer to be necessary for the distribution and /or delivery of any and all "utility services" to each lot and unit within the Tentative Map. For purposes of this condition, "utility services" shall mean electric, cable television, telecommunication (including video, voice, and data) and other similar services designated by the City Engineer. "Utility services" shall not include sewer, water, and natural gas services, which are addressed by other conditions of approval.

The City, or the City's designee, shall utilize dedicated utility facilities to ensure safe, reliable, sustainable and cost effective delivery of utility services and maintain the integrity of streets and other public infrastructure. Developer shall, at developer's sole expense, install or cause the installation of such interconnection facilities as may be necessary to connect the electrical distribution infrastructure within the project to the Moreno Valley Utility owned and controlled electric distribution system.

MVU-3 This project is subject to a Reimbursement Agreement and is responsible for a proportionate share of costs associated with electrical distribution infrastructure previously installed that directly benefits the project.
Payment shall be required prior to issuance of building permits.

MVU-4 For all new projects, existing Moreno Valley Utility electrical infrastructure shall be preserved in place. The developer will be responsible, at developer expense, for any and all costs associated with the relocation of any of Moreno Valley Utility's underground electrical distribution facilities, as determined by Moreno Valley Utility, which may be in conflict with any developer planned construction on the project site.

POLICE DEPARTMENT

PD1. Prior to the start of any construction, temporary security fencing shall be erected. The fencing shall be a minimum of six (6) feet high with locking, gated access and shall remain through the duration of construction. Security fencing is required if there is: construction, unsecured structures, unenclosed storage of materials and/or equipment, and/or the condition of the site constitutes a public hazard as determined by the Public Works Department. If security fencing is required, it shall remain in place until the project is completed or the above conditions no longer exist. (DC 9.08.080)

PD2. (GP) Prior to the issuance of grading permits, a temporary project identification sign shall be erected on the site in a secure and visible manner. The sign shall be conspicuously posted at the site and remain in place until occupancy of the project. The sign shall include the following:

a. The name (if applicable) and address of the development.

b. The developer's name, address, and a 24-hour emergency telephone number. (MC 9.08.080)

PD3. (CO) Prior to the issuance of a Certificate of Occupancy, an Emergency Contact information Form for the project shall be completed at the permit counter of the Community Development Department - Building Division for routing to the Police Department. (MC 9.08.080)

MITIGATED NEGATIVE DECLARATION

PROJECT TITLE AND FILE NUMBERS: PEN16-0092 (PA16-0018) – General Plan Amendment PEN16-0093 (PA16-0019) – Zone Change PEN16-0094 (PA14-0052) – Conditional Use Permit PEN16-0095 (PA14-0053) – Tentative Tract Map 36760
PROJECT APPLICANT: Mission Pacific Land Company **TELEPHONE NUMBER:** (949) 333-6752
PROJECT LOCATION: Southeast corner of Indian Street and Gentian Avenue, Moreno Valley, Riverside County, CA
PROJECT DESCRIPTION: The project proposes a General Plan Amendment from Residential 30 to Residential 5 and a Zone Change from R30 to R5 for a 15.06 acre portion of a 53 acre site. This project includes Tentative Tract Map 36760 to subdivide the 53 acre site into a total of 221 single family residential lots and a Conditional Use Permit for a Planned Unit Development (PUD). The PUD application will establish minimum lot sizes of 4,000 and 5,000 square feet and establish unique lot widths and setback standards along with architectural guidelines.

FINDING

The City of Moreno Valley has reviewed the above project in accordance with the City of Moreno Valley's Guidelines for the Implementation of the California Environmental Quality Act, and has determined that an Environmental Impact Report need not be prepared because:

[ ] The proposed project will not have a significant effect on the environment.

[x] Although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because mitigation measures described in the attached Initial Study and hereby made a part of this Mitigated Negative Declaration have been added to the project. The Final Conditions of Approval contain the final form and content of all mitigation measures.

This determination is based upon an Initial Study. The project file, including the Initial Study and related documents is available for review during normal business hours (7:30 a.m. to 5:30 p.m. Monday through Thursday, and 7:30 a.m. to 4:30 p.m. on Friday) at the City of Moreno Valley, Community Development Department, Planning Division, 14177 Frederick Street, Moreno Valley, California 92553, Telephone (951) 413-3206.

PREPARED BY: Jeff Bradshaw DATE: December 19, 2017

NOTICE

The public is invited to comment on the Mitigated Negative Declaration. The appropriateness and adoption of the Mitigated Negative Declaration is considered at the time of project approval in light of comments received.

DATE ADOPTED: ____________________________ BY:

INITIAL STUDY/
ENVIRONMENTAL CHECKLIST FORM
CITY OF MORENO VALLEY

1.	Project Title:	Legacy Park Project PEN16-0092 (PA16-0018) – General Plan Amendment PEN16-0093 (PA16-0019) – Zone Change PEN16-0094 (PA14-0052) – Conditional Use Permit PEN16-0095 (PA14-0053) – Tentative Tract Map 36760 PEN16-0096 (P16-030) – Expanded Initial Study
2.	Lead Agency Name and Address:	City of Moreno Valley 14177 Frederick Street Moreno Valley, CA 92553
3.	Contact Person and Phone Number:	Jeff Bradshaw, Associate Planner (951) 413-3224
4.	Project Location:	Southeast corner of Gentian Avenue and Indian Street
5.	Project Sponsor's Name and Address:	Mission Pacific Land Company 4100 Newport Beach Place, Ste. #480 Newport Beach, CA 92660
6.	Existing General Plan Designation:	Residential 5 (37.18 acres) and Residential 30 (15.06 acres)
7.	Proposed General Plan Designation:	Residential 5 (52.24 acres)
8.	Existing Zoning:	R5 (37.18 acres) and R30 (15.06 acres)
9.	Proposed Zoning:	R5 (52.24 acres)

10. Description of the Project:

The project proposes to develop the Legacy Park planned community on an approximately 53 acre site. Applications include a General Plan Amendment from Residential 30 to Residential 5 and a Zone Change from R30 to R5 for a 15.06 acre portion of a 53 acre site. This project includes an application for Tentative Tract Map 36760 to subdivide the 53 acre site into a total of 221 single family residential lots and a Conditional Use Permit for a Planned Unit Development (PUD). The PUD application will establish minimum lot sizes of 4,000 and 5,000 square feet and establish unique development standards for future single family residential construction within the community. The proposed 221 lots does not exceed the allowable density for the R5 zone. Common amenities include passive open space, trail segments, decorative treatment in Street L at major intersections, and a median in Street L at Gentian.

Off-site improvements that the project will be responsible for completing include:

- Master Plan Storm Drain system Line M2 and associated utility relocation. Approximately 3,000 feet of off-site improvements in Santiago Drive, Perris Boulevard, and Iris Avenue;
- Master Plan Storm Drain system Line D1. Approximately 300 feet of off-site improvements in Indian Avenue;
- Park improvements on a 0.85 acre parcel within Lot A TPM 36606 (open space area on adjacent Walmart center site);
- Trail and passive park improvements within the adjacent California Aqueduct easement which is under the authority of the Department of Water Resources (DWR). This will satisfy General Plan requirements under the City's Master Plan of Trails for development of the City's portion of the Juan Bautista De Anza trail system;
- A new traffic signal at the intersection of Perris Boulevard and Santiago Drive;
- Street Improvements outside the map boundary on fronting streets:
    - Gentian Ave. – Raised median;
    - Indian Ave. – Street widening, curb/gutter, and parkway improvements; and
    - Santiago Drive - Street widening, curb/gutter, and parkway improvements.

This project is also conditioned to construct and then convey to the City a public park of approximately two acres in size with amenities that would include play equipment, a picnic shelter, a gazebo, large group barbeques, concrete picnic tables and benches, concrete waste/recycle containers; drinking fountains, walkway security lighting, decorative concrete walkways, decomposed granite walking path; and tubular steel fencing surrounding the park.

11. Surrounding Land Uses and Setting:

The project site is bounded by existing single-family tract homes to the west and northwest in the RS-10 zone with minimum lot sizes of 4,500 square feet. The property immediately to the north is zoned R5 and has been subdivided with a recorded map, Tract Map 22180. Further to the north are existing single-family tract homes in the R5 zone. Southwest of the project site are single-family homes in the R5 zone with March Middle School and Rainbow Elementary School located immediately to the south. Vacant and developed land (non-conforming single-family residences) in the R30 zone is located to the southeast of the project site.

The California Aqueduct bounds the property along its eastern property line with vacant Community Commercial zoned property to the east. The site to the east was recently approved for development as a Walmart retail center. Additional commercial existing retail centers are located to the southeast at the intersection of Perris Boulevard and Iris Avenue.

March Air Reserve Base is located approximately three-quarters of a mile to the west. The City Corporate Yard is located approximately 1,400 feet to the east.

Overall, the proposed residential development is compatible with the City's General Plan and existing land uses.

12. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, has consultation begun?

The City received requests for consultation from the following Native American tribes and consultation has begun:

- Agua Caliente Band of Cahuilla Indians;
- Pechanga Band of Luiseno Indians; and
- Soboba Band of Luiseno Indians.

13. Other public agencies whose approval is required:

Riverside County Flood Control and Water Conservation District will require an encroachment permit for connecting to existing storm drain infrastructure located in Perris Boulevard and the State of California Department of Water Resources will require an encroachment permit for work alongside and within the easement for the California Aqueduct.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below(■) would be potentially affected by this project, involving at least one impact that is a “Potentially Significant Impact” as indicated by the checklist on the following pages.

	Aesthetics		Greenhouse Gas Emissions		Population/Housing
	Agricultural Resources		Hazards & Hazardous Materials		Public Services
	Air Quality		Hydrology/Water Quality		Recreation
	Biological Resources		Land Use/Planning		Transportation/Traffic
	Cultural Resources		Mineral Resources		Utilities/Service Systems
	Geology/Soils		Noise		Mandatory Findings of Significance
	Tribal Cultural Resources				

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial evaluation:

I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.	
I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.	■
I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.	
I find that the proposed project MAY have a “potential significant impact” or “potentially significant unless mitigated” impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.	
I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.	

December 19, 2016

Signature Date

Jeff Bradshaw, Associate Planner

Printed Name For

EVALUATION OF ENVIRONMENTAL IMPACTS

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g. the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g. the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Potentially Significant Unless Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from "Earlier Analysis," as described in (5) below, may be cross-referenced).

5) Earlier analysis may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063 (c) (3) (d). In this case, a brief discussion should identify the following:

   (a) Earlier Analysis Used. Identify and state where they are available for review.

   (b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

   (c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g. general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

9) The analysis of each issue should identify: (a) the significance criteria or threshold used to evaluate each question; and (b) the mitigation measure identified, if any, to reduce the impact to less than significance.

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

I. **AESTHETICS.** Would the project:				
a) Have a substantial adverse effect on a scenic vista?				■
The Moreno Valley General Plan identifies scenic highways, panoramic viewsheds, and photographic viewing locations within the aesthetic resource element. The General Plan identifies no scenic roadways or panoramic viewsheds in the project vicinity. The project site is comprised of level topography with no rock outcroppings. As designed and conditioned, the proposed project will have no effect on a scenic vista.				
b) Substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?				■
The project property topography is flat. Based upon site visits by staff and review of the General Plan, the subject site does not include scenic resources. There are no rock outcroppings, trees or historic buildings on site. There are no scenic highways in the area. The site has been previously disturbed through weed abatement. As designed and conditioned, the proposed project will not substantially damage scenic resources.				
c) Substantially degrade the existing visual character or quality of the site and its surroundings?			■	
The Legacy Park project proposes to subdivide the 53 acre site for development of a 221 lot planned community within the R5 zoning district. Development of the site will require installation of public street improvements along Gentian Avenue, Indian Street and Santiago Drive frontages, the installation of a new segment of raised landscaped median and the undergrounding of overhead utility lines. The Legacy Park Design Guidelines and the Municipal Code provide a framework that ensures that any new development would be designed and constructed in a manner that is compatible with surrounding land uses. The Planned Unit Development and related Design Guidelines provide a framework for coordinating architectural style, design, materials, colors, perimeter walls, pedestrian access and circulation for the development. The proposed project as designed is aesthetically compatible with adjacent residential uses. The Planned Unit Development and related Design Guidelines provide a framework for coordinating architectural style, design, materials, colors, perimeter walls, pedestrian access and circulation for the development. As designed and conditioned, the proposed project would not significantly degrade the existing visual character or quality of the site and surroundings.				
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?			■	
The project would introduce some additional new light sources into the area as the project site is currently vacant. The proposed residential development would include required street lighting and exterior wall mounted lights on the residences. The project has been conditioned for compliance with the City's light standards as referenced in Municipal Code Section 9.08.100 including the shielding of lighting and restrictions on the intensity of exterior lighting which will reduce light and glare impacts to City accepted levels on surrounding properties. Therefore, potential impacts related to substantial light or glare are less than significant and no mitigation would be required.				
II. **AGRICULTURE & FORESTRY RESOURCES:** In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project?				
a) Convert Prime Farmland, Unique Farmland or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency to non-agricultural use?				■
The site is designated as 'Farmland of Local Importance' on the 2015 State Important Farmland Map. This category is described as soils that would be classified as Prime and Statewide but lack available irrigation water. The site is bounded on the north and west by existing residential development with an approved retail center to the east and a middle school and elementary school and single-family residences to the south. There are currently no agriculturally productive activities occurring within the project boundaries. There will be no impact to farmlands as the development of this project will not result in the conversion of Prime Farmland, Unique Farmland or Farmland of Statewide Importance.				
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				■
The site is not currently in agricultural use, or under Williamson Act control. There is no existing surrounding agricultural use, or sites under Williamson Act contract within the City limits. The Municipal Code allows for agricultural uses such as crops in all zoning districts, therefore, the proposed project does not conflict with existing zoning for agricultural use, or impact sites under Williamson Act contract.				
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public				■

Attachment: Initial Study Checklist (2444 : Legacy Park Project)

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?				
The project site is not zoned or designated on the City's General Plan for forest land, timberland, or timberland zoned Timberland Production. The City does not have any forest lands, or timberland as defined in the State Public Resources Code and Government Code within the City limits. Therefore, since the project will not result in impacts to forest land, timberland, or timberland zoned timberland production, no impacts would occur and no mitigation measures would be required.				
d) Result in the loss of forest land or conversion of forest land to non-forest use?				■
The project site is not forest land as defined by Public Resources Code section 1220(g). The project site does not involve the loss of forest land or the conversion of forest land to non-forest use. Therefore, since the project will not result in the loss of forest land or the conversion of forest land to non-forest use, no impacts would occur and no mitigation measures would be required.				
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?				■
There is no immediate surrounding or proposed agricultural use. The proposed project will not involve changes to the existing environment, which will result in the conversion of farmland to non-agricultural use, or conversion of forest land to non-forest land.				
III. **AIR QUALITY:** Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?			■	
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation.			■	
(a and b) The Air Quality Management Plan (AQMP) adopted by the South Coast Air Quality Management District (SCAQMD) in 2012 sets forth a comprehensive program that will lead the air basin into compliance with all federal and state air quality standards. The proposed project is located within the boundaries of the AQMP. The AQMP control measures and related emission reduction estimates are based upon emissions projections for a future development scenario derived from General Plan land use, population, and employment characteristics defined in consultation with local governments. Moreno Valley's General Plan Land Use Element was considered in the preparation of the 2012 AQMP. Accordingly, conformance with the AQMP for development projects is determined by demonstrating compliance with local land use plans and/or population projections. Based upon the conclusions of the Air Quality study prepared for this project by Urban Crossroads on November 3, 2016, the Project would not result in or cause federal and/or state ambient air quality standards (NAAQS or CAAQS) violations. The Project proposed General Plan Amendment and Zone Change from R30 to R5 would not increase the density allowed in the General Plan and therefore not result in a land use that is more intense than that anticipated by the General Plan. Furthermore, the Project would not exceed any applicable regional or local thresholds. As such, the Project is therefore considered to be consistent with the AQMP. <u>Construction-Source Emissions</u> For regional emissions, the Project would not exceed the numerical thresholds of significance established by the SCAQMD for any criteria pollutant. It should be noted that impacts without mitigation take credit for reductions achieved through standard regulatory requirements (Rule 403 and Rule 1113). Thus a less than significant impact would occur for Project-related construction-source emissions and no mitigation measures are required. For localized emissions, the Project would not exceed the SCAQMD's localized significance threshold. Therefore, a less than significant impact would occur and no mitigation is required. Project construction-source emissions would not conflict with the applicable AQMP. <u>Operation-Source Emissions</u> For regional emissions, the Project would not exceed the numerical thresholds of significance established by the SCAQMD. Thus a less than significant impact would occur for Project-related operational-source emissions and no mitigation is required. Project operational-source emissions would not result in or cause a significant localized air quality impact as discussed in the operational LSTs section of this report. The proposed Project would not result in a significant CO "hotspot" as a result of Project related traffic during ongoing operations, nor would the Project result in a significant adverse health impact as discussed in Section 3.8, thus a less than significant impact to sensitive receptors during operational activity is expected.				
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?			■	

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

CEQA Section 21100 (e) addresses evaluation of cumulative effects allowing the use of approved land use documents in a cumulative impact analysis. CEQA Guidelines Section 15064 (i)(3) further stipulates that for an impact involving a resource that is addressed by an approved plan or mitigation program, the lead agency may determine that a project's incremental contribution is not cumulatively considerable if the project complies with the adopted plan or program. In addressing cumulative effects for air quality, the AQMP is the most appropriate document to use because the AQMP sets forth a comprehensive program that will lead the air basin, including the project area, into compliance with all federal and state air quality standards and utilizes control measures and related emission reduction estimates based upon emissions projections for a future development scenario derived from land use, population, and employment characteristics defined in consultation with local governments.

The Air Quality Management Plan (AQMP) sets forth a comprehensive program that will lead the air basin into compliance with all federal and state air quality standards. The AQMP control measures and related emission reduction estimates are based upon emissions projections for a future development scenario derived from General Plan land use, population, and employment characteristics defined in consultation with local governments. Accordingly, conformance with the AQMP for development projects is determined by demonstrating compliance with local land use plans and/or population projections. The AQMD uses the same significance thresholds for project specific and cumulative impacts for all environmental topics analyzed in an Environmental Assessment or EIR. Projects that exceed the project-specific significance thresholds are considered by the SCAQMD to be cumulatively considerable. This is the reason project-specific and cumulative significance thresholds are the same. Conversely, projects that do not exceed the project-specific thresholds are generally not considered to be cumulatively significant."

The SCAQMD has recognized that there is typically insufficient information to quantitatively evaluate the cumulative contributions of multiple projects because each project applicant has no control over nearby projects. Nevertheless, the potential cumulative impacts from the Project and other projects are discussed below.

A cumulative project list was developed for this analysis and is shown in Table 3-11 of the Air Quality study. The Project area is designated as an extreme non-attainment area for ozone, and a nonattainment area for PM10, PM2.5, and lead. Related projects could contribute to an existing or projected air quality exceedance because the Basin is currently nonattainment for ozone, PM10, and PM2.5. With regard to determining the significance of the contribution from the Project, the SCAQMD recommends that any given project's potential contribution to cumulative impacts should be assessed using the same significance criteria as for project-specific impacts. Therefore, this analysis assumes that individual projects that do not generate operational or construction emissions that exceed the SCAQMD's recommended daily thresholds for project-specific impacts would also not cause a commutatively considerable increase in emissions for those pollutants for which the Basin is in nonattainment, and, therefore, would not be considered to have a significant, adverse air quality impact.

As previously noted, the Project would not result in any construction-source or operational-source emissions exceedances. Therefore the Project would result in a less than significant impact on a project-specific and cumulative basis.

d) Expose sensitive receptors to substantial pollutant concentrations?			■	

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

The nearest sensitive receptors include March Middle School located immediately to the south and Rainbow Elementary School located 700 feet further to the south on Indian Street and existing single-family homes to the north, west and south.

Construction-Source Emissions LST Analysis
Table 3-7 identifies the localized impacts at the nearest receptor location in the vicinity of the Project. As shown below, emissions during construction activity would not exceed the SCAQMD's localized significance thresholds for any criteria pollutant and a less than significant impact would occur.

Localized Significance – Long-Tem Operational Activity
The proposed project involves the construction and operation of 221 single family residential dwelling units. According to SCAQMD LST methodology, LSTs would apply to the operational phase of a proposed project, if the project includes stationary sources, or attracts mobile sources that may spend long periods queuing and idling at the site (e.g., transfer facilities and warehouse buildings). The proposed project does not include such uses, and thus, due to the lack of significant stationary source emissions, no long-term localized significance threshold analysis is needed.

CO "Hot Spot" Analysis
The proposed Project considered herein would not produce the volume of traffic required to generate a CO "hot spot" either in the context of the 2003 Los Angeles hot spot study, or based on representative BAAQMD CO threshold considerations, as shown on Table 3-10. Therefore, CO "hot spots" are not an environmental impact of concern for the proposed Project. Localized air quality impacts related to mobile-source emissions would therefore be less than significant.

Based upon the conclusions of the project Air Quality study, the project will not expose sensitive receptors to substantial pollutant concentrations.

e) Create objectionable odors affecting a substantial number of people?			■	

The Project does not contain land uses typically associated with emitting objectionable odors. Potential odor sources associated with the proposed Project may result from construction equipment exhaust and the application of asphalt and architectural coatings during construction activities and the temporary storage of typical solid waste (refuse) associated with the proposed Project's (long-term operational) uses. Standard construction requirements would minimize odor impacts from construction. The construction odor emissions would be temporary, short term, and intermittent in nature and would cease upon completion of the respective phase of construction and is thus considered less than significant. It is expected that Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with the City's solid waste regulations. The proposed Project would also be required to comply with SCAQMD Rule 402 to prevent occurrences of public nuisances. Therefore, odors associated with the proposed Project construction and operations would be less than significant and no mitigation is required.

IV. **BIOLOGICAL RESOURCES**. Would the project:

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U. S. Fish and Wildlife Service?			■	
b) Have a substantially adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U. S. Wildlife Service?			■	

(a and b) The project site is bounded on the north, west and south by existing single-family residential development with vacant commercial land to the east which includes a recently approved retail center. Also, the March Middle School and Rainbow Elementary School are located to the south. The site is comprised of level topography and has been disturbed routinely through weed abatement of the site.

A Biological Technical report was prepared for the project by Glenn Lukos Associate, Inc. on September 18 2014. This report identifies and evaluates impacts to biological resources associated with the proposed Project in the context of the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP), the California Environmental Quality Act (CEQA), and State and Federal regulations such as the Endangered Species Act (ESA), Clean Water Act (CWA), and the California Fish and Game Code.

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

The Project site is located within the Reche Canyon/Badlands Area Plan of the MSHCP, but is not located within the MSHCP Criteria Area. The Project site is located within the burrowing owl survey area, but is not located within the NEPSSA, CAPSSA, amphibian, or mammal survey areas. Focused burrowing owl surveys were conducted for the Project site; however, no burrowing owls or burrows with owl sign were detected onsite. In compliance with the MSHCP, pre-construction burrowing owl surveys are required prior to site disturbance.

The Project site will not impact special-status plants, but will result in the loss of actual or potential habitat for special-status animals, including potential habitat for Stephens' kangaroo rat (Dipodomys stephensi) [SKR]. Impacts to SKR are covered under the SKR Habitat Conservation Plan (HCP) with payment of the SKR mitigation fee. The loss of potential habitat for other special-status animals would be less than significant due to the low degree of sensitivity of the species, the disturbed nature of the site, and the lack of adjacency to native open space. The Project site does not contain jurisdictional waters, MSHCP riparian/riverine areas, or MSHCP vernal pools.

The following discussion provides project-specific mitigation/avoidance measures for actual or potential impacts to special-status resources.

<u>Burrowing Owl</u>

The Project site contains suitable habitat for burrowing owls; however, burrowing owls were not detected onsite during focused surveys. MSHCP Objective 6 for burrowing owls requires that pre-construction surveys prior to site grading. As such, the following measure is recommended to avoid direct impacts to burrowing owls and to ensure consistency with the MSHCP:

BR1. A qualified biologist will conduct a pre-construction presence/absence survey for burrowing owls within 14 days prior to site disturbance. If burrowing owls are detected onsite, the owls will be relocated/excluded from the site outside of the breeding season following accepted protocols, and subject to the approval of the RCA and wildlife agencies.

<u>Nesting Birds</u>

The Project site contains vegetation with the potential to support nesting birds. As discussed above, the MBTA and California Fish and Game Code prohibit impacts to nesting birds. The following measure is recommended to avoid impacts to nesting birds:

BR2. As feasible, vegetation clearing should be conducted outside of the nesting season, which is generally identified as February 1 through September 15. If avoidance of the nesting season is not feasible, then a qualified biologist shall conduct a nesting bird survey within three days prior to any disturbance of the site, including disking, demolition activities, and grading. If active nests are identified, the biologist shall establish suitable buffers around the nests, and the buffer areas shall be avoided until the nests are no longer occupied and the juvenile birds can survive independently from the nests.

Therefore, the project as conditioned and subject to the biological resource mitigation measures listed above, will not have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U. S. Fish and Wildlife Service. The project will not have a substantially adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U. S. Wildlife Service.

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?				■

The project site comprised of flat topography. There are no existing trees or vegetation on the project site. The project site is bounded on the north, west and south by existing single-family residential development with vacant commercial land to the east which includes a recently approved retail center. Also to the south are March Middle School and Rainbow Elementary School. Based upon the results of the Biological Technical report prepared for the project, the project site does not contain jurisdictional waters, MSHCP riparian/riverine areas, or MSHCP vernal pools. Therefore, no impacts would occur to federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.). through direct removal, filling, hydrological interruption, or other means, and no mitigation measures would be required.

d) Interfere substantially with the movement of any resident or migratory fish or wildlife species or with established native resident migratory wildlife corridors, or impede the use of native wildlife nursery sites?				■

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

The project site comprised of flat topography. There are no existing trees or vegetation on the project site. The project site is bounded on the north, west and south by existing single-family residential development with vacant commercial land to the east which includes a recently approved retail center. Also, the March Middle School and Rainbow Elementary School are located to the south. Based upon the conclusions of the Biological Technical report prepared for this project, there is no evidence of resident or migratory fish or wildlife species was noted on the project site or the adjacent vacant parcel. Therefore, the project will not interfere substantially with the movement of any resident or migratory fish or wildlife species or with established native resident migratory wildlife corridors, or impede the use of native wildlife nursery sites.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				■

The project site comprised of flat topography. There are no existing trees or vegetation on the project site. The project site is bounded on the north, west and south by existing single-family residential development with vacant commercial land to the east which includes a recently approved retail center. Also, the March Middle School and Rainbow Elementary School are located to the south. There are no existing trees or vegetation on the project site. Therefore related to any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance, no impacts would occur and no mitigation measures would be required.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or state habitat conservation plan?			■	

The project site is not located within one of the Multiple Species Habitat Conservation Plan (MSHCP) criteria areas, which are potential habitat preservation areas. The proposed project will not conflict with the Stephen's Kangaroo Rat Habitat Conservation Plan (SKR HCP) or MSHCP or any other known local, regional or state habitat conservation plans. The project will be conditioned to pay required SKR mitigation fees. Also, the City participates in the MSHCP, a comprehensive habitat conservation-planning program addressing multiple species' needs, including preservation of habitat and native vegetation in Western Riverside County. This project will also be subject to impact fees to support the implementation of the Multiple Species Habitat Conservation Plan as provided for by City ordinance.

V. **CULTURAL RESOURCES**. Would the project:

a) Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?			■	
b) Cause a substantial adverse change in the significance of an archaeological resources pursuant to Section 15064.5?			■	
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?			■	

(a, b and c)

A Cultural Resource Assessment for the project site was prepared by Helix Environmental Planning April 13, 2016. The cultural resources study included a record search, a Sacred Lands File search, tribal outreach, a review of historic maps and aerial photographs, an intensive survey by a HELIX archaeologist and a Native American monitor, and preparation of a report.

The project site is comprised of flat topography with no rock outcroppings or other unique geologic features. Based upon inspections of the project site in November 2015 and again in April 2016 and review of a 1987 citywide survey (Archeological Research Unit, University of California, Riverside), there are no known archaeological resources on the project site. There are no historical structures existing on the project site (General Plan, Figure 5.10-1, Historic Resources Inventory). There are no known historical paleontological or unique geological features on the project site (General Plan, Figures 5.10-2, Prehistoric Sites). Additionally, the City's Final Program EIR (June 2006), Figure 5.10-3 list the project site as low potential for paleontological sensitive area based on extensive field work (Page 5.10-10).

Based on the Cultural Resource Assessment, a record search of the project area and a one-mile radius from the Eastern Information Center (EIC) indicated that eight cultural resources had been recorded within the search radius (see Table 1 of the Cultural Resource Study). One resource (P-33-023936) was mapped within the project property. This resource is a historic period alfalfa farm that encompasses the property adjacent to the project area on the east as well as the southeastern corner of the project area. One feature from this site is located in the project area: the remnants of a grain loading dock from the Barron/Lantz Holdings, tentatively dated for use between 1948 and 1970. This historic feature is not considered a significant resource.

The current survey did not identify any cultural resources within the project area other than the previously recorded historic feature, which is not a significant resource. Therefore, no impacts to cultural resources are anticipated. However, the project site is in alluvial soils, where there is a potential for buried cultural resources. Based on this, it is recommended that an archaeological and Native American monitoring program be implemented. The monitoring program would include attendance by the archaeologist and Native

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

American monitor(s) at a preconstruction meeting with the grading contractor and the presence of archaeological and Native American monitors during initial ground-disturbing activities on site. Both archaeological and Native American monitors would have the authority to temporarily halt or redirect grading and other ground-disturbing activity in the event that cultural resources are encountered.

The following mitigation measures have been introduced to ensure compliance with City General Plan Policies and the State Public Resources Code:

CR-1: Prior to the issuance of a grading permit, the Project Applicant shall provide evidence to the City of Moreno Valley that a professional archaeological monitor has been retained by the Applicant to conduct monitoring of all mass grading and trenching activities and that the monitor has the authority to temporarily halt and redirect earthmoving activities in the event that suspected archaeological resources are unearthed during Project construction. The Project archaeologist, with input from the appropriate Tribe, shall prepare a Cultural Resources Monitoring Plan (CRMP) to document protocols for inadvertent finds, to determine potential protection measures from further damage and destruction for any identified archaeological resource(s)/ tribal cultural resources (TCRs), outline the process for monitoring and for completion of the final Phase IV Monitoring Report. If any archaeological and/or TCRs are identified during monitoring, these will also be documented and addressed per standard archaeological protocols in the Phase IV report, with the exception of human remains which will be addressed per CUL-5. The Project Archaeologist shall attend the pregrading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.

CR-2: At least 30 days prior to the issuance of a grading permit, the Applicant shall contact the appropriate Luiseño tribe to develop a Cultural Resources Treatment Agreement and shall provide evidence to the City of Moreno Valley that the professionally qualified Luiseño Native American monitor(s) has been secured from the interested tribe(s), and that the monitor shall be allowed to monitor all mass grading and trenching activities. The Tribal representative(s) shall attend the pre-grading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.

CR-3: If, during mass grading and trenching activities, the Archaeologist or Tribal representatives suspect that an archaeological resource and/or TCR may have been unearthed, the monitor identifying the potential resources, in consultation with the other monitor as appropriate, shall immediately halt and redirect grading operations in a 100-foot radius around the find to allow identification and evaluation of the suspected resource. The Native American monitor(s) or appropriate representative(s) and the archaeological monitor shall evaluate the suspected resource and make a determination of significance pursuant to California Public Resources Code Section 21083.2. The archaeological monitor and tribal monitor(s) or appropriate representative(s), the Project Applicant, and the City Planning Division shall confer regarding mitigation of the discovered resource(s). All sacred sites, should they be encountered within the Project area, shall be avoided and preserved as the preferred mitigation, if feasible.

CR-4: Prior to grading permit issuance, the City shall verify that the following note is included on the Grading Plan:

"If any suspected archaeological resources are discovered during ground-disturbing activities and the archaeological monitor or Tribal representatives are not present, the construction supervisor is obligated to halt work in a 100-foot radius around the find and call the project archaeologist and the Tribal representatives to the site to assess the significance of the find."

CR-5: If human remains are encountered, California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the Riverside County Coroner has made the necessary findings as to origin. Further, pursuant to California Public Resources Code Section 5097.98(b), remains shall be left in place and free from disturbance until a final decision as to the treatment and disposition has been made by the Coroner. If the Riverside County Coroner determines the remains to be Native American, the California Native American Heritage Commission must be contacted within 24 hours. The Native American Heritage Commission must then immediately notify the "most likely descendant(s)" of receiving notification of the discovery. The most likely descendant(s) shall then make recommendations within 48 hours, and engage in consultations concerning the treatment of the remains as provided in Public Resources Code §5097.98.

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

CR-6: Prior to construction involving excavation four feet or more below existing surface grade, the construction contractor shall provide evidence that a qualified paleontologist has been retained, and that the paleontologist(s) shall be present during all grading and other significant ground-disturbing activities that reach four feet or more below existing surface grade. In the event fossiliferous deposits are encountered, the following measures shall be implemented:

- Monitoring shall be conducted by qualified paleontological monitor(s) of excavation in areas identified as likely to contain paleontological resources, including very old alluvial fan deposits. Paleontological monitors shall be equipped to salvage fossils as they are unearthed, to avoid construction delays, and to remove samples of sediments that are likely to contain the remains of small fossil invertebrates and vertebrates. Monitors shall be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring may be reduced if the potentially fossiliferous units are determined upon exposure and examination by qualified paleontological personnel to have low potential to contain fossil resources.

- Paleontological monitoring of any earthmoving will be conducted by a monitor, under direct guidance of a qualified paleontologist. Earthmoving in areas of the parcel where previously undisturbed sediments are buried, but not otherwise disturbed, will not be monitored.

- If too few fossil remains are found after 50 percent of the planned-for earthmoving has been completed, monitoring can be reduced or discontinued in those areas at the Project paleontologist's direction.

- Preparation of recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates.

- Identification and curation of specimens into a professional, fully accredited museum repository with permanent retrievable storage. The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities.

- Preparation or a report of findings with and appended itemized inventory of specimens. The report and inventory, when submitted to the city along with confirmation of the curation of recovered of recovered specimens into an established, accredited museum repository, will signify completion of the program to mitigate impacts to paleontological resources.

Based on the proceeding information, development of the project will not result in substantial adverse change in the significance of a historical or archaeological resource or result directly or indirectly in the destruction of a unique paleontological resource or site or unique geologic feature.

d) Disturb any human remains, including those interred outside of dedicated cemeteries?			■	
No known human remains have been identified at the project site. Compliance with mitigation measure CR-5 as identified in the response to checklist questions a, b, and c for Cultural Resources will also serve to prevent the disturbance of any human remains.				
VI. **GEOLOGY AND SOILS**. Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death involving:				
(i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				■

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
According to the City's General Plan, the project site is not on, or close to, any known earthquake fault. There is no new information that would indicate the existence of a fault or fault tract in proximity of the site. Accordingly, there is no risk of ground rupture due to faulting at the proposed project site.				
(ii) Strong seismic ground shaking?			■	
According to the City's General Plan, the project site is not on, or close to, any known earthquake fault. The nearest fault is the San Jacinto fault system, which is located about 8 miles to the northeast. The San Andreas fault system is more than 25 miles from the site. The active Sierra Madre and San Gabriel fault zones lie roughly 35 and 40 miles respectively to the northwest of the site. The active Elsinore and Newport-Inglewood fault zones lie approximately 20 and 45 miles, respectively, to the southwest of the site. This faulting is not considered a significant constraint to development on the site with the use of current building codes. Ground-shaking intensity could be moderately-high during a 100-year interval earthquake. Foundation designs will be reviewed to ensure incorporation of appropriate engineering recommendations to mitigate any such seismicity. There is no new information that would indicate the existence of a fault on the site.				
(iii) Seismic-related ground failure, including liquefaction?			■	
According to the City's General Plan, the project site is not on, or close to, any known earthquake fault. However, ground-shaking intensity could be moderately-high during a 100-year interval earthquake. Based on available resources and the City's General Plan, the potential for seismic related failure or liquefaction on the site is minimal based on the water table and soil conditions at the site.				
(iv) Landslides?				■
The project site is not near or adjacent to mountainside areas. Due to a lack of slopes within or nearby the project site seismically induced landslides are not anticipated to pose a danger to the project site. Development of the project will not result in impacts from landslides and no mitigation measures would be required.				
(b) Result in substantial soil erosion or the loss of topsoil?			■	
The development of the site will likely result in the reduction of erosion with the placement of buildings and landscaping on the site. During construction, there is the potential for less than significant impacts for short-term soil erosion from minimal excavation and grading. This will be addressed as part of standard construction, such as watering to reduce dust and sandbagging, if required, during raining periods.				
(c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?			■	
According to the City's environmental information, the geologic unit or soil is not known to be unstable (Western Riverside Area Soil Survey – University of California Agricultural Experiment Station, 1971). As designed and conditioned, the potential for the impacts resulting from a landslide, lateral spreading, subsidence, liquefaction or collapse is less than significant.				
(d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?			■	
According to the City's environmental information and the results of a Geotechnical Report prepared by Leighton and Associates, Inc. on June 9, 2004 and an Update prepared on August 29, 2016, project soils evaluated in a near surface sample have a very low expansion potential. The potential for the project to create substantial risks to life or property is less than significant.				
(e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?			■	
The proposed apartment project will operate on a sewer system that will be reviewed, approved and installed according to Eastern Municipal Water District requirements. The proposed project will not be introducing septic tanks or alternative water disposal systems.				
VII. **GREENHOUSE GAS EMISSIONS.** Would this project?				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?			■	

Attachment: Initial Study Checklist (2444 : Legacy Park Project)

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

Global climate change is caused by greenhouse gas (GHG) emissions throughout the world. Mitigating global climate change will require worldwide solutions. Greenhouse gases are gases emitted from the earth's surface that absorb infrared radiation in the atmosphere. Increases in these gases lead to more absorption of radiation and warm the lower atmosphere, and therefore increase evaporation rates and temperatures on the Earth's surface.

The City of Moreno Valley adopted a Climate Action Strategy on October 9, 2012. In 2012, the City of Moreno Valley completed a Greenhouse Gas Analysis (City's GHG Analysis) that addresses statewide legislation for sustainability through the preparation of GHG inventories and strategies to reduce emissions consistent with AB 32, which established a statewide target to reduce GHG emission to 1990 levels by 2020. The greenhouse gas analysis provides a policy framework for reducing emissions within the City. Following the state's adopted GHG reduction target, Moreno Valley set a goal to reduce emissions back to 1990 levels by the year 2020. This target was calculated as a 15 percent decrease from 2007 levels. Projects that demonstrate compliance with the reduction target described in the City's GHG Analysis are considered consistent with the AB 32 reduction target.

As provided for in the CEQA Guidelines (Section 15064.4), it is necessary for the lead agency to make a good-faith effort in considering GHG emissions on a project specific basis. A Greenhouse Gas Analysis (GHG) was prepared for the project by Urban Crossroads on November 3, 2016, to analyze potential construction resource and operational resource impacts.

The City of Moreno Valley has not adopted its own numeric threshold of significance for determining impacts with respect to GHG emissions. The SCAQMD has convened aWorking Group. Based on the last Working Group meeting (Meeting No. 15) held in September 2010, SCAQMD is proposing to adopt a tiered approach for evaluating GHG emissions for development projects where SCAQMD is not the lead agency. SCAQMD had proposed a Project level efficiency significance threshold, in which a 2020 statewide population and employment for land use sectors was divided by 2020 statewide SP, amounting to a 4.8 MTCO2e per service population threshold (1). The City will utilize the Project level efficiency significance threshold approach recommended in the SCAQMD's Interim Thresholds document for commercial, residential, and mixed use projects. Thus, and based on guidance from the SCAQMD, if a residential project would emit GHGs less than 4.8 MTCO2e per service population, the project is not considered a substantial GHG emitter and the GHG impact is less than significant. On the other hand, if a residential project would emit GHGs in excess of 4.8 MTCO2e per service population, then the project could be considered a substantial GHG emitter, requiring additional analysis and potential mitigation. As identified in Table 4-1 of the Greenhouse Gas Analysis, the proposed project would result in approximately 4.62 MTCO2e per service population and would not exceed the threshold of 4.8 MTCO2e per service population. Therefore, project-related emissions would not have a significant direct or indirect impact on GHG and climate change.

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?			■	

AB 32 is the primary plan, policy or regulation adopted in the State of California to reduce GHG emissions. The City's GHG Analysis in 2012 addressed statewide legislation for sustainability through the preparation of GHG inventories and strategies to reduce emissions consistent with AB 32, which established a statewide target to reduce GHG emission to 1990 levels by 2020. Preparing a greenhouse gas analysis supports AB 32 at the local level, and the greenhouse gas analysis provides a policy framework for how the City of Moreno Valley can do its part to reduce emissions.

The City of Moreno Valley adopted a Climate Action Strategy on October 9, 2012. In 2012, the City of Moreno Valley completed a Greenhouse Gas Analysis (City's GHG Analysis) that addresses statewide legislation for sustainability through the preparation of GHG inventories and strategies to reduce emissions consistent with AB 32, which established a statewide target to reduce GHG emission to 1990 levels by 2020. Preparing a greenhouse gas analysis supports AB 32 at the local level. The greenhouse gas analysis provides a policy framework for how the City of Moreno Valley can do its part to reduce emissions. Following the state's adopted GHG reduction target, Moreno Valley set a goal to reduce emissions back to 1990 levels by the year 2020. This target was calculated as a 15 percent decrease from 2007 levels. Projects that demonstrate compliance with the reduction target described in the City's GHG Analysis are considered consistent with the AB 32 reduction target.

The Project is consistent with and supports the City of Moreno Valley Energy Efficiency and Climate Action Strategy (CAS), which is the applicable plan, policy or regulation adopted for the purpose of reducing greenhouse gases. Project consistency with the CAS is detailed in Section 2.10 of the Greenhouse Gas Analysis.

Therefore, since the proposed Project meets and exceeds the City's GHG Analysis reduction target and complies with applicable measures that reduce GHG emissions, the proposed Project will not conflict with any applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases, and impacts in this regard are considered less than significant.

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
VIII. **HAZARDS AND HAZARDOUS MATERIALS.** Would the project?				
a) Create a significant hazard to the public or the environment through the routine transport, use or disposal of hazardous materials?				■
The proposed project will not involve the routine transport, use or disposal of hazardous materials. Since the project will not involve the routine transport, use or disposal of hazardous materials, there will be no potential for a significant hazard to the public or the environment.				
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?				■
The proposed project will not involve the routine transport, use or disposal of hazardous materials. The proposed project will not create a significant hazard to the public or the environment through the routine transport, or use or disposal of hazardous materials. Since the project will not involve the routine transport, use or disposal of hazardous materials, there will be no potential for a significant hazard to the public or the environment.				
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				■
March Middle School is located immediately to the south of the project site and Rainbow Elementary School is located approximately 700 feet further to the south. The project as designed and conditioned will not emit hazardous emissions or handle hazardous materials.				
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result would it create a significant hazard to the public or the environment?				■
The site was checked against the list of hazardous material sites pursuant to Government Code Section 65962.5. The project is not located on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5.				
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?			■	
The nearest airport is the March Air Reserve Base located approximately three-quarters of a mile to the west. The distance to the runway is approximately one mile. The project site is located within Compatibility Zone E of the March Air Reserve Base/Inland Port Airport Land Use Compatibility Plan where residential density is not restricted. This project was reviewed by the Riverside County Airport Land Use Commission and in a letter dated May 10, 2016 it was determined to be consistent with the 2014 March Air Reserve Base/Inland Port Airport Land Use Compatibility Plan subject to certain requirements which have been incorporated into the project conditions of approval. The project, as conditioned, will not result in a safety hazard for future residents.				
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				■
There are no private airstrips within the City of Moreno Valley. The project is not within proximity of a private airstrip. Therefore, the project would not result in a safety hazard pertaining to proximity of a private airstrip.				
g) Impair implementation of, or physically interfere with an adopted emergency response plan or emergency evacuation plan?				■
The proposed project would not have any direct effect on an adopted emergency response plan, or emergency evacuation plan. The City's emergency plans are also consistent with the General Plan. The proposed project has been designed and conditioned to provide required circulation and required fire access to allow for ingress of emergency vehicles and egress of passenger vehicles. Therefore, the proposed project would not be in conflict in any way with the emergency response or emergency evacuation plans.				
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				■
The proposed project site is not adjacent to wildlands and is not located within the Very High Fire Hazard Severity Zone. As designed and conditioned, the project would not expose people or structures to a significant risk of loss, injury or death involving wildland fires. In addition, the project is not located within a designated wildland area.				

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
IX. **HYDROLOGY AND WATER QUALITY**. Would the project:				
a) Violate any water quality standards or waste discharge requirements?			■	
Pursuant to the requirements of the Santa Ana Regional Water Quality Control Board, a project specific Water Quality Management Plan (WQMP) is required of certain projects involving discretionary approval. This project requires a WQMP to address pollutants of concern. Site Design and Source Control best management practices (BMP) are conditioned to be used throughout the project. The project has proposed the use of bioretention facilities and Low Impact Development (LID) BMP's. Treatment BMPs will be selected and implemented which are medium to highly effective in treating pollutants of concern. Final design and sizing details of all BMPs must be provided in the first submittal of the F-WQMP. The project has been conditioned to provide documentation that runoff will be treated in conformance with the "Riverside County Water Quality Management Plan for Urban Runoff" dated October 22, 2012 and approved by the Santa Ana Regional Water Quality Control Board (Guidance Document). Additionally, grading activities would temporarily expose soils to wind and water erosion that would contribute to downstream sedimentation. The proposed project would comply with all permits and development guidelines associated with urban water runoff and discharge set forth by the City of Moreno Valley and the Regional Water Quality Control Board. With the approval of the storm drainage facilities by the City Engineer and Riverside County Flood Control District (RCFCD), as well as complying with all applicable storm water discharge permits, impacts would be less than significant.				
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?			■	
The Eastern Municipal Water District (EMWD) would provide the proposed project with potable water as opposed to utilizing individual water wells. Potable water is adequate to serve the proposed project. Although the project would cover a majority of the site with impervious surfaces, the landscaped areas would still provide a means for groundwater recharge. Impacts would be less than significant.				
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?			■	
There is no streambed or river on the project site, so the project will not cause a change in the existing on-site drainage pattern that would result in substantial erosion or siltation on- or off-site. During construction of the project, there is the potential for some sediments to be discharged within the storm water system. Erosion control plans are required for projects prior to issuance of grading permits for preventing substantial erosion. The project as designed and conditioned will not change the existing drainage pattern that would result in substantial erosion or siltation on- or off-site. Impacts would be less than significant.				
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or surface runoff in a manner which would result in flooding on- or off site?			■	
There is no streambed or river on the project site. The on-site project storm drain infrastructure proposes to tie into existing storm drain infrastructure in Perris Boulevard. The project will be responsible for completing both and off-site storm drain infrastructure. The project as designed and conditioned will not cause a change in the existing drainage pattern that would result in substantial erosion or siltation on- or off-site. Therefore, project implementation would not result in modifications that could ultimately result in substantial erosion or siltation on- or off-site. Impacts would be less than significant.				
e) Create or contribute runoff which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?			■	

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

The proposed project is consistent with the City's General Plan. All storm drainage improvements would be developed to the standards of the City Engineer and the Riverside County Flood Control and Water Conservation District (RCFCD). Additionally, the project has been designed in accordance with the City's standard conditions of approval, which includes measures pertaining to storm drainage facilities and runoff. RCFCD provided a letter dated November 2, 2015, indicating that the project site is within the limits of the Sunnymead Master Drainage Plan. The project proposes to construct on-site storm drain infrastructure and detention/water quality basins. Post-construction, the project will not discharge storm water that exceeds historic capacities and will not exceed the capacity of existing or planned stormwater drainage systems. The project will also construct Master Plan Storm Drain system Line M2 and the related utility relocation by constructing approximately 3,000 of off-site storm drain in Santiago Drive, Perris Boulevard, and Iris Avenue. The project will also construct Master Plan Storm Drain system Line D1 by constructing approximately 300 of off-site storm drain in Indian Avenue.

As with any urban project, runoff entering the storm drainage system would contain minor amounts of pollutants (including pesticides, fertilizers and motor oil). This would incrementally contribute to the degradation of surface and sub-surface water quality. Additionally, grading activities would temporarily expose soils to water erosion that would contribute to downstream sedimentation. However, the project is subject to the permit requirements of the Santa Ana Regional Water Quality Control Board. As the site is currently unpaved and exposed, development of the proposed project would lessen the existing site contribution to sediment runoff at project completion. Additionally, the approved Preliminary WQMP proposes Best Management Practices for water quality treatment at both the project construction and operational stages. With the approval of the storm drainage facilities by the City Engineer and RCFCD, incorporation of conditions of approval into the project's design, as well as compliance with all applicable storm water discharge permits, impacts would be less than significant.

f) Otherwise substantially degrade water quality?			■	

The proposed project is consistent with the City's General Plan. All storm drainage improvements would be developed to the standards of the City Engineer and the RCFCD. Additionally, the project has been designed in accordance with the City's standard conditions of approval, which includes measures pertaining to storm drainage facilities and runoff. As with any urban project, runoff entering the storm drainage system would contain minor amounts of pollutants (including pesticides, fertilizers and motor oil). This would incrementally contribute to the degradation of surface and sub-surface water quality. Additionally, grading activities would temporarily expose soils to water erosion that would contribute to downstream sedimentation. However, the tract is subject to the permit requirements of the Santa Ana Regional Water Quality Control Board. As the site is currently unpaved and exposed, development of the proposed project would lessen the existing site contribution to sediment runoff at project completion. With the approval the storm drainage facilities by the City Engineer and Riverside County Flood Control District, incorporation of conditions of approval into the project's design, as well as compliance with all applicable storm water discharge permits, impacts would be less than significant.

g) Place housing within a 100-year floodplain, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?			■	
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?			■	

(g and h) The proposed project site is located within Federal Emergency Management Agency Zone "X" area outside of the 100-year flood hazard area. This is an area determined to be outside of the 0.2% annual chance flood plain. The project is outside of the delineated dam inundation area for Perris Dam at Lake Perris Reservoir and will not place housing or structures within a 100-year flood hazard area. There are no mountains or steep slopes in proximity to the project site, therefore, there is no chance of mudflows from local mountains. Therefore, impacts would be less than significant. The project as designed and conditioned will not place structures which would impede or redirect flood flows.

i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?				■

The proposed project site is located within Federal Emergency Management Agency Zone "X" area outside of the 100-year flood hazard area. This is an area determined to be outside of the 0.2% annual chance flood plain. The project site is outside of the delineated dam inundation area for Perris Dam at Lake Perris Reservoir and will not expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.

j) Inundation by seiche, tsunami, or mudflow?				■

The project site is not identified in the General Plan as a location subject to seiche, or mudflow. The project is outside of the delineated dam inundation area for Perris Dam at Lake Perris Reservoir. Additionally, due to the position of the proposed project, mudflows from local mountains would be unlikely due to surrounding development. There would be no impacts resulting from inundation by seiche, tsunami, or mudflow.

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
X. **LAND USE AND PLANNING**. Would the project:				
a) Physically divide an established community?			■	

The project proposes to develop a planned single-family residential community on approximately 53 acres in the R5 zone. Project applications include:

- General Plan Amendment from Residential 30 to Residential 5 for a 15.06 acre portion of the approximately 53 acre site;
- Zone Change from R30 to R5 for a 15.06 acre portion of the approximately 53 acre site;
- Conditional Use Permit for a Planned Unit Development (PUD) to create minimum lot sizes of 4,000 and 5,000 square and unique development standards; and
- Tentative Tract Map 36760 to subdivide the approximately 53 acre site into a total of 221 single family residential lots.

The project site is bounded by existing single-family tract homes to west and northwest in the RS-10 zone with minimum lot sizes of 4,500 square feet. The property immediate to the north is zoned R5 and has been subdivided with a recorded map, Tract Map 22180. Further to the north are existing single-family tract homes in the R5 zone. Southwest of the project site are single-family homes in the R5 zone. March Middle School and Rainbow Elementary School are located immediately to the south. The California Aqueduct bounds the property along its eastern property line with vacant Community Commercial zoned property to the east. The site to the east was recently approved for development as a Walmart retail center. Additional commercial existing retail centers are located to the southeast at the intersection of Perris Boulevard and Iris Avenue. March Air Reserve Base is located approximately three-quarters of a mile to the west with the City Corporate Yard located approximately 1,400 feet to the east. Since the residential development proposed at this location is an extension of an established land use pattern and is compatible with adjacent General Plan and Zoning districts and existing land uses, the project will not physically divide an established community and impacts would be less than significant under this category.

b) Conflict with an applicable land use plan, policy or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?			■	

This single-family residential project, proposes development that is a permitted use in the R5 zone and are consistent with the goals, objectives and policies of the Residential 5 General Plan designation for the project site.

Based upon the conclusions of a Traffic Impact Analysis Report prepared by Urban Crossroads on September 16, 2016, analysis of existing traffic patterns plus project traffic conditions does not result in direct impacts to studied roadway segments or intersections. Analysis of the year 2021 cumulative traffic plus project traffic conditions demonstrated cumulative impacts to three intersections (Indian Street at Cactus Avenue, Indian Street at Gentian Avenue, and Perris Boulevard at Santiago Drive). Mitigation measure requiring the payment of development impact fees and a fair share contribution have been placed on this project to reduce cumulative impacts to less than significant at these three intersections.

As designed and conditioned, and subject to implementation of mitigation measures, the project will not conflict with an applicable land use plan, policy or regulation of an agency with jurisdiction over the project including the City's General Plan.

c) Conflict with any applicable habitat conservation plan or natural community conservation plan?			■	

The project is not within one of the Multiple Species Habitat Conservation Plan (MSHCP) criteria areas, which are potential habitat preservation areas. The proposed project will not conflict with the Stephen's Kangaroo Rat Habitat Conservation Plan (SKR HCP) or MSHCP or any other known local, regional or state habitat conservation plans. The project will be conditioned to pay the required SKR mitigation fees. Also, the City participates in the MSHCP, a comprehensive habitat conservation-planning program addressing multiple species' needs, including preservation of habitat and native vegetation in Western Riverside County. This project will also be subject to fees per City ordinance to support the implementation of the Multiple Species Habitat Conservation Plan.

XI. **MINERAL RESOURCES.** Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				■
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?				■

(a and b) The project site is located in an urbanized area with additional development occurring in the vicinity. No active mines or mineral recovery programs are currently active within the project site or the surrounding area. Consequently, the development of the project site would not conflict with a mineral recovery plan as adopted by the General Plan. No significant impacts would occur.

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

XII. **NOISE.** Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?			■	
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?			■	

(a and b) The General Plan Environmental Impact Report (EIR) Noise Section for the City of Moreno Valley states that "The noise generated by construction is addressed by existing city regulations. It is unlawful to create noise that annoys reasonable people of normal sensitivity. The Public Works Department has a standard condition of approval regarding the public nuisance aspect of the construction activities. The construction operations including building related activities and deliveries shall be restricted to Monday through Friday (except for holidays which occur on weekdays), six a.m. to eight p.m.; weekends and holidays (as observed by the city and described in Chapter 2.55 of the Municipal Code), seven a.m. to eight p.m., unless written approval is obtained from the city building official or city engineer. Although construction activities will result in a noise impact, this impact will be short-term and will cease upon completion of construction. The temporary nature of the impact in conjunction with existing city regulations on hours of operation will lessen the potential of a significant impact due to construction noise. However, noise sensitive land use located adjacent to construction sites may be impacted by future construction in the planning area as a result of groundborne noise levels, noise levels that exceed existing standards, and temporary or periodic increases in the ambient noise level.

Although not required as mitigation measures to reduce a potentially significant impact to acceptable levels, the following mitigation measures have been introduced to ensure compliance with City General Plan Policies regarding noise:

N-1: Construction activities shall be operated in a manner that limits noise impacts on surrounding uses (General Plan Policy 6.5.2). In order to limit noise impacts on surrounding property, the construction contractor will ensure the following:

- All construction equipment powered by gasoline or diesel engines will be required to have sound-control devices at least as effective as those originally provided by the manufacturer; no equipment will be permitted to have an unmuffled exhaust.
- Mobile noise-generating equipment and machinery will be shut off when not in use;
- Construction vehicles assessing the site will be required to use the shortest possible route to and from local freeways, provided the routes do not expose additional receptors to noise.

N-2: The staging of construction equipment and the construction trailer shall be placed as far as possible from the existing single-family residences located to the west and south and the schools to the south.

The proposed residential development as designed and conditioned is consistent with City Municipal Code development standards and the City's design guidelines for single-family residential development. It is anticipated that project traffic will operate within acceptable Levels of Service at General Plan build-out, therefore, noise levels will be consistent with General Plan criteria for noise, and noise levels will not exceed the standards set forth in the General Plan. Perceptible groundborne vibrations are typically associated with blasting operations and potentially the use of pile drivers, neither of which will be used during construction of the Proposed Project. As such, no excessive groundborne vibration would be created by the Proposed Project. A less than significant impact would occur.

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?			■	

The proposed residential development, as designed and conditioned is consistent with City Municipal Code development standards and Design Guidelines for single-family residential development. Permanent noise associated with the proposed residential development includes, but are not limited to, resident and visitor vehicular traffic, routine landscape and home maintenance, and maintenance of common landscape areas. However, these noise sources would be typical of the adjacent area and therefore, the project would not introduce unique noise sources. Although not required as mitigation measures to reduce a potentially significant impact to acceptable levels, mitigation measures N-1 and N-2 as referenced under Noise checklist questions (a) and (b) have been introduced to ensure compliance with City General Plan Policies related to noise regulation. Therefore, noise levels would be consistent with General Plan criteria for noise, and noise levels will not exceed the standards set forth in the General Plan. Impacts would be less than significant as a result of the proposed project.

d) A substantially temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?			■	

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
During construction, there will be the temporary impact of noise from construction equipment. The nearest sensitive receptors are March Middle School located immediately to the south and Rainbow Elementary School located approximately 700 feet further to the south and existing single-family tract homes to the west and northwest on the west side of Indian Street and to south. The Public Works Department has a standard condition of approval regarding the public nuisance aspect of the construction activities. Any construction within the city shall only be completed between the hours of seven a.m. to seven p.m. Monday through Friday, excluding holidays and from eight a.m. to four p.m. on Saturday, unless written approval is obtained from the city building official or city engineer. According to the Moreno Valley Municipal Code (9.10.030), all temporary construction activities are exempt from the noise standards as long as construction activities are limited to the daytime hours as described above and construction equipment is properly maintained with working mufflers. Although not required as mitigation measures to reduce a potentially significant impact to acceptable levels, mitigation measures N-1 and N-2 as referenced under Noise checklist questions (a) and (b) have been introduced to ensure compliance with City General Plan Policies related to noise regulation.				
e) For a project located within an airport land use plan, or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				■
The nearest airport is the March Air Reserve Base located approximately three-quarters of a mile to the west. The distance to the runway is approximately one mile. The project site is located within Compatibility Zone E of the March Air Reserve Base/Inland Port Airport Land Use Compatibility Plan. This area is considered a Flight Corridor Buffer zone. Noise impacts are identified as low since the project site is located beyond the 55 CNEL contour. The 55 CNEL contour is below the recommended exterior noise levels caused by aircraft over flight for new residential (65 CNEL) and other development (70 CNEL which requires insulation) as outlined General Plan Policies 6.3.2 and 6.3.3. Noise concerns within Zone E are related to occasional overflights intrusive to some outdoor activities. There are no restrictions on land use or density within this zone. This project was reviewed by the Riverside County Airport Land Use Commission and found to be consistent with the 2014 March Air Reserve Base/Inland Port Airport Land Use Compatibility Plan subject to certain requirements which have been incorporated into the project conditions of approval.				
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				■
There is no private airstrip within the vicinity of the site, or within the City of Moreno Valley.				
XIII. **POPULATION AND HOUSING.** Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?		■		
The project site is bounded on the west and south by development with improved street frontage along Indian Street and vacant R5 zone land to the north with a recorded map (Tract Map 22180). Vacant land for commercial (Community Commercial zoning) is located to the east (approved Walmart retail center). The project is surrounded by urban uses. The proposed residential development is consistent with surrounding General Plan land use and Zoning designations. The project will allow for the construction of 221 single-family residential homes. However, the numbers of residential units is less than the total number that would be allowed by the existing General Plan and zoning designations for the site. The project has been conditioned to construct all required on-site and off-site public infrastructure and to participate in the payment of applicable development impact fees.				
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				■
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				■
(b and c) This property is currently vacant, and no housing is currently located there. No housing will be displaced by development of this project. The project will not displace any residents.				
XIV. **PUBLIC SERVICES**. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities, need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
a) Fire protection?			■	
The proposed project has incorporated the City's standard conditions of approval into its design. These standards specifically address concerns regarding the Fire Prevention Bureau. Standards such as providing approved fire hydrants, fire flow requirements; development impact fee programs and utilizing fire retardant materials have all been incorporated into the project's design. Insurance Services Office (ISO) ratings are given to firefighting districts in order to rank their operation level. This scale ranges from one (1) the highest possible score, to a ten (10), the worst possible score. The City of Moreno Valley currently has an ISO rating of four (4), which is considered high. With the implementation of the conditions of approval of the project pertaining to Fire Services, impacts would be less than significant.				

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Police protection?			■	

The proposed project conforms to the City's Municipal Code and to the General Plan. Police protection to the project area is provided through the Moreno Valley Police Department. The Police Department was involved in the project review process. Conditions of approval have been included by Police Department to ensure health and safety is protected during construction. Development of the project site would increase the demand for services on the Police Department. The project will pay development impact fees related to Police Facilities. With payment of impact fees, the development of the proposed project would not over-burden their service ability in continuing to provide high quality police service.

c) Schools?				■
d) Parks?				■

(c and d) The project would directly increase the use of schools or park facilities through the development of a 221 lot single-family residential planned community. Consistent with City General Plan Policies 4.2.1 and 4.2.14 the City's Master Plan of Trails and the Master Plan of Parks, this project has been conditioned to construct and then convey to the City a segment of the Juan Bautista De Anza trail within the adjacent California Aqueduct and to construct and convey to the City a public park of approximately 2.0 acres in size with amenities that would include play equipment, a picnic shelter, a gazebo, large group barbeques, concrete picnic tables and benches, concrete waste/recycle containers; drinking fountains, walkway security lighting, decorative concrete walkways, decomposed granite walking path; and tubular steel fencing surrounding the park. The project will pay development impact fees collected and administered by the Moreno Valley Unified School District.

e) Other public facilities?			■	

There will be an incremental increase in the demand for new or altered public services including city hall, and city yard facilities. These facilities would be needed with or without the project. This project will be subject to development impact fees, which shall address the impact of the proposed development.

XV. **RECREATION.**

a) Would the project increase the use of existing neighborhood or regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				■
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?				■

(a and b) As a residential use, the proposed development has the potential to increase the use of parks or other recreational facilities. The proposed project is designed to include private recreational amenities or facilities. The project has also been conditioned to construct and then convey to the City a segment of the Juan Bautista De Anza trail within the adjacent California Aqueduct and to construct and convey to the City a public park of approximately 2.0 acres.

XVI. **TRANSPORTATION/TRAFFIC.** Would the project:

a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?		■		
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?		■		

(a and b) A Traffic Impact Analysis Report prepared by Urban Crossroads on September 16, 2016, in order to evaluate the proposed General Plan Amendment and Zone Change and the potential circulation system deficiencies that may result from the development of the proposed Project, and to recommend improvements to achieve acceptable circulation system operational conditions.

At the City's direction, the evaluation of General Plan Buildout (2040) traffic conditions was contemplated for the purposes of this TIA. The development of the proposed Project (R5 land use designation) is anticipated to generate 1,799 fewer trip-ends per day with 135 fewer AM peak hour trips and 156 fewer PM peak hour trips, as compared to the currently adopted General Plan land uses (R5 and R30 land use designation). As such, evaluation of long-range traffic conditions was determined to be unnecessary as the proposed General Plan Amendment is anticipated to reduce the trips generated by the site. E+P and Opening Year Cumulative traffic conditions have been evaluated as part of this TIA in an effort to identify the near-term Project impacts, however, long-range traffic impacts are anticipated to be consistent with or less than those identified by the City's currently adopted General Plan.

Analysis of the year 2021 cumulative traffic plus project traffic conditions demonstrated cumulative impacts to three intersections

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact

(Indian Street at Cactus Avenue, Indian Street at Gentian Avenue, and Perris Boulevard at Santiago Drive). A mitigation measure requiring the payment of development impact fees and a fair share contribution have been placed on this project to reduce cumulative impacts to less than significant at these three intersections.

Improvement strategies have been recommended at intersections that have been identified as deficient to reduce each location's peak hour delay and improve the associated LOS grade to an acceptable LOS (LOS D or better). The effectiveness of the proposed recommended improvements is presented in Table 3-3 for Existing traffic conditions. Recommended improvements to address deficiencies for Existing traffic conditions are described below and analysis worksheets are provided in Appendix 3.4. of the Traffic Impact Analysis Report. The following mitigation measures apply to the project:

TR-1: Prior to the issuance of building permits, the Project applicant shall participate in the City's DIF and County TUMF fee programs by paying the requisite fees at the time of building permit, and in addition pay the Project's fair share amount of $43,497 for improvements at the intersections of Indian Street at Cactus Avenue and Indian Street at Gentian Avenue as identified in Table 1-5 that are consistent with the improvements shown on Table 6-3, or as otherwise agreed to by the City and Project Applicant. Project fair share payment shall only be collected if the City creates a fee program that includes the improvements the fair share contribution is intended to construct.

TR-2: Prior to the final approval of the street improvement plans, traffic signal plans will be required for a new traffic signal located at the intersection of Perris Boulevard and Santiago Drive. Prior to issuance of Certificate of Occupancy, the traffic signal and Perris Boulevard and Santiago Drive shall be completed per the approved plans to the satisfaction of the City Engineer.

As designed and conditioned, and subject to implementation of mitigation measures TR-1 and TR-2, the project will not conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system and will not conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highway.

c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?			■	

The nearest airport is the March Air Reserve Base located approximately three-quarters of a mile to the west. The distance to the runway is approximately one mile. The project site is located within Compatibility Zone E of the March Air Reserve Base/Inland Port Airport Land Use Compatibility Plan. This project was reviewed by the Riverside County Airport Land Use Commission and in a letter dated May 10, 2016 it was determined to be consistent with the 2014 March Air Reserve Base/Inland Port Airport Land Use Compatibility Plan subject to specific conditions related to the operation of the project. These conditions of approval have been made a requirement for this development. Therefore, as designed and conditioned, this project will not result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks.

d) Substantially increase hazards to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment)?			■	

In addition to the project's on-site public streets, the project has been conditioned by Public Works to complete street improvements where necessary along the site's Indian Street, Gentian Avenue and Santiago Drive frontages. The street improvements will include but not be limited to, pavement, curb, gutter, sidewalk, streetlights, storm drain, signing and striping, raised median and dry and wet utilities. As designed, the project will not result in hazards, but will help decrease potential hazards at this location. The project is not adjacent to any potential incompatible uses.

e) Result in inadequate emergency access?			■	

As designed and conditioned, all driveways and drive aisles will be built to the specifications of the City Engineer and Traffic Engineer, the Fire Prevention Bureau and the General Plan. This will ensure that no hazardous traffic situations would occur during construction or with completion of the project. The site will be readily accessible for emergency access.

f) Conflict with adopted policies or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?				■

The project as designed and conditioned will not conflict with adopted alternative transportation policies, therefore, no adverse impacts would occur.

XVII. **UTILITIES AND SERVICE SYSTEMS.** Would the project:

a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				■
b) Require or result in construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				■

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
(a and b) A Prelminary Water Quality Management Plan (PWQMP) was prepared by Rick Engineering. The PWQMP identifies treatment Best Management Practices (BMP's) to address the project's pollutants of concern. The information presented in the PWQMP has been found by the City to be in general conformance with the document, "Water Quality Management Plan for the Santa Ana Region of Riverside County" dated October 22, 2012 and approved by the Santa Ana Regional Water Quality Control Board (Guidance Document). This project will not exceed the wastewater treatment requirements of the Regional Water Quality Control Board. The Eastern Municipal Water District (EMWD) is the sanitary district provider for the project. The project will not exceed wastewater treatment capacity of the Moreno Water Reclamation Facility.				
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?			■	
Riverside County Flood Control District (RCFCD) provided a letter dated November 2, 2015, indicating that the project site is within the limits of the Sunnymead Master Drainage Plan. The project proposes to construct Master Plan Storm Drain system Line M2 and the related utility relocation by constructing approximately 3,000 of off-site storm drain in Santiago Drive, Perris Boulevard, and Iris Avenue. The project will also construct Master Plan Storm Drain system Line D1 by constructing approximately 300 of off-site storm drain in Indian Avenue. Construction of the required on and off-site storm drain infrastructure will not cause significant environmental effects.				
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?				■
The water purveyor, Eastern Municipal Water District (EMWD), prepared an Urban Water Management Plan in 2010 demonstrating that it has or will have sufficient water supplies available to serve urban development within the City of Moreno Valley. EMWD's plan was based on the City's General Plan Land Use Element. The proposed residential development is consistent existing General Plan and Zoning designations. Therefore, sufficient water supplies exist to support the proposed project.				
e) Result in a determination by the wastewater treatment provider which serves or may serve the project determined that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				■
The wastewater treatment provider is EMWD. The current wastewater treatment facility has adequate capacity to serve projects within Moreno Valley that are consistent with the General Plan and EMWD has plans for major expansions of the Moreno Water Reclamation Facility to serve future needs. Source: EIR for the 2006 General Plan Update.				
f)) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?				■
Waste Management provides waste hauling service to the City of Moreno Valley. The project will be served by a landfill in the Badlands with sufficient permitted capacity to accommodate the project's solid waste disposal needs. Source: EIR for the 2006 General Plan Update.				
g) Comply with federal, state, and local statues and regulations related to solid waste?				■
City policies require compliance with State and Federal regulations regarding solid waste. This project will be required to comply with the current policies regarding solid waste. (General Plan Objective 7.8 and Municipal Code Section 6.02)				
XVIII. **MANDATORY FINDINGS OF SIGNIFICANCE.**				
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?			■	
There are no streambeds or riparian habitat within the project site. There were no surveyed rare plant or animal species noted on the project site. The project would not significantly degrade the quality of the environment or reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal. There are no historic structures on the site, and there will be no impact to historic resources. The project will not eliminate important examples of the major periods of California history or prehistory. The analysis in this Initial Study demonstrates that project and cumulative impacts would be less than significant. The project as designed and conditioned would not cause substantial adverse health effects on human beings.				
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?		■		

Issues and Supporting Information	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
Analysis of the year 2021 cumulative traffic plus project traffic conditions demonstrated cumulative impacts to three intersections (Indian Street at Cactus Avenue, Indian Street at Gentian Avenue, and Perris Boulevard at Santiago Drive). Mitigation measure requiring the payment of development impact fees and a fair share contribution have been placed on this project to reduce cumulative impacts to less than significant at these three intersections. Therefore, this project as conditioned and with mitigation will not create any impacts, that would be considered cumulatively considerable when viewed in connection with existing land uses, other recently approved projects, and existing land use designations. It is not expected that the proposed project would result in incremental effects. The analysis in this Initial Study demonstrates that with the implementation of mitigation measures for cumulative impacts to traffic infrastructure, the proposed project's cumulative impacts would be less than significant.				
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?			■	
The project proposes a General Plan Amendment from Residential 30 to Residential 5 and Zone Change from R30 to R5 for a 15.06 acre portion of a 53 acre site in order to develop a 221 lot planned residential community. The project includes applications for Tentative Tract Map 36760 to subdivide the 53 acre site into a total of 221 single family residential lots and a Conditional Use Permit for a Planned Unit Development (PUD). The PUD application will establish minimum lot sizes of 4,000 and 5,000 square feet and establish unique lot widths and setback standards along with architectural guidelines. Analysis of the year 2021 cumulative traffic plus project traffic conditions demonstrated cumulative impacts to three intersections (Indian Street at Cactus Avenue, Indian Street at Gentian Avenue, and Perris Boulevard at Santiago Drive). Mitigation measure requiring the payment of development impact fees and a fair share contribution have been placed on this project to reduce cumulative impacts to less than significant at these three intersections. The project as designed and conditioned and with mitigation will not cause substantial adverse effects on human beings, either directly or indirectly for the reasons described in this checklist/initial study.				

List of Key Documents and Resources:

- City of Moreno Valley General Plan, adopted by City Council on July 11, 2006
- City of Moreno Valley Municipal Code, adopted by City Council in 1997
- Preliminary Water Quality Management Plan prepared by Rick Engineering Company
- Traffic Impact Analysis prepared by Urban Crossroads, dated September 13, 2016
- Air Quality Study prepared by Urban Crossroads, dated November 3, 2016
- Greenhouse Gas Analysis prepared by Urban Crossroads, dated November 3, 2016
- Riverside County Integrated Project Long Report, Riverside County Transportation and Land Management Agency, April 15, 2016
- Western Riverside Area Soil Survey – University of California Agricultural Experiment Station, 1971
- Urban Water Management Plan, Eastern Municipal Water District, 2010
- State Important Farmland Map, 2015, http://maps.conservation.ca.gov/ciff/ciff.html
- Air Quality Management Plan (AQMP), South Coast Air Quality Management Board, 2012
- Cultural Resources Inventory, Archeological Research Unit, University of California, Riverside), October 1987
- Cultural Resource Study prepared by Helix Environmental Planning, dated April 13, 2016
- Geotechnical Report prepared by Leighton and Associates, Inc., dated June 9, 2004
- Update to Geotechnical Report prepared by Leighton and Associates, Inc., dated August 29, 2016
- March Air Reserve Base /Inland Port Airport Land Use Compatibility Plan, Riverside County Airport Land Use Commission, adopted November 13, 2014
- Hydrology Study, prepared by Rick Engineering Company, September 21, 2016
- Flood Insurance Rate Map, Federal Emergency Management Agency, Map Number 06065C0765G, August 28, 2008
- State Wildland Fires Map
- Riverside County Airport Land Use Commission consistency letter dated May 10, 2016

**The above documents and studies are incorporated by reference and available in the case file for Expanded Initial Study PEN16-0096 and the Community Development Department – Planning Division or Public Works Department – Land Development Division.

Legacy Park Project – Mitigation Monitoring and Reporting Program

Conditional Use Permit PEN16-0094 / Tentative Tract Map 36760 (PEN16-0095)

Introduction

This Mitigation Monitoring and Reporting Program has been prepared for use in implementing mitigation for the Mitigated Negative Declaration (MND) for The Legacy Park (Conditional Use Permit PEN16-0094 and Tentative Tract Map 36760). The program has been prepared in compliance with State law and the MND prepared for the project.

The California Environmental Quality Act (CEQA) requires adoption of a reporting or monitoring program for those measures places on a project to mitigated or avoid adverse effects on the environment (Public Resources Code Section 21081.6). The law states that the reporting or monitoring program shall be designed to ensure compliance during project implementation.

The monitoring program contains the following elements:

- 1. The mitigation measures are recorded with the action and procedure necessary to ensure compliance. In some instances, one action may be used to verify implementation of several mitigation measures.
- 2. A procedure for compliance and verification has been outlined for each action necessary. This procedure designates who will take action, what action will be taken and when, and to whom and when compliance will be reported.
- 3. The program has been designed to be flexible. As monitoring progresses, changes to compliance procedures may be necessary based upon recommendations by those responsible for the program. As changes are made, new monitoring compliance procedures are records will be developed and incorporated into the program.

Mitigation Monitoring and Responsibilities

As the Leady Agency, the City of Moreno Valley is responsible for ensuring full compliance with the mitigation measures adopted for the proposed project. The City will monitor and report on all mitigation activities. Mitigation measures will be implemented at different stages of development throughout the project. In this regards, the responsibilities for implementation have been assigned to the Applicant, Contractor, or a combination thereof. If during the course of project implementation, any of the mitigation measures identified herein cannot be successfully implemented, the City shall be immediately informed, and the City will then inform any affected responsible agencies. The City, in conjunction with any affected responsible agencies, will then determine if modification to the project is required and/or whether alternative mitigation is appropriate.

Mitigation Monitoring and Reporting Program Checklist

Project: Legacy Park Project (Conditional Use Permit PEN16-0094 and Tentative Tract Map 36760)

Applicant: Mission Pacific Land Company

Date: January 18, 2017

Mitigation Measure No.	Responsible for Monitoring	Monitoring Frequency	Timing of Verification	Method of Verification	Verified Date/Initials	Sanctions for Non-Compliance
Traffic/Transportation						
TR-1: Prior to the issuance of building permits, the Project applicant shall participate in the City's DIF and County TUMF fee programs by paying the requisite fees at the time of building permit, and in addition pay the Project's fair share amount of $43,497 for improvements at the intersections of Indian Street at Cactus Avenue and Indian Street at Gentian Avenue as identified in Table 1-5 that are consistent with the improvements shown on Table 6-3, or as otherwise agreed to by the City and Project Applicant. Project fair share payment shall only be collected if the City creates a fee program that includes the improvements the fair share contribution is intended to construct.	City of Moreno Valley Transportation Engineering Division and Planning Division	Ongoing during construction	Prior to Building Final	Review of paid DIF invoice and receipt		Withhold Building Final
TR-2: Prior to the final approval of the street improvement plans, traffic signal plans will be required for a new traffic signal located at the intersection of Perris Boulevard and Santiago Drive. Prior to issuance of Certificate of Occupancy, the traffic signal and Perris Boulevard and Santiago Drive shall be completed per the approved plans to the satisfaction of the City Engineer.	City of Moreno Valley Transportation Engineering Division , Land Development and Planning Division	Ongoing during construction	Prior to Building Final	Final Inspection of signal improvements		Withhold Building Final

Mitigation Measure No.	Responsible for Monitoring	Monitoring Frequency	Timing of Verification	Method of Verification	Verified Date/Initials	Sanctions for Non-Compliance
Biological Resources						
BR-1. A qualified biologist will conduct a pre-construction presence/absence survey for burrowing owls within 14 days prior to site disturbance. If burrowing owls are detected onsite, the owls will be relocated/excluded from the site outside of the breeding season following accepted protocols, and subject to the approval of the RCA and wildlife agencies.	City of Moreno Valley Planning Division	Ongoing during grading plan check	Prior to Issuance of a grading permit	Review of and approval of pre-construction survey		Withhold Grading Permit
BR-2. As feasible, vegetation clearing should be conducted outside of the nesting season, which is generally identified as February 1 through September 15. If avoidance of the nesting season is not feasible, then a qualified biologist shall conduct a nesting bird survey within three days prior to any disturbance of the site, including disking, demolition activities, and grading. If active nests are identified, the biologist shall establish suitable buffers around the nests, and the buffer areas shall be avoided until the nests are no longer occupied and the juvenile birds can survive independently from the nests.	City of Moreno Valley Planning Division	Ongoing during grading plan check	Prior to Issuance of a grading permit	Review of and approval of survey		Withhold Grading Permit
Mitigation Measure No.	**Responsible for Monitoring**	**Monitoring Frequency**	**Timing of Verification**	**Method of Verification**	**Verified Date/Initials**	**Sanctions for Non-Compliance**
Cultural Resources						
CR-1: Prior to the issuance of a grading permit, the Project Applicant shall provide evidence to the City of Moreno Valley that a professional archaeological monitor has been retained by the Applicant to conduct monitoring of all mass grading and trenching activities and that the monitor has the authority to temporarily halt and redirect earthmoving activities in the event that suspected archaeological resources are unearthed during Project construction. The Project archaeologist, with input from the	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations.	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order

appropriate Tribe, shall prepare a Cultural Resources Monitoring Plan (CRMP) to document protocols for inadvertent finds, to determine potential protection measures from further damage and destruction for any identified archaeological resource(s)/ tribal cultural resources (TCRs), outline the process for monitoring and for completion of the final Phase IV Monitoring Report. If any archaeological and/or TCRs are identified during monitoring, these will also be documented and addressed per standard archaeological protocols in the Phase IV report, with the exception of human remains which will be addressed per CUL-5. The Project Archaeologist shall attend the pregrading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.						
CR-2: At least 30 days prior to the issuance of a grading permit, the Applicant shall contact the appropriate Luiseño tribe to develop a Cultural Resources Treatment Agreement and shall provide evidence to the City of Moreno Valley that the professionally qualified Luiseño Native American monitor(s) has been secured from the interested tribe(s), and that the monitor shall be allowed to monitor all mass grading and trenching activities. The Tribal representative(s) shall attend the pre-grading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations.	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order
CR-3: If, during mass grading and trenching activities, the Archaeologist or Tribal representatives suspect that an archaeological resource and/or TCR may have been unearthed, the monitor identifying the potential resources, in consultation with the other monitor as appropriate, shall immediately halt and redirect grading operations in a 100-foot radius around the find to allow identification	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order

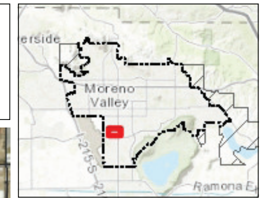
and evaluation of the suspected resource. The Native American monitor(s) or appropriate representative(s) and the archaeological monitor shall evaluate the suspected resource and make a determination of significance pursuant to California Public Resources Code Section 21083.2. The archaeological monitor and tribal monitor(s) or appropriate representative(s), the Project Applicant, and the City Planning Division shall confer regarding mitigation of the discovered resource(s). All sacred sites, should they be encountered within the Project area, shall be avoided and preserved as the preferred mitigation, if feasible.						
CR-4: Prior to grading permit issuance, the City shall verify that the following note is included on the Grading Plan: "If any suspected archaeological resources are discovered during ground-disturbing activities and the archaeological monitor or Tribal representatives are not present, the construction supervisor is obligated to halt work in a 100-foot radius around the find and call the project archaeologist and the Tribal representatives to the site to assess the significance of the find."	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order
CR-5: If human remains are encountered, California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the Riverside County Coroner has made the necessary findings as to origin. Further, pursuant to California Public Resources Code Section 5097.98(b), remains shall be left in place and free from disturbance until a final decision as to the treatment and disposition has been made by the Coroner. If the Riverside County Coroner determines the remains to be Native American, the California Native American Heritage Commission must be contacted within 24 hours. The Native American Heritage Commission must then	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order

immediately notify the "most likely descendant(s)" of receiving notification of the discovery. The most likely descendant(s) shall then make recommendations within 48 hours, and engage in consultations concerning the treatment of the remains as provided in Public Resources Code §5097.98.						
CR-6: Prior to construction involving excavation four feet or more below existing surface grade, the construction contractor shall provide evidence that a qualified paleontologist has been retained, and that the paleontologist(s) shall be present during all grading and other significant ground-disturbing activities that reach four feet or more below existing surface grade. In the event fossiliferous deposits are encountered, the following measures shall be implemented: • Monitoring shall be conducted by qualified paleontological monitor(s) of excavation in areas identified as likely to contain paleontological resources, including very old alluvial fan deposits. Paleontological monitors shall be equipped to salvage fossils as they are unearthed, to avoid construction delays, and to remove samples of sediments that are likely to contain the remains of small fossil invertebrates and vertebrates. Monitors shall be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring may be reduced if the potentially fossiliferous units are determined upon exposure and examination by qualified paleontological personnel to have low potential to contain fossil resources.	City of Moreno Valley Land Development Division and Planning Division	Once prior to Grading and during grading and construction operations	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order

• Paleontological monitoring of any earthmoving will be conducted by a monitor, under direct guidance of a qualified paleontologist. Earthmoving in areas of the parcel where previously undisturbed sediments are buried, but not otherwise disturbed, will not be monitored. • If too few fossil remains are found after 50 percent of the planned-for earthmoving has been completed, monitoring can be reduced or discontinued in those areas at the Project paleontologist's direction. • Preparation of recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. • Identification and curation of specimens into a professional, fully accredited museum repository with permanent retrievable storage. The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities. • Preparation or a report of findings with and appended itemized inventory of specimens. The report and inventory, when submitted to the city along with confirmation of the curation of recovered of recovered specimens into an established, accredited museum repository, will signify completion of the program to mitigate impacts to paleontological resources.						

Mitigation Measure No.	Responsible for Monitoring	Monitoring Frequency	Timing of Verification	Method of Verification	Verified Date/Initials	Sanctions for Non-Compliance
Noise						
N-1: Construction activities shall be operated in a manner that limits noise impacts on surrounding uses (General Plan Policy 6.5.2). In order to limit noise impacts on surrounding property, the construction contractor will ensure the following: • All construction equipment powered by gasoline or diesel engines will be required to have sound-control devices at least as effective as those originally provided by the manufacturer; no equipment will be permitted to have an unmuffled exhaust. • Mobile noise-generating equipment and machinery will be shut off when not in use; • Construction vehicles assessing the site will be required to use the shortest possible route to and from local freeways, provided the routes do not expose additional receptors to noise	City of Moreno Valley Engineering and Building and Safety Planning Division	Once prior to Grading and during grading and construction operations.	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order
N-2: The staging of construction equipment and the construction trailer shall be placed as far as possible from the existing single-family residences located to the west and south and the schools to the south.	City of Moreno Valley Engineering and Building and Safety Planning Division	Once prior to Grading and during grading and construction operations.	Prior to issuance of Grading Permit	Review of construction documents and on-site inspection		Withhold Grading Permit or Issuance of a Stop Work Order

Legacy Park Project



Legend

Public Facilities

- Public Facilities
- Fire Stations

Parcels

City Boundary

Sphere of Influence

631.0 0 315.48 631.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere

Print Date: 1/18/2017

N

DISCLAIMER: The information shown on this map was compiled from the City of Moreno Valley GIS and Riverside County GIS. The land base and facility information on this map is for display purposes only and should not be relied upon without independent verification as to its accuracy. Riverside County and City of Moreno Valley will not be held responsible for any claims, losses or damages resulting from the use of this map.

Notes

3.0

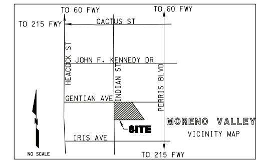
Attachment: Aerial Photograph [Revision 1] (2444 : Legacy Park Project)

IN THE CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

TENTATIVE TRACT 36760
PLANNED UNIT DEVELOPMENT

APN'S: 485-220-023, 485-220-032, 485-220-040

MARCH 8, 2016; REVISED: SEPTEMBER 19, 2016



OWNER/APPLICANT

MPLC LEGACY 75 PARTNERS, LLP
4100 NEWPORT PLACE, SUITE 480
NEWPORT BEACH, CA 92660
CONTACT: JASON KELLER
PHONE: (949) 333-6752
FAX: (949) 483-6752
EMAIL: JKELLER@MISSIONPACIFIC.COM

ENGINEER

RICK ENGINEERING COMPANY
1770 IOWA AVENUE, STE 100
RIVERSIDE, CA 92507
CONTACT: RICHARD O'NEILL
PHONE: (951) 782-0707
FAX: (951) 782-0723
EMAIL: RONEILL@RICKENGINEERING.COM

UTILITY PURVEYORS

SEWER AND WATER: EASTERN MUNICIPAL WATER DISTRICT
2270 TRUMBLE ROAD
PERRIS, CA 92570
(951) 928-3777
GAS: SOUTHERN CALIFORNIA GAS COMPANY
(800) 427-2200
ELECTRIC: MORENO VALLEY ELECTRIC UTILITY
14331 FREDERICK STREET, SUITE 2
MORENO VALLEY, CA 92553
(877) 811-8700
TELEPHONE: VERIZON
(800) 483-400
CABLE TV: TIME WARNER
1500 AUTO CENTER DRIVE
ONTARIO, CA 91761
STORM DRAIN: RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 MARKET STREET
RIVERSIDE, CA 92501
(951) 955-1200
CITY OF MORENO VALLEY
14177 FREDERICK STREET
MORENO VALLEY, CA 92553
TRASH: WASTE MANAGEMENT OF INLAND VALLEY
17700 INDIAN AVENUE
MORENO VALLEY, CA 92551
(800) 423-9986

LEGEND

TRACT MAP BOUNDARY
CENTERLINE
RIGHT-OF-WAY/ LOT LINE
PROPOSED CURB
EXISTING EASEMENT
EXISTING SPOT ELEVATION — X 1514.7
ACCESS GATE
BLOCK WALL
TUBULAR STEEL FENCE
PROPOSED STORM DRAIN — SD
PROPOSED WATERLINE — W
PROPOSED SEWER/MANHOLE — S
TOP OF SLOPE
TOE OF SLOPE
DIRECTION OF FLOW
CENTERLINE RADIUS — R= 50'
POINT OF INTERSECTION — PI
FINISHED SURFACE — FS
GRADE BREAK — GB
STREET GRADE — 2%
LAST LOT NUMBER — 220
CURB RAMP
DECORATIVE CONCRETE

GENERAL NOTES

1. EXISTING ZONING: R5, R30
2. EXISTING LAND USE: SUBURBAN RESIDENTIAL
3. EXISTING SURROUNDING LAND USE: PUBLIC FACILITIES, RESIDENTIAL, COMMERCIAL
4. PROPOSED ZONING: R5
5. PROPOSED LAND USE: SUBURBAN RESIDENTIAL
6. PROJECT ACREAGE: 52.9 AC. GROSS, 48.7 AC. NET
7. THOMAS BROS. MAP: 2009 SAN BERNARDINO/RIVERSIDE COUNTIES, PAGE 747, F-1 AND F-2
8. THIS IS NOT A GATED COMMUNITY
9. SCHOOL DISTRICT: VAL VERDE UNIFIED
10. AERIAL TOPOGRAPHY COMPILED AND PREPARED BY RICK ENGINEERING COMPANY ON 03/10/2011 AT 1' CONTOUR INTERVAL ACCURACY
11. AVERAGE RESIDENTIAL LOT SIZE: SEE TABULATION TABLE
12. FEMA FLOOD ZONE "X": NO AREAS OF FLOOD HAZARD, INUNDATION OR OVERFLOW WITHIN THE RESIDENTIAL LOTS OF THIS TENTATIVE TRACT MAP BOUNDARY
13. THERE ARE NO ADJACENT STRUCTURES OR PROPERTY IMPROVEMENTS WITHIN 50' OF THE PROJECT BOUNDARY
14. THERE ARE NO KNOWN EXISTING BUILDINGS OR STRUCTURES ABOVE GROUND WITHIN THE SUBDIVISION
15. THERE ARE NO KNOWN EXISTING WELLS, IRRIGATION LINES, CESSPOOLS, SEPTIC TANKS, SEWAGE LEACH FIELDS, SEWERS, CULVERTS, STORM DRAINS, OR UNDERGROUND STRUCTURES WITHIN THE SUBDIVISION
16. THERE ARE NO KNOWN PREVIOUSLY FILLED AREAS, INCLUDING LIQUID AND SOLID WASTE DISPOSAL SITES, WITHIN THE SUBDIVISION
17. THERE ARE NO EXISTING WATERCOURSES OR FLOOD CONTROL CHANNELS WITHIN THE PROJECT SITE
18. THERE ARE NO KNOWN EXISTING TREES OR ROCKS ON SITE
19. WATER QUALITY MEASURES ARE DESCRIBED IN PRELIMINARY WATER QUALITY MANAGEMENT PLAN.
20. WATER QUALITY BASINS AND PROPOSED PARK SITE TO BE MAINTAINED BY THE HOA OR PUBLIC ENTITY.
21. TRAFFIC SIGNAL INTERCONNECT WILL BE PROVIDED AT GENTIAN AVE.
22. PROJECT SITE IS IN HCOC EXEMPT AREA. OUTLET FROM BASINS WILL NOT MATCH PRE-PROJECT FLOWS, BUT WILL BE SIZED TO STORM DRAIN SYSTEM CAPACITIES.
23. APPLICANT RESERVES THE RIGHT TO RECORD THE FINAL MAP IN PHASES.

LEGAL DESCRIPTION

LOTS 18 AND 23 IN BLOCK 3 OF RIVERSIDE ALFALFA ACRES, AS SHOWN BY MAP ON FILE IN BOOK 8, PAGE 21 OF MAPS, RIVERSIDE COUNTY RECORDS.

EXCEPTING THEREFROM ANY PORTION LYING WITHIN TRACT NO. 22180-2 AS PER MAP RECORDED IN BOOK 207 OF MAPS, PAGES 97 THROUGH 103, INCLUSIVE, RIVERSIDE COUNTY RECORDS.

ALSO EXCEPTING THEREFROM ANY PORTION LYING WITHIN TRACT NO. 22180-3 AS PER MAP RECORDED IN BOOK 208, OF MAPS, PAGES 1 THROUGH 6, INCLUSIVE, RIVERSIDE COUNTY RECORDS.

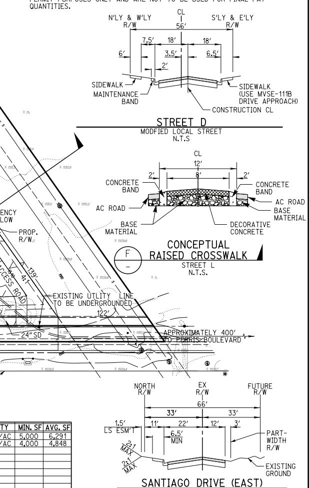
EASEMENTS

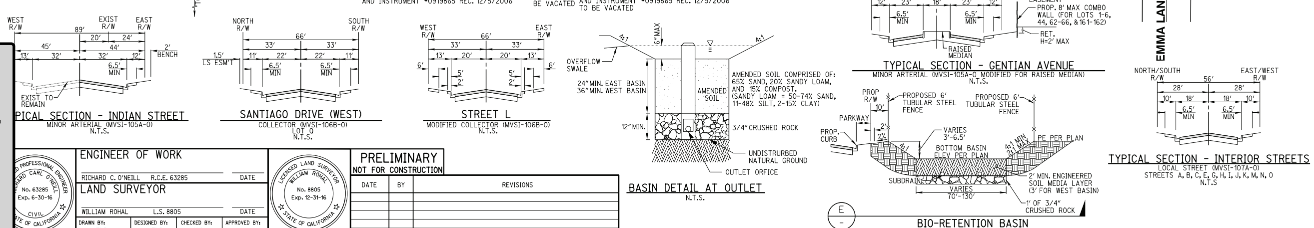
1. 100' CALIFORNIA DWR AQUEDUCT EASEMENT
2. 30' EMWD SEWER EASEMENT
3. PUBLIC UTILITY EASMENT 4' ON EACH SIDE OF LOT LINE REC 04/19.1977 # 67179
4. 6' PUBLIC UTLITY EASEMENT REC 04/19/1977
5. EASEMENT FOR ROADWAY PUBLIC UTILITY AND DRAINAGE, 04/06/2006 #0246722, 12/15/2006 #0919865

ESTIMATED GRADING QUANTITIES

ESTIMATED EXCAVATION: 108,000 C.Y.
ESTIMATED EMBANKMENT: 108,000 C.Y.

NOTE: THE GRADING QUANTITIES SHOWN HEREON ARE RAW QUANTITIES FOR PERMIT PURPOSES ONLY AND ARE NOT TO BE USED FOR FINAL PAY QUANTITIES.





LAND USE

	LAND USE	LOT NO.	MAINTAINED BY	# OF LOTS	AREA	LOT SIZE	DENSITY	MIN. SF	AVG. SF
50x100 NEIGHBORHOOD	RESIDENTIAL	1-145		145	34.6 AC	50'x100'	4.2 DU/AC	5,000	6,291
50x80 NEIGHBORHOOD	RESIDENTIAL	146-221		76	18.3 AC	50'x80'	4.2 DU/AC	4,000	4,848
OPEN SPACE	BASIN	AA	HOA		1.32 AC				
OPEN SPACE	SD ESM'T/COMMON AREA	BB	HOA		6,426 SF				
OPEN SPACE	PARK	CC	CITY		2.83 AC				
OPEN SPACE	BASIN	DD	HOA		1.19 SF				
OPEN SPACE	SD ESM'T/COMMON AREA	EE	HOA		1,600 SF				
OPEN SPACE	COMMON AREA	FF	HOA		8,008 SF				
OPEN SPACE	COMMON AREA	GG	HOA		1,558 SF				
OPEN SPACE	AQUEDUCT/TRAIL	HH	CITY		3.46 AC				
OPEN SPACE	PASEO	II	HOA		2,400 SF				
OPEN SPACE	PASEO	JJ	HOA		5,688 SF				
OPEN SPACE	COMMON AREA	KK	HOA		704 SF				
OPEN SPACE	COMMON AREA	LL	HOA		669 SF				
OPEN SPACE	COMMON AREA	MM	HOA		1,037 SF				
OPEN SPACE	COMMON AREA	NN	HOA		931 SF				
INDIAN STREET	ROAD	S	CITY		0.73 AC				
SANTIAGO DR (WEST)	ROAD	Q	CITY		0.56 AC				
SANTIAGO DR (EAST)	ROAD	R	CITY		0.73 AC				
ONSITE ROADS					12.0 AC				
NET					48.8 AC				
GROSS					52.9 AC		4.2 DU/AC		5,801

NOTE: ALL DENSITY CALCULATIONS ARE BASED ON GROSS ACREAGE.

ENGINEER OF WORK
RICHARD C. O'NEILL R.C.E. 63285
LAND SURVEYOR
WILLIAM ROHAL L.S. 8805

PRELIMINARY
NOT FOR CONSTRUCTION

TTM 36760 (PUD)
PA14-0052, PA14
MARCH 8, 2016
REVISED: DECEMBER

RICK ENGINEERING COMPANY

Attachment: Tentative Tract Map 36760 / PUD Exhibit (2444 : Legacy Park Project)

CONCEPTUAL LANDSCAPE PLANS
TRACT 36760 - MORENO VALLEY, CA
PRELIMINARY LANDSCAPE PLAN

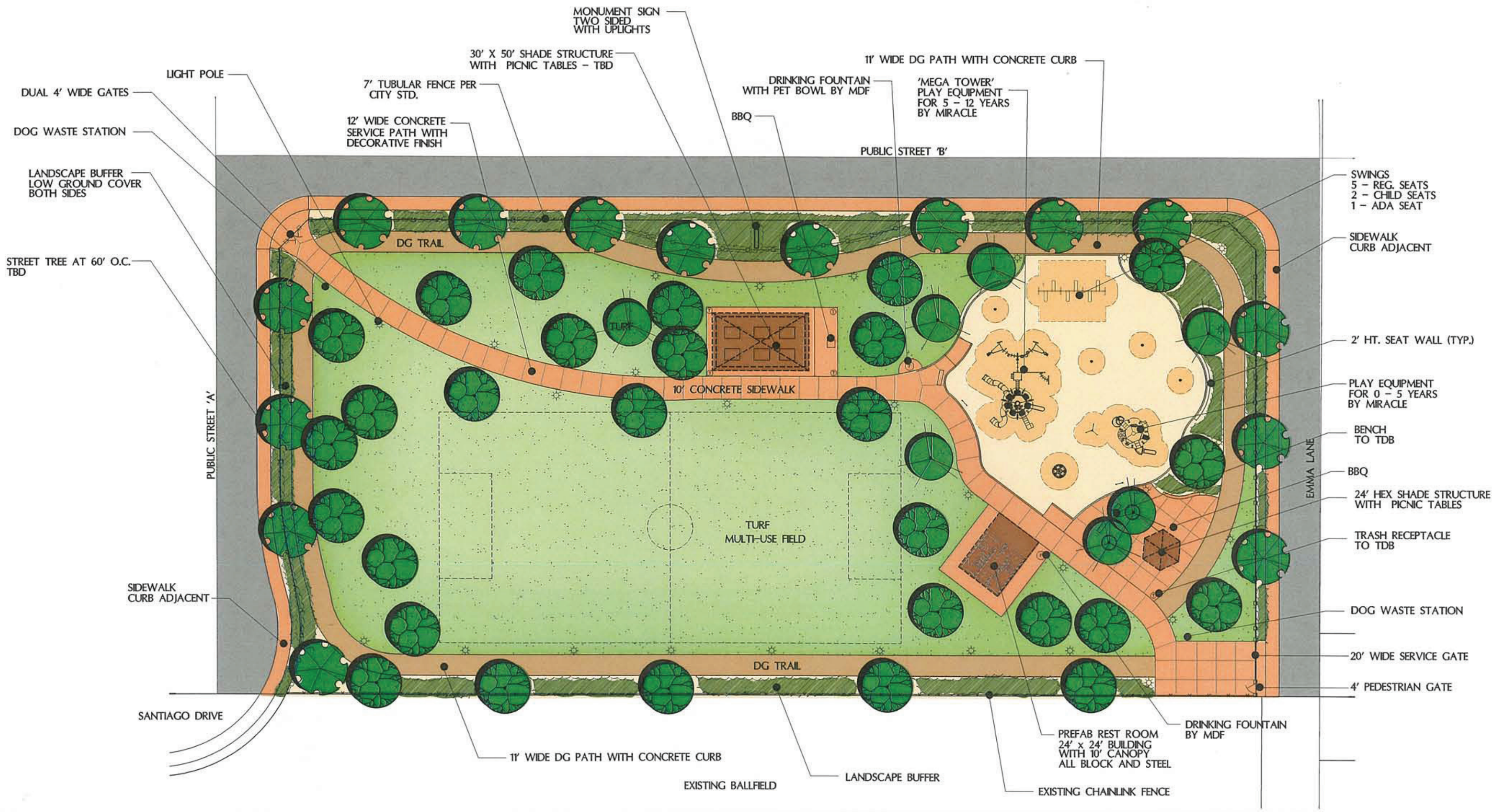
MISSION PACIFIC LAND COMPANY
4100 NEWPORT PLACE, SUITE 480, NEWPORT BEACH, CA 92660

HERMANN DESIGN GROUP
77-899 WOLF RD.
SUITE 102
PALM DESERT, CA
92211
LIC# 2754, EXP 04/30/18
PH. (760) 777-9131
FAX (760) 777-9132

DATE 11/8/16

3.q

Attachment: Conceptual Landscape Plan (2444 : Legacy Park Project)



MISSION PACIFIC LAND COMPANY
4100 NEWPORT PLACE, SUITE 480, NEWPORT BEACH, CA 92660

CITY OF MORENO VALLEY

LEGACY PARK

MORENO VALLEY, California

Conceptual Park Plan

HERMANN DESIGN GROUP

DATE: 4/16/15

Attachment: Park Plan (2444 : Legacy Park Project)

3.r

Legacy Park

Planned Unit Development Guidelines
Draft November 2016

Legacy Park

Legacy Park

Planned Unit Development Guidelines

Draft November 2016

Prepared For:

Mission Pacific Land Company

City of Moreno Valley

Prepared By:

William Hezmalhalch Architects

Rick Engineering Company

Hermann Design Group

Legacy Park

Table of Contents

Purpose

The purpose of the Legacy Park Planned Unit Development guidelines to promote a high standard of neighborhood design and architectural quality; provide innovation and diversity in housing choices, contribute to Moreno Valley open space and recreational facilities and instal storm water control systems. The Legacy Park Plan provides two new City parks one on-site and one off-site fitness park on the adjacent property as well as paseos that connect to the Department of Water Resources (DWR) Juan Bautista De Anza bikeway/trail and the two new retaining basins. The Plan promotes recreational opportunities through the addition of these new facilities. It is further intended that the community be designed to conserve energy and water use.

Figure 1: Illustrative Site Plan

Legacy Park

1.0 Site Planning and Design

This section includes design standards that avoid monotonous, repetitive appearances and that encourage a pleasant, pedestrian-oriented neighborhood environment. Two different lot sizes are provided to increase diversity of home types (Refer to Figure 2: Land Plan).

Figure 2: Land Plan

1.1 Standards

Standards for Legacy Park are shown on the table below.

Table 1: Legacy Park Standards

Standards		
Minimum Lot Size	4,000 SF	5,000 SF
Number of Homes	76	145
Number of Plans	3	4
Number of Elevations	3	4
Min. Lot Width (at setback line)	50′	50′
Min. Lot Depth*	80′	100′
Typical House Width	40′	40′
Max. Building height	2-story or 35′	
Front Setbacks		
Street-facing Garage**	18′	18′
Two-story Living Space	12′	12′
Single-story Living Space	10′	10′
Porch***/ Portico	4′	4′
Rear Setbacks****		
Two-story Living Space	10′	15′
Two-story Deck	10′	15′
Single-story Living Space	5′	10′
California Rooms (has up to 3 sides)	5′	10′
Patio Cover or Trellis	5′	10′
Side Setbacks		
Typical Condition	5′	5′
Side Street	10′	10′
Min. Distance Between Living Spaces	10′	10′
Max. Coverage (including garage)	50%	50%

Note: All setbacks are considered minimums as measured from the right-of-way.

*Except at knuckles and cul-de-sacs.
**Garages shall be 20′ along D Street and L Street.
***Minimum porch depth shall be 6′.
****Rear setbacks measured from lot line not landscaped easement.

Legacy Park

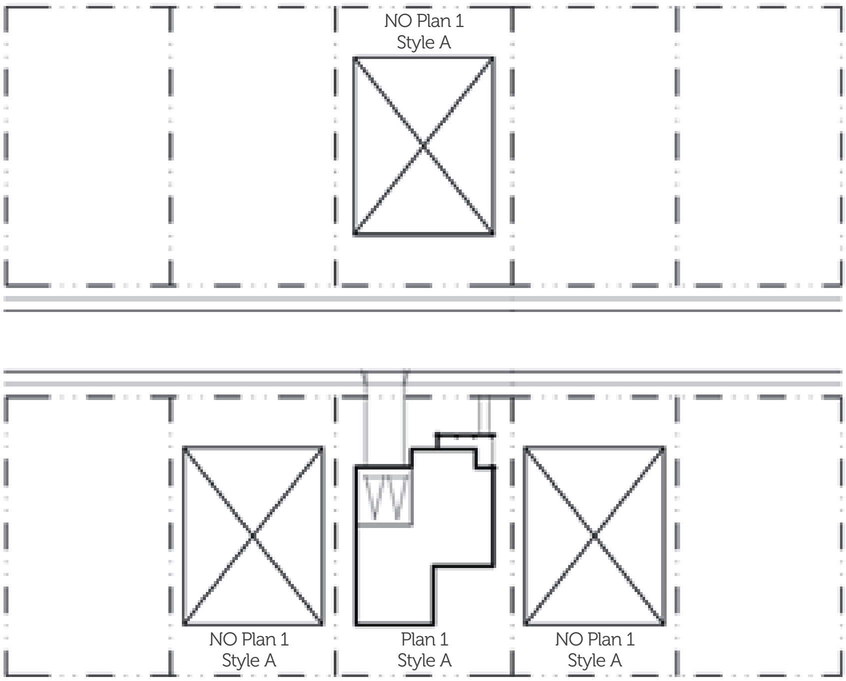


Figure 3: Plan/Elevation Style Plotting Diagram

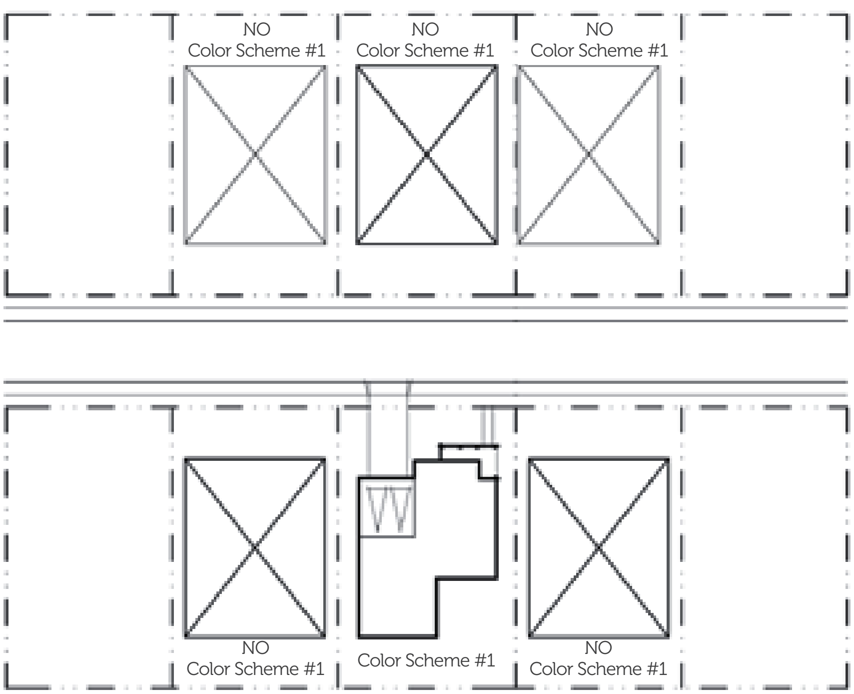


Figure 4: Color Scheme Plotting

1.2 Streetscape Diversity

In order to ensure architectural diversity above typical subdivision communities, plans should have variation in floor plans, massing and minor variations in size.

- Plot the minimum required floor plans and elevations from Table 1: Legacy Park Standards.
- Do not use a floor plan consecutively more than two (2) times in a row whether reversed or not.
- Prohibit the same plan and elevation on the lot most directly across from it and on the adjacent lots.
- Prohibit repeat of like color schemes even if on a different plan for the three (3) lots most directly across from it and on the single lot to each side of it.
- Improve opportunities for on-street parking by plotting garages next to garages and living space next to living space.
- Unless a street incline prevents otherwise, a left or right side garage may not be plotted more than 3 times in a row.

1.3 Street Activation

The living portions of the home should be the most visually interesting portion of the street scene. Home design should place entries, windows, front porches, covered terraces and living areas directly facing the street on most plan variations. Streetscape composition shall:

- Orient homes toward the street with clearly define entries.
- Provide a direct pedestrian path between the home and the sidewalk.

1.3.1 Outdoor Living

Outdoor living spaces, including porches and courtyards, activate the streetscene and promote neighbor interaction. Outdoor living spaces can also create indoor/outdoor environments to enhance livability.

A. Porches

Porches are encouraged to add architectural interest to the front of a residential structure. They help add depth to a building façade, break-up large wall masses and provide a pedestrian-friendly scale. The design of the porch shall be consistent with the architectural style. If provided, porches shall be at least 6 feet deep to accommodate seating.

B. Front Courtyards

The Spanish and Hacienda styles lend themselves to the use of front courtyards to promote social interaction. A 3½-foot high courtyard wall is permitted in the required front setback, provided there is 5-foot minimum setback from the property line to allow for landscape. The courtyard wall and gate shall have a finish material to match the architectural style, i.e. stucco, stone, wood, etc.

C. Entries

The entry shall be articulated as a focal point of the building's front elevation. Entries are encouraged to be covered or recessed in order to create a welcoming appearance, promote individuality and increase privacy. Where residences have front doors that are not visible from the street, an entry element such as a trellis, portal element, or similar architectural feature to identify the entry and a sense of arrival.

1.4 Visible Edges

Homes located along the edges of the community impact how residents and visitors view the development. Elevations facing outside edges shall provide the following:

- Main roof span shall have variety between plans (front-to-rear, side-to-side, gables and hipped roofs).
- Single-story alternative massing.
- Significant massing offset(s).
- Compatible color variety consistent with architectural style

Example of Rear Visible Edge

1.5 Garage Location and Design

Plot and reverse plans when possible so that garages and/or entries are adjacent to each other. Occasionally, break this pattern so that it will not become overly repetitious or reflect the massing directly across the street.

- Minimum 2-car garage size is 20-foot x 20-foot clear dimension with a 16-foot wide door or two single doors.
- Tandem garages recommended to be 36 feet deep.
- Only a 2-car garage space is permitted to face the street; additional garage spaces may be provided in tandem configurations.

1.5.1 Garage Doors

Garage doors are the most impactful feature of the garage. Builders are encouraged to consider the following in the design and selection of garage doors:

- Design garage door patterns consistent with the style of the home.
- Provide different style door patterns .
- Vary the inclusion of window lites.

1.6 Corner Lots

Corner lots also have high visibility and are important to design of a quality community. Typically, corner lots are wider to accommodate the side yard setback and allow for side porches. To encourage variety, more than one plan shall be used as a corner plan. Architecture on corner lots shall:

- Provide the same level of architecture as the front elevation
- Provide window details to match on side elevation.
- Create a significant massing offset.
- Where possible, expose ⅓ the length of the home.
- Consider wrap around porches, courtyards, or entry doors oriented toward the side street.

2.0 Architectural Requirements

The following principles will guide the architecture to ensure quality implementation:

- Use architectural elements and details that reinforce architectural styles.
- Choose appropriate massing, roof forms and colors to define the architectural styles.
- Ensure that plans and styles provide a degree of individual identity while being compatible.

2.1 Building Form and Massing

Homes should be broken down into smaller components to reduce the massing volume. This can be achieved through a variety of architectural techniques and treatments such as:

- Varied roof forms, pitches and heights.
- Changes in materials and color.
- Offset first-story and second-story massing.
- Clearly defined entry features.

2.2 Materials & Finishes

Specific materials are identified for each architectural style within these Guidelines. The natural colors of clay, wood and slate roof tile are encouraged when using concrete tile formulations.

- Lighter materials should be placed above materials of a heavier weight.
- Use complementary building materials that promote a harmonious appearance and provide interest and variety consistent with the architectural styles.
- Where possible, use style-appropriate concrete roof tile blends; prohibit overly dramatic blends with extreme contrast.

Material finishes should express permanence and quality.

- Create a more solid and permanent appearance with stone or other masonry materials, particularly as accents.
- Install masonry using traditional methods.
- Avoid frequent changes in materials.
- Detail finishes properly with the architectural style.
- Use high-quality, durable, low-maintenance materials.

2.2.1 Stucco

Stucco finish should project high quality and be appropriate to the architectural style. Heavy Lace and Spanish Texture stucco finishes are prohibited.

A. Stucco Details

All stucco trim details (such as window surrounds, window sills, roof eaves, column details, lintels, etc.) must be constructed with a level of precision and accuracy to express the authentic execution of the style.

- Use clean, crisp and smooth stucco details.
- Use a different trim stucco finish from the wall stucco finish.
- No rough, "blob"-like and uneven stucco finish.
- Carefully locate stucco control joints if applicable on elevation designs.

Medium Sand Float (16/20 Aggregate)

Heavy Lace Texture - Prohibited

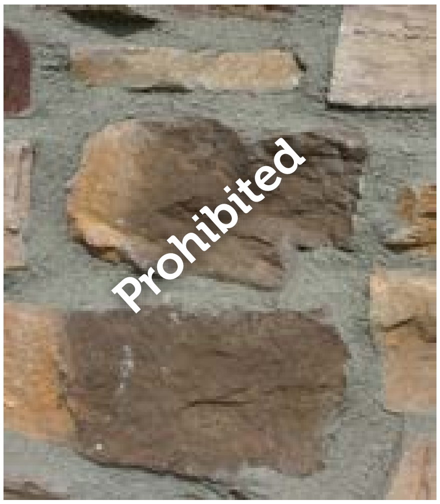
Fine Sand Float (20/30 Aggregate)

Spanish Texture - Prohibited

Source: Technical Services Information Bureau

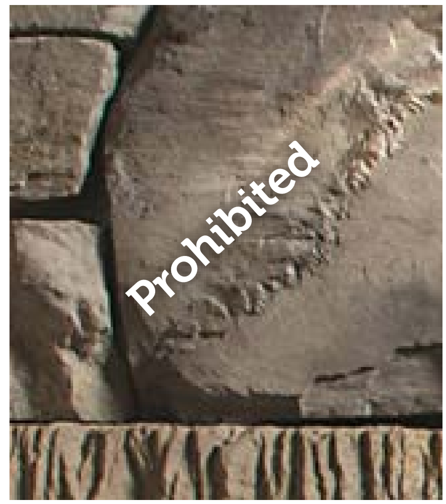
2.2.2 Veneers

Manufactured stone shall have a texture and color that mimics natural stone and be of exceptional quality. The mortar joint types and colors for each masonry product used should be specified.



Stone with poor application of color example

Unnatural looking stone from a worn out mold with poor detailing example



Unnatural looking stone from a old and deteriorating mold example

Stone corner application example

Stacked stone application example

Grouted stone application example

Legacy Park

Veneer close to slab as possible example

A. Stucco Screed Details

The stucco weep screed at stone or brick adhesively applied veneers should be detailed to be as close to finish grade/finish slab as possible while still maintaining the minimum dimensions required by the building code. Stucco weep screeds that "float" above the finished grade by more than six inches are prohibited.

Sufficient details, notes and specifications should be provided in the construction documents to ensure proper construction in the field.

B. Material Wrapping

Architectural elements must not end at the corner of a building and shall wrap around the corner and extend to a logical terminus point that is incorporated into the overall architectural design.

Wrap columns, tower elements and pilasters entirely.

Examples of veneers wrapping columns entirely

Example of siding terminating at an inside corner

2.2.3 Wood

Wood is a material used in many architectural styles. However, maintenance concerns, a desire for long-term architectural quality and new high-quality manufactured alternative wood materials make use of real wood material less desirable. Where "wood" is referred to in these Guidelines, it can also be interpreted as simulated wood trim with style-appropriate wood texture.

2.2.4 Ornamental Details

Use details that appear as functional elements and match the architectural style.

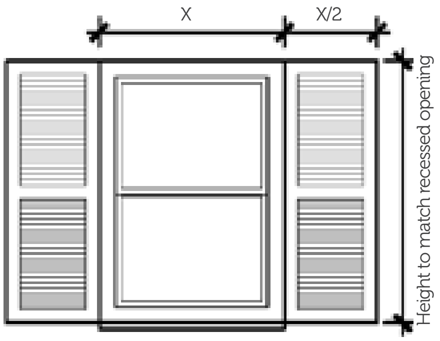
2.2.5 Gutters & Downspouts

Integrate gutters and downspouts into the home design when used.

2.2.6 Eave Paint

Eave paint shall match the fascia color (spray paint of the wall color on the eaves is prohibited).

Example of prohibited horizontal windows



Shutter size corresponds to window size

Example of prohibited embedded shutter

2.3 Windows

Window details differentiate architectural styles and can provide a high level of architectural enrichment. The selection and proportion of the windows to the façade shall be responsive to the architectural style of the building. Size and shape shall be considered to assure a balanced relationship with the surrounding roof and walls. Accent shutters are a way to further enhance the architecture and shall be proportionate to the window opening. In general, windows shall enhance rather than dominate the overall architectural character.

- No horizontal bathroom windows are permitted.
- Divided lite windows are encouraged and should reflect the architectural style.
- Non street-facing and rear yard windows may delete the divided lites.

2.3.1 Shutters

All shutters shall comply with the following:

- Mount shutters on finished wall material; embedded shutters prohibited.
- Match shutter size to the recessed opening window width.
- Use material at least 1.5-inches thick.

2.4 Lighting

Appropriate lighting is essential in creating an inviting evening atmosphere for the community. All lighting shall be non-obtrusive.

- Limit all exterior lighting to the minimum necessary for safety.
- Shield all exterior lighting to minimize glare and light spill onto adjacent properties.
- Use exterior entry lights that complement the architectural style.
- Use low voltage lighting whenever possible in common areas.

2.5 Mechanical Equipment

Mechanical equipment shall be screened from street view. Mechanical equipment includes:

- HVAC equipment.
- Gas and electric meters.
- Cable/TV panels.
- Pool and spa equipment.
- Exterior landscape/lighting equipment.

2.6 Addresses

Addresses must be a minimum of 6 inches high and clearly visible from the nearest emergency vehicle right-of-way.

2.7 Solid Waste

Space shall be provided for the refuse storage bins out of view from the street.

Exterior lighting matches architectural style

2.8 Gateways & Doors

Main entry doors and gateways should be thoughtfully selected to match the specific style of architecture. Courtyard openings and entries function as a statement for the entire home and add interest to the streetscape. These elements should be treated with detail of equal level.

Gateways shall:

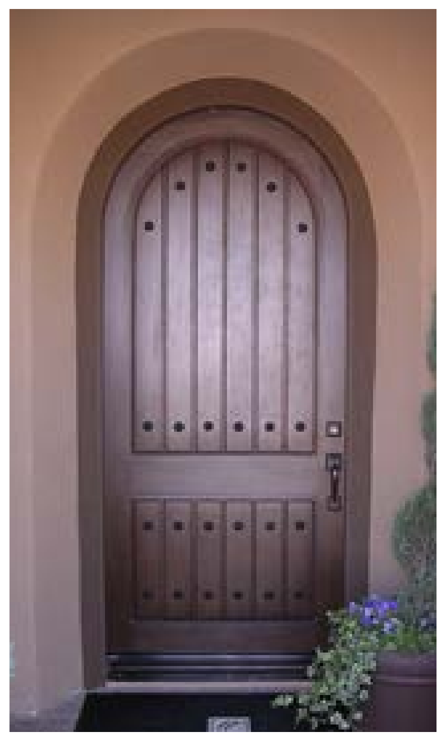
- Match or complement entry and garage doors in character, materials and finish.
- Include decorative iron gates when appropriate to the architectural style.

Entry doors shall:

- Accentuate and announce the main entry of the home.
- Reinforce the style of architecture.

Other doors shall:

- Use architecturally complementary garage and/or utility doors on visible corner-side elevations.
- Only use decorative screen doors with openings concealed in a private courtyard or similar space recessed under a covered roof.



Main entry door matches architectural style

2.9 Color

The use of color and materials is an essential ingredient to quality development. Successful application of color and materials improves the character and essence of the community.

The primary goal of color and materials palettes is to further enhance and define the architectural styles within these Guidelines. Equally important is the balance of diversity and harmony; variety of color and materials must be achieved within the context of a harmonious community.

Colors selected should be appropriate to the styles they represent and used to further differentiate from the other styles (i.e. the body color for an Arts & Crafts home should typically be darker than for a Spanish home).

Architectural screens, fences and accessory structures should be compatible in material, color and texture to the main buildings (Refer to Figure 4: Color Scheme Plotting for color plotting requirements).

3.0 Architectural Styles

These design guidelines are intended to be flexible and are, therefore, illustrative in nature. It is not the intent of these design guidelines to require that all of the identified design components and elements be incorporated into the actual building designs. Rather, these guidelines serve as a "palette" of character defining elements that can be used in home designs. Builders, along with their architects and planners, are encouraged to utilize creativity and imagination when developing exciting design proposals for Legacy Park.

3.1 Design Principles

While these design guidelines do not limit architectural styles, the styles employed should be authentic and distinct. Traditional styles tend to have defining features that should be consistently implemented across the product offering. Additional styles may be proposed however, they must follow the same principles and attention to detail as the specific styles listed here.

By emphasizing authentic styles, these guidelines discourage sameness and monotony. The multi-style streetscene should be diverse as to form, massing, features, windows, front doors, garage doors, materials and colors.

To some extent, resource efficiency should influence architectural styles. The concept of resource efficiency includes reduction of wasteful elements in the design and construction of the house as well as conservation of energy and water during occupancy of the house.

3.2 Authentic Adaptations

Recognizable authentic architecture is based on traditional forms, materials and details that reasonably express the heritage of a particular style. Historically derived, or authentically adapted, elevations continue to focus on forms and details, but allow for the integration of modern materials, colors and artistic interpretation to generate a contemporary, yet recognizable, expression of an architectural style. Historically adapted elevations combine these notions into physical reinterpretation of an architectural style.

Authentic adapted elevations should express a recognizable architectural style from the Legacy Park collection of styles but can use artistic design to incorporate new, modern or progressive forms, details and materials in the modern context of architecture. Any of the Legacy Park styles may be expressed as an authentic adapted or historically derived elevation using any, all, or a sampling of elements.

Legacy Park

Arts & Crafts

Arts & Crafts homes can be found nestled in the original town centers of older communities. Stylized by California architects such as Bernard Maybeck in Berkeley and the Greene brothers in Pasadena, the style focuses on exterior elements with tasteful and artful attention. This architecture relies on the simple house tradition, combining hip and gable roof forms with wide, livable porches and broad overhanging eaves.

Extensive built-in elements define this style, treating details such as windows and porches as if they were furniture. The horizontal nature is emphasized by exposed rafter tails and knee braces below broad overhanging eaves and rusticated, textural materials. The overall effect is the creation of a natural, warm and livable home of artful and expressive character.

Details	Standard	Enhancements
Roofs	Side-to-side gable with cross gable Roof pitches 3.5:12 to 8:12 Standard overhangs Exposed rafter tails Deeper rakes Bargeboard at gable end	Extended eaves Shaped rafter tails preferred Outlookers & brackets
Roof Materials	Flat, shake concrete tile	
Wall Materials	Medium sand float stucco finish (16/20) Horizontal siding	Shingle siding OR board & batten OR brick OR stone accents (natural OR painted to match stucco)
Architectural Elements	Porches OR covered OR defined entry	Heavy timber columns, posts & beams
Trim & Details	Appropriately sized columns	Gable end details Tapered OR double-post porch columns on brick OR stone piers
Windows	Vertically proportioned windows Window grids Fully trimmed windows	Grouped windows with continuous head trim Vertical windows at first floor Horizontal windows at 2nd floor along belt course
Doors & Gates	Paneled front entry doors Paneled garage door	Front entry wood & glass doors Garage door with windows

Farmhouse

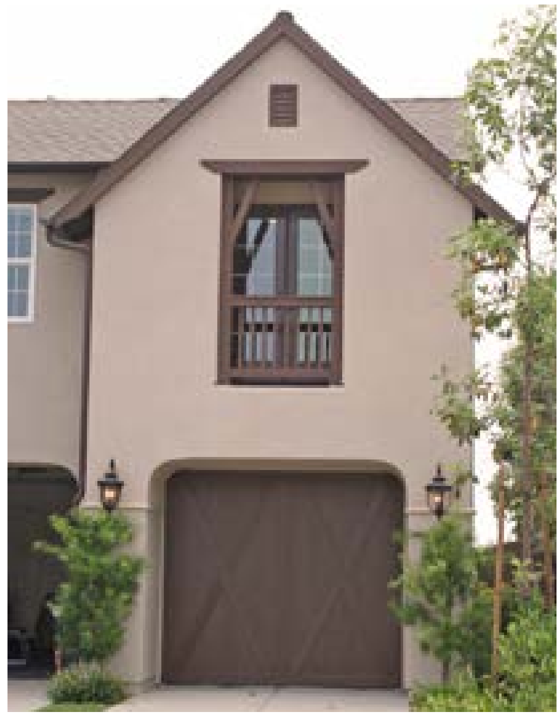
The California Farmhouse blends the country farm home with California sensibilities of outdoor living, earth colors and simple use of materials. Predominant features include large and sometimes wrapping front porch to extend the living space to the outside. This presents a warm welcome to neighbors. Wood columns and railings with cross braces, exposed rafter tails and siding accents give this style a charming appeal.

Details	Standard	Enhancements
Roofs	Clean, asymmetrical gable roof with cross gables Roof pitches 4:12 to 6:12 12" to 18" overhangs at eaves 6" to 12" overhangs at rakes	Dormer roof projections Simple shaped, square OR half round rafter tails Boxed eaves
Roof Materials	Flat tile OR composition roof	
Wall Materials	Stucco: 16/20 finish 30/30 finish at feature elements	Horizontal siding accents Stone accents
Architectural Elements	Simple square post & beam supports at porch	Proportionally large porch at entry Square "wood" columns with brackets, cross braces & railing
Trim & Details	Stucco-wrapped, high density foam trim Exposed eaves & simple square rafter tails	Wall mounted light fixtures at garage door
Windows	Horizontally proportioned windows with divided lites Unifying sill	Plank OR Lazy-Z shutters Balanced header & sill trim Pot shelves
Doors & Gates	Entry doors highlighted by roof element OR porch feature Well-placed & proportional entry light fixture	Rectangular OR arched surrounds (follows door design)

Legacy Park

European Cottage

The European Cottage is a picturesque style that evolved out of medieval Tudor and Norman domestic architecture. The evolving character that resulted in the English "cottage look" became extremely popular with the addition of stone and brick veneer details in the 1920s. Roof pitches are steeper and include gable, hip and half-hip roof forms. The primary exterior stucco is accented with stone and brick bases, veneers and tower elements. Some of the most recognizable features of this style are the accents in the gable end forms and the sculptured swooping walls at the front elevation.



Details	Standard	Enhancements
Roofs	4:12 to 12:12 roof pitches Standard overhangs Gable end details	Dormers Swoop roof
Roof Materials	Flat tile OR composition roof	
Wall Materials	Stucco: 16/20 finish	Stone accent ½ timbering
Architectural Elements	Traditional pediment surround entry Porches OR meaningful entries	Tower Element Bay windows
Trim & Details	Appropriately sized simple columns Plank OR Lazy-Z shutters	Metal details
Windows	Vertically proportioned windows Window grids on upper levels	Dormer windows
Doors & Gates	Paneled entry doors Paneled garage door with windows	

Italian

In the 1860s, the Italian Villa was one of the fashionable architectural styles in the United States based on the formal and symmetrical palaces of the Italian Renaissance. Italian homes are straightforward and boxy, with only window crowns and cornice moldings as ornamentation. The shallow pitched hipped roof, often with decorative brackets, identifies this style. As it became a popular building material, cast iron expanded the Italian style vocabulary to include a variety of embellished designs for porches, balconies, railings and fences.

Elements	Standards	Enhancements
Roofs	Main hip roof with hip ancillary roofs 1-story shed roofs permitted Roof pitches 3.5:12 to 5:12 Tight to 12-inch overhangs at rakes 12- to 18-inch overhangs at eaves	Closed/shaped eave with corbels at accent elements
Roof Materials	"S" concrete tile	Clay tile
Architectural Elements	Window & door trim	
Wall Materials	Medium sand float stucco finish (16/20)	Brick OR stone accents
Trim & Details	Formal entry with smooth stucco trim Rectangular OR full arch top with fine sand float stucco finish (20/30) OR smooth manufactured foam trim	Metal balconies & pot shelves Simulated precast surrounds, precast trim Simulated precast columns at entry OR between windows Belt course Base trim
Windows	Grid patterned at front & visible windows Trim around front & visible windows Paneled OR louvered shutters on accent window	Round arch top accent windows Symmetrically ordered & stacked windows & openings Recessed windows
Doors & Gates	Paneled front entry doors Paneled garage door	Garage door with windows

Legacy Park

Monterey

Influenced by both the Spanish Colonial and the New England Colonial homes, the Monterey style features Spanish detailing while maintaining the Colonial style form. With its stucco or masonry walls, red barrel, "S" or flat concrete shake roofs, this style exhibits many of the same elements as an historical Spanish home: simple building form and mass, rusticated corbels, head trim, posts or balconies (if used) and gable roof forms. Many successful adaptations of this style focused simply on careful massing, detail and the natural beauty inspired through its blend of rich Spanish and Colonial heritage.

Details	Standard	Enhancements
Roofs	Clean, uncomplicated roof solutions of hips OR gables Roof pitches 4:12 to 5:12 12" to 18" overhangs at eaves Tight rakes Balcony & main roof are same low pitch	Modest projected rafter tails, shaped tails preferred Parapets with barrel tile cap
Roof Materials	Concrete "S" tile OR flat tile	2-piece barrel tile with mud boost on 1st two courses
Wall Materials	Stucco: 16/20 finish 30/30 finish at feature elements Material change at second floor	Brick OR slump block on first floor at main entrance Board & batt OR horizontal siding at upper level
Architectural Elements		Balconies cantilevered OR supported Balconies & railings made of heavy timber wood
Trim & Details	Stucco-wrapped, high density foam trim Closed OR exposed eaves Well-placed & proportional entry light fixture Plank-style shutters on feature windows	Wood OR metal railing Gutter/downspouts exposed & treated as design feature
Windows	Vertically proportioned windows with divided lites	Awnings
Doors & Gates	Rectangular OR arched surrounds (follows door design)	Entry located under covered balcony

Spanish

The Spanish style attained wide-spread popularity after the Panama-California exposition of 1914 in San Diego. The Spanish style's most notable characteristics include the use of "S" or barrel tile roofs, stucco walls, feature entry doors and porticos, highlighted ornamental iron work and carefully proportioned windows appropriate to its wall mass.

Key features of this style were adapted to the California lifestyle. Plans were informally organized around a courtyard with the front elevation very simply articulated and detailed. The charm of this style lies in the directness, adaptability and contrasts of materials and textures.

Elements	Standards	Enhancements
Roofs	Hip OR gable roofs Roof pitches 3½:12 to 5:12 Tight to 18" overhangs at eaves Tight to 12" overhangs at rakes	Rafter tails, shaped tails preferred Parapets with barrel tile caps
Roof Materials	Concrete "S" tile	2-piece barrel clay tile Boosted tile (25%) Stacked tile on 1st two courses Mudded bird stops
Wall Materials	Medium sand float stucco finish (16/20)	Decorative ceramic tile OR brick accents
Architectural Elements		Porches, balconies OR verandas
Trim & Details	Stucco-wrapped, high density foam trim with fine sand float stucco finish (20/20) Closed OR exposed eaves Gable end details Decorative metal Well-placed & proportional entry light fixtures	Wall mounted light fixtures at garage door
Windows	Vertically proportioned windows with divided lites	Fabric awnings
Doors & Gates	Front entry doors without a porch, deeply recessed from front facade	Rectangular OR arched surrounds (following door design)

Legacy Park

Traditional

The American Traditional style is a combination of the early English and Dutch houses found on the Atlantic coast. Their origins were adaptations of Adams and other classical styles. Details from these original styles are loosely combined in many examples. Current interpretations have maintained the simple elegance of the early prototypes with added refinements and new design details. Another identifying feature of this style is the monumented entry with decorative crown (pediment) supported by pilasters or columns projecting forward of the otherwise flat facade to form an entry.

Elements	Standards	Enhancements
Roofs	Roof pitches 3:12 to 8:12 18" to 24" overhang at eaves & rakes Exposed rafter tails	Standing seam metal roof accents Cornice emphasized by dentils OR decorative molding
Roof Materials	Flat concrete shake tile OR flat concrete slate tile OR high definition asphalt shingles	
Wall Materials	Medium sand float stucco finish (16/20) Re-sawn wood siding accents	Wood siding Board & batt OR groove joint Brick
Architectural Elements	Entry feature with traditional pediments & substantial portico stoop OR surround	Front porches
Trim & Details	Head & sill trim shall consist of one of the following materials & be of proper proportion: Proportional, high density foam trim with fine sand float stucco finish (20/30) OR re-sawn wood trim Simple columns with base trim	Shaped wood corbels Louvered shutters flanking windows Low-walled entry courtyards with hardscape paving, in lieu of porches Balconies - cantilevered OR supported with posts Decorative metal at post to beam connection Plank style garage door
Windows	Window mullions	Round-top fan light Bay windows
Doors & Gates	Panel OR planked doors	Windows in garage doors

Attachment: Tract 36760 Design Guidelines (2444 : Legacy Park Project)

4.0 Landscape Design

The landscape and planting design provides the identity for Legacy Park that is sustainable over time and meets the City of Moreno Valley's Landscape standards. The plant palette chosen for the Legacy Park is appropriate to the site's climate while providing color and seasonal change. All Legacy Park community areas will be landscaped as shown on Figure 5: Overall Landscape Plan, Figure 6: Landscape Sections, and Figure 7: Landscape Plan Enlargements. The landscape will provide a unified look to the community. A community identity sign will be provided at the entry. Refer to Figure 8: Entry Monument Elevation.

Front yard landscaping is required on all lots and will be designed to meet the City of Moreno Valley landscape requirements to include drought tolerant/xeriscape landscaping on all of the lots. Refer to Figure 9: Front Yard Landscape Plan.

Landscaping adjacent to Indian and Gentian Avenue and shall be maintained by the City of Moreno Valley Landscape Maintenance District (LMD).

Special paving will be provided to identify key pedestrian crossings along the main entry drive and at the connection to the Juan Baustista De Anza Trail as shown on Figure 5: Overall Landscape Plan. The special stamped concrete provides additional pedestrian amenities and traffic calming. Final pavement color and texture is subject to the approval of the Public Works department.

Six exercise stations will be provided adjacent to the trail. The City of Moreno Valley will maintain the trail and exercise stations. Refer to Figure 10: Landscape Maintenance Plan.

4.1 Community Landscape, Walls and Fencing

The visible Legacy Park Theme walls include a six-foot high decorative tan split-face (street side only) block wall with pilasters with colored concrete caps. An entry monument will be located at the entrance to the community.

At rear yards adjacent open space areas, a split-face (visible open space side only) wall will be provided. Tubular steel fencing will also be provided adjacent to the detention basin per City of Moreno Valley standards except where private lots are adjacent.

The walls and fencing shall meet the following requirements as shown on Figure 11: Wall and Fence Plan and Details. All walls and fencing will be maintained by the Legacy Park HOA.

Examples of decorative paving for the public streets

Attachment: Tract 36760 Design Guidelines (2444 : Legacy Park Project)

Decorative Theme Walls

All decorative Theme walls will be block or an approved alternative. This includes perimeter and private areas.

Colored masonry caps to match the masonry color will be used at wall tops.

Theme wall pilasters will match block material and color and will have complementarily colored concrete caps.

Retaining walls will match block wall conditions.

Trail Fencing

The trail fencing will be per City standards.

Interior Fencing

The interior privacy fencing will be tan vinyl for both interior property line and fence return conditions.

All interior fencing height will vary but will be no lower than six feet high.

Gates will be constructed of tan vinyl to match the fence.

4.2 Detention Basin

The landscape plan provides for detention basins as shown and approved with the final recorded tract map and the Final Water Quality Plan. These areas will be maintained by the Legacy Park Homeowner's Association (HOA).

Legacy Park

PLANT PALETTE

TREES: (Conceptual list including but not limited to:)

		WUCOLS
ENTRY TREE (24" Box)		
Quercus agrifolia	Coast Live Oak	Low
INTERIOR STREET TREE (Two 24" Box per Standard Lot, Three per corner Lot):		
Koelreuteria bipinnata	Chinese Flame Tree	Moderate
Pistacia chinensis	Chinese Pistache	Moderate
Platanus acerfolia	London Plane Tree	Moderate
Ulmus parviflora 'True Green'	Chinese Elm	Moderate
INDIAN AND GENTIAN AVE - STREET TREE (One 24" Box):		
Koelreuteria bipinnatta	Chinese Flame Tree	Moderate
DETENTION BASIN AND COMMON AREA LOTS (15 Gallon)		
Cercis occidentalis	Western Redbud	Low
Gleditsia triacanthos	Honey Locust	Low
Laurus nobilis 'Saratoga'	Sweet Bay	Low
Rhus lancea	African Sumac	Low
Schinus molle	California Pepper	Low

INDIAN AND GENTIAN AVE - PARKWAY LANDSCAPE (LMD Maintained)

Proposed planting with combination of shrubs and trees at an equivalent o.c. spacing in addition to a drought-tolerant groundcover.
CONCEPTUAL PLANT PALETTE TO INCLUDE, BUT NOT BE LIMITED TO:
SHRUBS (One Gallon minimum @ max. 10' o.c.):

NOT SHOWN

Abelia x. grandiflora	Glossy Abelia Moderate	Moderate
Berberis thunbergii	'Crimson Pygmy' Japanese BarberrY	Moderate
Cistus x. purpureus	Orchid Rock Rose	Low
Escallonia 'Compacta'	Compact Escallonia	Moderate
Ligustrum japonicum	'Texanum' Texas Privet	Moderate
Pittosporum tobira	'Shima' Cream De Mint Mock Orange	Moderate
Plumbago capensis	Royal Cape Plumbago	Moderate
Rhaphiolepis i. 'Springtime'	Indian Hawthorne	Moderate
Salvia leucantha	Mexican Sage	Low

GROUNDCOVER (One Gallon @ 3' o.c. or rooted cuttings @ 18" o.c. traingular spaced):

Cotoneaster dammeri	'Lowfast' Bearberry Cotoneaster	Moderate
Rosmarinus o.	'Prostratus' Prostrate Rosemary	Low

WATER QUALITY BASIN / LOT "AA" AND "DD" PLANT PALETTE

Slopes exceeding a vertical height of 3' to be irrigated and planted with drought tolerant groundcover. Slopes exceeding 15' in vertical heights to be irrigated and planted with drought-tolerant shrubs at 10' o.c., or trees at 20' o.c., or a combination of shrubs and trees at an equivalent o.c. spacing in addition to a drought-tolerant groundcover.
CONCEPTUAL PLANT PALETTE TO INCLUDE, BUT NOT BE LIMITED TO:

SHRUBS (One Gallon minimum @ max. 10' o.c.):

Aloe arborescens	Torch Aloe	Low
Baccharis sarothroides	Desert Broom	Low
Cistus x. purpureus	Orchid Rock Rose	Low
Elaeagnus pungens	Silverberry	Low
Helictotrichon sempervirenS	Blue Oat Grass	Moderate
Heteromeles arbutifolia	Toyon	Low
Leucophyllum frutescens	Texas Ranger	Low
Muhlenbergia capillaris	Pink Muhly	Moderate
Plumbago capensis	Royal Cape Plumbago	Moderate

GROUNDCOVER (One Gallon @ 3' o.c. or rooted cuttings @ 18" o.c. traingular spaced):

Acacia redolens	'Low Boy' Low Boy Acacia	Low
Myoporum parvifolium	Myoporum	Low

LOT "B","E","F","G", "I" AND "J" - PLANT PALETTE

Planted along property walls and along slope embankments.
CONCEPTUAL PLANT PALETTE TO INCLUDE, BUT NOT BE LIMITED TO:
SHRUBS (One Gallon minimum @ max. 10' o.c.):

Baccharis sarothroides	Desert Broom	Low
Cistus x. purpureus	Orchid Rock Rose	Low
Muhlenbergia capillaris	Pink Muhly	Moderate
Plumbago capensis	Royal Cape Plumbago	Moderate

GROUNDCOVER (One Gallon @ 3' o.c. or rooted cuttings @ 18" o.c. traingular spaced):

Myoporum parvifolium	Myoporum	Low

VINE (Five Gallon @ 8' o.c. tied to wall with guy wires):

Calliandra haematocephala	Pink Powder Puff	Moderate

IN-TRACT PARKWAY PLANT PALETTE

Planted along interior parkways adjacent to property walls and along slope embankments.
CONCEPTUAL PLANT PALETTE TO INCLUDE, BUT NOT BE LIMITED TO:
SHRUBS (One Gallon minimum):

NOT SHOWN

Russelia equisetiformis	Coral Fountain	Moderate
Cistus x. purpureus	Orchid Rock Rose	Low
Hesperaloe parviflora	Redtipped Yucca	Low
Penstemon superbus	Superb Beardtongue	Low

GROUNDCOVER (One Gallon @ 3' o.c. or rooted cuttings @ 18" o.c. traingular spaced):

	Bat Faced Cuphea	Moderate

Figure 5: Overall Landscape Plan

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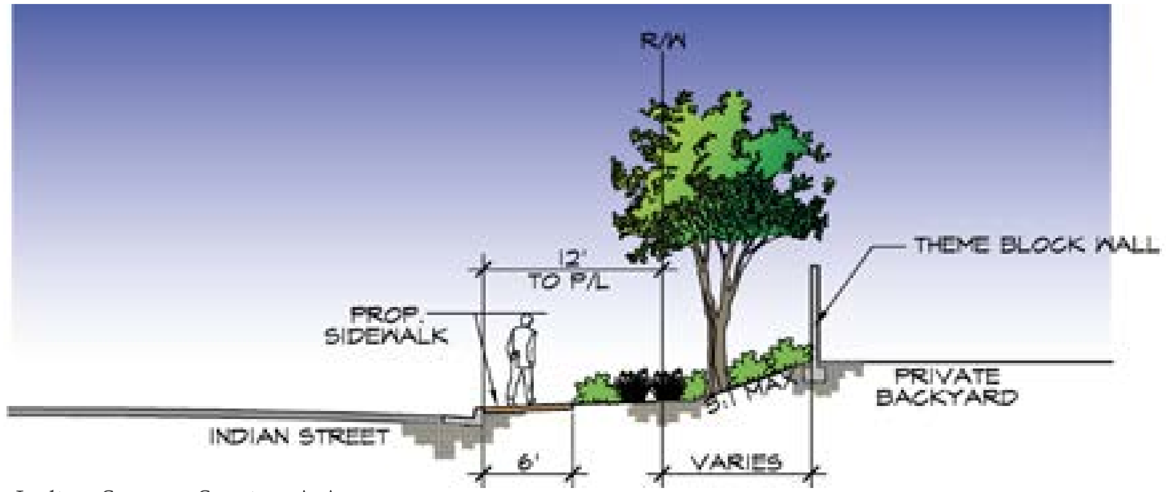
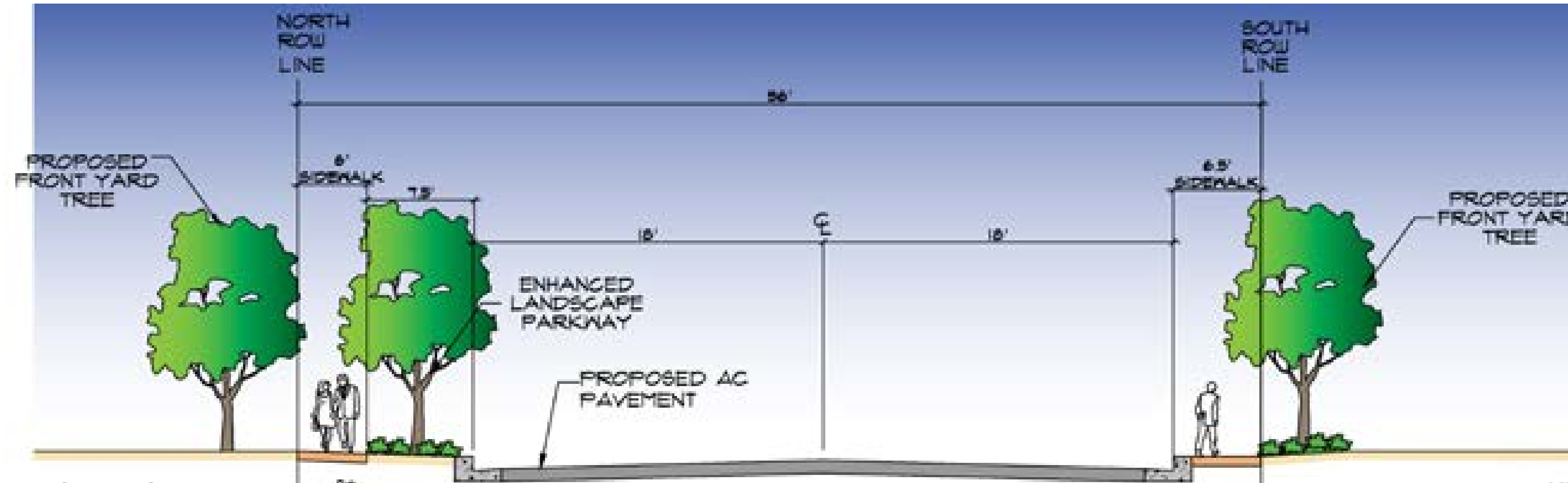
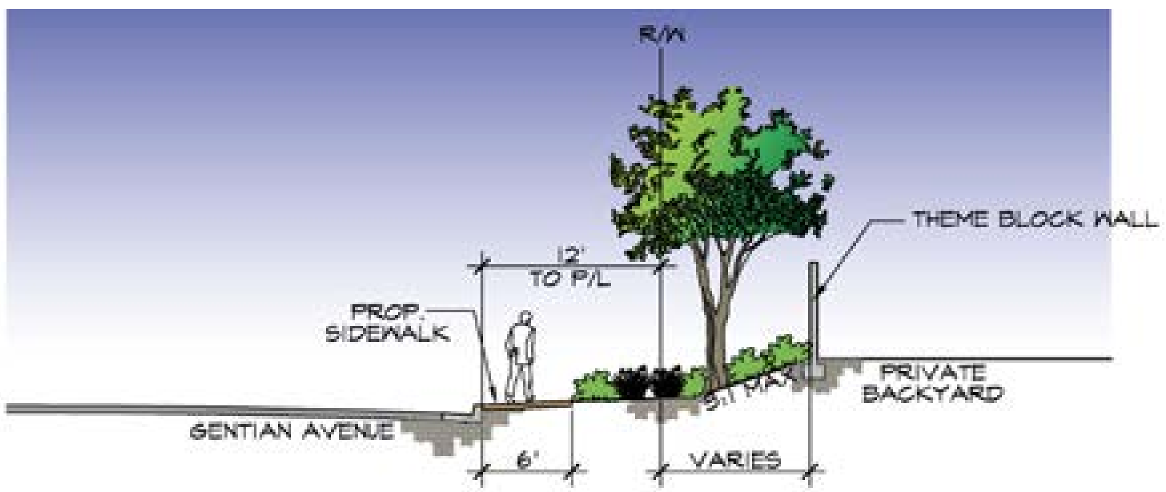


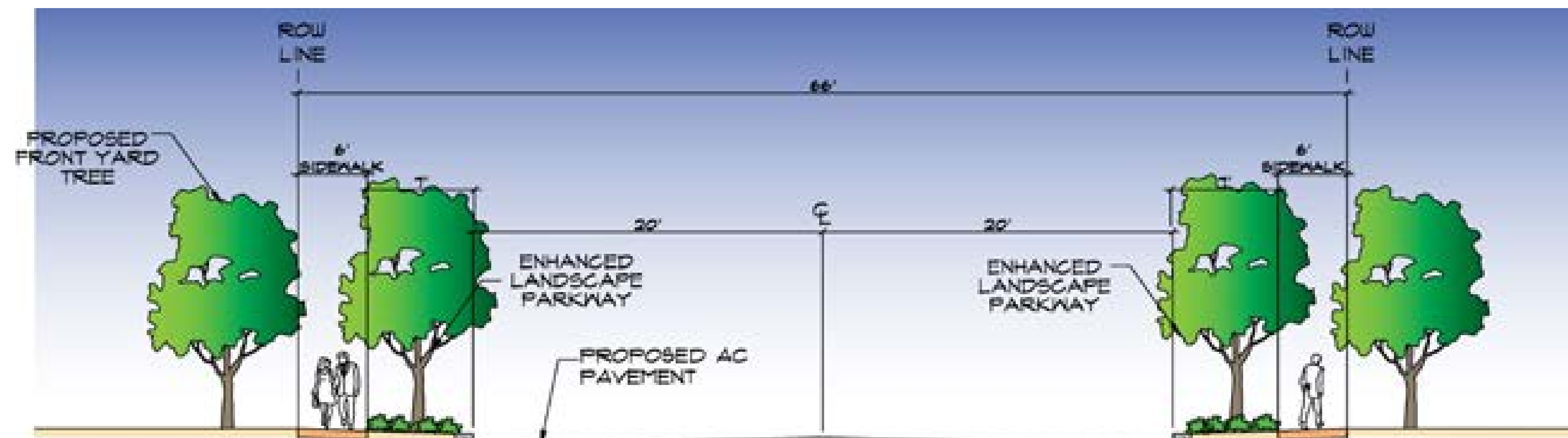
Indian Street - Section A-A NTS



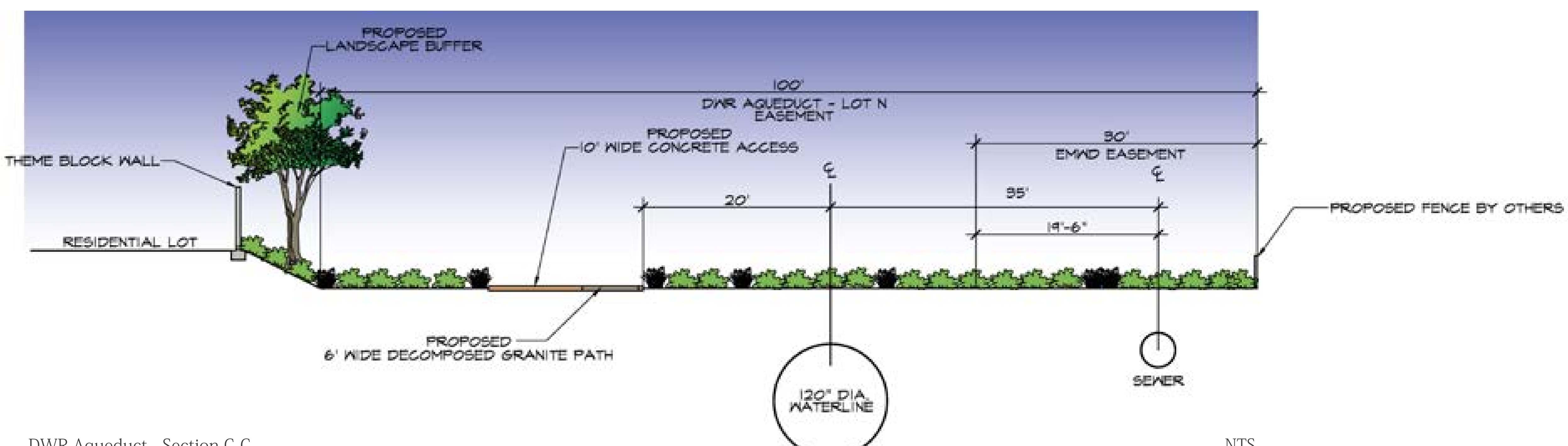
D Street - Section D-D NTS



Gentian Avenue - Section B-B NTS



L Street - Section E-E NTS



DWR Aqueduct - Section C-C NTS

Figure 6: Landscape Sections

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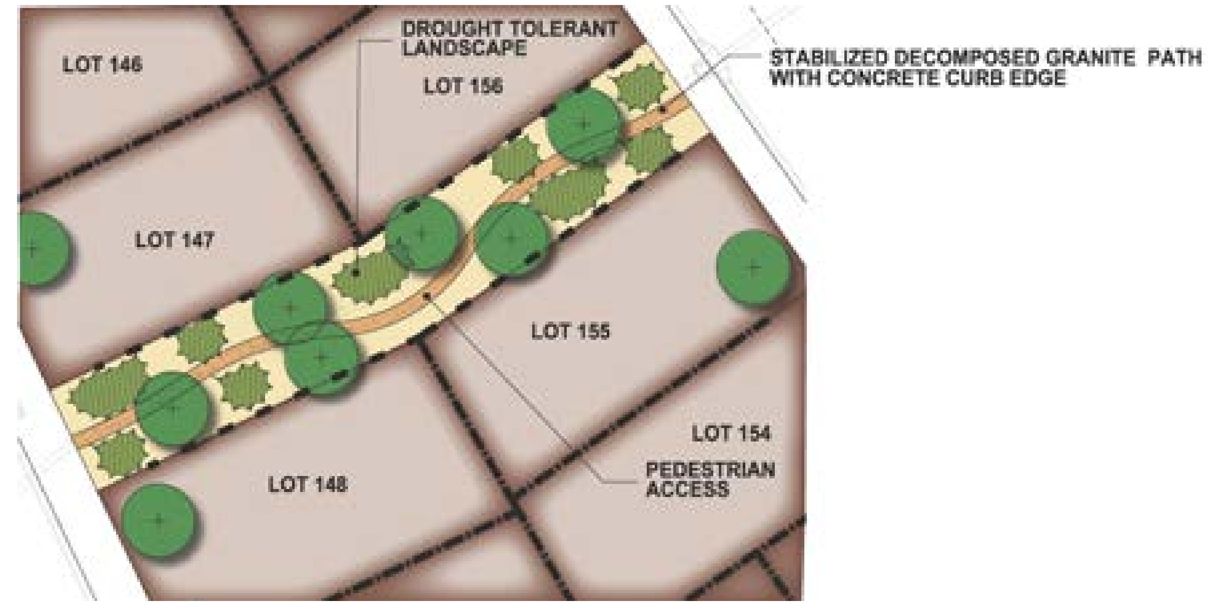
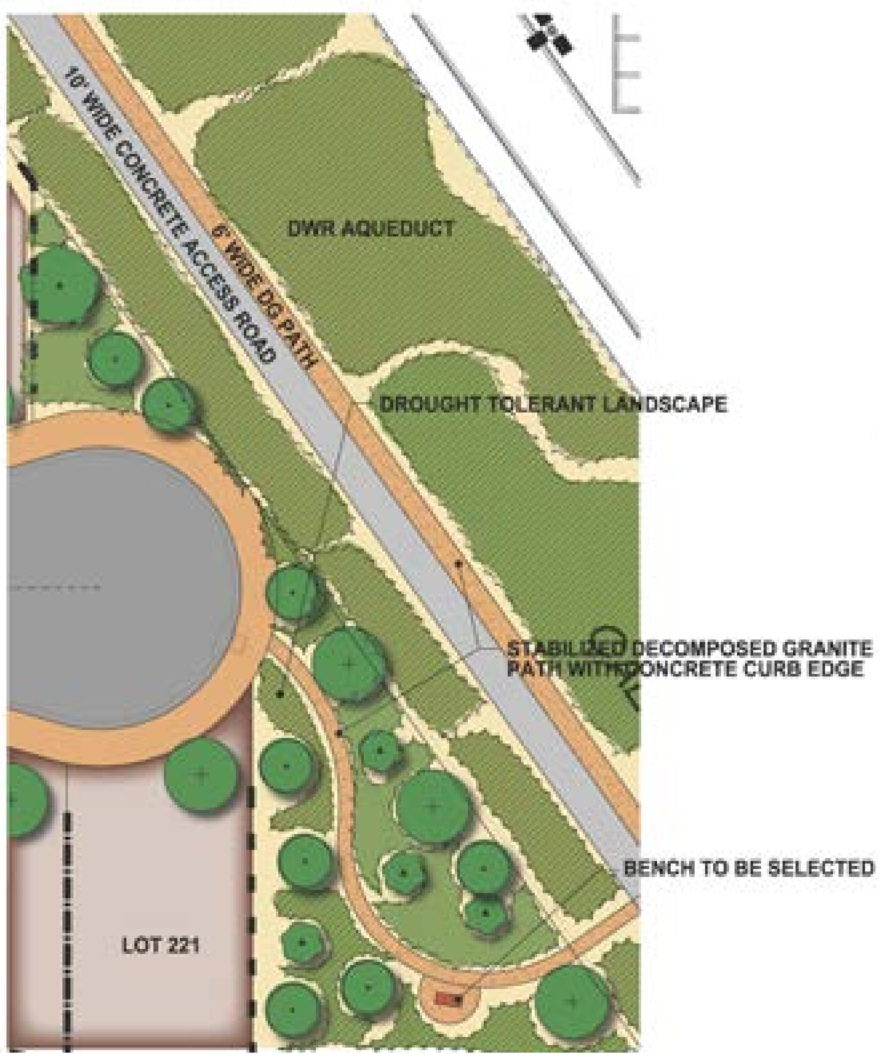
Attachment: Tract 36760 Design Guidelines (2444 : Legacy Park Project)

Lot 'BB' Enlargement NTS



Lot 'JJ' Enlargement NTS



Lot 'FF' Enlargement NTS

Lot 'A-TPM36606' Enlargement NTS

Figure 7: Landscape Plan Enlargements

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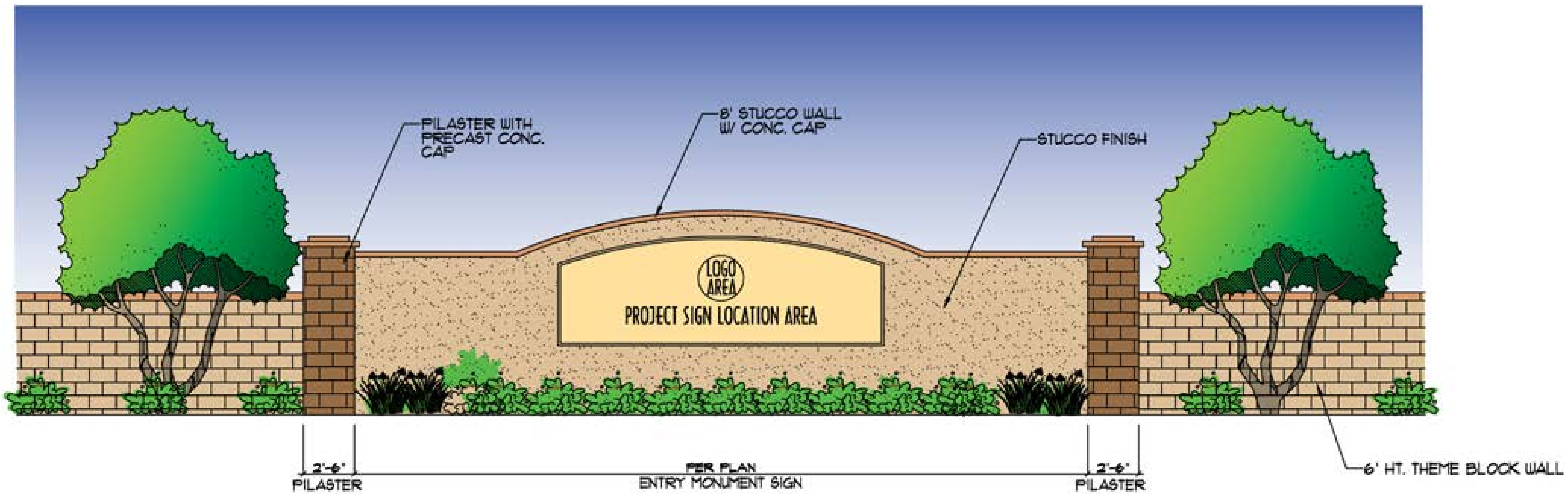

Entry Monument Elevation

NTS

Figure 8: Entry Monument Elevation

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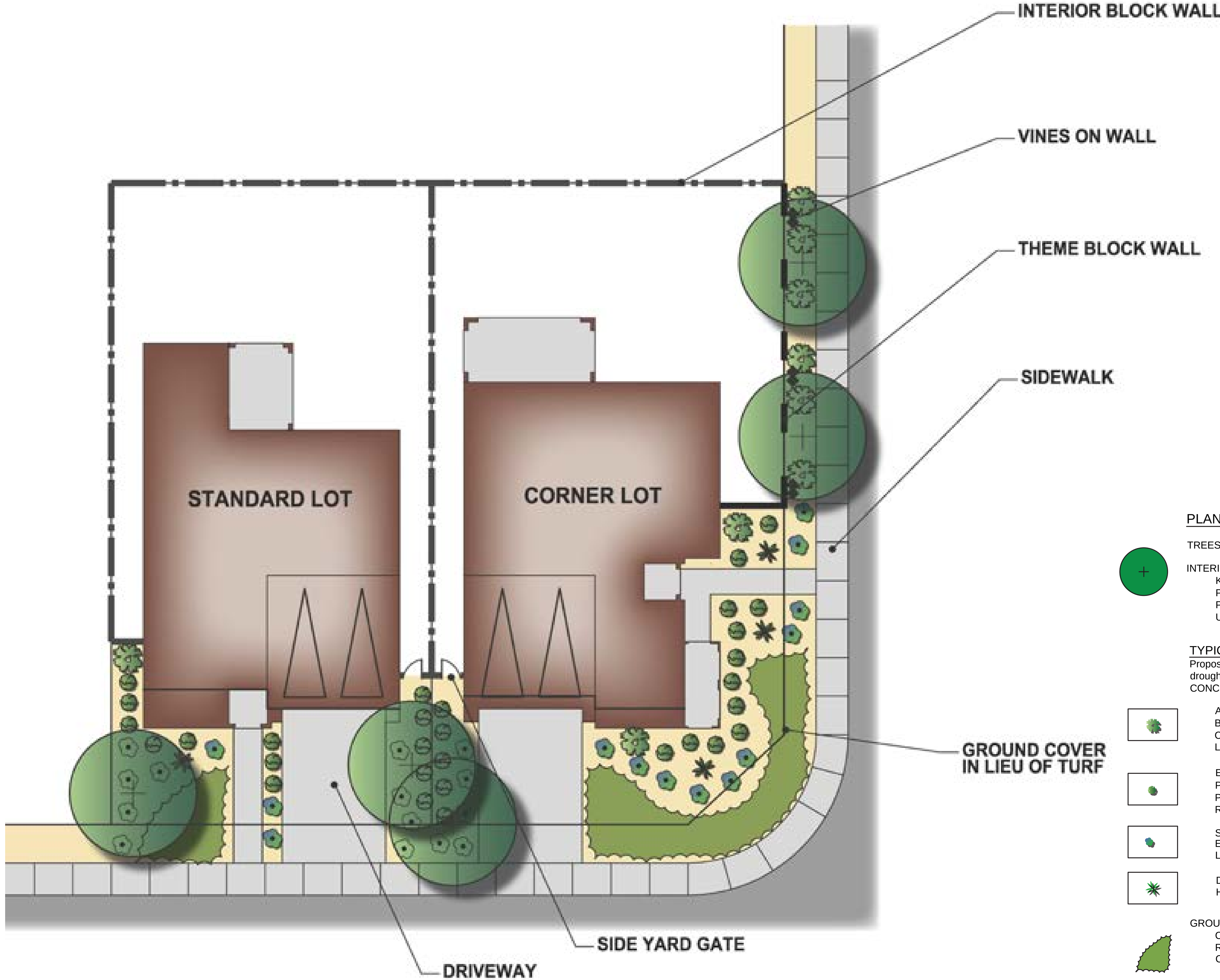

PLANT PALETTE

TREES: (Conceptual list including but not limited to:)

INTERIOR STREET TREE (Two 24" Box per Standard Lot, Three per corner Lot):

Koelreuteria bipinnata	Chinese Flame Tree	Moderate
Pistacia chinensis	Chinese Pistache	Moderate
Platanus acerfolia	London Plane Tree	Moderate
Ulmus parviflora 'True Green'	Chinese Elm	Moderate

TYPICAL FRONT YARD LANDSCAPE (Homeowner Maintained)
Proposed planting with combination of shrubs and trees at an equivalent o.c. spacing in addition to a drought-tolerant groundcover.
CONCEPTUAL PLANT PALETTE TO INCLUDE, BUT NOT BE LIMITED TO:

Abelia x. grandiflora	Glossy Abelia Moderate	Moderate
Berberis thunbergii	'Crimson Pygmy' Japanese BarberrY	Moderate
Cistus x. purpureus	Orchid Rock Rose	Low
Ligustrum japonicum	'Texanum' Texas Privet	Moderate
Escallonia 'Compacta'	Compact Escallonia	Moderate
Pittosporum tobira	'Shima' Cream De Mint Mock Orange	Moderate
Plumbago capensis	Royal Cape Plumbago	Moderate
Rhaphiolepis i. 'Springtime'	Indian Hawthorne	Moderate
Salvia leucantha	Mexican Sage	Low
Eremophila maculata	'Valentine'	Low
Lavandula stoechas	NCN	Low
Dasylirion wheeleri	Desert Spoon	Low
Hesperaloe parviflora	Brakelights	Low

GROUNDCOVER (One Gallon @ 3' o.c. or rooted cuttings @ 18" o.c. traingular spaced):

Cotoneaster dammeri	'Lowfast' Bearberry Cotoneaster	Moderate
Rosmarinus o.	'Prostratus' Prostrate Rosemary	Low
Carissa macrocarpa	'Green Carpet'	Low

NTS

Figure 9: Front Yard Landscape Plan

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NTS

Legend

- Home Owners Association
  Common Areas & Basins
- City of Moreno Valley
  LMD Easement
- City of Moreno Valley
  Parks

Figure 10: Landscape Maintenance Plan

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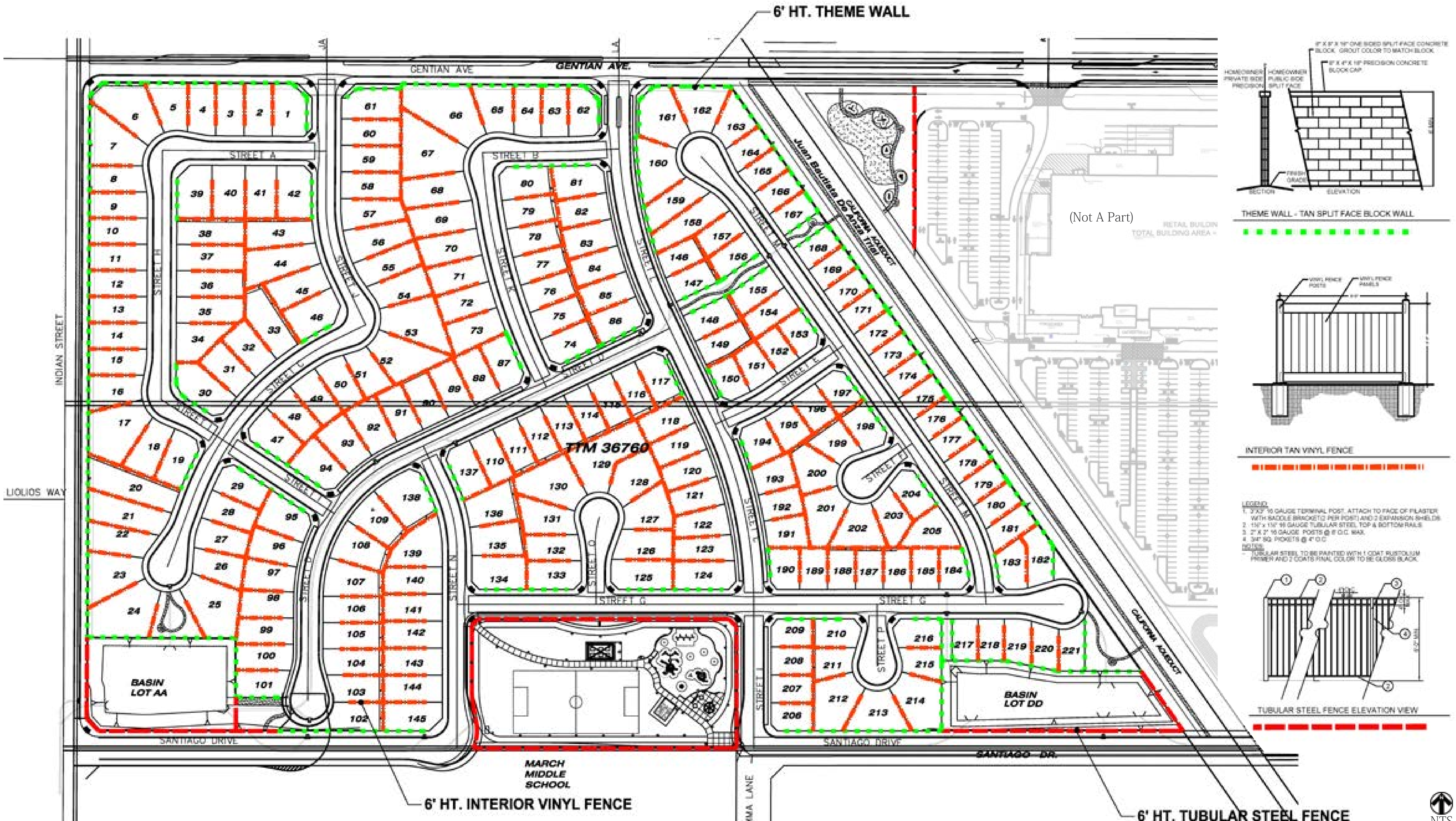

Figure 11: Wall and Fence Plan and Details

Attachment: Tract 36760 Design Guidelines (2444 : Legacy Park Project)

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Legacy Park (Tentative Tract Map No. 36760)

Air Quality Impact Analysis

City of Moreno Valley

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November 3, 2016

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Attachment: Air Quality Study (2444 : Legacy Park Project)

APPENDICES

LIST OF EXHIBITS

LIST OF TABLES

LIST OF ABBREVIATED TERMS

(1)	Reference
µg/m3	Microgram per Cubic Meter
AADT	Annual Average Daily Trips
AQIA	Air Quality Impact Analysis
AQMD	Air Quality Management District
AQMP	Air Quality Management Plan
ARB	California Air Resources Board
BACM	Best Available Control Measures
CAA	Federal Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
DPM	Diesel Particulate Matter
EPA	Environmental Protection Agency
LST	Localized Significance Threshold
NAAQS	National Ambient Air Quality Standards
NO2	Nitrogen Dioxide
NOx	Oxides of Nitrogen
Pb	Lead
PM10	Particulate Matter 10 microns in diameter or less
PM2.5	Particulate Matter 2.5 microns in diameter or less
PPM	Parts Per Million
Project	Legacy Park (Tentative Tract Map No. 36760)
ROG	Reactive Organic Gases
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SIPs	State Implementation Plans
SRA	Source Receptor Area
TAC	Toxic Air Contaminant
TIA	Traffic Impact Analysis

TOG	Total Organic Gases
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds
VPH	Vehicles Per Hour

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EXECUTIVE SUMMARY

ES-1 CONSTRUCTION-SOURCE EMISSIONS

REGIONAL IMPACTS

For regional emissions, the Project would not exceed the numerical thresholds of significance established by the South Coast Air Quality Management District (SCAQMD) for any criteria pollutant. It should be noted that impacts without mitigation take credit for reductions achieved through standard regulatory requirements (Rule 403 and Rule 1113). Thus a less than significant impact would occur for Project-related construction-source emissions and no mitigation measures are required.

Localized Impacts

For localized emissions, the Project would not exceed the SCAQMD's localized significance threshold. Thus a less than significant impact would occur and no mitigation is required.

Project construction-source emissions would not conflict with the applicable Air Quality Management Plan (AQMP).

ODORS

Established requirements addressing construction equipment operations, and construction material use, storage, and disposal requirements act to minimize odor impacts that may result from construction activities. Moreover, construction-source odor emissions would be temporary, short-term, and intermittent in nature and would not result in persistent impacts that would affect substantial numbers of people. Potential construction-source odor impacts are therefore considered less-than-significant.

ES-2 OPERATIONAL-SOURCE EMISSIONS

REGIONAL IMPACTS

For regional emissions, the Project would not exceed the numerical thresholds of significance established by the SCAQMD. Thus a less than significant impact would occur for Project-related operational-source emissions and no mitigation is required.

LOCALIZED IMPACTS

Project operational-source emissions would not result in or cause a significant localized air quality impact as discussed in the operational LSTs section of this report. The proposed Project would not result in a significant CO "hotspot" as a result of Project related traffic during ongoing operations, nor would the Project result in a significant adverse health impact as discussed in Section 3.8, thus a less than significant impact to sensitive receptors during operational activity is expected.

ODORS

Substantial odor-generating sources include land uses such as agricultural activities, feedlots, wastewater treatment facilities, landfills or various heavy industrial uses. The Project does not propose any such uses or activities that would result in potentially significant operational-source odor impacts. Potential sources of operational odors generated by the Project would include disposal of miscellaneous residential refuse. Moreover, SCAQMD Rule 402 acts to prevent occurrences of odor nuisances (1) . Consistent with City requirements, all Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with solid waste regulations. Potential operational-source odor impacts are therefore considered less-than-significant.

1 INTRODUCTION

This report presents the results of the air quality impact analysis (AQIA) prepared by Urban Crossroads, Inc., for the Legacy Park (Tentative Tract Map No. 36760) (referred to as "Project").

The purpose of this AQIA is to evaluate the potential impacts to air quality associated with construction and operation of the proposed Project, and recommend measures to mitigate impacts considered potentially significant in comparison to established air district thresholds.

1.1 SITE LOCATION

The proposed Legacy Park (Tentative Tract Map No. 36760) site is located on the southeast corner of Indian Street and Gentian Avenue in the City of Moreno Valley. The Project site is currently vacant. Residential land uses are located west of the Project site. The vacant land use located adjacent north and east of the Project site is designated as Residential and Commercial, respectively. March Middle School is located adjacent south of the Project. The Interstate 215 (I-215) Freeway is located approximately 2.20 miles west of the Project site.

1.2 PROJECT DESCRIPTION

The Project consists of 221 single family residential dwelling units, as shown on Exhibit 1-A.

For the purposes of this AQIA, it is assumed that the Project will be constructed and at full occupancy by 2021.

1.3 STANDARD REGULATORY REQUIREMENTS/BEST AVAILABLE CONTROL MEASURES (BACMS)

Measures listed below (or equivalent language) shall appear on all Project grading plans, construction specifications and bid documents, and the City shall ensure such language is incorporated prior to issuance of any development permits.

SCAQMD Rules that are currently applicable during construction activity for this Project include but are not limited to: Rule 1113 (Architectural Coatings) (2); Rule 431.2 (Low Sulfur Fuel); Rule 403 (Fugitive Dust) (3); and Rule 1186 / 1186.1 (Street Sweepers) (4). It should be noted that BACMs are not mitigation as they are standard regulatory requirements.

BACM AQ-1

The following measures shall be incorporated into Project plans and specifications as implementation of Rule 403 (4):

- All clearing, grading, earth-moving, or excavation activities shall cease when winds exceed 25 mph per SCAQMD guidelines in order to limit fugitive dust emissions.
- The contractor shall ensure that all disturbed unpaved roads and disturbed areas within the Project are watered at least three (3) times daily during dry weather. Watering, with complete coverage of disturbed areas, shall occur at least three times a day, preferably in the mid-morning, afternoon, and after work is done for the day.

- The contractor shall ensure that traffic speeds on unpaved roads and Project site areas are reduced to 15 miles per hour or less.

BACM AQ-2

The following measures shall be incorporated into Project plans and specifications as implementation of Rule 1113 (5):

- In order to limit the VOC content of architectural coatings used in the SCAB, architectural coatings shall be no more than a low VOC default level of 50 g/L unless otherwise specified in the SCAQMD Table of Standards (pg. 32-33).

1.4 PROJECT DESIGN FEATURES

Energy-saving and sustainable design features and operational programs would be incorporated into facilities developed pursuant to the currently-proposed Legacy Park (Tentative Tract Map No. 36760). The Project also incorporates and expresses the following design features and attributes promoting energy efficiency and sustainability. Because these features/attributes are integral to the Project, and/or are regulatory requirements, they are not considered to be mitigation measures.

- Regional vehicle miles traveled (VMT) and associated vehicular-source emissions are reduced by the following Project design features/attributes:
  - Pedestrian connections shall be provided to surrounding areas consistent with the City's General Plan. Providing a pedestrian access network to link areas of the Project site encourages people to walk instead of drive. The Project would provide a pedestrian access network that internally links all uses. The Project would minimize barriers to pedestrian access and interconnectivity.
  - The Project's proposed collocation of varied residential, school, park, and open spaces within ¼ mile proximity together with supporting amenities would tend to decrease the propensity for vehicle travel for local residents.

1.5 CONSTRUCTION-SOURCE MITIGATION MEASURES

Construction-source emissions will be less than significant. Therefore, no mitigation measures are required.

1.6 OPERATIONAL-SOURCE MITIGATION MEASURES

Operational-source emissions will be less than significant. Therefore, no mitigation measures are required.

EXHIBIT 1-A: SITE PLAN

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2 AIR QUALITY SETTING

This section provides an overview of the existing air quality conditions in the Project area and region.

2.1 SOUTH COAST AIR BASIN

The Project site is located in the South Coast Air Basin (SCAB) within the jurisdiction of SCAQMD (6). The SCAQMD was created by the 1977 Lewis-Presley Air Quality Management Act, which merged four county air pollution control bodies into one regional district. Under the Act, the SCAQMD is responsible for bringing air quality in areas under its jurisdiction into conformity with federal and state air quality standards. As discussed above, the Project site is located within the South Coast Air Basin, a 6,745-square mile subregion of the SCAQMD, which includes portions of Los Angeles, Riverside, and San Bernardino Counties, and all of Orange County. The larger South Coast district boundary includes 10,743 square miles.

The SCAB is bound by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east. The Los Angeles County portion of the Mojave Desert Air Basin is bound by the San Gabriel Mountains to the south and west, the Los Angeles / Kern County border to the north, and the Los Angeles / San Bernardino County border to the east. The Riverside County portion of the Salton Sea Air Basin is bound by the San Jacinto Mountains in the west and spans eastward up to the Palo Verde Valley.

2.2 REGIONAL CLIMATE

The regional climate has a substantial influence on air quality in the SCAB. In addition, the temperature, wind, humidity, precipitation, and amount of sunshine influence the air quality.

The annual average temperatures throughout the SCAB vary from the low to middle 60s (degrees Fahrenheit). Due to a decreased marine influence, the eastern portion of the SCAB shows greater variability in average annual minimum and maximum temperatures. January is the coldest month throughout the SCAB, with average minimum temperatures of 47°F in downtown Los Angeles and 36°F in San Bernardino. All portions of the SCAB have recorded maximum temperatures above 100°F.

Although the climate of the SCAB can be characterized as semi-arid, the air near the land surface is quite moist on most days because of the presence of a marine layer. This shallow layer of sea air is an important modifier of SCAB climate. Humidity restricts visibility in the SCAB, and the conversion of sulfur dioxide to sulfates is heightened in air with high relative humidity. The marine layer provides an environment for that conversion process, especially during the spring and summer months. The annual average relative humidity within the SCAB is 71 percent along the coast and 59 percent inland. Since the ocean effect is dominant, periods of heavy early morning fog are frequent and low stratus clouds are a characteristic feature. These effects decrease with distance from the coast.

More than 90 percent of the SCAB's rainfall occurs from November through April. The annual average rainfall varies from approximately nine inches in Riverside to fourteen inches in downtown Los Angeles. Monthly and yearly rainfall totals are extremely variable. Summer rainfall usually consists of widely scattered thunderstorms near the coast and slightly heavier shower activity in the eastern portion of the SCAB with frequency being higher near the coast.

Due to its generally clear weather, about three-quarters of available sunshine is received in the SCAB. The remaining one-quarter is absorbed by clouds. The ultraviolet portion of this abundant radiation is a key factor in photochemical reactions. On the shortest day of the year there are approximately 10 hours of possible sunshine, and on the longest day of the year there are approximately 14 1/2 hours of possible sunshine.

The importance of wind to air pollution is considerable. The direction and speed of the wind determines the horizontal dispersion and transport of the air pollutants. During the late autumn to early spring rainy season, the SCAB is subjected to wind flows associated with the traveling storms moving through the region from the northwest. This period also brings five to ten periods of strong, dry offshore winds, locally termed "Santa Anas" each year. During the dry season, which coincides with the months of maximum photochemical smog concentrations, the wind flow is bimodal, typified by a daytime onshore sea breeze and a nighttime offshore drainage wind. Summer wind flows are created by the pressure differences between the relatively cold ocean and the unevenly heated and cooled land surfaces that modify the general northwesterly wind circulation over southern California. Nighttime drainage begins with the radiational cooling of the mountain slopes. Heavy, cool air descends the slopes and flows through the mountain passes and canyons as it follows the lowering terrain toward the ocean. Another characteristic wind regime in the SCAB is the "Catalina Eddy," a low level cyclonic (counterclockwise) flow centered over Santa Catalina Island which results in an offshore flow to the southwest. On most spring and summer days, some indication of an eddy is apparent in coastal sections.

In the SCAB, there are two distinct temperature inversion structures that control vertical mixing of air pollution. During the summer, warm high-pressure descending (subsiding) air is undercut by a shallow layer of cool marine air. The boundary between these two layers of air is a persistent marine subsidence/inversion. This boundary prevents vertical mixing which effectively acts as an impervious lid to pollutants over the entire SCAB. The mixing height for the inversion structure is normally situated 1,000 to 1,500 feet above mean sea level.

A second inversion-type forms in conjunction with the drainage of cool air off the surrounding mountains at night followed by the seaward drift of this pool of cool air. The top of this layer forms a sharp boundary with the warmer air aloft and creates nocturnal radiation inversions. These inversions occur primarily in the winter, when nights are longer and onshore flow is weakest. They are typically only a few hundred feet above mean sea level. These inversions effectively trap pollutants, such as NOX and CO from vehicles, as the pool of cool air drifts seaward. Winter is therefore a period of high levels of primary pollutants along the coastline.

2.3 WIND PATTERNS AND PROJECT LOCATION

The distinctive climate of the Project area and the SCAB is determined by its terrain and geographical location. The Basin is located in a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean in the southwest quadrant with high mountains forming the remainder of the perimeter.

Wind patterns across the south coastal region are characterized by westerly and southwesterly on-shore winds during the day and easterly or northeasterly breezes at night. Winds are characteristically light although the speed is somewhat greater during the dry summer months than during the rainy winter season.

2.4 EXISTING AIR QUALITY

Existing air quality is measured at established SCAQMD air quality monitoring stations. Monitored air quality is evaluated and in the context of ambient air quality standards. These standards are the levels of air quality that are considered safe, with an adequate margin of safety, to protect the public health and welfare. National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) currently in effect, as well health effects of each pollutant regulated under these standards are shown in Table 2-1 (7).

The determination of whether a region's air quality is healthful or unhealthful is determined by comparing contaminant levels in ambient air samples to the state and federal standards presented in Table 2-1. The air quality in a region is considered to be in attainment by the state if the measured ambient air pollutant levels for O3, CO, SO2, NO2, PM10, and PM2.5 are not equaled or exceeded at any time in any consecutive three-year period; and the federal standards (other than O3, PM10, PM2.5, and those based on annual averages or arithmetic mean) are not exceeded more than once per year. The O3 standard is attained when the fourth highest eight-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24-hour standard is attained when 99 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

TABLE 2-1: AMBIENT AIR QUALITY STANDARDS (1 OF 2)

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1] Concentration[3]	California Standards[1] Method[4]	National Standards[2] Primary[3,5]	National Standards[2] Secondary[3,6]	National Standards[2] Method[7]
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

See footnotes on next page …

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TABLE 2-1: AMBIENT AIR QUALITY STANDARDS (2 OF 2)

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
7. Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.
8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.
9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.
10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.
11. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
12. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
13. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
14. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

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2.5 REGIONAL AIR QUALITY

The SCAQMD monitors levels of various criteria pollutants at 38 permanent monitoring stations and 5 single-pollutant source Lead (Pb) air monitoring sites throughout the air district (8). In 2015, the federal and state ambient air quality standards (NAAQS and CAAQS) were exceeded on one or more days for ozone, PM10, and PM2.5 at most monitoring locations (9). No areas of the SCAB exceeded federal or state standards for NO2, SO2, CO, sulfates or lead. See Table 2-2, for attainment designations for the SCAB (10). Appendix 3.1 provides geographic representation of the state and federal attainment status for applicable criteria pollutants within the SCAB.

TABLE 2-2: ATTAINMENT STATUS OF CRITERIA POLLUTANTS IN THE SOUTH COAST AIR BASIN (SCAB)

Criteria Pollutant	State Designation	Federal Designation
Ozone – 1-hour standard	Nonattainment	No Standard
Ozone - 8-hour standard	Nonattainment	Nonattainment
PM_{10}	Nonattainment	Attainment
$PM_{2.5}$	Nonattainment	Nonattainment
Carbon Monoxide	Attainment	Attainment
Nitrogen Dioxide	Attainment	Attainment
Sulfur Dioxide	Attainment	Attainment
Lead[1]	Attainment	Attainment

Source: State/Federal designations were taken from http://www.arb.ca.gov/desig/adm/adm.htm
Note: See Appendix 3.1 for a detailed map of State/National Area Designations within the South Coast Air Basin

2.6 LOCAL AIR QUALITY

Relative to the Project site, the nearest long-term air quality monitoring site for Ozone (O_3) and Particulate Matter ≤ 10 Microns (PM_{10}) is the South Coast Air Quality Management District Perris monitoring station (SRA 24), located approximately 4.8 miles south of the Project site (11). Data for Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), and Ultra-Fine Particulates ($PM_{2.5}$) was obtained from the Metropolitan Riverside County 2 monitoring station (SRA 23) and Lake Elsinore monitoring station (SRA 25), located approximately 10.6 miles northwest and 13.50 miles southwest of the Project site, respectively. It should be noted that the Metropolitan Riverside County 2 and Lake Elsinore monitoring stations were utilized in lieu of the Perris monitoring station only where data was not available from the nearest monitoring site.

The most recent three (3) years of data available is shown on Table 2-3, and identifies the number of days ambient air quality standards were exceeded for the study area, which is was considered to be representative of the local air quality at the Project site (12). Additionally, data for SO2 has

[1] The Federal nonattainment designation for lead is only applicable towards the Los Angeles County portion of the SCAB.

been omitted as attainment is regularly met in the South Coast Air Basin and few monitoring stations measure SO2 concentrations.

TABLE 2-3: PROJECT AREA AIR QUALITY MONITORING SUMMARY 2013-2015

POLLUTANT	STANDARD	YEAR		
		2013	2014	2015
Ozone (O_3)				
Maximum 1-Hour Concentration (ppm)		0.108	0.117	0.124
Maximum 8-Hour Concentration (ppm)		0.090	0.094	0.102
Number of Days Exceeding State 1-Hour Standard	> 0.09 ppm	17	16	25
Number of Days Exceeding State 8-Hour Standard	> 0.07 ppm	60	63	50
Number of Days Exceeding Federal 1-Hour Standard	> 0.12 ppm	0	0	0
Number of Days Exceeding Federal 8-Hour Standard	> 0.075 ppm	34	38	31
Number of Days Exceeding Health Advisory	≥ 0.15 ppm	0	0	0
Carbon Monoxide (CO)				
Maximum 1-Hour Concentration (ppm)		--	2.0	--
Maximum 8-Hour Concentration (ppm)		1.6	1.4	--
Number of Days Exceeding State 1-Hour Standard	> 20 ppm	0	0	--
Number of Days Exceeding Federal / State 8-Hour Standard	> 9.0 ppm	0	0	--
Number of Days Exceeding Federal 1-Hour Standard	> 35 ppm	0	0	--
Nitrogen Dioxide (NO_2)*				
Maximum 1-Hour Concentration (ppm)		0.058	0.056	0.047
Annual Arithmetic Mean Concentration (ppm)		0.016	0.016	0.009
Number of Days Exceeding State 1-Hour Standard	> 0.18 ppm	0	0	0
Particulate Matter ≤ 10 Microns (PM_{10})				
Maximum 24-Hour Concentration (μg/m^3)		70	87	188
Annual Arithmetic Mean (μg/m^3)		33.6	35.1	33.1
Number of Samples		57	60	--
Number of Samples Exceeding State Standard	> 50 μg/m^3	7	6	4
Number of Samples Exceeding Federal Standard	> 150 μg/m^3	0	0	1
Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$)*				
Maximum 24-Hour Concentration (μg/m^3)		53.7	30.9	42.2
Annual Arithmetic Mean (μg/m^3)		11.2	10.9	--
Number of Samples Exceeding Federal 24-Hour Standard	> 35 μg/m^3	0	0	--

-- = data not available from SCAQMD or ARB; *Data from the Riverside County 2 monitoring station is only available up to year 2014. As such, data from the Lake Elsinore monitoring station is used for the year 2015.

Attachment: Air Quality Study (2444 : Legacy Park Project)

Criteria pollutants are pollutants that are regulated through the development of human health based and/or environmentally based criteria for setting permissible levels. Criteria pollutants, their typical sources, and effects are identified below:

- Carbon Monoxide (CO): Is a colorless, odorless gas produced by the incomplete combustion of carbon-containing fuels, such as gasoline or wood. CO concentrations tend to be the highest during the winter morning, when little to no wind and surface-based inversions trap the pollutant at ground levels. Because CO is emitted directly from internal combustion engines, unlike ozone, motor vehicles operating at slow speeds are the primary source of CO in the Basin. The highest ambient CO concentrations are generally found near congested transportation corridors and intersections.
- Sulfur Dioxide (SO2): Is a colorless, extremely irritating gas or liquid. It enters the atmosphere as a pollutant mainly as a result of burning high sulfur-content fuel oils and coal and from chemical processes occurring at chemical plants and refineries. When SO2 oxidizes in the atmosphere, it forms sulfates (SO4). Collectively, these pollutants are referred to as sulfur oxides (SOX).
- Nitrogen Oxides (Oxides of Nitrogen, or NOx): Nitrogen oxides (NOx) consist of nitric oxide (NO), nitrogen dioxide (NO2) and nitrous oxide (N2O) and are formed when nitrogen (N2) combines with oxygen (O2). Their lifespan in the atmosphere ranges from one to seven days for nitric oxide and nitrogen dioxide, to 170 years for nitrous oxide. Nitrogen oxides are typically created during combustion processes, and are major contributors to smog formation and acid deposition. NO2 is a criteria air pollutant, and may result in numerous adverse health effects; it absorbs blue light, resulting in a brownish-red cast to the atmosphere and reduced visibility. Of the seven types of nitrogen oxide compounds, NO2 is the most abundant in the atmosphere. As ambient concentrations of NO2 are related to traffic density, commuters in heavy traffic may be exposed to higher concentrations of NO2 than those indicated by regional monitors.
- Ozone (O3): Is a highly reactive and unstable gas that is formed when volatile organic compounds (VOCs) and nitrogen oxides (NOX), both byproducts of internal combustion engine exhaust, undergo slow photochemical reactions in the presence of sunlight. Ozone concentrations are generally highest during the summer months when direct sunlight, light wind, and warm temperature conditions are favorable to the formation of this pollutant.
- PM10 (Particulate Matter less than 10 microns): A major air pollutant consisting of tiny solid or liquid particles of soot, dust, smoke, fumes, and aerosols. The size of the particles (10 microns or smaller, about 0.0004 inches or less) allows them to easily enter the lungs where they may be deposited, resulting in adverse health effects. PM10 also causes visibility reduction and is a criteria air pollutant.
- PM2.5 (Particulate Matter less than 2.5 microns): A similar air pollutant consisting of tiny solid or liquid particles which are 2.5 microns or smaller (which is often referred to as fine particles). These particles are formed in the atmosphere from primary gaseous emissions that include sulfates formed from SO2 release from power plants and industrial facilities and nitrates that are formed from NOX release from power plants, automobiles and other types of combustion sources. The chemical composition of fine particles highly depends on location, time of year, and weather conditions. PM2.5 is a criteria air pollutant.
- Volatile Organic Compounds (VOC): Volatile organic compounds are hydrocarbon compounds (any compound containing various combinations of hydrogen and carbon atoms) that exist in the ambient air. VOCs contribute to the formation of smog through atmospheric photochemical reactions and/or may be toxic. Compounds of carbon (also known as organic compounds) have

different levels of reactivity; that is, they do not react at the same speed or do not form ozone to the same extent when exposed to photochemical processes. VOCs often have an odor, and some examples include gasoline, alcohol, and the solvents used in paints. Exceptions to the VOC designation include: carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate. VOCs are a criteria pollutant since they are a precursor to O3, which is a criteria pollutant. The SCAQMD uses the terms VOC and ROG (see below) interchangeably.

- Reactive Organic Gases (ROG): Similar to VOC, Reactive Organic Gases (ROG) are also precursors in forming ozone. Smog is formed when ROG and nitrogen oxides react in the presence of sunlight. ROGs are a criteria pollutant since they are a precursor to O3, which is a criteria pollutant. The SCAQMD uses the terms ROG and VOC (see previous) interchangeably.
- Lead (Pb): Lead is a heavy metal that is highly persistent in the environment. In the past, the primary source of lead in the air was emissions from vehicles burning leaded gasoline. As a result of the removal of lead from gasoline, there have been no violations at any of the SCAQMD's regular air monitoring stations since 1982. Currently, emissions of lead are largely limited to stationary sources such as lead smelters. It should be noted that the Project is not anticipated to generate a quantifiable amount of lead emissions. Lead is a criteria air pollutant.

<u>Health Effects of Air Pollutants</u>

Ozone

Individuals exercising outdoors, children, and people with preexisting lung disease, such as asthma and chronic pulmonary lung disease, are considered to be the most susceptible sub-groups for ozone effects. Short-term exposure (lasting for a few hours) to ozone at levels typically observed in Southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. Elevated ozone levels are associated with increased school absences. In recent years, a correlation between elevated ambient ozone levels and increases in daily hospital admission rates, as well as mortality, has also been reported. An increased risk for asthma has been found in children who participate in multiple sports and live in communities with high ozone levels.

Ozone exposure under exercising conditions is known to increase the severity of the responses described above. Animal studies suggest that exposure to a combination of pollutants that includes ozone may be more toxic than exposure to ozone alone. Although lung volume and resistance changes observed after a single exposure diminish with repeated exposures, biochemical and cellular changes appear to persist, which can lead to subsequent lung structural changes.

Carbon Monoxide

Individuals with a deficient blood supply to the heart are the most susceptible to the adverse effects of CO exposure. The effects observed include earlier onset of chest pain with exercise, and electrocardiograph changes indicative of decreased oxygen supply to the heart. Inhaled CO has no direct toxic effect on the lungs, but exerts its effect on tissues by interfering with oxygen transport and competing with oxygen to combine with hemoglobin present in the blood to form carboxyhemoglobin (COHb). Hence, conditions with an increased demand for oxygen supply can be adversely affected by exposure to CO. Individuals most at risk include fetuses, patients with diseases involving heart and blood vessels, and patients with chronic hypoxemia (oxygen deficiency) as seen at high altitudes.

Reduction in birth weight and impaired neurobehavioral development have been observed in animals chronically exposed to CO, resulting in COHb levels similar to those observed in smokers. Recent studies have found increased risks for adverse birth outcomes with exposure to elevated CO levels; these include pre-term births and heart abnormalities.

Particulate Matter

A consistent correlation between elevated ambient fine particulate matter (PM10 and PM2.5) levels and an increase in mortality rates, respiratory infections, number and severity of asthma attacks and the number of hospital admissions has been observed in different parts of the United States and various areas around the world. In recent years, some studies have reported an association between long-term exposure to air pollution dominated by fine particles and increased mortality, reduction in life-span, and an increased mortality from lung cancer.

Daily fluctuations in PM2.5 concentration levels have also been related to hospital admissions for acute respiratory conditions in children, to school and kindergarten absences, to a decrease in respiratory lung volumes in normal children, and to increased medication use in children and adults with asthma. Recent studies show lung function growth in children is reduced with long-term exposure to particulate matter.

The elderly, people with pre-existing respiratory or cardiovascular disease, and children appear to be more susceptible to the effects of high levels of PM10 and PM2.5.

Nitrogen Dioxide

Population-based studies suggest that an increase in acute respiratory illness, including infections and respiratory symptoms in children (not infants), is associated with long-term exposure to NO2 at levels found in homes with gas stoves, which are higher than ambient levels found in Southern California. Increase in resistance to air flow and airway contraction is observed after short-term exposure to NO2 in healthy subjects. Larger decreases in lung functions are observed in individuals with asthma or chronic obstructive pulmonary disease (e.g., chronic bronchitis, emphysema) than in healthy individuals, indicating a greater susceptibility of these sub-groups.

In animals, exposure to levels of NO2 considerably higher than ambient concentrations results in increased susceptibility to infections, possibly due to the observed changes in cells involved in maintaining immune functions. The severity of lung tissue damage associated with high levels of ozone exposure increases when animals are exposed to a combination of ozone and NO2.

Sulfur Dioxide

A few minutes of exposure to low levels of SO2 can result in airway constriction in some asthmatics, all of whom are sensitive to its effects. In asthmatics, increase in resistance to air flow, as well as reduction in breathing capacity leading to severe breathing difficulties, are observed after acute exposure to SO2. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO2.

Animal studies suggest that despite SO2 being a respiratory irritant, it does not cause substantial lung injury at ambient concentrations. However, very high levels of exposure can cause lung edema (fluid accumulation), lung tissue damage, and sloughing off of cells lining the respiratory tract.

Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient SO2 levels. In these studies, efforts to separate the effects of SO2 from those of fine particles have not been successful. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.

Lead

Fetuses, infants, and children are more sensitive than others to the adverse effects of Pb exposure. Exposure to low levels of Pb can adversely affect the development and function of the central nervous system, leading to learning disorders, distractibility, inability to follow simple commands, and lower intelligence quotient. In adults, increased Pb levels are associated with increased blood pressure.

Pb poisoning can cause anemia, lethargy, seizures, and death; although it appears that there are no direct effects of Pb on the respiratory system. Pb can be stored in the bone from early age environmental exposure, and elevated blood Pb levels can occur due to breakdown of bone tissue during pregnancy, hyperthyroidism (increased secretion of hormones from the thyroid gland) and osteoporosis (breakdown of bony tissue). Fetuses and breast-fed babies can be exposed to higher levels of Pb because of previous environmental Pb exposure of their mothers.

Odors

The science of odor as a health concern is still new. Merely identifying the hundreds of VOCs that cause odors poses a big challenge. Offensive odors can potentially affect human health in several ways. First, odorant compounds can irritate the eye, nose, and throat, which can reduce respiratory volume. Second, studies have shown that the VOCs that cause odors can stimulate sensory nerves to cause neurochemical changes that might influence health, for instance, by compromising the immune system. Finally, unpleasant odors can trigger memories or attitudes linked to unpleasant odors, causing cognitive and emotional effects such as stress.

2.7 REGULATORY BACKGROUND

2.7.1 FEDERAL REGULATIONS

The U.S. EPA is responsible for setting and enforcing the NAAQS for O3, CO, NOx, SO2, PM10, PM2.5, and lead (7). The U.S. EPA has jurisdiction over emissions sources that are under the authority of the federal government including aircraft, locomotives, and emissions sources outside state waters (Outer Continental Shelf). The U.S. EPA also establishes emission standards for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission requirements of the CARB.

The Federal Clean Air Act (CAA) was first enacted in 1955, and has been amended numerous times in subsequent years (1963, 1965, 1967, 1970, 1977, and 1990). The CAA establishes the federal air quality standards, the NAAQS, and specifies future dates for achieving compliance (13). The CAA also mandates that states submit and implement State Implementation Plans (SIPs) for local areas not meeting these standards. These plans must include pollution control measures that demonstrate how the standards will be met.

The 1990 amendments to the CAA that identify specific emission reduction goals for areas not meeting the NAAQS require a demonstration of reasonable further progress toward attainment and incorporate additional sanctions for failure to attain or to meet interim milestones. The sections of the CAA most directly applicable to the development of the Project site include Title I (Non-Attainment Provisions) and Title II (Mobile Source Provisions). Title I provisions were established with the goal of attaining the NAAQS for the following criteria pollutants O3, NO2, SO2, PM10, CO, PM2.5, and lead. The NAAQS were amended in July 1997 to include an additional standard for O3 and to adopt a NAAQS for PM2.5. Table 2-1 (previously presented) provides the NAAQS within the basin.

Mobile source emissions are regulated in accordance with Title II provisions. These provisions require the use of cleaner burning gasoline and other cleaner burning fuels such as methanol and natural gas. Automobile manufacturers are also required to reduce tailpipe emissions of hydrocarbons and nitrogen oxides (NOx). NOx is a collective term that includes all forms of nitrogen oxides (NO, NO2, NO3) which are emitted as byproducts of the combustion process.

2.7.2 CALIFORNIA REGULATIONS

The CARB, which became part of the California EPA in 1991, is responsible for ensuring implementation of the California Clean Air Act (AB 2595), responding to the federal CAA, and for regulating emissions from consumer products and motor vehicles. The California CAA mandates achievement of the maximum degree of emissions reductions possible from vehicular and other mobile sources in order to attain the state ambient air quality standards by the earliest practical date. The CARB established the CAAQS for all pollutants for which the federal government has NAAQS and, in addition, establishes standards for sulfates, visibility, hydrogen sulfide, and vinyl chloride. However, at this time, hydrogen sulfide and vinyl chloride are not measured at any monitoring stations in the SCAB because they are not considered to be a regional air quality problem. Generally, the CAAQS are more stringent than the NAAQS (14) (7).

Local air quality management districts, such as the SCAQMD, regulate air emissions from commercial and light industrial facilities. All air pollution control districts have been formally designated as attainment or non-attainment for each CAAQS.

Non-attainment areas are required to prepare air quality management plans that include specified emission reduction strategies in an effort to meet clean air goals. These plans are required to include:

- Application of Best Available Retrofit Control Technology to existing sources;
- Developing control programs for area sources (e.g., architectural coatings and solvents) and indirect sources (e.g. motor vehicle use generated by residential and commercial development);

- A District permitting system designed to allow no net increase in emissions from any new or modified permitted sources of emissions;
- Implementing reasonably available transportation control measures and assuring a substantial reduction in growth rate of vehicle trips and miles traveled;
- Significant use of low emissions vehicles by fleet operators;
- Sufficient control strategies to achieve a five percent or more annual reduction in emissions or 15 percent or more in a period of three years for ROGs, NOx, CO and PM10. However, air basins may use alternative emission reduction strategy that achieves a reduction of less than five percent per year under certain circumstances.

2.7.3 AIR QUALITY MANAGEMENT PLANNING

Currently, the NAAQS and CAAQS are exceeded in most parts of the SCAB. In response, the SCAQMD has adopted a series of Air Quality Management Plans (AQMPs) to meet the state and federal ambient air quality standards (15). AQMPs are updated regularly in order to more effectively reduce emissions, accommodate growth, and to minimize any negative fiscal impacts of air pollution control on the economy. A detailed discussion on the AQMP and Project consistency with the AQMP is provided in Section 3.9.

2.8 EXISTING PROJECT SITE AIR QUALITY CONDITIONS

Existing air quality conditions at the Project site would generally reflect ambient monitored conditions as presented previously at Table 2-3.

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3 PROJECT AIR QUALITY IMPACT

3.1 INTRODUCTION

The Project has been evaluated to determine if it will violate an air quality standard or contribute to an existing or projected air quality violation. Additionally, the Project has been evaluated to determine if it will result in a cumulatively considerable net increase of a criteria pollutant for which the SCAB is non-attainment under an applicable federal or state ambient air quality standard. The significance of these potential impacts is described in the following section.

3.2 STANDARDS OF SIGNIFICANCE

The criteria used to determine the significance of potential Project-related air quality impacts are taken from the Initial Study Checklist in Appendix G of the State CEQA Guidelines (14 California Code of Regulations §§15000, et seq.). Based on these thresholds, a project would result in a significant impact related to air quality if it would (16):

- Conflict with or obstruct implementation of the applicable air quality plan.
- Violate any air quality standard or contribute to an existing or projected air quality violation.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone precursors).
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.

The SCAQMD has also developed regional and localized significance thresholds for other regulated pollutants, as summarized at Table 3-1 (17). The SCAQMD's CEQA Air Quality Significance Thresholds (March 2015) indicate that any projects in the SCAB with daily emissions that exceed any of the indicated thresholds should be considered as having an individually and cumulatively significant air quality impact.

TABLE 3-1: MAXIMUM DAILY EMISSIONS THRESHOLDS (1 OF 2)

Pollutant	Construction	Operations
	Regional Thresholds	
NOx	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM10	150 lbs/day	150 lbs/day
PM2.5	55 lbs/day	55 lbs/day
Sox	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day

TABLE 3-1: MAXIMUM DAILY EMISSIONS THRESHOLDS (2 OF 2)

Pollutant	Construction	Operations
Localized Thresholds		
NOx	203 lbs/day (site preparation)	N/A
CO	1,114 lbs/day (site preparation)	N/A
PM10	9 lbs/day (site preparation)	N/A
PM2.5	5 lbs/day (site preparation)	N/A

3.3 PROJECT-RELATED SOURCES OF POTENTIAL IMPACT

Land uses such as the Project affect air quality through construction-source and operational-source emissions.

On October 14, 2016, the SCAQMD in conjunction with the California Air Pollution Control Officers Association (CAPCOA) and other California air districts, released the latest version of the California Emissions Estimator Model™ (CalEEMod™) v2016.3.1. The purpose of this model is to calculate construction-source and operational-source criteria pollutant (NO_x, VOC, PM_{10}, $PM_{2.5}$, SO_x, and CO) and greenhouse gas (GHG) emissions from direct and indirect sources; and quantify applicable air quality and GHG reductions achieved from mitigation measures (18). Accordingly, the latest version of CalEEMod™ has been used for this Project to determine construction and operational air quality emissions. Output from the model runs for both construction and operational activity are provided in Appendix 3.2.

3.4 CONSTRUCTION EMISSIONS

Construction activities associated with the Project will result in emissions of CO, VOCs, NOx, SOx, PM10, and PM2.5. Construction related emissions are expected from the following construction activities:

- Grading
- Building Construction
- Paving
- Architectural Coating
- Construction Workers Commuting

Construction is expected to commence in October 2017 and will last through December 2021. Construction duration by phase is shown on Table 3-2. The duration of construction activity was estimated based on past project experience and a 2021 opening year. The construction schedule utilized in the analysis, shown in Table 3-2, represents a "worst-case" analysis scenario should construction occur any time after the respective dates since emission factors for construction decrease as time passes and the analysis year increases due to emission regulations becoming more stringent.[2] The detailed summary of construction equipment, shown on Table 3-3, was estimated based on CalEEMod model defaults and past project experience. The site specific construction fleet may vary due to specific project needs at the time of construction. The duration of construction activity and associated equipment both represent a reasonable approximation of the expected construction fleet as required per CEQA guidelines. Please refer to specific detailed modeling inputs/outputs contained in Appendix 3.2 of this analysis.

Dust is typically a major concern during rough grading activities. Because such emissions are not amenable to collection and discharge through a controlled source, they are called "fugitive emissions". Fugitive dust emissions rates vary as a function of many parameters (soil silt, soil moisture, wind speed, area disturbed, number of vehicles, depth of disturbance or excavation, etc.). The CalEEMod model was utilized to calculate fugitive dust emissions resulting from this phase of activity. It is our understanding the Project is expected to balance (will not require import/export of soil).

A review of aerial image indicates the Project site is currently vacant, therefore no demolition is required.

The Project shall comply with SCAQMD rules and regulations regarding handling and disturbances of toxics, such as asbestos and lead-based paint, that may be encountered during building materials and demolition. Inspections for these hazardous materials shall be performed prior to any demolition activities and compliance with the applicable rules and regulations, such as Rule 1403 for asbestos removal, will be required.

Construction emissions for construction worker vehicles traveling to and from the Project site, as well as vendor trips (construction materials delivered to the Project site) were estimated based on information CalEEMod model defaults.

TABLE 3-2: CONSTRUCTION DURATION

Phase Name	Start Date	End Date	Days
Grading	10/01/2017	01/12/2018	75
Paving	01/13/2018	03/30/2018	55
Building Construction	03/31/2018	09/25/2020	650
Architectural Coatings	06/29/2019	12/24/2021	650

[2] As shown in the California Emissions Estimator Model (CalEEMod) User's Guide Version 2013.2, Table 3.4 "OFFROAD Equipment Emission Factors" as the analysis year increases, emission factors for the same equipment pieces decrease due to the natural turnover of older equipment being replaced by newer less polluting equipment and new regulatory requirements.

TABLE 3-3: CONSTRUCTION EQUIPMENT

Activity	Equipment	Number	Hours Per Day
Grading	Excavators	2	8
	Graders	1	8
	Water Trucks	1	8
	Rubber Tired Dozers	1	8
	Scrapers	2	8
	Tractors/Loaders/Backhoes	2	8
Paving	Paving Equipment	2	8
	Rollers	2	8
	Pavers	2	8
Building Construction	Cranes	1	8
	Forklifts	3	8
	Generator Sets	1	8
	Tractors/Loaders/Backhoes	3	8
	Welders	1	8
Architectural Coating	Air Compressors	1	8

3.4.1 CONSTRUCTION EMISSIONS SUMMARY

The SCAQMD Rules that are currently applicable during construction activity for this Project include but are not limited to: Rule 1113 (Architectural Coatings) (19); Rule 431.2 (Low Sulfur Fuel) (20); Rule 403 (Fugitive Dust) (21); and Rule 1186 / 1186.1 (Street Sweepers) (22). Notwithstanding, credit for BACMs AQ-1 (Rule 1113) and AQ-2 (Rule 403) have been taken.

The estimated maximum daily construction emissions are summarized on Table 3-4. Detailed construction model outputs are presented in Appendix 3.2. It should be noted that credit has been taken for reductions achieved through standard regulatory requirements, such as BACM AQ-1 and BACM AQ-2. Under the assumed scenarios, emissions resulting from the Project construction would not exceed numerical thresholds established by the SCAQMD for any criteria pollutant. Therefore, a less than significant impact would occur and no mitigation is required.

TABLE 3-4: EMISSIONS SUMMARY OF OVERALL CONSTRUCTION

Year	Emissions (pounds per day)					
	VOC	NOx	CO	SOx	PM10	PM2.5
2017	6.60	75.32	43.00	0.07	7.03	4.59
2018	5.80	65.36	38.80	0.09	1.47	4.11
2019	10.36	38.79	39.04	0.10	1.27	2.85
2020	9.86	35.19	35.19	0.10	1.27	2.62
2021	5.73	2.20	2.20	0.01	0.18	0.31
Maximum Daily Emissions	**6.60**	**75.32**	**43.00**	**0.07**	**7.03**	**4.59**
SCAQMD Regional Threshold	75	100	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

3.5 OPERATIONAL EMISSIONS

Operational activities associated with the proposed Project will result in emissions of VOCs, NOx, CO, SOx, PM10, and PM2.5. Operational emissions would be expected from the following primary sources:

- Area Source Emissions
- Energy Source Emissions
- Mobile Source Emissions

3.5.1 AREA SOURCE EMISSIONS

Architectural Coatings

Over a period of time the buildings that are part of this Project will be subject to emissions resulting from the evaporation of solvents contained in paints, varnishes, primers, and other surface coatings as part of Project maintenance. The emissions associated with architectural coatings were calculated using the CalEEMod model.

Consumer Products

Consumer products include, but are not limited to detergents, cleaning compounds, polishes, personal care products, and lawn and garden products. Many of these products contain organic compounds which when released in the atmosphere can react to form ozone and other photochemically reactive pollutants. The emissions associated with use of consumer products were calculated based on defaults provided within the CalEEMod model.

Hearths/Fireplaces

The emissions associated with use of hearths/fireplaces were calculated based on assumptions provided in the CalEEMod model. The Project is required to comply with SCAQMD Rule 445, which prohibits the use of wood burning stoves and fireplaces in new development. In order to account for the requirements of this Rule, the unmitigated CalEEMod model estimates were adjusted to remove wood burning stoves and fireplaces. As the project is required to comply with SCAQMD Rule 445, the removal of wood burning stoves and fireplaces is not considered "mitigation" although it must be identified as such in CalEEMod in order to treat the case appropriately.

Landscape Maintenance Equipment

Landscape maintenance equipment would generate emissions from fuel combustion and evaporation of unburned fuel. Equipment in this category would include lawnmowers, shedders/grinders, blowers, trimmers, chain saws, and hedge trimmers used to maintain the landscaping of the Project. The emissions associated with landscape maintenance equipment were calculated based on assumptions provided in the CalEEMod model.

3.5.2 ENERGY SOURCE EMISSIONS

Combustion Emissions Associated with Natural Gas and Electricity

Electricity and natural gas are used by almost every project. Criteria pollutant emissions are emitted through the generation of electricity and consumption of natural gas. However, because electrical generating facilities for the Project area are located either outside the region (state) or offset through the use of pollution credits (RECLAIM) for generation within the SCAB, criteria pollutant emissions from offsite generation of electricity is generally excluded from the evaluation of significance and only natural gas use is considered. The emissions associated with natural gas use were calculated using the CalEEMod model.

3.5.3 MOBILE SOURCE EMISSIONS

Vehicles

Project operational (vehicular) impacts are dependent on both overall daily vehicle trip generation and the effect of the Project on peak hour traffic volumes and traffic operations in the vicinity of the Project. The Project related operational air quality impacts derive primarily from vehicle trips generated by the Project. Trip characteristics available from the report, Legacy Park (Tentative Tract Map No. 36760) Trip Generation Evaluation (Urban Crossroads) 2016 were utilized in this analysis (23). A fleet mix consistent with the Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol was used in this report in order to appropriately represent vehicular trips from a primarily residential development (24).

3.5.4 OPERATIONAL EMISSIONS SUMMARY

The estimated operation-source emissions are summarized on Table 3-5. Detailed operation model outputs are presented in Appendix 3.2. Under the assumed scenarios, emissions resulting from the Project operations would not exceed the numerical thresholds established by the SCAQMD for any criteria pollutant. Therefore, a less than significant impact would occur and no mitigation is required.

TABLE 3-5: MAXIMUM DAILY OPERATIONAL EMISSIONS SUMMARY

Operational Activities – Summer Scenario	Emissions (pounds per day)					
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Area Source	12.23	3.88	19.83	2.00E-02	0.40	0.40
Energy Source	0.24	2.07	0.88	1.00E-02	0.17	0.17
Mobile Source	4.34	30.90	50.51	0.21	15.16	4.15
Total Maximum Daily Emissions	**16.81**	**36.85**	**71.22**	**0.24**	**15.73**	**4.72**
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Operational Activities – Winter Scenario	Emissions (pounds per day)					
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Area Source	12.23	3.88	19.83	2.00E-02	0.40	0.40
Energy Source	2.40E-01	2.07	0.88	1.00E-02	0.17	0.17
Mobile Source	3.68	30.92	43.83	0.19	15.16	4.15
Total Maximum Daily Emissions	**16.15**	**36.87**	**64.54**	**0.22**	**15.73**	**4.72**
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

3.6 LOCALIZED SIGNIFICANCE - CONSTRUCTION ACTIVITY

BACKGROUND ON LOCALIZED SIGNIFICANCE THRESHOLD (LST) DEVELOPMENT

The analysis makes use of methodology included in the SCAQMD *Final Localized Significance Threshold Methodology* (Methodology) (19). The SCAQMD has established that impacts to air quality are significant if there is a potential to contribute or cause localized exceedances of the federal and/or state ambient air quality standards (NAAQS/CAAQS). Collectively, these are referred to as Localized Significance Thresholds (LSTs).

The significance of localized emissions impacts depends on whether ambient levels in the vicinity of any given project are above or below State standards. In the case of CO and NO2, if ambient levels are below the standards, a project is considered to have a significant impact if project emissions result in an exceedance of one or more of these standards. If ambient levels already exceed a state or federal standard, then project emissions are considered significant if they increase ambient concentrations by a measurable amount. This would apply to PM10 and PM2.5; both of which are non-attainment pollutants.

The SCAQMD established LSTs in response to the SCAQMD Governing Board's Environmental Justice Initiative I-4. LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard at the nearest residence or sensitive receptor. The SCAQMD states that lead agencies can use the LSTs as another indicator of significance in its air quality impact analyses.

LSTs were developed in response to environmental justice and health concerns raised by the public regarding exposure of individuals to criteria pollutants in local communities. To address the issue of localized significance, the SCAQMD adopted LSTs that show whether a project would cause or contribute to localized air quality impacts and thereby cause or contribute to potential localized adverse health effects. The analysis makes use of methodology included in the SCAQMD *Final Localized Significance Threshold Methodology* (LST Methodology) (25).

EMISSIONS CONSIDERED

SCAQMD's Methodology clearly states that "off-site mobile emissions from the Project should NOT be included in the emissions compared to LSTs (26)." Therefore, for purposes of the construction LST analysis only emissions included in the CalEEMod "on-site" emissions outputs were considered.

APPLICABILITY OF LSTS FOR THE PROJECT

For this Project, the appropriate Source Receptor Area (SRA) for the LST is the Perris monitoring station (SRA 24). LSTs apply to carbon monoxide (CO), nitrogen dioxide (NO2), particulate matter ≤ 10 microns (PM10), and particulate matter ≤ 2.5 microns (PM2.5). The SCAQMD produced look-up tables for projects less than or equal to 5 acres in size.

In order to determine the appropriate methodology for determining localized impacts that could occur as a result of Project-related construction, the following process is undertaken:

- The CalEEMod model is utilized to determine the maximum daily on-site emissions that will occur during construction activity.
- The SCAQMD's Fact Sheet for Applying CalEEMod to Localized Significance Thresholds (21) is used to determine the maximum site acreage that is actively disturbed based on the construction equipment fleet and equipment hours as estimated in CalEEMod.
- If the total acreage disturbed is less than or equal to five acres per day, then the SCAQMD's screening look-up tables are utilized to determine if a Project has the potential to result in a significant impact (the SCAQMD recommends that Projects exceeding the screening look-up tables undergo dispersion modeling to determine actual impacts). The look-up tables establish a maximum daily emissions threshold in pounds per day that can be compared to CalEEMod outputs.
- For projects that exceed 5 acres, the 5-acre LST look-up values can be used as a screening tool to determine which pollutants require detailed analysis.[3] This approach is conservative as it assumes that all on-site emissions would occur within a 5-acre area and would over predict potential localized impacts (i.e., more pollutant emissions occurring within a smaller area and within closer proximity to potential sensitive receptors). If the project exceeds the LST look-up values, then the SCAQMD recommends that project specific air quality modeling be performed.

3 Personal communication with Mr. Ian MacMillan, November 17, 2011

MAXIMUM DAILY DISTURBED-ACREAGE

Table 3-6 is used to determine the maximum daily disturbed-acreage for purposes of modeling localized emissions. As shown, the proposed Project could actively disturb 3.0 acres per day for the grading phase of construction.

TABLE 3-6: MAXIMUM DAILY DISTURBED-ACREAGE

Construction Phase	Equipment Type	Equipment Quantity	Acres graded per 8 hour day	Operating Hours per Day	Acres graded per day
Grading	Rubber Tired Dozers	1	0.5	8	0.5
	Crawler Tractors	0	0.5	8	0
	Graders	1	0.5	8	0.5
	Scrapers	2	1	8	2
Total acres graded per day during Grading					3

Sensitive Receptors

Some people are especially sensitive to air pollution and are given special consideration when evaluating air quality impacts from projects. These groups of people include children, the elderly, persons with preexisting respiratory or cardiovascular illness, and athletes and others who engage in frequent exercise. Structures that house these persons or places where they gather to exercise are defined as "sensitive receptors".

The nearest sensitive receptor is the residential community located immediately adjacent west of the Project site. Notwithstanding, the *Methodology* explicitly states that "*It is possible that a project may have receptors closer than 25 meters. Projects with boundaries located closer than 25 meters to the nearest receptor should use the LSTs for receptors located at 25 meters* (27)." Therefore, LSTs for receptors located at 25 meters were utilized in this AQIA.

CONSTRUCTION-SOURCE EMISSIONS LST ANALYSIS

Table 3-7 identifies the localized impacts at the nearest receptor location in the vicinity of the Project. As shown below, emissions during construction activity would not exceed the SCAQMD's localized significance thresholds for any criteria pollutant and a less than significant impact would occur.

TABLE 3-7: LOCALIZED SIGNIFICANCE SUMMARY CONSTRUCTION

On-Site Grading Emissions	Emissions (pounds per day)			
	NO_x	CO	PM_{10}	$PM_{2.5}$
Maximum Daily Emissions	**75.22**	**41.70**	**6.77**	**4.52**
SCAQMD Localized Threshold	203	1,114	9	5
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**

3.7 LOCALIZED SIGNIFICANCE – LONG-TERM OPERATIONAL ACTIVITY

The proposed project involves the construction and operation of 221 single family residential dwelling units. According to SCAQMD LST methodology, LSTs would apply to the operational phase of a proposed project, if the project includes stationary sources, or attracts mobile sources that may spend long periods queuing and idling at the site (e.g., transfer facilities and warehouse buildings). The proposed project does not include such uses, and thus, due to the lack of significant stationary source emissions, no long-term localized significance threshold analysis is needed.

3.8 CO "HOT SPOT" ANALYSIS

As discussed below, the Project would not result in potentially adverse CO concentrations or "hot spots." Further, detailed modeling of Project-specific carbon monoxide (CO) "hot spots" is not needed to reach this conclusion.

An adverse CO concentration, known as a "hot spot", would occur if an exceedance of the state one-hour standard of 20 ppm or the eight-hour standard of 9 ppm were to occur. At the time of the 1993 Handbook, the SCAB was designated nonattainment under the California AAQS and National AAQS for CO (28).

It has long been recognized that CO hotspots are caused by vehicular emissions, primarily when idling at congested intersections. In response, vehicle emissions standards have become increasingly stringent in the last twenty years. Currently, the allowable CO emissions standard in California is a maximum of 3.4 grams/mile for passenger cars (there are requirements for certain vehicles that are more stringent). With the turnover of older vehicles, introduction of cleaner fuels, and implementation of increasingly sophisticated and efficient emissions control technologies, CO concentration in the SCAB is now designated as attainment, as previously noted in Table 2-2. Also, CO concentrations in the Project vicinity have steadily declined, as indicated by historical emissions data presented previously at Table 2-3.

To establish a more accurate record of baseline CO concentrations affecting the SCAB, a CO "hot spot" analysis was conducted in 2003 for four busy intersections in Los Angeles at the peak morning and afternoon time periods. This "hot spot" analysis did not predict any violation of CO standards, as shown on Table 3-8.

Based on the SCAQMD's 2003 AQMP and the 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan), peak carbon monoxide concentrations in the SCAB were a result of unusual meteorological and topographical conditions and not a result of traffic volumes and congestion at a particular intersection. As evidence of this, for example, 9.3 ppm 8-hr CO concentration measured at the Long Beach Blvd. and Imperial Hwy. intersection (highest CO generating intersection within the "hot spot" analysis), only 0.7 ppm was attributable to the traffic volumes and congestion at this intersection; the remaining 8.6 ppm were due to the ambient air measurements at the time the 2003 AQMP was prepared (28). In contrast, the ambient 8-hr CO concentration within the Project study area is estimated at 1.4 ppm—1.6 ppm (please refer to previous Table 2-3). Therefore, even if the traffic volumes for the proposed Project were double or even triple of the traffic volumes generated at the Long Beach Blvd. and Imperial Hwy. intersection, coupled with the on-going improvements in ambient air quality, the Project would not be capable of resulting in a CO "hot spot" at any study area intersections.

Similar considerations are also employed by other Air Districts when evaluating potential CO concentration impacts. More specifically, the Bay Area Air Quality Management District (BAAQMD) concludes that under existing and future vehicle emission rates, a given project would have to increase traffic volumes at a single intersection by more than 44,000 vehicles per hour—or 24,000 vehicles per hour where vertical and/or horizontal air does not mix—in order to generate a significant CO impact (29).

Traffic volumes generating the CO concentrations for the "hot spot" analysis, shown on Table 3-9. The busiest intersection evaluated was that at Wilshire Blvd. and Veteran Ave., which has a daily traffic volume of approximately 100,000 vehicles per day. The 2003 AQMP estimated that the 1-hour concentration for this intersection was 4.6 ppm; this indicates that, should the daily traffic volume increase four times to 400,000 vehicles per day, CO concentrations (4.6 ppm x 4= 18.4 ppm) would still not likely exceed the most stringent 1-hour CO standard (20.0 ppm).[4] At buildout of the Project, the highest average daily trips on a segment of road would be 44,300 daily trips on Perris Blvd.) south of John F. Kennedy Dr., which is lower than the highest daily traffic volumes generated at the busiest intersection in the CO "hot spot" analysis (30).

The proposed Project considered herein would not produce the volume of traffic required to generate a CO "hot spot" either in the context of the 2003 Los Angeles hot spot study, or based on representative BAAQMD CO threshold considerations, as shown on Table 3-10. Therefore, CO "hot spots" are not an environmental impact of concern for the proposed Project. Localized air quality impacts related to mobile-source emissions would therefore be less than significant.

TABLE 3-8: CO MODEL RESULTS

Intersection Location	Carbon Monoxide Concentrations (ppm)		
	Morning 1-hour	Afternoon 1-hour	8-hour
Wilshire-Veteran	4.6	3.5	4.2
Sunset-Highland	4	4.5	3.9
La Cienega-Century	3.7	3.1	5.8
Long Beach-Imperial	3	3.1	9.3

Source: 2003 AQMP

Notes: ppm: parts per million. Federal 1-hour standard is 35 ppm and the deferral 8-hour standard is 9.0 ppm.

4 Based on the ratio of the CO standard (20.0 ppm) and the modeled value (4.6 ppm).

TABLE 3-9: TRAFFIC VOLUMES

Intersection Location	Peak Traffic Volumes (vph)				
	Northbound (AM/PM)	Southbound (AM/PM)	Eastbound (AM/PM)	Westbound (AM/PM)	Total (AM/PM)
Wilshire-Veteran	560/933	721/1,400	4,954/2,069	1,830/3,317	8,062/7,719
Sunset-Highland	1,551/2,238	2,304/1,832	1,417/1,764	1,342/1,540	6,614/5,374
La Cienega-Century	821/1,674	1,384/2,029	2,540/2,243	1,890/2,728	6,634/8,674
Long Beach-Imperial	756/1,150	479/944	1,217/2,020	1,760/1,400	4,212/5,514

Source: 2003 AQMP
Notes: vph-vehicles per hour

TABLE 3-10: PROJECT PEAK HOUR TRAFFIC VOLUMES

Intersection Location	Peak Traffic Volumes (vph)				
	Northbound (AM/PM)	Southbound (AM/PM)	Eastbound (AM/PM)	Westbound (AM/PM)	Total (AM/PM)
Indian St./ Cactus Ave.	391/	499/	1,261/	753/	2,904/
Elliot Rd./ Jean Nicholas Rd.	1,459/	1,430/	1,074/	663/	4,625/
Perris Blvd./ John F. Kennedy Dr.	1,646/	1,537/	547/	516/	4,245/
Perris Blvd./ Iris Ave.	1,400/	1,344/	614/	764/	4,122/

Source: Legacy Park (Tentative Tract Map No. 36760) Traffic Impact Analysis (Urban Crossroads, Inc., 2016).

3.9 AIR QUALITY MANAGEMENT PLANNING

The Project site is located within the SCAB, which is characterized by relatively poor air quality. The SCAQMD has jurisdiction over an approximately 10,743 square-mile area consisting of the four-county Basin and the Los Angeles County and Riverside County portions of what use to be referred to as the Southeast Desert Air Basin. In these areas, the SCAQMD is principally responsible for air pollution control, and works directly with the Southern California Association of Governments (SCAG), county transportation commissions, local governments, as well as state and federal agencies to reduce emissions from stationary, mobile, and indirect sources to meet state and federal ambient air quality standards.

Currently, these state and federal air quality standards are exceeded in most parts of the Basin. In response, the SCAQMD has adopted a series of Air Quality Management Plans (AQMPs) to meet the state and federal ambient air quality standards. AQMPs are updated regularly in order to more effectively reduce emissions, accommodate growth, and to minimize any negative fiscal impacts of air pollution control on the economy.

The Final 2012 AQMP was adopted by the AQMD Governing Board on December 7, 2012 (31) (15). The 2012 AQMP incorporates the latest scientific and technological information and planning assumptions, including the 2012 Regional Transportation Plan/Sustainable Communities Strategy and updated emission inventory methodologies for various source categories.

Similar to the 2007 AQMP, the 2012 AQMP was based on assumptions provided by both CARB and SCAG in the latest available EMFAC model for the most recent motor vehicle and demographics information, respectively. The air quality levels projected in the 2012 AQMP are based on several assumptions. For example, the 2012 AQMP has assumed that development associated with general plans, specific plans, residential projects, and wastewater facilities will be constructed in accordance with population growth projections identified by SCAG in its 2012 RTP. The 2012 AQMP also has assumed that such development projects will implement strategies to reduce emissions generated during the construction and operational phases of development.

In June 2016, the AQMD released the draft 2016 AQMP for public review. The 2016 draft AQMP continues to evaluate current integrated strategies and control measures to meet the NAAQS, as well as, explore new and innovative methods to reach its goals. Some of these approaches include utilizing incentive programs, recognizing existing co-benefit programs from other sectors, and developing a strategy with fair-share reductions at the federal, state, and local levels (32). As the draft 2016 AQMP has not been formally adopted by the AQMD, the Project's consistency with the AQMP will be determined using the 2012 AQMP, discussed below.

Criteria for determining consistency with the AQMP are defined in Chapter 12, Section 12.2 and Section 12.3 of the SCAQMD's CEQA Air Quality Handbook (1993) (33). These indicators are discussed below:

- Consistency Criterion No. 1: The proposed Project will not result in an increase in the frequency or severity of existing air quality violations or cause or contribute to new violations, or delay the timely attainment of air quality standards or the interim emissions reductions specified in the AQMP.

Construction Impacts

Consistency Criterion No. 1 refers to violations of the CAAQS and NAAQS. CAAQS and NAAQS violations would occur LSTs were exceeded. As evaluated as part of the Project LST analysis (previously presented), the Project's localized construction-source emissions would not exceed applicable LSTs.

Operational Impacts

The Project regional analysis demonstrates that Project operational-source emissions would not exceed applicable thresholds, and would therefore not result in or cause violations of the CAAQS and NAAQS.

On the basis of the preceding discussion, the Project is determined to be consistent with the first criterion.

- Consistency Criterion No. 2: The Project will not exceed the assumptions in the AQMP based on the years of Project build-out phase.

Overview

The 2012 AQMP demonstrates that the applicable ambient air quality standards can be achieved within the timeframes required under federal law. Growth projections from local general plans adopted by cities in the district are provided to the Southern California Association of Governments (SCAG), which develops regional growth forecasts, which are then used to develop future air quality forecasts for the AQMP. Development consistent with the growth projections in the City of Moreno Valley General Plan (referred to as the "General Plan") is considered to be consistent with the AQMP.

Construction Impacts

Peak day emissions generated by construction activities are largely independent of land use assignments, but rather are a function of development scope and maximum area of disturbance. Irrespective of the site's land use designation, development of the site to its maximum potential would likely occur, with disturbance of the entire site occurring during construction activities.

Operational Impacts

The General Plan currently designates the Project site as a Suburban Residential Use. The Project is currently zoned as "R-5" and "R-30", which allows a maximum density of 5 dwellings per acre and 30 dwelling units per acre, respectively (34).

The Project proposes to construct 221 single-family residential dwelling units, with a density of 4.18 dwelling units per acre, which is permitted under both the R-5 and R-30 zones. Furthermore, the Project is proposing a partial zone change for the R-30 zoned area to R-5, which would decrease the maximum allowed density from 30 dwelling units per acre to 5 dwelling units per acre. As such, the partial zone change to R-5 would be more conservative than the existing zone and would be more consistent with the Project. Additionally, the Project would not exceed any applicable regional or local thresholds. As such, the development proposed by the Project is generally consistent with the goals and objectives of the AQMP.

On the basis of the preceding discussion, the Project is determined to be consistent with the second criterion.

AQMP Consistency Conclusion

The Project would not result in or cause NAAQS or CAAQS violations. The Project would not increase the growth intensities allowed in the General Plan. Furthermore, the Project would not exceed any applicable regional or local thresholds. As such, the Project is therefore considered to be consistent with the AQMP.

3.10 POTENTIAL IMPACTS TO SENSITIVE RECEPTORS

The potential impact of Project-generated air pollutant emissions at sensitive receptors has also been considered. Sensitive receptors can include uses such as long term health care facilities, rehabilitation centers, and retirement homes. Residences, schools, playgrounds, child care centers, and athletic facilities can also be considered as sensitive receptors.

Results of the LST analysis indicate that the Project would not exceed the SCAQMD localized significance thresholds during construction. Therefore, sensitive receptors would not be subject to a significant air quality impact during Project construction.

Results of the LST analysis indicate that the Project would not exceed the SCAQMD localized significance thresholds during operational activity. The proposed Project would not result in a CO "hotspot" as a result of Project related traffic during ongoing operations, nor would the Project result in a significant adverse health impact as discussed in Section 3.8. Thus a less than significant impact to sensitive receptors during operational activity is expected.

3.11 ODORS

The potential for the Project to generate objectionable odors has also been considered. Land uses generally associated with odor complaints include:

- Agricultural uses (livestock and farming)
- Wastewater treatment plants
- Food processing plants
- Chemical plants
- Composting operations
- Refineries
- Landfills
- Dairies
- Fiberglass molding facilities

The Project does not contain land uses typically associated with emitting objectionable odors. Potential odor sources associated with the proposed Project may result from construction equipment exhaust and the application of asphalt and architectural coatings during construction activities and the temporary storage of typical solid waste (refuse) associated with the proposed Project's (long-term operational) uses. Standard construction requirements would minimize odor impacts from construction. The construction odor emissions would be temporary, short-term, and intermittent in nature and would cease upon completion of the respective phase of construction and is thus considered less than significant. It is expected that Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with the City's solid waste regulations. The proposed Project would also be required to comply with SCAQMD Rule 402 to prevent occurrences of public nuisances. Therefore, odors associated with the proposed Project construction and operations would be less than significant and no mitigation is required.

3.12 CUMULATIVE IMPACTS

The Project area is designated as an extreme non-attainment area for ozone, and a non-attainment area for PM_{10}, $PM_{2.5}$, and lead.

The AQMD has published a report on how to address cumulative impacts from air pollution: *White Paper on Potential Control Strategies to Address Cumulative Impacts from Air Pollution* (35). In this report the AQMD clearly states (Page D-3):

"…the AQMD uses the same significance thresholds for project specific and cumulative impacts for all environmental topics analyzed in an Environmental Assessment or EIR. The only case where the significance thresholds for project specific and cumulative impacts differ is the Hazard Index (HI) significance threshold for toxic air contaminant (TAC) emissions. The project specific (project increment) significance threshold is HI > 1.0 while the cumulative (facility-wide) is HI > 3.0. It should be noted that the HI is only one of three TAC emission significance thresholds considered (when applicable) in a CEQA analysis. The other two are the maximum individual cancer risk (MICR) and the cancer burden, both of which use the same significance thresholds (MICR of 10 in 1 million and cancer burden of 0.5) for project specific and cumulative impacts.

Projects that exceed the project-specific significance thresholds are considered by the SCAQMD to be cumulatively considerable. This is the reason project-specific and cumulative significance thresholds are the same. Conversely, projects that do not exceed the project-specific thresholds are generally not considered to be cumulatively significant."

Therefore, this analysis assumes that individual projects that do not generate operational or construction emissions that exceed the SCAQMD's recommended daily thresholds for project-specific impacts would also not cause a cumulatively considerable increase in emissions for those pollutants for which the Basin is in nonattainment, and, therefore, would not be considered to have a significant, adverse air quality impact. Alternatively, individual project-related construction and operational emissions that exceed SCAQMD thresholds for project-specific impacts would be considered cumulatively considerable.

CRITERION 1; REGIONAL EMISSIONS ANALYSIS

Construction Impacts

The Project-specific evaluation of emissions presented in the preceding analysis demonstrates that Project construction-source air pollutant emissions would not result in exceedances of regional thresholds. Therefore, Project construction-source emissions would be considered less than significant on a project-specific and cumulative basis.

Operational Impacts

The Project-specific evaluation of emissions presented in the preceding analysis demonstrates that Project operational-source air pollutant emissions would not result in exceedances of regional thresholds. Therefore, Project operational-source emissions would be considered less than significant on a project-specific and cumulative basis.

CRITERION 2; LOCAL EMISSIONS ANALYSIS UTILIZING LIST APPROACH

A list approach is used, in accordance with Section 15130(b) of the CEQA Guidelines, which states the following:

> *The following elements are necessary to an adequate discussion of significant cumulative impacts: 1) Either: (A) A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency, or (B) A summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or area wide conditions contributing to the cumulative impact.*

The SCAQMD has recognized that there is typically insufficient information to quantitatively evaluate the cumulative contributions of multiple projects because each project applicant has no control over nearby projects. Nevertheless, the potential cumulative impacts from the Project and other projects are discussed below. A cumulative project list was developed for this analysis and is shown in Table 3-11.

Related projects could contribute to an existing or projected air quality exceedance because the Basin is currently nonattainment for ozone, PM10, and PM2.5. With regard to determining the significance of the contribution from the Project, the SCAQMD recommends that any given project's potential contribution to cumulative impacts should be assessed using the same significance criteria as for project-specific impacts. Therefore, this analysis assumes that individual projects that do not generate operational or construction emissions that exceed the SCAQMD's recommended daily thresholds for project-specific impacts would also not cause a commutatively considerable increase in emissions for those pollutants for which the Basin is in nonattainment, and, therefore, would not be considered to have a significant, adverse air quality impact. Alternatively, individual project-related construction and operational emissions that exceed SCAQMD thresholds for project-specific impacts would be considered cumulatively considerable. As previously noted, the Project would not result in any construction-source or operational-source emissions exceedances. Therefore the Project would result in a less than significant impact on a project-specific and cumulative basis.

TABLE 3-11: CUMULATIVE LIST OF PROJECTS

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
CITY OF MORENO VALLEY				
MV-1	PA 06-0152 & PA 06-0153 (First Park Nandina I & II)	High-Cube Warehouse	483.767	TSF
MV-2	Bella Vista Apartments	Apartments	220.00	DU
MV-3	PA 04-0063 (Centerpointe Buildings 8 and 9)	General Light Industrial	361.384	TSF
MV-4	PA 07-0035; PA 07-0039 (Moreno Valley Industrial Park)	General Light Industrial	204.657	TSF
		High-Cube Warehouse	409.920	TSF
MV-5	First Inland Logistics Center	High-Cube Warehouse	400.130	TSF
MV-6	Indian Street Commerce Center Project	High-Cube Warehouse	436.350	TSF
MV-7	PA 08-0093 (Centerpointe Business Park II)	General Light Industrial	99.988	TSF
MV-8	PA 06-0021; PA 06-0022; PA 06-0048; PA 06-0049 (Komar Investments)	Warehousing	287.100	TSF
MV-9	PA 06-0017 (Ivan Devries)	Industrial Park	569.200	TSF
MV-10	Modular Logistics (Dorado Property)	High-Cube Warehouse	1109.378	TSF
MV-11	PA 09-0004 (Vogel)	High-Cube Warehouse	800.000	TSF

Attachment: Air Quality Study (2444 : Legacy Park Project)

	Sares Regis	High-Cube Warehouse	1600.000	TSF
MV-12	TM 34748	SFDR	135	DU
MV-13	First Nandina Logistics Center	High-Cube Warehouse	1450.000	TSF
MV-14	First Park Nandina III	High-Cube Warehouse	691.960	TSF
	Moreno Valley Commerce Park	High-Cube Warehouse	354.321	TSF
MV-15	March Business Center	General Light Industrial	16.732	TSF
		Warehousing	87.429	TSF
		High-Cube Warehouse	1380.246	TSF
MV-16	TM 33810	SFDR	16	DU
MV-17	TM 34151	SFDR	37	DU
MV-18	373K Industrial Facility	High-Cube Warehouse	373.030	TSF
MV-19	TM 32716	SFDR	57	DU
MV-20	TM 33417	Condo/Townhomes	60	DU
MV-21	TM 34988	Condo/Townhomes	271	DU
MV-22	TM 34216	Condo/Townhomes	39	DU
MV-23	TM 34681	Condo/Townhomes	49	DU
MV-24	PA 08-0079-0081 (WinCo Foods)	Discount Supermarket	95.440	TSF
		Specialty Retail	14.800	TSF
MV-25	Moreno Beach Marketplace (Lowe's)	Commercial Retail	175.000	TSF
	Auto Mall Specific Plan (Planning Area C)	Commercial Retail	304.500	TSF
	Westridge	High-Cube Warehouse	937.260	TSF
	ProLogis	High-Cube Warehouse	1916.190	TSF
		Warehousing	328.448	TSF
	World Logistics Center	High-Cube Warehouse	41400.000	TSF
		Warehousing	200.000	TSF
		Gas Station w/ Market	12	VFP
		Existing SFDR	7	DU
MV-26	a TR 32460 (Sussex Capital)	SFDR	57	DU
	b TR 32459 (Sussex Capital)	SFDR	11	DU
	c TR 30411 (Pacific Communities)	SFDR	24	DU
	d TR 33962 (Pacific Scene Homes)	SFDR	31	DU
	e TR 30998 (Pacific Communities)	SFDR	47	DU
MV-27	a P06-158 (Gascon)	Commercial Retail	116.360	TSF
	b Auto Mall Specific Plan (PAC)	Commercial Retail	304.500	TSF
	c ProLogis	SFDR	126	DU
		High-Cube Warehouse	1529.498	TSF
	d TR 35823 (Stowe Passco)	SFDR	261	DU
		Apartments	216	DU
MV-28	TR 36340	SFDR	275	DU
MV-29	a TR 31771 (Sanchez)	SFDR	25	DU
	b TR 34397 (Winchester Associates)	SFDR	52	DU
	c TR 32645 (Winchester Associates)	SFDR	53	DU
MV-30	Lowe's (Moreno Beach Marketplace)	Home Improvement Store	175.000	TSF
MV-31	a Senior Assisted Living	Assisted Living Units	139	DU
	b TR 31590 (Winchester Associates)	SFDR	96	DU
	c TR 32548 (Gabel, Cook & Associates)	SFDR	107	DU
	d TR 32218 (Whitney)	SFDR	63	DU

	e Medical Plaza	Medical Offices	311.633	TSF
MV-32	a Moreno Medical Campus	Medical Offices	80.000	TSF
	b Aqua Bella Specific Plan	SFDR	2,922	DU
	c TR 34329 (Granite Capitol)	SFDR	90	DU
	d Cresta Bella	General Office	30.000	TSF
MV-33	Moreno Valley Industrial Center (Industrial Area SP)	General Light Industrial	354.810	TSF
MV-34	Centerpointe Business Park	General Light Industrial	356.000	TSF
MV-35	Moreno Valley Shopping Center	Free Standing Discount Store	189.520	TSF
		Gas Station w/ Market / Car Wash	16	VFP
MV-36	TR 31305 / Richmond American	Residential	87	DU
MV-37	TR 34329 / Granite Capitol	Residential	90	DU
MV-38	TR 31814 / Moreno Valley Investors	Residential	60	DU
MV-39	TR 33771 / Creative Design Associates	Residential	12	DU
MV-40	TR 35663 / Kha	Residential	12	DU
MV-41	TR 22180 / Young Homes	Residential	140	DU
MV-42	TR 32515	Residential	161	DU
MV-43	TR 32142	Residential	81	DU
MV-44	San Michele Industrial Center (Industrial Area SP)	General Light Industrial	865.960	TSF
MV-45	Commercial Medical Plaza	Medical Offices	311.633	TSF
MV-46	Edgemont Street, South of Eucalyptus Av. (PA14-0042)	Apartments	112	DU
MV-47	28860 Professor's Fun IV, LLC/Winchester Associates, Inc.	SFDR	9	DU
MV-48	20636 Pacific Communities	SFDR	67	DU
MV-49	31297 Randy McFarland	SFDR	7	DU
MV-50	31394 Pigeon Pass, Ltd.	SFDR	78	DU
MV-51	31442 SKG Pacific Enterprises Inc.	SFDR	63	DU
MV-52	31517 Professors Prop Six/Winchester Assoc.	SFDR	83	DU
MV-53	31621 Peter Sanchez	SFDR	25	DU
MV-54	32005 Red Hill Village, LLC	SFDR	214	DU
MV-55	32126 Salvador Torres	SFDR	35	DU
MV-56	32194 Arman Pezeshkifar	SFDR	32	DU
MV-57	32408 Sanstone Inc.	SFDR	80	DU
MV-58	32844 Winchester Associates	SFDR	17	DU
MV-59	32978 Focus Estates	SFDR	19	DU
MV-60	33024 Adam Wislar	SFDR	8	DU
MV-61	33275 Jose Guzman	SFDR	4	DU
MV-62	33388 SCH Development, LLC	SFDR	16	DU
MV-63	33436 Winchester Associates	SFDR	105	DU
MV-64	33963 Rance Garrett	SFDR	31	DU
MV-65	34043 RM3 Building and Development	SFDR	12	DU
MV-66	31621 Beazer Homes	SFDR	274	DU
MV-67	30268 Pacific Communities	SFDR	83	DU
MV-68	31414 GRF - Majestic Hills	SFDR	31	DU
	Tract 31618	SFDR	55	DU
MV-69	31494 Winchester Associates	SFDR	12	DU

MV-70	32715 GFR - Trinity	SFDR	30	DU
MV-71	33256 Granite Homes	SFDR	79	DU
MV-72	32711 Isaac Genah	SFDR	9	DU
MV-73	35530 Moreno Gilman 650, LLC-Quail Ranch	SFDR	1,105	DU
MV-74	35534 Leedco Engineers	SFDR	12	DU
MV-75	36436 CV Communities	SFDR	159	DU
MV-76	36401 Continental East Fund III, LLC	SFDR	92	DU
MV-77	32215 Winchester Associates "Scottish Village"	MFDR	194	DU
MV-78	32756 Jimmy Lee	MFDR	24	DU
MV-79	35369 Tason Myers Property	MFDR	12	DU
MV-80	35414 Lincoln Property Co. Southwest	MFDR	266	DU
MV-81	35769 Michael Chen	MFDR	16	DU
MV-82	PA09-0006 Jim Nydam	MFDR	15	DU
MV-83	35861 Frederick Homes	MFDR	24	DU
MV-84	36038 Alessandro Village Plaza, LLC	MFDR	96	DU
MV-85	35304 Jimmy Lee	MFDR	12	DU
MV-86	Alessandro & Lasselle	Shopping Center	140.000	TSF
MV-87	Food 4 Less - Fueling Station	Gas Station with Convenience Market	16	VFP
MV-88	El Paso (food court)	Fast Food no Drive Thru	--	TSF
MV-89	O'Reilly Automotive	Automobile Parts Sale	7.500	TSF
	PA15-004	Retail/Restaurant/Fast Food	2.973	TSF
MV-90	Moreno Valley Logistics	High-Cube Warehouse	1351.770	TSF
		Light Industrial	385.748	TSF
MV-91	Restaurant	Restaurant	9.000	TSF
MV-92	Rancho Belago Plaza - Retail	Retail	14.000	TSF
MV-93	Yum Yum Donut Shop	Coffee/Donut Shop w/o Drive-Thru	4.351	TSF
MV-94	Hawthorn Inn & Suites	Hotel	79	RMS
MV-95	Sleep Inn Suites	Hotel	66	RMS
MV-96	Integrated Care Communities	Nursing Home	44.000	TSF
MV-97	Kaiser Permanente - Emergency Room Expansion	Medical Offices	--	TSF
MV-98	Moreno Valley Professional Center	General Office	84.000	TSF
MV-99	Olivewood Plaza - Office Building	General Office	23.000	TSF
MV-100	Renaissance Village of Moreno Valley	Senior Adult Housing-Attached	44	DU
MV-101	Riverside County Office Building	General Office	52.000	TSF
MV-102	Gateway Business Park	Residential Condo/Townhouse	34	DU
MV-103	Shaw Development	High-Cube Warehouse	367.000	TSF
MV-104	IDS/Real Estate Group - Nandina Distribution Center	High-Cube Warehouse	697.000	TSF
MV-105	Stoneridge Town Centre - Vacant Restaurant	Restaurant	5700.000	TSF
MV-106	Ironwood Residential	SFDR	144	DU
MV-107	TTM 31592 (P 13-078) Covey Ranch	SFDR	115	DU
MV-108	PA 06-0014 (Pierce Hardy Limited Partnership)	Lumbar Yard	67.000	TSF
MV-109	P06-1408	Retail	75.300	TSF

MV-110	PA13-009	Gas Station	16	VFP
MV-111	Moval Assemblage	High-Cube Warehouse	459.945	TSF
MARCH JOINT POWERS AUTHORITY				
MA-1	March Lifecare Campus Specific Plan[4]	Medical Offices	190.000	TSF
		Commercial Retail	210.000	TSF
		Research & Education	200.000	TSF
		Hospital	50	Beds
		Institutional Residential	660	Beds
MA-2	Airport Master Plan	Airport Use	559.000	TSF
MA-3	Freeway Business Center (March JPA)	High-Cube Warehouse	710.083	TSF
COUNTY OF RIVERSIDE				
RC-1	SP 341; PP 21552 (Majestic Freeway Business Center)	High-Cube Warehouse	6100.715	TSF
RC-2	PP 20699 (Oleander Business Park)	Warehousing	1206.710	TSF
RC-3	Ramona Metrolink Station	Light Rail Transit Station	300	SP
RC-4	PP 22925 (Amstar/Kaliber Development)	Office (258.102 TSF)	258.102	TSF
		Warehousing	409.312	TSF
		General Light Industrial	42.222	TSF
		Retail	10.000	TSF
RC-5	Alessandro Metrolink Station	Light Rail Transit Station	300	SP
RC-6	Meridian Business Park North	Industrial Park	5985.000	TSF
RC-7	PP 18908	General Light Industrial	133.000	TSF
RC-8	Tract 33869	SFDR	39.000	DU
RC-9	PP 16976	General Light Industrial	85.000	TSF
RC-10	PP 21144	Industrial Park	190.802	TSF
RC-11	a Villages of Lakeview	SFDR	860	DU
		Condo/Townhomes	1,920	DU
		Elementary School	1,200	STU
		Commercial Retail	100.000	TSF
		Soccer Complex	12	Fields
		City Park	8.9	AC
		County Park	8.1	AC
		Regional Park	107.1	AC
	b Motte Lakeview Ranch	SFDR	847	DU
		Condo/Townhomes	686	DU
		Apartments	467	DU
		Elementary School	650	STU
		Middle School	300	STU
		Commercial Retail	120.000	TSF
		Regional Park	177.0	AC
RC-12	CUP03315	Gas Station w/ Market	17	VFP
		Fast Food w/o Drive Thru	5.600	TSF
		High-Turnover Restaurant	6.500	TSF
RC-13	PP23342	Industrial Park	180.600	TSF
RC-14	TR30592	SFDR	131	DU

RC-15	Rider Street Quarry	Quarry	2500.0	AC
RC-16	PP 20711	Manufacturing	20.0	AC
	Yocum Baldwin	Warehousing	46.8	AC
RC-17	March Business Center - South Campus	Shopping Center	108.900	TSF
		Industrial Park	1336.700	TSF
		Large Industrial Park	3269.000	TSF
		General Office Building	140.600	TSF
		Manufacturing	215.600	TSF
		Warehousing	1379.200	TSF
		Park	50.0	AC
		R&D	1611.800	TSF
RC-18	Ben Clark Training Facility	Students	5,045	STU
		Employees	354	EMP
RC-19	PP 20103	Gen. Light Industrial	290.985	TSF
RC-20	Nuevo Business Park	Gen. Light Industrial	357.156	TSF
		Warehousing	1767.618	TSF
RC-21	Meridian (March Business Park SP)	Business Park	41917.000	TSF
RC-22	Blanding Assemblage	High-Cube Warehouse	707.880	TSF
RC-23	CUP 03527	Warehousing	8.000	TSF
RC-24	CUP 03599	Hotel	52.798	TSF
RC-25	PP 24608	Retail	9.280	TSF
RC-26	PM 32699	SFDR	2.00	DU
RC-27	PP 25699	Fast-Food w/Drive Thru	2.800	TSF
		Retail	19.000	TSF
RC-28	TR 30592	SFDR	131.00	DU
RC-29	PP 25768	Manufacturing	52.450	TSF
RC-30	CUP 03620R1	Gas Station w/ Market	8.00	VFP
RC-31	TTM 33410 Box Springs	SFDR	142	DU
RC-32	Knox Logistics	High-Cube Warehouse	1,259.050	TSF
RC-33	University Highlands	SFDR	405	DU
		Condo/Townhomes	320	DU
		Apartments	1,475	DU
		Shopping Center	50.0	TSF
		Parks	42.4	AC
CITY OF RIVERSIDE				
R-1	P07-1028 (Alessandro Business Park)	General Light Industrial	662.018	TSF
	Alessandro and Gorgonio	Fast Food w/Drive Thru	4.050	TSF
R-2	Alessandro Bl. (APN 263-091-008; 263-100-019; 263-100-005; P14-0841 to 0848)	Commercial and Industrial Complex	101.580	TSF
R-3	California Baptist University Specific Plan	University	157.0	AC
R-4	Canyon Springs Specific Plan	Hospital	280	BEDS
		Medical-Dental Office	370.000	TSF
		Senior Adult Housing-Attached	234	DU
		Assisted Living	267	BEDS
R-5	Citrus Business Park Specific Plan	Industrial Business Park	49.0	AC
R-6	Downtown Specific Plan	Residential	5,000	DU
R-7	Hunter Business Park	Industrial	1300.0	AC
R-8	La Sierra University Specific Plan	Mixed-Use		

R-9	Magnolia Avenue Specific Plan	Mixed-Use/Very High Residential	1473.0	AC
R-10	Marketplace Specific Plan	Commercial Retail/Office	200.0	AC
R-11	Mission Grove Specific Plan	Business/Office Park	56.8	AC
		Commercial Retail	68.1	AC
		High Density Residential	53.8	AC
		Low Density Residential	78.4	AC
		Medium Density Residential	155.3	AC
R-12	Orangecrest Specific Plan	Rural Residential	2.1	AC
		Business/Office Park	2.7	AC
		Commercial Retail	139.0	AC
		High Density Residential	13.7	AC
		Low Density Residential	540.8	AC
		Medium Density Residential	1217.8	AC
		Public Facilities/Institutions	121.6	AC
		Public Park	59.5	AC
R-13	Rancho La Sierra Specific Plan	SFDR	598	DU
R-14	Riverside Auto Center Specific Plan	Auto Center		
R-15	Riverwalk Vista Specific Plan	Residential	402	DU
R-16	Sycamore Canyon Specific Plan	Hillside Residential	41.8	AC
		Low Density Residential	97.3	AC
		Medium Density Residential	14.8	AC
		Very Low Density Residential	884.2	AC
		Public Park	27.9	AC
R-17	Sycamore Canyon Business Park Specific Plan	Business/Office Park	847.2	AC
		Commercial Retail	10.3	AC
R-18	Sycamore-Highlands Specific Plan	Commercial Retail	14.6	AC
		High Density Residential	52.2	AC
		Medium Density Residential	99.1	AC
		Public Facilities	1.6	AC
			144.2	AC
		Very Low Density Residential	49.1	AC
R-19	University Avenue Specific Plan	Mixed-Use	Varies	
R-20	807 Blaine Street (P09-0717; P09-0718)	Apartments	55	DU
R-21	2340 Fourteenth Street (P09-0808; P08-0809)	Senior Housing	134	BEDS
R-22	Park Sierra Avenue (P14-0026; P14-0027)	Fast Food w/Drive Thru	3.500	TSF
R-23	6287 Day Street (P10-0090; P10-0091)	Gas Station	2	VFP
	2570 Canyon Springs Parkway (P08-0274; P08-0275)	Bank w/ Drive Thru	2.746	TSF

	6211 Valley Springs Parkway (Steak 'N Shake Restaurant; P14-0536)	Fast Food w/Drive Thru	3.750	TSF
R-24	N. of Van Buren Boulevard; W. of Wood Street (P10-0808; P10-0708)	Fast Food w/Drive Thru	2.361	TSF
R-25	E. of Commerce St., between Mission Inn Av. and Ninth St. (P14-0045; P14-0046; P14-0047; P14-0048; P14-0049)	Apartments	208	DU
R-26	NWC of Riverwalk Parkway and Flat Rock Drive (P12-0019; P12-0156; P12-0158)	Convenience Store	2.400	TSF
		Coffee Shop	3.946	TSF
R-27	3875 Dawes Street (P10-0438; Magnolia Garden Condominiums)	Condo/Townhomes	62	DU
R-28	5938-5944 Grand Avenue (P12-0266; P12-0267; P12-0268)	Senior Housing	37	DU
R-29	4445 Magnolia Avenue (P13-0207; P13-0208; P13-0209; P13-0210; P13-0211)	Hospital Expansion	Varies	
R-30	SR-91/Van Buren Commercial	Commercial Retail	23.565	TSF
R-31	360 Alessandro Boulevard (P12-0419; P12-0557; P12-0558; P12-0559)	Bank	3.858	TSF
R-32	6465 Sycamore Canyon Boulevard	Health Club	4.000	TSF
R-33	2450 Market Street (P13-0087; P13-0262)	Apartments	77	DU
R-34	6091 Victoria Avenue (P13-0432)	Day Care	1.831	TSF
R-35	14601 Dauchy Av. - TM 36370 (P12-0601; P12-0697; P12-0698)	SFDR	10	DU
	TM 32180 (P07-1073)	SFDR	9	DU
	18875 Moss Road	SFDR	8	DU
	South of Clarke St., west of Crystal View Terrace (PM 34583' {09-0141; P09-173)	SFDR	3	DU
R-36	4824 Jones Avenue (P13-0181; P13-0182)	Church	23.124	TSF
R-37	2586 University avenue (P13-0650; P13-0651)	Bed and Breakfast	3.618	TSF
R-38	18580 Van Buren Boulevard (P08-0402; P13-0822)	Auto Repair Shop	8.142	TSF
R-39	4247 Van Buren Boulevard (P13-0785; P13-0787)	Church Expansion	12.166	TSF
R-40	SWC of Lurin Avenue and Wood Road (P06-0900; P08-0269; P08-0270; TTM 32301)	SFDR	20	DU
R-41	8616 California Avenue (P08-0084; PM 35852)	Condo/Townhomes	21	DU
R-42	19811 Lurin Avenue (P06-1355; TM 33480)	SFDR	32	DU
R-43	APN:266140029, 030 (P06-1396; Mariposa Avenue; TM 33481)	SFDR	25	DU
R-44	APN:266140002, 021, 022 (P06-1404; Lurin Avenue; TM 33482)	SFDR	29	DU
R-45	3719 Strong Street (P05-0269; P08-0416; TM 33550)	SFDR	9	DU
R-46	1006 & 1008 Clark Street (P06-0782; TM 34908)	SFDR	15	DU
R-47	E. of Gratton St., W. of Corsica Av., N. of Van Buren Bl. (P05-1528; P09-0087; TM 34509)	SFDR	50	DU
R-48	NWC of Dominion Avenue and Division Street (P08-0396; P08-0397; P08-0398; P08-0399; TM 35620)	Condo/Townhomes	36	DU
R-49	6639 Hillside Avenue (P08-0727; PM 35901)	Industrial	5	LOTS

R-50	19985 Van Buren Boulevard (P10-0118; Gless Ranch)	Commercial Retail	425.447	TSF
R-51	3990 Reynolds Road (P12-0021; P12-0022; P12-0074; PM 36442)	Condo/Townhomes	102	DU
R-52	NEC of Martha Way & Everest Avenue (P13-0389; TM 36579)	SFDR	5	DU
R-53	4325, 4335, 4345, 4355, 4375 Adams Street (P13-0723; P13-0724; P13-0725; TM 36654)	SFDR	62	DU
R-54	5200 Van Buren Boulevard (P09-0600; P09-0601; Walmart Expansion)	Free Standing Discount Store	22.272	TSF
R-55	P06-0160	Gen. Light Industrial	316.224	TSF
	P06-1281	Warehousing	107.732	TSF
R-56	9241 & 9265 Audrey Avenue (P12-0184; P12-0185; P12-0187; Azar Plaza)	Commercial Retail	6.150	TSF
R-57	Office, Magnon & Panattoni	Office	131.000	TSF
		Warehousing	1400.000	TSF
		Warehousing	300.000	TSF
		Warehousing	216.000	TSF
R-58	1710 Main Street (P12-0717)	Family Dollar Store	8.039	TSF
R-59	2861 Mary Street (P12-0442; P12-0443; P12-0444)	Shopping Center	56.101	TSF
R-60	3545 Central Avenue (P12-0741; P12-0743)	Riverside Plaza Renovations	35.0	AC
R-61	5731, 5741, 5761 & 5797 Pickler Street (P13-0198; P13-0199; P13-0200; P13-0201)	Apartments	30	DU
R-62	3705 Tyler Street (P13-0501; P13-0502)	Restaurant	6.000	TSF
R-63	6570 Magnolia Avenue; 3739 & 3747 Central Avenue (P13-0196; P13-0197)	Fast Food w/Drive Thru	3.795	TSF
R-64	5940-5980 Sycamore Canyon Boulevard (P13-0553; P13-0554; P13-0583; P14-0065)	Apartments	275	DU
R-65	SEC Sycamore Canyon Boulevard & Box Springs Road (P13-0607; P13-0608; P0609; P13-0854)	General Light Industrial	171.616	TSF
R-66	P06-0591	Office	37.939	TSF
		Warehousing	782.188	TSF
		Manufacturing	168.294	TSF
R-67	474 Palmyrita Avenue (P13-0956; P13-0959; P13-0960; P13-0963; P13-0964; P13-0965; P13-0966)	High-Cube Warehouse	1461.449	TSF
CITY OF PERRIS				
P-1	P 05-0113 (IDI)	High-Cube Warehouse	1750.000	TSF
P-2	P 05-0192 (Oakmont I)	High-Cube Warehouse	697.600	TSF
P-3	P 05-0477	High-Cube Warehouse	462.692	TSF
P-4	Rados Distribution Center	High-Cube Warehouse	1200.000	TSF
P-5	Investment Development Services (IDS) II	High-Cube Warehouse	350.000	TSF
P-6	P 07-09-0018	Warehousing	170.000	TSF
P-7	P 07-07-0029 (Oakmont II)	High-Cube Warehouse	1600.000	TSF
P-8	TR 32707	SFDR	137	DU
P-9	TR 34716	SFDR	318	DU
P-10	P 05-0493 (Ridge I)	High-Cube Warehouse	700.000	TSF
P-11	Ridge II	High-Cube Warehouse	2000.000	TSF

P-12	Harvest Landing Specific Plan	SFDR	717	DU
		Condo/Townhomes	1,139	DU
		Sports Park	16.7	AC
		Business Park	1233.401	TSF
		Shopping Center	73.181	TSF
	Perris Marketplace	Shopping Center	450.000	TSF
P-13	P 06-0411 (Concrete Batch Plant)	Manufacturing	2.000	TSF
P-14	Jordan Distribution	High-Cube Warehouse	378.000	TSF
P-15	Aiere	High-Cube Warehouse	642.000	TSF
P-16	P 08-11-0005; P 08-11-0006 (Starcrest)	High-Cube Warehouse	454.088	TSF
P-17	Stratford Ranch Specific Plan	High-Cube Warehouse	1725.411	TSF
P-18	Stratford Ranch Specific Plan	High-Cube Warehouse	480.000	TSF
		General Light Industrial	120.000	TSF
P-19	P05-0493	Logistics	597.370	TSF
P-20	Starcrest, P011-0005; 08-11-0006	General Light Industrial	454.088	TSF
P-21	South Perris Industrial Phase 1	Logistics	787.700	TSF
P-22	South Perris Industrial Phase 2	Logistics	3448.734	TSF
P-23	South Perris Industrial Phase 3	Logistics	3166.857	TSF
P-24	P 04-0343	Warehousing	41.650	TSF
P-25	P 06-0228	General Light Industrial	149.738	TSF
P-26	P 06-0378	Senior Housing	429	DU
P-27	P 11-09-0011	Retail	80.000	TSF
P-28	P 12-05-0013	Apartments	75	DU
P-29	P 12-10-0005	High-Cube Warehouse	1463.887	TSF
P-30	TR 30850	Residential	496	DU
P-31	TR 30973	Residential	35	DU
P-32	TR 31225	Residential	57	DU
P-33	TR 31226	Residential	82	DU
P-34	TR 31240	Residential	114	DU
P-35	TR 31407	Residential	243	DU
P-36	TR 31650	SFDR	61	DU
P-37	TR 31659	SFDR	161	DU
P-38	TR 32041	Residential	122	DU
P-39	TR 32406	SFDR	15	DU
P-40	TR 33193	Townhomes	94	DU
P-41	TR 33338	Residential	75	DU
P-42	Park West Specific Plan	SFDR	521	DU
		Elementary School	750	STU
		Neighborhood Park	5.0	AC
P-43	The Venue	Commercial Retail	642.627	TSF
	Retail on San Jacinto	Commercial Retail	217.800	TSF
	Retail on Redlands	Fast Food w/ Drive Thru	4.500	TSF
		Pharmacy w/ Drive Thru	14.000	TSF
		Specialty Retail	31.500	TSF
P-44	South Perris Metrolink Station	Light Rail Transit Station	680	SP
P-45	IDS 04-0464	High-Cube Warehouse	1686.760	TSF

P-46	TTM 32708 (50% Complete)	SFDR	238	DU
P-47	PM 34199	Gen. Light Industrial	46.500	TSF
	DPR 05-0387	Gen. Light Industrial	9.854	TSF
	DPR 05-0452	Warehousing	31.200	TSF
	TPM 34697	Gen. Light Industrial	47.400	TSF
	DPR 06-0396	Warehousing	159.823	TSF
P-48	Integra Pacific Industrial Facility	High-Cube Warehouse	880.000	TSF

[1] SFDR = Single Family Detached Residential ; MFDR = Multi-Family Detached Residential

[2] DU = Dwelling Units; TSF = Thousand Square Feet; SP = Spaces; VFP = Vehicle Fueling Positions; RMS = Rooms; AC = Acres; EMP = Employees

[3] Source: Cactus Avenue and Commerce Center Drive Commercial Center TIA, Urban Crossroads, Inc., December 9, 2008 (Revised).

[4] Source: March Lifecare Campus Specific Plan Traffic Impact Analysis, Mountain Pacific, Inc., May 2009 (Revised).

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4 FINDINGS & CONCLUSIONS

4.1 CONSTRUCTION-SOURCE EMISSIONS

REGIONAL IMPACTS

For regional emissions, the Project would not exceed the numerical thresholds of significance established by the SCAQMD for any criteria pollutant. It should be noted that impacts without mitigation take credit for reductions achieved through standard regulatory requirements (Rule 403 and Rule 1113). Thus a less than significant impact would occur for Project-related construction-source emissions and no mitigation measures are required.

Localized Impacts

For localized emissions, the Project would not exceed the SCAQMD's localized significance threshold. Thus a less than significant impact would occur and no mitigation is required.

Project construction-source emissions would not conflict with the applicable AQMP.

Odors

Established requirements addressing construction equipment operations, and construction material use, storage, and disposal requirements act to minimize odor impacts that may result from construction activities. Moreover, construction-source odor emissions would be temporary, short-term, and intermittent in nature and would not result in persistent impacts that would affect substantial numbers of people. Potential construction-source odor impacts are therefore considered less-than-significant.

4.2 OPERATIONAL-SOURCE EMISSIONS

REGIONAL IMPACTS

For regional emissions, the Project would not exceed the numerical thresholds of significance established by the SCAQMD. Thus a less than significant impact would occur for Project-related operational-source emissions and no mitigation is required.

LOCALIZED IMPACTS

Project operational-source emissions would not result in or cause a significant localized air quality impact as discussed in the operational LSTs section of this report. The proposed Project would not result in a significant CO "hotspot" as a result of Project related traffic during ongoing operations, nor would the Project result in a significant adverse health impact as discussed in Section 3.8, thus a less than significant impact to sensitive receptors during operational activity is expected.

ODORS

Substantial odor-generating sources include land uses such as agricultural activities, feedlots, wastewater treatment facilities, landfills or various heavy industrial uses. The Project does not propose any such uses or activities that would result in potentially significant operational-source odor impacts. Potential sources of operational odors generated by the Project would include disposal of miscellaneous residential refuse. Moreover, SCAQMD Rule 402 acts to prevent occurrences of odor nuisances (1). Consistent with City requirements, all Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with solid waste regulations. Potential operational-source odor impacts are therefore considered less-than-significant.

5 REFERENCES

1. **South Coast Air Quality Management District.** RULE 402. Nuisance. [Online] May 7, 1976. [Cited: September 17, 2013.] http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-402.pdf?sfvrsn=4.
2. —. RULE 1113. Architectural Coatings. [Online] http://www.aqmd.gov/rules/reg/reg11/r1113.pdf.
3. —. RULE 403. Fugitive Dust. [Online] http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-403.pdf?sfvrsn=4.
4. —. RULE 1186. PM10 Emissions From Paved and Unpaved Roads, and Livestock Operations. [Online] http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1186-1-less-polluting-sweepers.pdf?sfvrsn=4.
5. —. Draft Staff Report: Proposed Amended Rules 1113- Architectural Coatings. [Online] November 2015. http://www.aqmd.gov/docs/default-source/planning/architectural-coatings/current-activities-support-documents/2015_11_dsr_par1113.pdf?sfvrsn=2.
6. —. Southern California Air Basins. [Online] [Cited: November 13, 2013.] http://www.aqmd.gov/map/mapaqmd1.pdf.
7. **Environmental Protection Agency.** National Ambient Air Quality Standards (NAAQS). [Online] 1990. [Cited: September 17, 2014.] http://www.epa.gov/air/criteria.html.
8. **South Coast Air Quality Management District.** Annual Air Quality Monitoring Network Plan. [Online] July 2016. http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-monitoring-network-plan/annual-air-quality-monitoring-network-plan-v2.pdf?sfvrsn=2.
9. **Environmental Protection Agency.** Monitor Values Report. [Online] https://www.epa.gov/outdoor-air-quality-data/monitor-values-report.
10. **Air Resources Board.** Air Quality Standards and Area Designations. [Online] 2013. [Cited: September 17, 2014.] http://www.arb.ca.gov/desig/desig.htm.
11. **South Coast Air Quality Management District.** *Air Quality Reporting.* [pdf] Diamond Bar : Sierra Wade Associates, 1999.
12. —. RULE 403. Fugitive Dust. [Online] http://www.aqmd.gov/rules/reg/reg04/r403.pdf.
13. **Environmental Protection Agency.** Air Pollution and the Clean Air Act. [Online] [Cited: September 17, 2014.] http://www.epa.gov/air/caa/.
14. **Air Resources Board.** California Ambient Air Quality Standards (CAAQS). [Online] 2009. [Cited: September 17, 2014.] http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm.
15. **South Coast Air Quality Management District.** 2012 Air Quality Management Plan (AQMP). [Online] 2012. [Cited: September 17, 2014.] http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan.
16. **California Environmental Quality Act.** Checklist. [Online] [Cited: September 17, 2014.] http://ceres.ca.gov/ceqa/guidelines/Appendix_G.html.
17. **South Coast Air Quality Management District (SCAQMD).** SCAQMD Air Quality Significance Thresholds. [Online] http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2.
18. **California Air Pollution Control Officers Association (CAPCOA).** California Emissions Estimator Model (CalEEMod). [Online] September 2016. www.caleemod.com.

19. **South Coast Air Quality Management District.** RULE 1113. Architectural Coatings. [Online] http://www.aqmd.gov/rules/reg/reg11/r1113.pdf.
20. —. RULE 431.2. Sulfur Content of Liquid Fuels. [Online] http://www.aqmd.gov/rules/siprules/sr431-2.pdf.
21. —. RULE 403. Fugitive Dust. [Online] http://www.aqmd.gov/rules/reg/reg04/r403.pdf.
22. —. RULE 1186. PM10 Emissions From Paved and Unpaved Roads, and Livestock Operations. [Online] http://www.aqmd.gov/rules/reg/reg11/r1186.pdf.
23. **Urban Crossroads, Inc.** *Legacy Park (Tentative Tract Map No. 36760) Traffic Impact Analysis.* Irvine : s.n., 2016.
24. **California Department of Transportation.** *Transportation Project-Level Carbon Monoxed Protocol.* 1997. UCD-ITS-RR-92-21.
25. **Lake Environmental.** US EPA Models. *Lake Environmental.* [Online] http://www.weblakes.com/download/us_epa.html.
26. **South Coast Air Quality Management District.** *Localized Significance Thresholds Methodology.* s.l. : South Coast Air Quality Managment District, 2003.
27. —. *Localized Significance Thresholds Methodology.* s.l. : South Coast Air Quality Managment District, 2008.
28. —. 2003 Air Quality Management Plan. [Online] 2003. http://www.aqmd.gov/aqmp/aqmd03aqmp.htm.
29. **Bay Area Air Quality Management District.** [Online] http://www.baaqmd.gov/.
30. **Urban Crossroads.** *Legacy Park (Tentative Tract Map No. 37078) Traffic Impact Analysis.* Irvine : s.n., 2016.
31. **South Coast Air Quality Management District.** 2012 Air Quality Management Plan (AQMP). [Online] 2012. [Cited: November 13, 2013.] http://www.aqmd.gov/aqmp/2012aqmp/draft/index.html.
32. —. Draft 2016 Air Quality Management Plan (AQMP). [Online] June 2016. http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2016-air-quality-management-plan/DRAFT2016AQMP/draft2016aqmp-full.pdf?sfvrsn=2.
33. —. CEQA Air Quality Handbook (1993). [Online] 1993. [Cited: September 17, 2014.] http://www.aqmd.gov/ceqa/oldhdbk.html.
34. **City of Moreno Valley.** City of Moreno Valley Land Use Map. [Online] November 7, 2014. http://www.moreno-valley.ca.us/city_hall/general-plan/landuse_internet1114.pdf.
35. **Goss, Tracy A and Kroeger, Amy.** White Paper on Potential Control Strategies to Address Cumulative Impacts from Air Pollution. [Online] South Coast Air Quality Management District, 2003. http://www.aqmd.gov/rules/ciwg/final_white_paper.pdf.

6 CERTIFICATION

The contents of this air study report represent an accurate depiction of the environmental impacts associated with the proposed Legacy Park (Tentative Tract Map No. 36760) Project. The information contained in this air quality impact assessment report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 336-5987.

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EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May, 2010

Bachelor of Arts in Environmental Analysis and Design
University of California, Irvine • June, 2006

PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Planned Communities and Urban Infill – Urban Land Institute • June, 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April, 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August, 2007
AB2588 Regulatory Standards – Trinity Consultants • November, 2006
Air Dispersion Modeling – Lakes Environmental • June, 2006

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Attachment: Air Quality Study (2444 : Legacy Park Project)

APPENDIX 3.1:

STATE/FEDERAL ATTAINMENT STATUS OF CRITERIA POLLUTANTS

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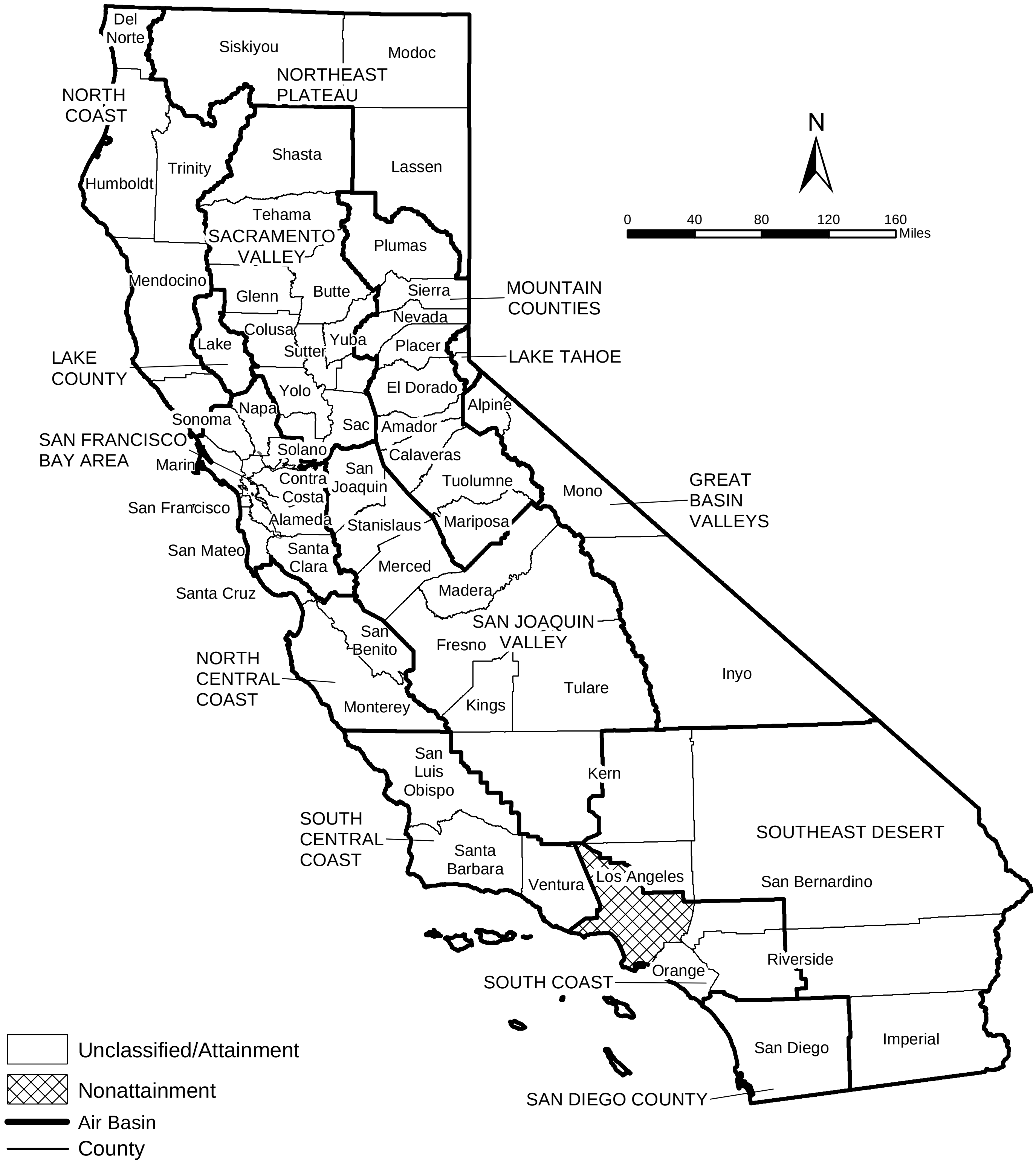
Area Designations for National Ambient Air Quality Standards

CARBON MONOXIDE

Last Reviewed: December 2015
Air Quality Planning Branch, AQPSD, CARB

Area Designations for National Ambient Air Quality Standards

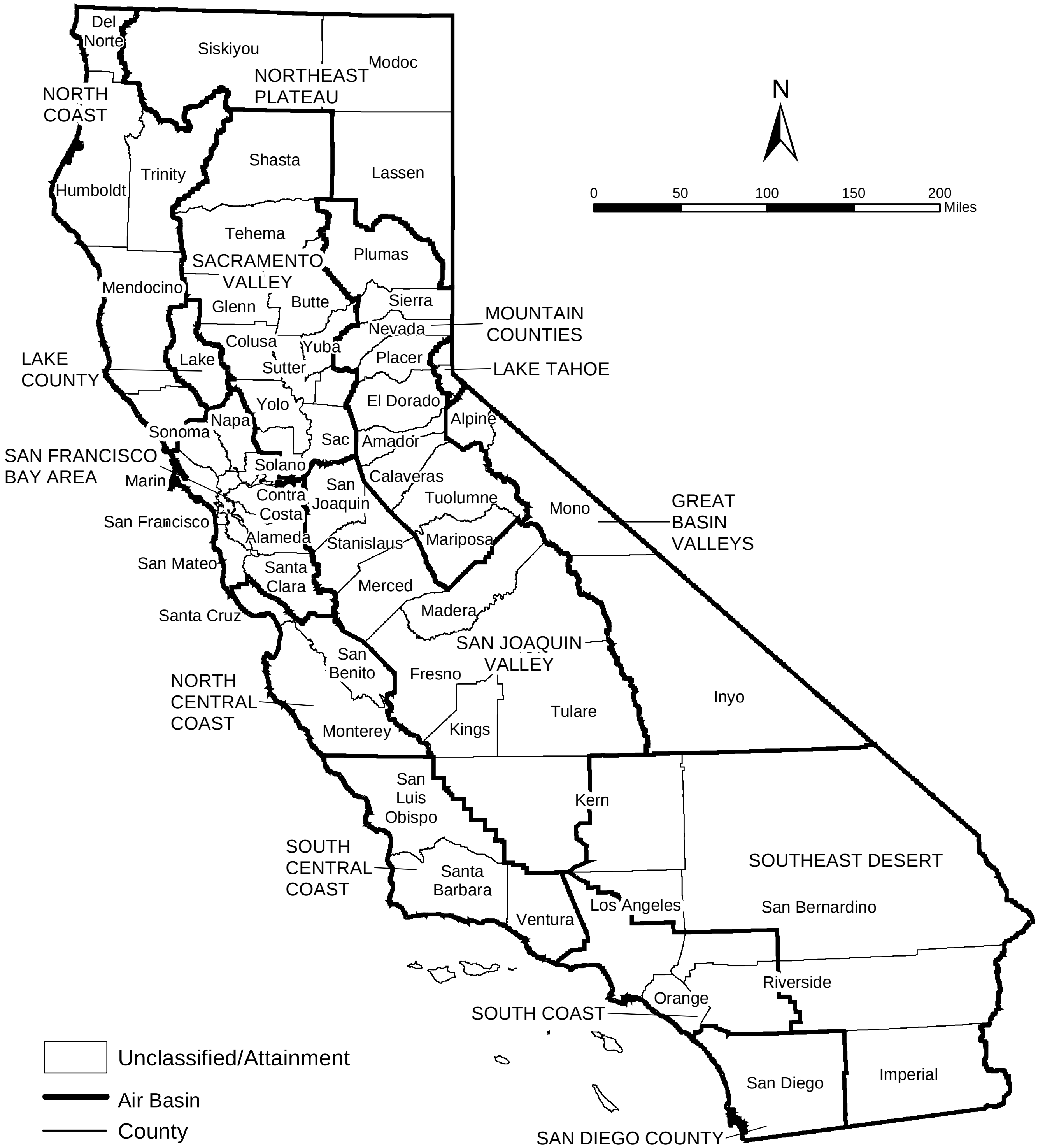
LEAD



Last Reviewed: December 2015
Air Quality Planning Branch, AQPSD, CARB

Area Designations for National Ambient Air Quality Standards

NITROGEN DIOXIDE



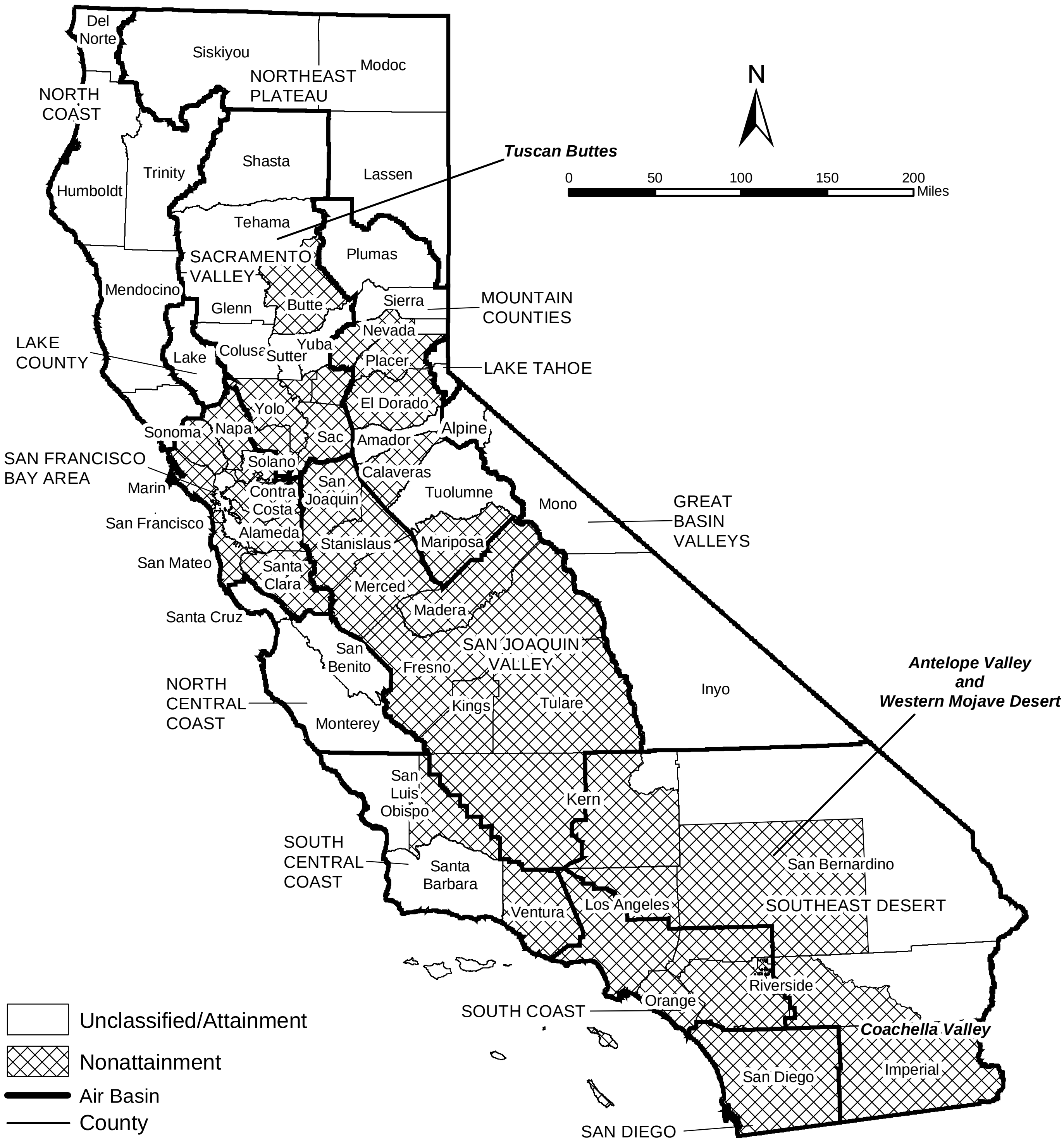
Unclassified/Attainment
Air Basin
County

Last Reviewed: December 2015
Air Quality Planning Branch, AQPSD, CARB

Attachment: Air Quality Study (2444 : Legacy Park Project)

Area Designations for National Ambient Air Quality Standards

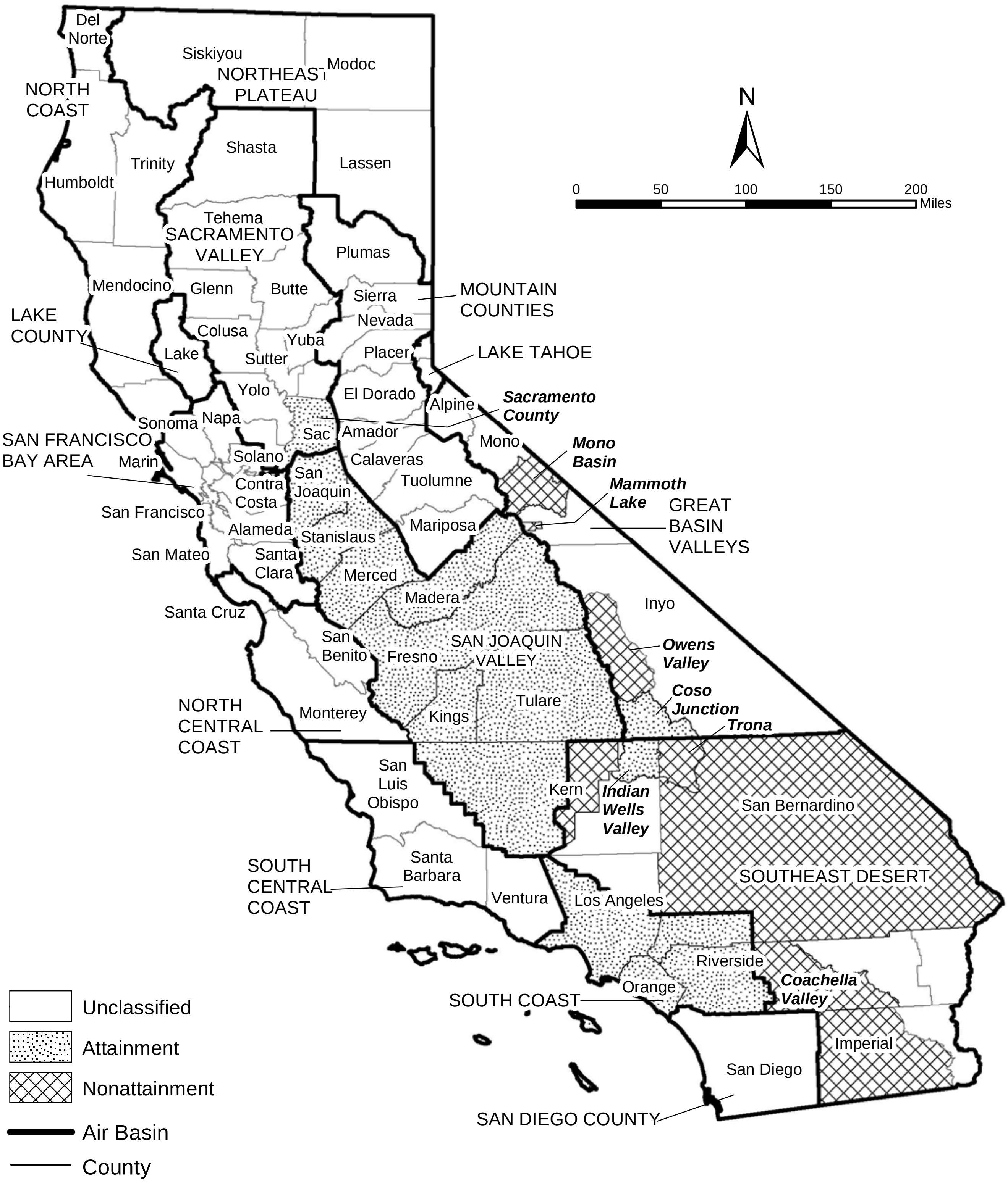
8-HOUR OZONE



Last Reviewed: December 2015
Air Quality Planning Branch, AQPSD, CARB

Area Designations for National Ambient Air Quality Standards

PM10



Last Reviewed: December 2015
Air Quality Planning Branch, AQPSD, CARB

Attachment: Air Quality Study (2444 : Legacy Park Project)

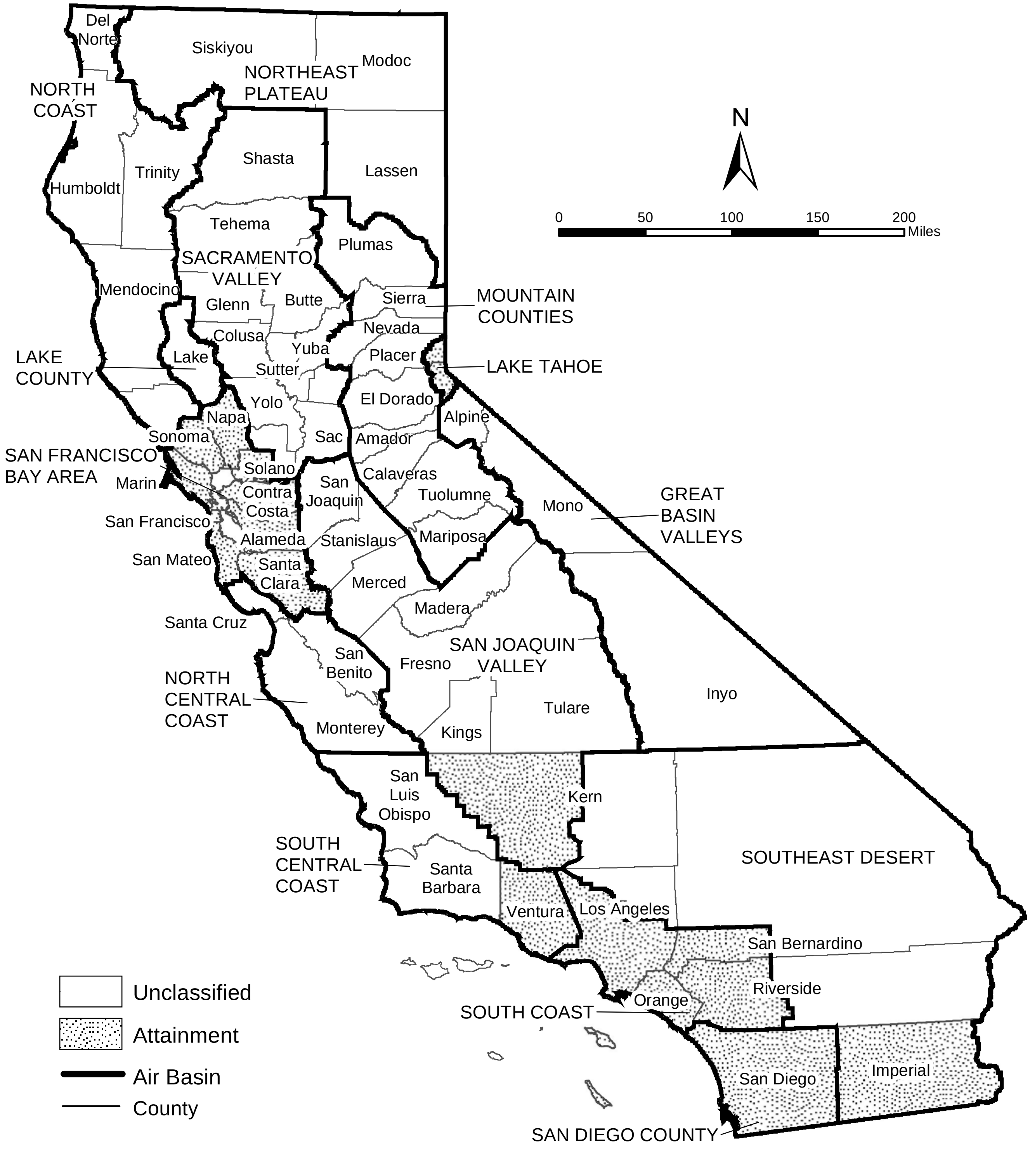
Area Designations
for
National Ambient Air Quality Standards

PM2.5

Last Reviewed: December 2015
Air Quality Planning Branch, AQPSD, CARB

Area Designations for National Ambient Air Quality Standards

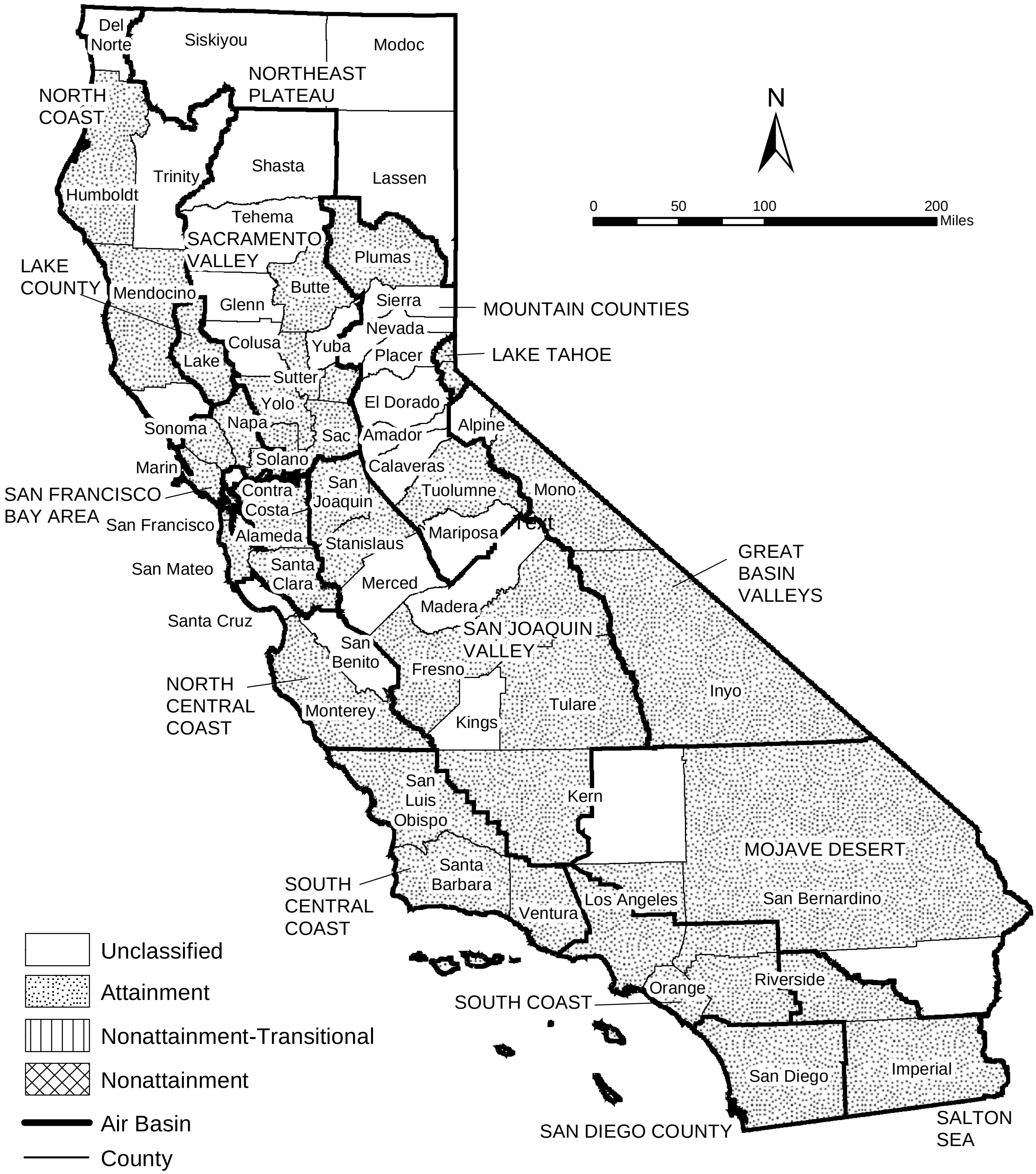
SULFUR DIOXIDE



Last Reviewed: December 2015
Air Quality Planning Branch, AQPSD, CARB

Area Designations
for
State Ambient Air Quality Standards

CARBON MONOXIDE



Source Date:
December 2015
Air Quality Planning Branch, AQPSD

Area Designations for State Ambient Air Quality Standards

LEAD

Source Date:
December 2015
Air Quality Planning Branch, AQPSD

Area Designations for State Ambient Air Quality Standards

NITROGEN DIOXIDE

Source Date:
December 2015
Air Quality Planning Branch, AQPSD

Attachment: Air Quality Study (2444 : Legacy Park Project)

Area Designations for State Ambient Air Quality Standards

OZONE

Source Date:
December 2015
Air Quality Planning Branch, AQPSD

Attachment: Air Quality Study (2444 : Legacy Park Project)

Area Designations for State Ambient Air Quality Standards

PM10

Source Date:
December 2015
Air Quality Planning Branch, AQPSD

Attachment: Air Quality Study (2444 : Legacy Park Project)

Area Designations for State Ambient Air Quality Standards

PM2.5

Source Date:
December 2015
Air Quality Planning Branch, AQPSD

Area Designations
for
State Ambient Air Quality Standards

SULFUR DIOXIDE

Source Date:
December 2015
Air Quality Planning Branch, AQPSD

Attachment: Air Quality Study (2444 : Legacy Park Project)

APPENDIX 3.2:

CALEEMOD EMISSIONS MODEL OUTPUTS

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Legacy Park (Tentative Tract Map No. 36760)

Riverside-South Coast County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	12.00	Acre	12.00	522,720.00	0
Single Family Housing	221.00	Dwelling Unit	40.90	512,278.00	632

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.4 **Precipitation Freq (Days)** 28

Climate Zone 10 **Operational Year** 2021

Utility Company Southern California Edison

CO2 Intensity (lb/MWhr) 479.9 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44.

Land Use - Based on site plan dated September 19, 2016; Total lot acreage: 52.9; Average home size: 2,318 s.f

Construction Phase - Based on past project experience and a 2021 opening year

Off-road Equipment - Based on 8 hour workday

Off-road Equipment - Based on 8 hour workday

Off-road Equipment - Based on past project experience

Off-road Equipment -

Grading -

Vehicle Trips -

Woodstoves - Rule 445- Gas stoves only

Energy Use - Title-24 Electricity Energy Intensity and Natural Gas Energy Intensity were adjusted by 28% to reflect 2016 Title 24 requirements. Source: 2016 Title 24 Energy Efficiency Standards Adoption Hearing 06/10/15

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Fleet Mix - Based on Caltrans ITS Transportation Project-Level Carbon Monixide Protocol to reflect residential land use trips.

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstructionPhase	NumDays	75.00	650.00
tblConstructionPhase	NumDays	1,110.00	650.00
tblConstructionPhase	NumDays	110.00	75.00
tblConstructionPhase	NumDays	75.00	55.00
tblConstructionPhase	PhaseEndDate	11/23/2022	12/24/2021
tblConstructionPhase	PhaseEndDate	3/11/2020	9/25/2020
tblConstructionPhase	PhaseEndDate	9/13/2017	1/12/2018
tblConstructionPhase	PhaseEndDate	5/27/2020	3/30/2018
tblConstructionPhase	PhaseStartDate	5/28/2020	6/29/2019
tblConstructionPhase	PhaseStartDate	9/14/2017	3/31/2018

tblConstructionPhase	PhaseStartDate	6/1/2017	10/1/2017
tblConstructionPhase	PhaseStartDate	3/12/2020	1/13/2018
tblEnergyUse	T24E	1,077.77	775.99
tblEnergyUse	T24NG	31,096.40	1,158.36
tblFireplaces	NumberGas	187.85	221.00
tblFireplaces	NumberNoFireplace	22.10	0.00
tblFireplaces	NumberWood	11.05	0.00
tblLandUse	BuildingSpaceSquareFeet	397,800.00	512,278.00
tblLandUse	LandUseSquareFeet	397,800.00	512,278.00
tblLandUse	LotAcreage	71.75	40.90
tblOffRoadEquipment	HorsePower	402.00	189.00
tblOffRoadEquipment	LoadFactor	0.38	0.50
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	479.9
tblProjectCharacteristics	OperationalYear	2018	2021
tblWoodstoves	NumberCatalytic	11.05	0.00
tblWoodstoves	NumberNoncatalytic	11.05	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	6.5974	75.3203	42.9950	0.0729	8.9304	3.3889	12.3193	3.6647	3.1178	6.7825	0.0000	7,447.2747	7,447.2747	2.2061	0.0000	7,502.4263
2018	5.7964	65.3611	38.7991	0.0929	8.9304	2.8708	11.8012	3.6647	2.6411	6.3058	0.0000	9,361.4179	9,361.4179	2.2052	0.0000	9,387.9007
2019	10.3616	38.7743	39.0430	0.1025	4.7108	1.6709	6.3817	1.2652	1.5805	2.8457	0.0000	10,259.8774	10,259.8774	1.0783	0.0000	10,286.8345
2020	9.8638	35.1902	36.9369	0.1009	4.7108	1.4308	6.1415	1.2652	1.3531	2.6183	0.0000	10,067.4495	10,067.4495	1.0375	0.0000	10,093.3869
2021	5.7314	2.1978	4.6417	0.0104	0.6707	0.1294	0.8001	0.1779	0.1291	0.3070	0.0000	1,014.1146	1,014.1146	0.0410	0.0000	1,015.1393
Maximum	**10.3616**	**75.3203**	**42.9950**	**0.1025**	**8.9304**	**3.3889**	**12.3193**	**3.6647**	**3.1178**	**6.7825**	**0.0000**	**10,259.8774**	**10,259.8774**	**2.2061**	**0.0000**	**10,286.8345**

2.1 Overall Construction (Maximum Daily Emission)

Mitigated Construction

Year	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
2017	6.5974	75.3203	42.9950	0.0729	3.6397	3.3889	7.0286	1.4708	3.1178	4.5886	0.0000	7,447.2747	7,447.2747	2.2061	0.0000	7,502.4263
2018	5.7964	65.3611	38.7991	0.0929	4.0402	2.8708	6.5105	1.4708	2.6411	4.1120	0.0000	9,361.4179	9,361.4179	2.2052	0.0000	9,387.9007
2019	10.3616	38.7743	39.0430	0.1025	4.7108	1.6709	6.3817	1.2652	1.5805	2.8457	0.0000	10,259.8774	10,259.8774	1.0783	0.0000	10,286.8345
2020	9.8638	35.1902	36.9369	0.1009	4.7108	1.4308	6.1415	1.2652	1.3531	2.6183	0.0000	10,067.4495	10,067.4495	1.0375	0.0000	10,093.3869
2021	5.7314	2.1978	4.6417	0.0104	0.6707	0.1294	0.8001	0.1779	0.1291	0.3070	0.0000	1,014.1146	1,014.1146	0.0410	0.0000	1,015.1393
Maximum	**10.3616**	**75.3203**	**42.9950**	**0.1025**	**4.7108**	**3.3889**	**7.0286**	**1.4708**	**3.1178**	**4.5886**	**0.0000**	**10,259.8774**	**10,259.8774**	**2.2061**	**0.0000**	**10,286.8345**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**36.42**	**0.00**	**28.26**	**43.71**	**0.00**	**23.27**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	12.2290	3.8769	19.8336	0.0244		0.3971	0.3971		0.3971	0.3971	0.0000	4,712.832 7	4,712.832 7	0.1215	0.0858	4,741.439 1
Energy	0.0469	0.4011	0.1707	2.5600e-003		0.0324	0.0324		0.0324	0.0324		512.0476	512.0476	9.8100e-003	9.3900e-003	515.0904
Mobile	4.4239	31.7453	53.1743	0.2198	15.9613	0.1515	16.1128	4.2707	0.1422	4.4130		22,417.69 16	22,417.69 16	1.0736		22,444.53 26
Total	**16.6999**	**36.0234**	**73.1787**	**0.2468**	**15.9613**	**0.5811**	**16.5424**	**4.2707**	**0.5718**	**4.8425**	**0.0000**	**27,642.57 18**	**27,642.57 18**	**1.2050**	**0.0952**	**27,701.06 22**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	12.2290	3.8769	19.8336	0.0244		0.3971	0.3971		0.3971	0.3971	0.0000	4,712.832 7	4,712.832 7	0.1215	0.0858	4,741.439 1
Energy	0.0469	0.4011	0.1707	2.5600e-003		0.0324	0.0324		0.0324	0.0324		512.0476	512.0476	9.8100e-003	9.3900e-003	515.0904
Mobile	4.3370	30.9037	50.5118	0.2082	15.0116	0.1434	15.1550	4.0166	0.1346	4.1512		21,239.33 46	21,239.33 46	1.0411		21,265.36 17
Total	**16.6129**	**35.1817**	**70.5161**	**0.2352**	**15.0116**	**0.5730**	**15.5846**	**4.0166**	**0.5641**	**4.5808**	**0.0000**	**26,464.21 48**	**26,464.21 48**	**1.1724**	**0.0952**	**26,521.89 12**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.52	2.34	3.64	4.70	5.95	1.40	5.79	5.95	1.34	5.41	0.00	4.26	4.26	2.70	0.00	4.26

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	10/1/2017	1/12/2018	5	75	
2	Paving	Paving	1/13/2018	3/30/2018	5	55	
3	Building Construction	Building Construction	3/31/2018	9/25/2020	5	650	
4	Architectural Coating	Architectural Coating	6/29/2019	12/24/2021	5	650	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 187.5

Acres of Paving: 12

Residential Indoor: 1,037,363; Residential Outdoor: 345,788; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 31,363 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Off-Highway Trucks	1	8.00	189	0.50
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Architectural Coating	Air Compressors	1	8.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	9	23.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	299.00	109.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	60.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	6.4437	75.2195	41.7040	0.0701		3.3873	3.3873		3.1163	3.1163		7,169.556 1	7,169.556 1	2.1967		7,224.474 5
Total	**6.4437**	**75.2195**	**41.7040**	**0.0701**	**8.6733**	**3.3873**	**12.0606**	**3.5965**	**3.1163**	**6.7128**		**7,169.556 1**	**7,169.556 1**	**2.1967**		**7,224.474 5**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1538	0.1008	1.2911	2.7900e-003	0.2571	1.6500e-003	0.2587	0.0682	1.5200e-003	0.0697		277.7187	277.7187	9.3200e-003		277.9518
Total	**0.1538**	**0.1008**	**1.2911**	**2.7900e-003**	**0.2571**	**1.6500e-003**	**0.2587**	**0.0682**	**1.5200e-003**	**0.0697**		**277.7187**	**277.7187**	**9.3200e-003**		**277.9518**

3.2 Grading - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.3826	0.0000	3.3826	1.4026	0.0000	1.4026			0.0000			0.0000
Off-Road	6.4437	75.2195	41.7040	0.0701		3.3873	3.3873		3.1163	3.1163	0.0000	7,169.556 1	7,169.556 1	2.1967		7,224.474 5
Total	**6.4437**	**75.2195**	**41.7040**	**0.0701**	**3.3826**	**3.3873**	**6.7699**	**1.4026**	**3.1163**	**4.5189**	**0.0000**	**7,169.556 1**	**7,169.556 1**	**2.1967**		**7,224.474 5**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1538	0.1008	1.2911	2.7900e-003	0.2571	1.6500e-003	0.2587	0.0682	1.5200e-003	0.0697		277.7187	277.7187	9.3200e-003		277.9518
Total	**0.1538**	**0.1008**	**1.2911**	**2.7900e-003**	**0.2571**	**1.6500e-003**	**0.2587**	**0.0682**	**1.5200e-003**	**0.0697**		**277.7187**	**277.7187**	**9.3200e-003**		**277.9518**

3.2 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	5.6580	65.2731	37.6616	0.0701		2.8692	2.8692		2.6397	2.6397		7,057.1675	7,057.1675	2.1970		7,112.0924
Total	**5.6580**	**65.2731**	**37.6616**	**0.0701**	**8.6733**	**2.8692**	**11.5425**	**3.5965**	**2.6397**	**6.2362**		**7,057.1675**	**7,057.1675**	**2.1970**		**7,112.0924**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1385	0.0881	1.1375	2.7100e-003	0.2571	1.6100e-003	0.2587	0.0682	1.4800e-003	0.0697		269.8524	269.8524	8.2200e-003		270.0578
Total	**0.1385**	**0.0881**	**1.1375**	**2.7100e-003**	**0.2571**	**1.6100e-003**	**0.2587**	**0.0682**	**1.4800e-003**	**0.0697**		**269.8524**	**269.8524**	**8.2200e-003**		**270.0578**

3.2 Grading - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.3826	0.0000	3.3826	1.4026	0.0000	1.4026			0.0000			0.0000
Off-Road	5.6580	65.2731	37.6616	0.0701		2.8692	2.8692		2.6397	2.6397	0.0000	7,057.1675	7,057.1675	2.1970		7,112.0923
Total	**5.6580**	**65.2731**	**37.6616**	**0.0701**	**3.3826**	**2.8692**	**6.2518**	**1.4026**	**2.6397**	**4.0423**	**0.0000**	**7,057.1675**	**7,057.1675**	**2.1970**		**7,112.0923**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1385	0.0881	1.1375	2.7100e-003	0.2571	1.6100e-003	0.2587	0.0682	1.4800e-003	0.0697		269.8524	269.8524	8.2200e-003		270.0578
Total	**0.1385**	**0.0881**	**1.1375**	**2.7100e-003**	**0.2571**	**1.6100e-003**	**0.2587**	**0.0682**	**1.4800e-003**	**0.0697**		**269.8524**	**269.8524**	**8.2200e-003**		**270.0578**

3.3 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6437	17.5209	14.7964	0.0228		0.9561	0.9561		0.8797	0.8797		2,294.0887	2,294.0887	0.7142		2,311.9432
Paving	0.5716					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.2153**	**17.5209**	**14.7964**	**0.0228**		**0.9561**	**0.9561**		**0.8797**	**0.8797**		**2,294.0887**	**2,294.0887**	**0.7142**		**2,311.9432**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0903	0.0574	0.7419	1.7700e-003	0.1677	1.0500e-003	0.1687	0.0445	9.7000e-004	0.0454		175.9907	175.9907	5.3600e-003		176.1247
Total	**0.0903**	**0.0574**	**0.7419**	**1.7700e-003**	**0.1677**	**1.0500e-003**	**0.1687**	**0.0445**	**9.7000e-004**	**0.0454**		**175.9907**	**175.9907**	**5.3600e-003**		**176.1247**

3.3 Paving - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6437	17.5209	14.7964	0.0228		0.9561	0.9561		0.8797	0.8797	0.0000	2,294.0887	2,294.0887	0.7142		2,311.9432
Paving	0.5716					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.2153**	**17.5209**	**14.7964**	**0.0228**		**0.9561**	**0.9561**		**0.8797**	**0.8797**	**0.0000**	**2,294.0887**	**2,294.0887**	**0.7142**		**2,311.9432**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0903	0.0574	0.7419	1.7700e-003	0.1677	1.0500e-003	0.1687	0.0445	9.7000e-004	0.0454		175.9907	175.9907	5.3600e-003		176.1247
Total	**0.0903**	**0.0574**	**0.7419**	**1.7700e-003**	**0.1677**	**1.0500e-003**	**0.1687**	**0.0445**	**9.7000e-004**	**0.0454**		**175.9907**	**175.9907**	**5.3600e-003**		**176.1247**

3.4 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.8506	25.2288	18.7719	0.0288		1.6066	1.6066		1.5082	1.5082		2,810.8008	2,810.8008	0.7012		2,828.3317
Total	**2.8506**	**25.2288**	**18.7719**	**0.0288**		**1.6066**	**1.6066**		**1.5082**	**1.5082**		**2,810.8008**	**2,810.8008**	**0.7012**		**2,828.3317**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4018	13.2434	2.5620	0.0289	0.6981	0.1111	0.8091	0.2010	0.1062	0.3072		3,042.5355	3,042.5355	0.2513		3,048.8175
Worker	1.8000	1.1448	14.7878	0.0353	3.3421	0.0209	3.3630	0.8863	0.0193	0.9056		3,508.0816	3,508.0816	0.1068		3,510.7516
Total	**2.2018**	**14.3881**	**17.3499**	**0.0641**	**4.0402**	**0.1319**	**4.1721**	**1.0873**	**0.1255**	**1.2128**		**6,550.6170**	**6,550.6170**	**0.3581**		**6,559.5690**

3.4 Building Construction - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.8506	25.2288	18.7719	0.0288		1.6066	1.6066		1.5082	1.5082	0.0000	2,810.8008	2,810.8008	0.7012		2,828.3317
Total	**2.8506**	**25.2288**	**18.7719**	**0.0288**		**1.6066**	**1.6066**		**1.5082**	**1.5082**	**0.0000**	**2,810.8008**	**2,810.8008**	**0.7012**		**2,828.3317**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4018	13.2434	2.5620	0.0289	0.6981	0.1111	0.8091	0.2010	0.1062	0.3072		3,042.5355	3,042.5355	0.2513		3,048.8175
Worker	1.8000	1.1448	14.7878	0.0353	3.3421	0.0209	3.3630	0.8863	0.0193	0.9056		3,508.0816	3,508.0816	0.1068		3,510.7516
Total	**2.2018**	**14.3881**	**17.3499**	**0.0641**	**4.0402**	**0.1319**	**4.1721**	**1.0873**	**0.1255**	**1.2128**		**6,550.6170**	**6,550.6170**	**0.3581**		**6,559.5690**

3.4 Building Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.5115	22.7062	18.3139	0.0288		1.3802	1.3802		1.2958	1.2958		2,778.3097	2,778.3097	0.6904		2,795.5700
Total	**2.5115**	**22.7062**	**18.3139**	**0.0288**		**1.3802**	**1.3802**		**1.2958**	**1.2958**		**2,778.3097**	**2,778.3097**	**0.6904**		**2,795.5700**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3631	12.4078	2.3252	0.0287	0.6980	0.0943	0.7923	0.2010	0.0902	0.2911		3,022.5985	3,022.5985	0.2419		3,028.6447
Worker	1.6463	1.0103	13.2832	0.0342	3.3421	0.0206	3.3628	0.8863	0.0190	0.9054		3,401.1917	3,401.1917	0.0952		3,403.5722
Total	**2.0094**	**13.4182**	**15.6084**	**0.0628**	**4.0401**	**0.1149**	**4.1550**	**1.0873**	**0.1092**	**1.1965**		**6,423.7902**	**6,423.7902**	**0.3371**		**6,432.2169**

3.4 Building Construction - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.5115	22.7062	18.3139	0.0288		1.3802	1.3802		1.2958	1.2958	0.0000	2,778.3097	2,778.3097	0.6904		2,795.5700
Total	**2.5115**	**22.7062**	**18.3139**	**0.0288**		**1.3802**	**1.3802**		**1.2958**	**1.2958**	**0.0000**	**2,778.3097**	**2,778.3097**	**0.6904**		**2,795.5700**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3631	12.4078	2.3252	0.0287	0.6980	0.0943	0.7923	0.2010	0.0902	0.2911		3,022.5985	3,022.5985	0.2419		3,028.6447
Worker	1.6463	1.0103	13.2832	0.0342	3.3421	0.0206	3.3628	0.8863	0.0190	0.9054		3,401.1917	3,401.1917	0.0952		3,403.5722
Total	**2.0094**	**13.4182**	**15.6084**	**0.0628**	**4.0401**	**0.1149**	**4.1550**	**1.0873**	**0.1092**	**1.1965**		**6,423.7902**	**6,423.7902**	**0.3371**		**6,432.2169**

3.4 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.2551	20.6494	17.9678	0.0288		1.1948	1.1948		1.1218	1.1218		2,735.699 9	2,735.699 9	0.6819		2,752.748 1
Total	**2.2551**	**20.6494**	**17.9678**	**0.0288**		**1.1948**	**1.1948**		**1.1218**	**1.1218**		**2,735.699 9**	**2,735.699 9**	**0.6819**		**2,752.748 1**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3038	11.2152	2.0517	0.0285	0.6980	0.0638	0.7618	0.2010	0.0610	0.2620		3,001.761 1	3,001.761 1	0.2252		3,007.389 7
Worker	1.5216	0.8999	12.0561	0.0331	3.3421	0.0202	3.3624	0.8863	0.0186	0.9050		3,293.767 7	3,293.767 7	0.0844		3,295.878 4
Total	**1.8254**	**12.1151**	**14.1079**	**0.0615**	**4.0401**	**0.0840**	**4.1241**	**1.0873**	**0.0797**	**1.1670**		**6,295.528 7**	**6,295.528 7**	**0.3096**		**6,303.268 1**

Attachment: Air Quality Study (2444 : Legacy Park Project)

3.4 Building Construction - 2020

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Off-Road	2.2551	20.6494	17.9678	0.0288		1.1948	1.1948		1.1218	1.1218	0.0000	2,735.6999	2,735.6999	0.6819		2,752.7481
Total	**2.2551**	**20.6494**	**17.9678**	**0.0288**		**1.1948**	**1.1948**		**1.1218**	**1.1218**	**0.0000**	**2,735.6999**	**2,735.6999**	**0.6819**		**2,752.7481**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3038	11.2152	2.0517	0.0285	0.6980	0.0638	0.7618	0.2010	0.0610	0.2620		3,001.7611	3,001.7611	0.2252		3,007.3897
Worker	1.5216	0.8999	12.0561	0.0331	3.3421	0.0202	3.3624	0.8863	0.0186	0.9050		3,293.7677	3,293.7677	0.0844		3,295.8784
Total	**1.8254**	**12.1151**	**14.1079**	**0.0615**	**4.0401**	**0.0840**	**4.1241**	**1.0873**	**0.0797**	**1.1670**		**6,295.5287**	**6,295.5287**	**0.3096**		**6,303.2681**

3.5 Architectural Coating - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	5.1551					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3553	2.4472	2.4551	3.9600e-003		0.1717	0.1717		0.1717	0.1717		375.2641	375.2641	0.0317		376.0565
Total	**5.5104**	**2.4472**	**2.4551**	**3.9600e-003**		**0.1717**	**0.1717**		**0.1717**	**0.1717**		**375.2641**	**375.2641**	**0.0317**		**376.0565**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.3304	0.2027	2.6655	6.8600e-003	0.6707	4.1400e-003	0.6748	0.1779	3.8100e-003	0.1817		682.5134	682.5134	0.0191		682.9911
Total	**0.3304**	**0.2027**	**2.6655**	**6.8600e-003**	**0.6707**	**4.1400e-003**	**0.6748**	**0.1779**	**3.8100e-003**	**0.1817**		**682.5134**	**682.5134**	**0.0191**		**682.9911**

3.5 Architectural Coating - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	5.1551					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3553	2.4472	2.4551	3.9600e-003		0.1717	0.1717		0.1717	0.1717	0.0000	375.2641	375.2641	0.0317		376.0565
Total	**5.5104**	**2.4472**	**2.4551**	**3.9600e-003**		**0.1717**	**0.1717**		**0.1717**	**0.1717**	**0.0000**	**375.2641**	**375.2641**	**0.0317**		**376.0565**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.3304	0.2027	2.6655	6.8600e-003	0.6707	4.1400e-003	0.6748	0.1779	3.8100e-003	0.1817		682.5134	682.5134	0.0191		682.9911
Total	**0.3304**	**0.2027**	**2.6655**	**6.8600e-003**	**0.6707**	**4.1400e-003**	**0.6748**	**0.1779**	**3.8100e-003**	**0.1817**		**682.5134**	**682.5134**	**0.0191**		**682.9911**

3.5 Architectural Coating - 2020

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Archit. Coating	5.1551					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3229	2.2451	2.4419	3.9600e-003		0.1479	0.1479		0.1479	0.1479		375.2641	375.2641	0.0291		375.9904
Total	**5.4780**	**2.2451**	**2.4419**	**3.9600e-003**		**0.1479**	**0.1479**		**0.1479**	**0.1479**		**375.2641**	**375.2641**	**0.0291**		**375.9904**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.3053	0.1806	2.4193	6.6400e-003	0.6707	4.0600e-003	0.6747	0.1779	3.7400e-003	0.1816		660.9567	660.9567	0.0169		661.3803
Total	**0.3053**	**0.1806**	**2.4193**	**6.6400e-003**	**0.6707**	**4.0600e-003**	**0.6747**	**0.1779**	**3.7400e-003**	**0.1816**		**660.9567**	**660.9567**	**0.0169**		**661.3803**

3.5 Architectural Coating - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	5.1551					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3229	2.2451	2.4419	3.9600e-003		0.1479	0.1479		0.1479	0.1479	0.0000	375.2641	375.2641	0.0291		375.9904
Total	**5.4780**	**2.2451**	**2.4419**	**3.9600e-003**		**0.1479**	**0.1479**		**0.1479**	**0.1479**	**0.0000**	**375.2641**	**375.2641**	**0.0291**		**375.9904**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.3053	0.1806	2.4193	6.6400e-003	0.6707	4.0600e-003	0.6747	0.1779	3.7400e-003	0.1816		660.9567	660.9567	0.0169		661.3803
Total	**0.3053**	**0.1806**	**2.4193**	**6.6400e-003**	**0.6707**	**4.0600e-003**	**0.6747**	**0.1779**	**3.7400e-003**	**0.1816**		**660.9567**	**660.9567**	**0.0169**		**661.3803**

3.5 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	5.1551					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2919	2.0358	2.4234	3.9600e-003		0.1255	0.1255		0.1255	0.1255		375.2641	375.2641	0.0258		375.9079
Total	**5.4470**	**2.0358**	**2.4234**	**3.9600e-003**		**0.1255**	**0.1255**		**0.1255**	**0.1255**		**375.2641**	**375.2641**	**0.0258**		**375.9079**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2845	0.1621	2.2183	6.4100e-003	0.6707	3.9500e-003	0.6746	0.1779	3.6400e-003	0.1815		638.8506	638.8506	0.0152		639.2314
Total	**0.2845**	**0.1621**	**2.2183**	**6.4100e-003**	**0.6707**	**3.9500e-003**	**0.6746**	**0.1779**	**3.6400e-003**	**0.1815**		**638.8506**	**638.8506**	**0.0152**		**639.2314**

3.5 Architectural Coating - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	5.1551					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2919	2.0358	2.4234	3.9600e-003		0.1255	0.1255		0.1255	0.1255	0.0000	375.2641	375.2641	0.0258		375.9079
Total	**5.4470**	**2.0358**	**2.4234**	**3.9600e-003**		**0.1255**	**0.1255**		**0.1255**	**0.1255**	**0.0000**	**375.2641**	**375.2641**	**0.0258**		**375.9079**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2845	0.1621	2.2183	6.4100e-003	0.6707	3.9500e-003	0.6746	0.1779	3.6400e-003	0.1815		638.8506	638.8506	0.0152		639.2314
Total	**0.2845**	**0.1621**	**2.2183**	**6.4100e-003**	**0.6707**	**3.9500e-003**	**0.6746**	**0.1779**	**3.6400e-003**	**0.1815**		**638.8506**	**638.8506**	**0.0152**		**639.2314**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Improve Pedestrian Network

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Mitigated	4.3370	30.9037	50.5118	0.2082	15.0116	0.1434	15.1550	4.0166	0.1346	4.1512		21,239.3346	21,239.3346	1.0411		21,265.3617
Unmitigated	4.4239	31.7453	53.1743	0.2198	15.9613	0.1515	16.1128	4.2707	0.1422	4.4130		22,417.6916	22,417.6916	1.0736		22,444.5326

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	2,103.92	2,190.11	1905.02	7,134,393	6,709,897
Total	2,103.92	2,190.11	1,905.02	7,134,393	6,709,897

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Asphalt Surfaces	0.542116	0.037578	0.185203	0.118503	0.016241	0.005141	0.017392	0.068695	0.001383	0.001183	0.004582	0.000945	0.001038
Single Family Housing	0.542116	0.037578	0.185203	0.118503	0.016241	0.005141	0.017392	0.068695	0.001383	0.001183	0.004582	0.000945	0.001038

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0469	0.4011	0.1707	2.5600e-003		0.0324	0.0324		0.0324	0.0324		512.0476	512.0476	9.8100e-003	9.3900e-003	515.0904
NaturalGas Unmitigated	0.0469	0.4011	0.1707	2.5600e-003		0.0324	0.0324		0.0324	0.0324		512.0476	512.0476	9.8100e-003	9.3900e-003	515.0904

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	4352.4	0.0469	0.4011	0.1707	2.5600e-003		0.0324	0.0324		0.0324	0.0324		512.0476	512.0476	9.8100e-003	9.3900e-003	515.0904
Total		**0.0469**	**0.4011**	**0.1707**	**2.5600e-003**		**0.0324**	**0.0324**		**0.0324**	**0.0324**		**512.0476**	**512.0476**	**9.8100e-003**	**9.3900e-003**	**515.0904**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	4.3524	0.0469	0.4011	0.1707	2.5600e-003		0.0324	0.0324		0.0324	0.0324		512.0476	512.0476	9.8100e-003	9.3900e-003	515.0904
Total		**0.0469**	**0.4011**	**0.1707**	**2.5600e-003**		**0.0324**	**0.0324**		**0.0324**	**0.0324**		**512.0476**	**512.0476**	**9.8100e-003**	**9.3900e-003**	**515.0904**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	12.2290	3.8769	19.8336	0.0244		0.3971	0.3971		0.3971	0.3971	0.0000	4,712.8327	4,712.8327	0.1215	0.0858	4,741.4391
Unmitigated	12.2290	3.8769	19.8336	0.0244		0.3971	0.3971		0.3971	0.3971	0.0000	4,712.8327	4,712.8327	0.1215	0.0858	4,741.4391

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.9180					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	10.3283					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.4290	3.6660	1.5600	0.0234		0.2964	0.2964		0.2964	0.2964	0.0000	4,680.0000	4,680.0000	0.0897	0.0858	4,707.8109
Landscaping	0.5537	0.2109	18.2736	9.6000e-004		0.1007	0.1007		0.1007	0.1007		32.8327	32.8327	0.0318		33.6282
Total	**12.2290**	**3.8769**	**19.8336**	**0.0244**		**0.3971**	**0.3971**		**0.3971**	**0.3971**	**0.0000**	**4,712.8327**	**4,712.8327**	**0.1215**	**0.0858**	**4,741.4391**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.9180					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	10.3283					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.4290	3.6660	1.5600	0.0234		0.2964	0.2964		0.2964	0.2964	0.0000	4,680.0000	4,680.0000	0.0897	0.0858	4,707.8109
Landscaping	0.5537	0.2109	18.2736	9.6000e-004		0.1007	0.1007		0.1007	0.1007		32.8327	32.8327	0.0318		33.6282
Total	**12.2290**	**3.8769**	**19.8336**	**0.0244**		**0.3971**	**0.3971**		**0.3971**	**0.3971**	**0.0000**	**4,712.8327**	**4,712.8327**	**0.1215**	**0.0858**	**4,741.4391**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Legacy Park (Tentative Tract Map No. 36760)

Riverside-South Coast County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	12.00	Acre	12.00	522,720.00	0
Single Family Housing	221.00	Dwelling Unit	40.90	512,278.00	632

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.4 **Precipitation Freq (Days)** 28

Climate Zone 10 **Operational Year** 2021

Utility Company Southern California Edison

CO2 Intensity (lb/MWhr) 479.9 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44.

Land Use - Based on site plan dated September 19, 2016; Total lot acreage: 52.9; Average home size: 2,318 s.f

Construction Phase - Based on past project experience and a 2021 opening year

Off-road Equipment - Based on 8 hour workday

Off-road Equipment - Based on 8 hour workday

Off-road Equipment - Based on past project experience

Off-road Equipment -

Grading -

Vehicle Trips -

Woodstoves - Rule 445- Gas stoves only

Energy Use - Title-24 Electricity Energy Intensity and Natural Gas Energy Intensity were adjusted by 28% to reflect 2016 Title 24 requirements. Source: 2016 Title 24 Energy Efficiency Standards Adoption Hearing 06/10/15

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Fleet Mix - Based on Caltrans ITS Transportation Project-Level Carbon Monixide Protocol to reflect residential land use trips.

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstructionPhase	NumDays	75.00	650.00
tblConstructionPhase	NumDays	1,110.00	650.00
tblConstructionPhase	NumDays	110.00	75.00
tblConstructionPhase	NumDays	75.00	55.00
tblConstructionPhase	PhaseEndDate	11/23/2022	12/24/2021
tblConstructionPhase	PhaseEndDate	3/11/2020	9/25/2020
tblConstructionPhase	PhaseEndDate	9/13/2017	1/12/2018
tblConstructionPhase	PhaseEndDate	5/27/2020	3/30/2018
tblConstructionPhase	PhaseStartDate	5/28/2020	6/29/2019
tblConstructionPhase	PhaseStartDate	9/14/2017	3/31/2018

tblConstructionPhase	PhaseStartDate	6/1/2017	10/1/2017
tblConstructionPhase	PhaseStartDate	3/12/2020	1/13/2018
tblEnergyUse	T24E	1,077.77	775.99
tblEnergyUse	T24NG	31,096.40	1,158.36
tblFireplaces	NumberGas	187.85	221.00
tblFireplaces	NumberNoFireplace	22.10	0.00
tblFireplaces	NumberWood	11.05	0.00
tblLandUse	BuildingSpaceSquareFeet	397,800.00	512,278.00
tblLandUse	LandUseSquareFeet	397,800.00	512,278.00
tblLandUse	LotAcreage	71.75	40.90
tblOffRoadEquipment	HorsePower	402.00	189.00
tblOffRoadEquipment	LoadFactor	0.38	0.50
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	479.9
tblProjectCharacteristics	OperationalYear	2018	2021
tblWoodstoves	NumberCatalytic	11.05	0.00
tblWoodstoves	NumberNoncatalytic	11.05	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	6.5937	75.3241	42.7568	0.0726	8.9304	3.3889	12.3193	3.6647	3.1178	6.7825	0.0000	7,418.7935	7,418.7935	2.2049	0.0000	7,473.9160
2018	5.7931	65.3643	38.5862	0.0882	8.9304	2.8708	11.8012	3.6647	2.6411	6.3058	0.0000	8,887.6308	8,887.6308	2.2042	0.0000	8,914.4560
2019	10.3343	38.7887	36.3985	0.0972	4.7108	1.6721	6.3829	1.2652	1.5816	2.8468	0.0000	9,726.8615	9,726.8615	1.0902	0.0000	9,754.1163
2020	9.8426	35.1687	34.5217	0.0958	4.7108	1.4315	6.1423	1.2652	1.3539	2.6190	0.0000	9,547.6966	9,547.6966	1.0496	0.0000	9,573.9376
2021	5.7261	2.2034	4.2140	9.7100e-003	0.6707	0.1294	0.8001	0.1779	0.1291	0.3070	0.0000	948.3802	948.3802	0.0390	0.0000	949.3551
Maximum	**10.3343**	**75.3241**	**42.7568**	**0.0972**	**8.9304**	**3.3889**	**12.3193**	**3.6647**	**3.1178**	**6.7825**	**0.0000**	**9,726.8615**	**9,726.8615**	**2.2049**	**0.0000**	**9,754.1163**

2.1 Overall Construction (Maximum Daily Emission)

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	6.5937	75.3241	42.7568	0.0726	3.6397	3.3889	7.0286	1.4708	3.1178	4.5886	0.0000	7,418.7935	7,418.7935	2.2049	0.0000	7,473.9160
2018	5.7931	65.3643	38.5862	0.0882	4.0402	2.8708	6.5105	1.4708	2.6411	4.1120	0.0000	8,887.6308	8,887.6308	2.2042	0.0000	8,914.4560
2019	10.3343	38.7887	36.3985	0.0972	4.7108	1.6721	6.3829	1.2652	1.5816	2.8468	0.0000	9,726.8615	9,726.8615	1.0902	0.0000	9,754.1163
2020	9.8426	35.1687	34.5217	0.0958	4.7108	1.4315	6.1423	1.2652	1.3539	2.6190	0.0000	9,547.6966	9,547.6966	1.0496	0.0000	9,573.9376
2021	5.7261	2.2034	4.2140	9.7100e-003	0.6707	0.1294	0.8001	0.1779	0.1291	0.3070	0.0000	948.3802	948.3802	0.0390	0.0000	949.3551
Maximum	**10.3343**	**75.3241**	**42.7568**	**0.0972**	**4.7108**	**3.3889**	**7.0286**	**1.4708**	**3.1178**	**4.5886**	**0.0000**	**9,726.8615**	**9,726.8615**	**2.2049**	**0.0000**	**9,754.1163**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**36.42**	**0.00**	**28.26**	**43.71**	**0.00**	**23.26**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Attachment: Air Quality Study (2444 : Legacy Park Project)

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	12.2290	3.8769	19.8336	0.0244		0.3971	0.3971		0.3971	0.3971	0.0000	4,712.8327	4,712.8327	0.1215	0.0858	4,741.4391
Energy	0.0469	0.4011	0.1707	2.5600e-003		0.0324	0.0324		0.0324	0.0324		512.0476	512.0476	9.8100e-003	9.3900e-003	515.0904
Mobile	3.7574	31.8018	45.9616	0.2028	15.9613	0.1531	16.1143	4.2707	0.1437	4.4144		20,703.3860	20,703.3860	1.1056		20,731.0264
Total	**16.0334**	**36.0798**	**65.9659**	**0.2297**	**15.9613**	**0.5826**	**16.5439**	**4.2707**	**0.5732**	**4.8440**	**0.0000**	**25,928.2663**	**25,928.2663**	**1.2369**	**0.0952**	**25,987.5559**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	12.2290	3.8769	19.8336	0.0244		0.3971	0.3971		0.3971	0.3971	0.0000	4,712.8327	4,712.8327	0.1215	0.0858	4,741.4391
Energy	0.0469	0.4011	0.1707	2.5600e-003		0.0324	0.0324		0.0324	0.0324		512.0476	512.0476	9.8100e-003	9.3900e-003	515.0904
Mobile	3.6763	30.9184	43.8339	0.1920	15.0116	0.1449	15.1565	4.0166	0.1360	4.1526		19,608.9083	19,608.9083	1.0755		19,635.7944
Total	**15.9522**	**35.1964**	**63.8383**	**0.2189**	**15.0116**	**0.5745**	**15.5861**	**4.0166**	**0.5656**	**4.5822**	**0.0000**	**24,833.7885**	**24,833.7885**	**1.2068**	**0.0952**	**24,892.3239**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.51	2.45	3.23	4.68	5.95	1.40	5.79	5.95	1.33	5.40	0.00	4.22	4.22	2.44	0.00	4.21

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	10/1/2017	1/12/2018	5	75	
2	Paving	Paving	1/13/2018	3/30/2018	5	55	
3	Building Construction	Building Construction	3/31/2018	9/25/2020	5	650	
4	Architectural Coating	Architectural Coating	6/29/2019	12/24/2021	5	650	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 187.5

Acres of Paving: 12

Residential Indoor: 1,037,363; Residential Outdoor: 345,788; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 31,363 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Off-Highway Trucks	1	8.00	189	0.50
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Architectural Coating	Air Compressors	1	8.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	9	23.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	299.00	109.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	60.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	6.4437	75.2195	41.7040	0.0701		3.3873	3.3873		3.1163	3.1163		7,169.5561	7,169.5561	2.1967		7,224.4745
Total	**6.4437**	**75.2195**	**41.7040**	**0.0701**	**8.6733**	**3.3873**	**12.0606**	**3.5965**	**3.1163**	**6.7128**		**7,169.5561**	**7,169.5561**	**2.1967**		**7,224.4745**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1500	0.1046	1.0528	2.5100e-003	0.2571	1.6500e-003	0.2587	0.0682	1.5200e-003	0.0697		249.2375	249.2375	8.1600e-003		249.4414
Total	**0.1500**	**0.1046**	**1.0528**	**2.5100e-003**	**0.2571**	**1.6500e-003**	**0.2587**	**0.0682**	**1.5200e-003**	**0.0697**		**249.2375**	**249.2375**	**8.1600e-003**		**249.4414**

3.2 Grading - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.3826	0.0000	3.3826	1.4026	0.0000	1.4026			0.0000			0.0000
Off-Road	6.4437	75.2195	41.7040	0.0701		3.3873	3.3873		3.1163	3.1163	0.0000	7,169.5561	7,169.5561	2.1967		7,224.4745
Total	**6.4437**	**75.2195**	**41.7040**	**0.0701**	**3.3826**	**3.3873**	**6.7699**	**1.4026**	**3.1163**	**4.5189**	**0.0000**	**7,169.5561**	**7,169.5561**	**2.1967**		**7,224.4745**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1500	0.1046	1.0528	2.5100e-003	0.2571	1.6500e-003	0.2587	0.0682	1.5200e-003	0.0697		249.2375	249.2375	8.1600e-003		249.4414
Total	**0.1500**	**0.1046**	**1.0528**	**2.5100e-003**	**0.2571**	**1.6500e-003**	**0.2587**	**0.0682**	**1.5200e-003**	**0.0697**		**249.2375**	**249.2375**	**8.1600e-003**		**249.4414**

3.2 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	5.6580	65.2731	37.6616	0.0701		2.8692	2.8692		2.6397	2.6397		7,057.1675	7,057.1675	2.1970		7,112.0924
Total	**5.6580**	**65.2731**	**37.6616**	**0.0701**	**8.6733**	**2.8692**	**11.5425**	**3.5965**	**2.6397**	**6.2362**		**7,057.1675**	**7,057.1675**	**2.1970**		**7,112.0924**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1351	0.0913	0.9246	2.4300e-003	0.2571	1.6100e-003	0.2587	0.0682	1.4800e-003	0.0697		242.1252	242.1252	7.1600e-003		242.3043
Total	**0.1351**	**0.0913**	**0.9246**	**2.4300e-003**	**0.2571**	**1.6100e-003**	**0.2587**	**0.0682**	**1.4800e-003**	**0.0697**		**242.1252**	**242.1252**	**7.1600e-003**		**242.3043**

3.2 Grading - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.3826	0.0000	3.3826	1.4026	0.0000	1.4026			0.0000			0.0000
Off-Road	5.6580	65.2731	37.6616	0.0701		2.8692	2.8692		2.6397	2.6397	0.0000	7,057.1675	7,057.1675	2.1970		7,112.0923
Total	**5.6580**	**65.2731**	**37.6616**	**0.0701**	**3.3826**	**2.8692**	**6.2518**	**1.4026**	**2.6397**	**4.0423**	**0.0000**	**7,057.1675**	**7,057.1675**	**2.1970**		**7,112.0923**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1351	0.0913	0.9246	2.4300e-003	0.2571	1.6100e-003	0.2587	0.0682	1.4800e-003	0.0697		242.1252	242.1252	7.1600e-003		242.3043
Total	**0.1351**	**0.0913**	**0.9246**	**2.4300e-003**	**0.2571**	**1.6100e-003**	**0.2587**	**0.0682**	**1.4800e-003**	**0.0697**		**242.1252**	**242.1252**	**7.1600e-003**		**242.3043**

Attachment: Air Quality Study (2444 : Legacy Park Project)

3.3 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6437	17.5209	14.7964	0.0228		0.9561	0.9561		0.8797	0.8797		2,294.0887	2,294.0887	0.7142		2,311.9432
Paving	0.5716					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.2153**	**17.5209**	**14.7964**	**0.0228**		**0.9561**	**0.9561**		**0.8797**	**0.8797**		**2,294.0887**	**2,294.0887**	**0.7142**		**2,311.9432**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0881	0.0595	0.6030	1.5900e-003	0.1677	1.0500e-003	0.1687	0.0445	9.7000e-004	0.0454		157.9077	157.9077	4.6700e-003		158.0245
Total	**0.0881**	**0.0595**	**0.6030**	**1.5900e-003**	**0.1677**	**1.0500e-003**	**0.1687**	**0.0445**	**9.7000e-004**	**0.0454**		**157.9077**	**157.9077**	**4.6700e-003**		**158.0245**

3.3 Paving - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6437	17.5209	14.7964	0.0228		0.9561	0.9561		0.8797	0.8797	0.0000	2,294.0887	2,294.0887	0.7142		2,311.9432
Paving	0.5716					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.2153**	**17.5209**	**14.7964**	**0.0228**		**0.9561**	**0.9561**		**0.8797**	**0.8797**	**0.0000**	**2,294.0887**	**2,294.0887**	**0.7142**		**2,311.9432**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0881	0.0595	0.6030	1.5900e-003	0.1677	1.0500e-003	0.1687	0.0445	9.7000e-004	0.0454		157.9077	157.9077	4.6700e-003		158.0245
Total	**0.0881**	**0.0595**	**0.6030**	**1.5900e-003**	**0.1677**	**1.0500e-003**	**0.1687**	**0.0445**	**9.7000e-004**	**0.0454**		**157.9077**	**157.9077**	**4.6700e-003**		**158.0245**

3.4 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.8506	25.2288	18.7719	0.0288		1.6066	1.6066		1.5082	1.5082		2,810.8008	2,810.8008	0.7012		2,828.3317
Total	**2.8506**	**25.2288**	**18.7719**	**0.0288**		**1.6066**	**1.6066**		**1.5082**	**1.5082**		**2,810.8008**	**2,810.8008**	**0.7012**		**2,828.3317**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4208	13.2324	2.9551	0.0278	0.6981	0.1124	0.8104	0.2010	0.1075	0.3085		2,929.2026	2,929.2026	0.2787		2,936.1689
Worker	1.7565	1.1863	12.0200	0.0316	3.3421	0.0209	3.3630	0.8863	0.0193	0.9056		3,147.6274	3,147.6274	0.0931		3,149.9554
Total	**2.1773**	**14.4187**	**14.9751**	**0.0594**	**4.0402**	**0.1333**	**4.1734**	**1.0873**	**0.1268**	**1.2141**		**6,076.8300**	**6,076.8300**	**0.3718**		**6,086.1243**

Attachment: Air Quality Study (2444 : Legacy Park Project)

3.4 Building Construction - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.8506	25.2288	18.7719	0.0288		1.6066	1.6066		1.5082	1.5082	0.0000	2,810.8008	2,810.8008	0.7012		2,828.3317
Total	**2.8506**	**25.2288**	**18.7719**	**0.0288**		**1.6066**	**1.6066**		**1.5082**	**1.5082**	**0.0000**	**2,810.8008**	**2,810.8008**	**0.7012**		**2,828.3317**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4208	13.2324	2.9551	0.0278	0.6981	0.1124	0.8104	0.2010	0.1075	0.3085		2,929.2026	2,929.2026	0.2787		2,936.1689
Worker	1.7565	1.1863	12.0200	0.0316	3.3421	0.0209	3.3630	0.8863	0.0193	0.9056		3,147.6274	3,147.6274	0.0931		3,149.9554
Total	**2.1773**	**14.4187**	**14.9751**	**0.0594**	**4.0402**	**0.1333**	**4.1734**	**1.0873**	**0.1268**	**1.2141**		**6,076.8300**	**6,076.8300**	**0.3718**		**6,086.1243**

3.4 Building Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.5115	22.7062	18.3139	0.0288		1.3802	1.3802		1.2958	1.2958		2,778.3097	2,778.3097	0.6904		2,795.5700
Total	**2.5115**	**22.7062**	**18.3139**	**0.0288**		**1.3802**	**1.3802**		**1.2958**	**1.2958**		**2,778.3097**	**2,778.3097**	**0.6904**		**2,795.5700**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3811	12.3796	2.7035	0.0276	0.6980	0.0954	0.7934	0.2010	0.0913	0.2923		2,909.6311	2,909.6311	0.2687		2,916.3480
Worker	1.6086	1.0459	10.7657	0.0306	3.3421	0.0206	3.3628	0.8863	0.0190	0.9054		3,051.3463	3,051.3463	0.0828		3,053.4162
Total	**1.9897**	**13.4255**	**13.4691**	**0.0582**	**4.0401**	**0.1161**	**4.1562**	**1.0873**	**0.1103**	**1.1976**		**5,960.9774**	**5,960.9774**	**0.3515**		**5,969.7642**

3.4 Building Construction - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.5115	22.7062	18.3139	0.0288		1.3802	1.3802		1.2958	1.2958	0.0000	2,778.3097	2,778.3097	0.6904		2,795.5700
Total	**2.5115**	**22.7062**	**18.3139**	**0.0288**		**1.3802**	**1.3802**		**1.2958**	**1.2958**	**0.0000**	**2,778.3097**	**2,778.3097**	**0.6904**		**2,795.5700**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3811	12.3796	2.7035	0.0276	0.6980	0.0954	0.7934	0.2010	0.0913	0.2923		2,909.6311	2,909.6311	0.2687		2,916.3480
Worker	1.6086	1.0459	10.7657	0.0306	3.3421	0.0206	3.3628	0.8863	0.0190	0.9054		3,051.3463	3,051.3463	0.0828		3,053.4162
Total	**1.9897**	**13.4255**	**13.4691**	**0.0582**	**4.0401**	**0.1161**	**4.1562**	**1.0873**	**0.1103**	**1.1976**		**5,960.9774**	**5,960.9774**	**0.3515**		**5,969.7642**

3.4 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.2551	20.6494	17.9678	0.0288		1.1948	1.1948		1.1218	1.1218		2,735.6999	2,735.6999	0.6819		2,752.7481
Total	**2.2551**	**20.6494**	**17.9678**	**0.0288**		**1.1948**	**1.1948**		**1.1218**	**1.1218**		**2,735.6999**	**2,735.6999**	**0.6819**		**2,752.7481**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3205	11.1565	2.4024	0.0274	0.6980	0.0645	0.7625	0.2010	0.0617	0.2627		2,888.9661	2,888.9661	0.2505		2,895.2296
Worker	1.4901	0.9309	9.7526	0.0297	3.3421	0.0202	3.3624	0.8863	0.0186	0.9050		2,954.8250	2,954.8250	0.0734		2,956.6598
Total	**1.8105**	**12.0874**	**12.1549**	**0.0571**	**4.0401**	**0.0848**	**4.1249**	**1.0873**	**0.0804**	**1.1677**		**5,843.7911**	**5,843.7911**	**0.3239**		**5,851.8894**

3.4 Building Construction - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.2551	20.6494	17.9678	0.0288		1.1948	1.1948		1.1218	1.1218	0.0000	2,735.6999	2,735.6999	0.6819		2,752.7481
Total	**2.2551**	**20.6494**	**17.9678**	**0.0288**		**1.1948**	**1.1948**		**1.1218**	**1.1218**	**0.0000**	**2,735.6999**	**2,735.6999**	**0.6819**		**2,752.7481**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3205	11.1565	2.4024	0.0274	0.6980	0.0645	0.7625	0.2010	0.0617	0.2627		2,888.9661	2,888.9661	0.2505		2,895.2296
Worker	1.4901	0.9309	9.7526	0.0297	3.3421	0.0202	3.3624	0.8863	0.0186	0.9050		2,954.8250	2,954.8250	0.0734		2,956.6598
Total	**1.8105**	**12.0874**	**12.1549**	**0.0571**	**4.0401**	**0.0848**	**4.1249**	**1.0873**	**0.0804**	**1.1677**		**5,843.7911**	**5,843.7911**	**0.3239**		**5,851.8894**

3.5 Architectural Coating - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	5.1551					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3553	2.4472	2.4551	3.9600e-003		0.1717	0.1717		0.1717	0.1717		375.2641	375.2641	0.0317		376.0565
Total	**5.5104**	**2.4472**	**2.4551**	**3.9600e-003**		**0.1717**	**0.1717**		**0.1717**	**0.1717**		**375.2641**	**375.2641**	**0.0317**		**376.0565**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.3228	0.2099	2.1603	6.1500e-003	0.6707	4.1400e-003	0.6748	0.1779	3.8100e-003	0.1817		612.3103	612.3103	0.0166		612.7257
Total	**0.3228**	**0.2099**	**2.1603**	**6.1500e-003**	**0.6707**	**4.1400e-003**	**0.6748**	**0.1779**	**3.8100e-003**	**0.1817**		**612.3103**	**612.3103**	**0.0166**		**612.7257**

Attachment: Air Quality Study (2444 : Legacy Park Project)

3.5 Architectural Coating - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	5.1551					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3553	2.4472	2.4551	3.9600e-003		0.1717	0.1717		0.1717	0.1717	0.0000	375.2641	375.2641	0.0317		376.0565
Total	**5.5104**	**2.4472**	**2.4551**	**3.9600e-003**		**0.1717**	**0.1717**		**0.1717**	**0.1717**	**0.0000**	**375.2641**	**375.2641**	**0.0317**		**376.0565**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.3228	0.2099	2.1603	6.1500e-003	0.6707	4.1400e-003	0.6748	0.1779	3.8100e-003	0.1817		612.3103	612.3103	0.0166		612.7257
Total	**0.3228**	**0.2099**	**2.1603**	**6.1500e-003**	**0.6707**	**4.1400e-003**	**0.6748**	**0.1779**	**3.8100e-003**	**0.1817**		**612.3103**	**612.3103**	**0.0166**		**612.7257**

3.5 Architectural Coating - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	5.1551					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3229	2.2451	2.4419	3.9600e-003		0.1479	0.1479		0.1479	0.1479		375.2641	375.2641	0.0291		375.9904
Total	**5.4780**	**2.2451**	**2.4419**	**3.9600e-003**		**0.1479**	**0.1479**		**0.1479**	**0.1479**		**375.2641**	**375.2641**	**0.0291**		**375.9904**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2990	0.1868	1.9570	5.9500e-003	0.6707	4.0600e-003	0.6747	0.1779	3.7400e-003	0.1816		592.9415	592.9415	0.0147		593.3097
Total	**0.2990**	**0.1868**	**1.9570**	**5.9500e-003**	**0.6707**	**4.0600e-003**	**0.6747**	**0.1779**	**3.7400e-003**	**0.1816**		**592.9415**	**592.9415**	**0.0147**		**593.3097**

3.5 Architectural Coating - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	5.1551					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3229	2.2451	2.4419	3.9600e-003		0.1479	0.1479		0.1479	0.1479	0.0000	375.2641	375.2641	0.0291		375.9904
Total	**5.4780**	**2.2451**	**2.4419**	**3.9600e-003**		**0.1479**	**0.1479**		**0.1479**	**0.1479**	**0.0000**	**375.2641**	**375.2641**	**0.0291**		**375.9904**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2990	0.1868	1.9570	5.9500e-003	0.6707	4.0600e-003	0.6747	0.1779	3.7400e-003	0.1816		592.9415	592.9415	0.0147		593.3097
Total	**0.2990**	**0.1868**	**1.9570**	**5.9500e-003**	**0.6707**	**4.0600e-003**	**0.6747**	**0.1779**	**3.7400e-003**	**0.1816**		**592.9415**	**592.9415**	**0.0147**		**593.3097**

3.5 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	5.1551					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2919	2.0358	2.4234	3.9600e-003		0.1255	0.1255		0.1255	0.1255		375.2641	375.2641	0.0258		375.9079
Total	**5.4470**	**2.0358**	**2.4234**	**3.9600e-003**		**0.1255**	**0.1255**		**0.1255**	**0.1255**		**375.2641**	**375.2641**	**0.0258**		**375.9079**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2792	0.1676	1.7906	5.7500e-003	0.6707	3.9500e-003	0.6746	0.1779	3.6400e-003	0.1815		573.1161	573.1161	0.0132		573.4472
Total	**0.2792**	**0.1676**	**1.7906**	**5.7500e-003**	**0.6707**	**3.9500e-003**	**0.6746**	**0.1779**	**3.6400e-003**	**0.1815**		**573.1161**	**573.1161**	**0.0132**		**573.4472**

3.5 Architectural Coating - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	5.1551					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.2919	2.0358	2.4234	3.9600e-003		0.1255	0.1255		0.1255	0.1255	0.0000	375.2641	375.2641	0.0258		375.9079
Total	**5.4470**	**2.0358**	**2.4234**	**3.9600e-003**		**0.1255**	**0.1255**		**0.1255**	**0.1255**	**0.0000**	**375.2641**	**375.2641**	**0.0258**		**375.9079**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2792	0.1676	1.7906	5.7500e-003	0.6707	3.9500e-003	0.6746	0.1779	3.6400e-003	0.1815		573.1161	573.1161	0.0132		573.4472
Total	**0.2792**	**0.1676**	**1.7906**	**5.7500e-003**	**0.6707**	**3.9500e-003**	**0.6746**	**0.1779**	**3.6400e-003**	**0.1815**		**573.1161**	**573.1161**	**0.0132**		**573.4472**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Improve Pedestrian Network

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Mitigated	3.6763	30.9184	43.8339	0.1920	15.0116	0.1449	15.1565	4.0166	0.1360	4.1526		19,608.9083	19,608.9083	1.0755		19,635.7944
Unmitigated	3.7574	31.8018	45.9616	0.2028	15.9613	0.1531	16.1143	4.2707	0.1437	4.4144		20,703.3860	20,703.3860	1.1056		20,731.0264

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	2,103.92	2,190.11	1905.02	7,134,393	6,709,897
Total	2,103.92	2,190.11	1,905.02	7,134,393	6,709,897

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Asphalt Surfaces	0.542116	0.037578	0.185203	0.118503	0.016241	0.005141	0.017392	0.068695	0.001383	0.001183	0.004582	0.000945	0.001038
Single Family Housing	0.542116	0.037578	0.185203	0.118503	0.016241	0.005141	0.017392	0.068695	0.001383	0.001183	0.004582	0.000945	0.001038

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0469	0.4011	0.1707	2.5600e-003		0.0324	0.0324		0.0324	0.0324		512.0476	512.0476	9.8100e-003	9.3900e-003	515.0904
NaturalGas Unmitigated	0.0469	0.4011	0.1707	2.5600e-003		0.0324	0.0324		0.0324	0.0324		512.0476	512.0476	9.8100e-003	9.3900e-003	515.0904

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	4352.4	0.0469	0.4011	0.1707	2.5600e-003		0.0324	0.0324		0.0324	0.0324		512.0476	512.0476	9.8100e-003	9.3900e-003	515.0904
Total		**0.0469**	**0.4011**	**0.1707**	**2.5600e-003**		**0.0324**	**0.0324**		**0.0324**	**0.0324**		**512.0476**	**512.0476**	**9.8100e-003**	**9.3900e-003**	**515.0904**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	4.3524	0.0469	0.4011	0.1707	2.5600e-003		0.0324	0.0324		0.0324	0.0324		512.0476	512.0476	9.8100e-003	9.3900e-003	515.0904
Total		**0.0469**	**0.4011**	**0.1707**	**2.5600e-003**		**0.0324**	**0.0324**		**0.0324**	**0.0324**		**512.0476**	**512.0476**	**9.8100e-003**	**9.3900e-003**	**515.0904**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	12.2290	3.8769	19.8336	0.0244		0.3971	0.3971		0.3971	0.3971	0.0000	4,712.8327	4,712.8327	0.1215	0.0858	4,741.4391
Unmitigated	12.2290	3.8769	19.8336	0.0244		0.3971	0.3971		0.3971	0.3971	0.0000	4,712.8327	4,712.8327	0.1215	0.0858	4,741.4391

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.9180					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	10.3283					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.4290	3.6660	1.5600	0.0234		0.2964	0.2964		0.2964	0.2964	0.0000	4,680.0000	4,680.0000	0.0897	0.0858	4,707.8109
Landscaping	0.5537	0.2109	18.2736	9.6000e-004		0.1007	0.1007		0.1007	0.1007		32.8327	32.8327	0.0318		33.6282
Total	**12.2290**	**3.8769**	**19.8336**	**0.0244**		**0.3971**	**0.3971**		**0.3971**	**0.3971**	**0.0000**	**4,712.8327**	**4,712.8327**	**0.1215**	**0.0858**	**4,741.4391**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.9180					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	10.3283					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.4290	3.6660	1.5600	0.0234		0.2964	0.2964		0.2964	0.2964	0.0000	4,680.0000	4,680.0000	0.0897	0.0858	4,707.8109
Landscaping	0.5537	0.2109	18.2736	9.6000e-004		0.1007	0.1007		0.1007	0.1007		32.8327	32.8327	0.0318		33.6282
Total	**12.2290**	**3.8769**	**19.8336**	**0.0244**		**0.3971**	**0.3971**		**0.3971**	**0.3971**	**0.0000**	**4,712.8327**	**4,712.8327**	**0.1215**	**0.0858**	**4,741.4391**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

BIOLOGICAL TECHNICAL REPORT

For

TENTATIVE TRACT 36760

Located in the City of Moreno Valley
Riverside County, California

Prepared For:

MPLC Legacy 75 Partners, LLP
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Report Preparer: David F. Moskovitz

September 18, 2014

INFORMATION SUMMARY

A. **Report Date:** September 17, 2014

B. **Report Title:** Biological Technical Report for Tentative Tract 36760

C. **Project Site Location:** Moreno Valley, Riverside County, California

D. **Owner/Applicant:** MPLC Legacy 75 Partners, LLP
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F. **Report Summary:**

This document provides the results of general and focused biological surveys for the approximately 53-acre Tentative Tract 36760 Project ("Project") located in the City of Moreno Valley, Riverside County, California. This report identifies and evaluates impacts to biological resources associated with the proposed Project in the context of the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP), the California Environmental Quality Act (CEQA), and State and Federal regulations such as the Endangered Species Act (ESA), Clean Water Act (CWA), and the California Fish and Game Code.

The Project site consists of a flat, undeveloped parcel that has been heavily disturbed through past and ongoing activities, including disking. The majority of the site is dominated by plants associated with ruderal areas.

The Project site is located within the Reche Canyon/Badlands Area Plan of the MSHCP, but is not located within the MSHCP Criteria Area. As such, the Project is not subject to the HANS or JPR processes. The Project site located within the burrowing owl survey area, but it not located within the NEPSSA, CAPSSA, amphibian, or mammal survey areas. Focused burrowing owl surveys were conducted for the Project site; however, no burrowing owls or burrows with owl sign were detected onsite. In compliance with the MSHCP, pre-construction burrowing owl surveys are required prior to site disturbance.

The Project site will not impact special-status plants, but will result in the loss of actual or potential habitat for special-status animals, including potential habitat for Stephens' kangaroo rat (Dipodomys stephensi) [SKR]. Impacts to SKR are covered under the SKR Habitat Conservation Plan (HCP) with payment of the SKR Fee. The loss of potential habitat for other special-status animals would be less than significant due to the low degree of sensitivity of the species, the disturbed nature of the site, and the lack of adjacency to native open space.

The Project site does not contain jurisdictional waters, MSHCP riparian/riverine areas, or MSHCP vernal pools.

The proposed Project will be consistent with the biological requirements of the MSHCP; specifically pertaining to the Project's relationship to reserve assembly, *Section 6.1.2* (Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools), *Section 6.1.3* (Protection of Narrow Endemic Plant Species), *Section 6.1.4* (Guidelines Pertaining to the Urban/Wildlands Interface), and *Section 6.3.2* (Additional Survey Needs and Procedures).

G. Individuals Conducting Fieldwork:

David Moskovitz
David Smith

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TABLES

EXHIBITS

1.0 INTRODUCTION

1.1 Background and Scope of Work

This document provides the results of general and focused biological surveys for the approximately 53-acre Tentative Tract 36760 Project ("Project") located in the City of Moreno Valley, Riverside County, California. This report identifies and evaluates impacts to biological resources associated with the proposed Project in the context of the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP), the California Environmental Quality Act (CEQA), and State and Federal regulations such as the Endangered Species Act (ESA), Clean Water Act (CWA), and the California Fish and Game Code.

The scope of this report includes a discussion of existing conditions for the Project site, all methods employed regarding the general and focused biological surveys, the documentation of botanical and wildlife resources identified (including special-status species), and an analysis of impacts to biological resources. Methods of the study include a review of relevant literature, field surveys, and a Geographical Information System (GIS)-based analysis of vegetation communities. As appropriate, this report is consistent with accepted scientific and technical standards and survey guideline requirements issued by the U.S. Fish and Wildlife Service (USFWS), the California Department of Fish and Wildlife (CDFW), the California Native Plant Society (CNPS), and other applicable agencies/organizations.

The field study focused on a number of primary objectives that would comply with CEQA requirements, including (1) general biological surveys and vegetation mapping; (2) habitat assessments for special-status plant species (including species with applicable MSHCP survey requirements); (3) habitat assessments for special-status wildlife species (including species with applicable MSHCP survey requirements); (4) assessments for MSHCP riparian/riverine areas and vernal pools; and (5) assessments for areas subject to the jurisdiction of the U.S. Army Corps of Engineers (Corps) jurisdiction pursuant to Section 404 of the Clean Water Act, and CDFW jurisdiction pursuant to Division 2, Chapter 6, Section 1600–1616 of the California Fish and Game Code. Observations of all plant and wildlife species were recorded during the general biological surveys and are included in this report.

1.2 Project Location

The Project site comprises approximately 53 acres in the City of Moreno Valley, Riverside California [Exhibit 1 – Regional Map] and is located within Section 19 of Township 3 South, Range 3 West, of the U.S. Geological Survey (USGS) 7.5" quadrangle map Sunnymead, California (dated 1967 and photorevised in 1980)[Exhibit 2 – Vicinity Map]. The Project site is comprised of three parcels (APN# 485-220-023, 485-220-032, and 485-220-040. The Project site is bordered by Indian Avenue and residential development to the west, an undeveloped parcel and residential development to the north, an undeveloped parcel and Perris Boulevard to the east, and March Middle School to the south.

1.3 Project Description

The proposed Project will subdivide 53.0 gross acres into 189 single family detached lots, one park lot, nine common area open space lots, and two remainder parcels. The Project is designed to accommodate two lot size product types (4,000 and 5,000 sf) as a Planned Unit Development (PUD).

1.4 Existing Conditions

The Project site consists of a flat, undeveloped parcel that has been heavily disturbed through past and ongoing activities, including disking. The majority of the site is dominated by plants associated with ruderal areas. The dominant plant at the site is Russian thistle (*Salsola tragus*). Additional plant species detected onsite include tumbling pigweed (*Amaranthus albus*), puncture vine (*Tribulus terrestris*), vinegar weed (*Trichostema lanceolatum*), telegraph weed (*Heterotheca grandiflora*), annual bur-sage (*Ambrosia acanthicarpa*), lamb's quarters (*Chenopodium album*), and common sunflower (*Helianthus annuus*).

1.5 Relationship of the Project Site to the MSHCP

1.5.1 MSHCP Background

The Western Riverside County MSHCP is a comprehensive habitat conservation/planning program for Western Riverside County. The intent of the MSHCP is to preserve native vegetation and meet the habitat needs of multiple species, rather than focusing preservation efforts on one species at a time. The MSHCP provides coverage (including take authorization for listed species) for special-status plant and animal species, as well as mitigation for impacts to special-status species and associated native habitats.

Through agreements with the U.S. Fish and Wildlife Service (USFWS) and CDFW, the MSHCP designates 146 special-status animal and plant species as Covered Species, of which the majority have no project-specific survey/conservation requirements. The MSHCP provides mitigation for project-specific impacts to these species for Projects that are compliant/consistent with MSHCP requirements, such that the impacts are reduced to below a level of significance pursuant to CEQA.

The Covered Species that are not yet adequately conserved have additional requirements in order for these species to ultimately be considered "adequately conserved". A number of these species have survey requirements based on a project's occurrence within a designated MSHCP survey area and/or based on the presence of suitable habitat. These include Narrow Endemic Plant Species (MSHCP *Volume I, Section 6.1.3*), as identified by the Narrow Endemic Plant Species Survey Areas (NEPSSA); Criteria Area Plant Species (MSHCP *Volume I, Section 6.3.2*) identified by the Criteria Area Plant Species Survey Areas (CAPSSA); animals species (burrowing owl, mammals, amphibians) identified by survey areas (MSHCP *Volume I, Section 6.3.2*); and species associated with riparian/riverine areas and vernal pool habitats, i.e., least Bell's vireo, southwestern willow flycatcher, western yellow-billed cuckoo, and three species of listed fairy shrimp (MSHCP *Volume I, Section 6.1.2*).

The goal of the MSHCP is to have a total Conservation Area in excess of 500,000 acres, including approximately 347,000 acres on existing Public/Quasi-Public (PQP) Lands, and approximately 153,000 acres of Additional Reserve Lands targeted within the MSHCP Criteria Area. The MSHCP is divided into 16 separate Area Plans, each with its own conservation goals and objectives. Within each Area Plan, the Criteria Area is divided into Subunits, and further divided into Criteria Cells and Cell Groups (a group of criteria cells). Each Cell Group and ungrouped, independent Cell has designated "criteria" for the purpose of targeting additional conservation lands for acquisition. Projects located within the Criteria Area are subject to the Habitat Evaluation and Acquisition Negotiation Strategy (HANS) process to determine if lands are targeted for inclusion in the MSHCP Reserve. In addition, all Projects located within the Criteria Area are subject to the Joint Project Review (JPR) process, where the Project is reviewed by the Regional Conservation Authority (RCA) to determine overall compliance/consistency with the biological requirements of the MSHCP.

1.6.2 Relationship of the Project Site to the MSHCP

The Project site is located within the Reche Canyon/Badlands Area Plan of the MSHCP, but is not located within the MSHCP Criteria Area. As such, the Project is not subject to the HANS or JPR processes. The Project site located within the burrowing owl survey area, but it not located within the NEPSSA, CAPSSA, amphibian, or mammal survey areas [Exhibit 3 – MSHCP Overlay Map].

Within the designated Survey Areas, the MSHCP requires habitat assessments, and focused surveys within areas of suitable habitat. For locations with positive survey results, the MSHCP requires that 90 percent of those portions of the property that provide for long-term conservation value for the identified species shall be avoided until it is demonstrated that conservation goals for the particular species have been met throughout the MSHCP. Findings of equivalency shall be made demonstrating that the 90-percent standard has been met, if applicable. If equivalency findings cannot be demonstrated, then "biologically equivalent or superior preservation" must be provided.

2.0 METHODOLOGY

2.1 Summary of Surveys

GLA conducted biological surveys in order to identify and analyze actual or potential impacts to biological resources associated with the Project. The scope of the biological surveys was determined through a review of the CNDDB [CDFW 2014], CNPS 8th edition online inventory (CNPS 2010), Natural Resource Conservation Service (NRCS) soil data, MSHCP species and habitat maps, MSHCP sensitive soil maps, other pertinent literature, and knowledge of the region. Fieldwork included general biological surveys and habitat assessments, and focused surveys for the burrowing owl (*Athene cunicularia*). Observations of all plant and wildlife species were recorded during each of the above mentioned survey efforts. In addition, the site surveys included an assessment for aquatic resources, including MSHCP riparian/riverine areas and vernal pools; and waters subject to the jurisdiction of the U.S. Army Corps of Engineers (Corps), Regional Water Quality Control Board (Regional Board), and CDFW.

Table 2-1 provides a summary list of survey dates, survey types and personnel.

Table 2-1. Summary of Biological Surveys for the Project Site.

Survey Type	2014 Survey Dates	Biologists
General Biological Survey Habitat Assessments Focused Burrow Survey	8/21	DM
Focused Burrowing Owl Surveys	8/21 8/27 8/28 8/29	DM DS DS DM

DM = David Moskovitz, DS = David Smith

Individual plants and wildlife species are evaluated in this report based on their “special-status.” For the purpose of this report, plants were considered “special-status” based on one or more of the following criteria:

- Listing through the Federal and/or State Endangered Species Act (ESA);
- Occurrence in the CNPS Rare Plant Inventory (Rank 1A/1B, 2A/2B, 3, or 4); and/or
- Occurrence in the CNDDB inventory.

Wildlife species were considered “special-status” based on one or more of the following criteria:

- Listing through the Federal and/or State ESA; and
- Designation by the State as a Species of Special Concern (SSC) or California Fully Protected (CFP) species.

Vegetation communities and habitats were considered "special-status" based on one or more of the following criteria:

- Global (G) and/or State (S) ranking of category 3 or less based on CDFW (see Section 3.2.2 below for further explanation); and
- Riparian habitat.

2.2 <u>Botanical Resources</u>

A site-specific survey program was designed to accurately document the botanical resources within the Project site, and consisted of five components: (1) a literature search; (2) preparation of a list of target special-status plant species and sensitive vegetation communities that could occur within the Project site; (3) general biological surveys; (4) vegetation mapping; and (5) habitat assessments for special-status plants.

2.2.1 Literature Search

Prior to conducting fieldwork, pertinent literature on the flora of the region was examined. A thorough archival review was conducted using available literature and other historical records. These resources included the following:

- CNPS *Inventory of Rare and Endangered Plants of California* (eighth edition). Rare Plant Advisory Committee, David Tibor, Convening Editor, California Native Plant Society. Sacramento, CA x + 388pp; (CNPS 2010); and

- CNDDB for the USGS 7.5' quadrangles: Sunnymead and surrounding quadrangles (CNDDB 2014).

2.2.2 Vegetation Mapping

Vegetation communities within the Project site were mapped according to the List of Vegetation Alliances and Associations (or Natural Communities List). The list is based on A Manual of California Vegetation, Second Edition or MCVII, which is the California expression of the National Vegetation Classification. Where necessary, deviations were made when areas did not fit into exact habitat descriptions. These vegetation communities were named based on the dominant plant species present. Plant communities were mapped in the field directly onto a 200-scale (1"=200') aerial photograph. A vegetation map is included as Exhibit 4. Representative site photographs are included as Exhibit 5.

2.2.3 Special-Status Plant Species and Habitats Evaluated for the Project Site

A literature search was conducted to obtain a list of special status plants with the potential to occur within the Project site. The CNDDB was initially consulted to determine well-known occurrences of plants and habitats of special concern in the region. Other sources used to develop a list of target species for the survey program included the CNPS online inventory (2010).

Based on this information, vegetation profiles and a list of sensitive plant species that could occur within the Project site were developed and incorporated into a mapping and survey program to achieve the following goals: (1) characterize the vegetation associations and land use; (2) identify the potential for any special status plants that may occur within the Project site; and (3) prepare a map showing the distribution of any sensitive botanical resources associated with the Project site, if applicable.

The Project site is not located within the MSHCP Narrow Endemic Plant Species Survey Area (NEPSSA) or Criteria Area Plant Species Survey Area (CAPSSA). As such, focused plant surveys are not required pursuant to the MSHCP.

2.3 Wildlife Resources

Wildlife species were evaluated and detected during field surveys by sight, call, tracks, and scat. Site reconnaissance was conducted in such a manner as to allow inspection of the entire Project Site by direct observation, including the use of binoculars. Observations of physical evidence and direct sightings of wildlife were recorded in field notes during the visit. Scientific nomenclature and common names for vertebrate species referred to in this report follow the Complete List of Amphibian, Reptile, Bird, and Mammal Species in California (CDFG 2008), Standard Common and Scientific Names for North American Amphibians, Turtles, Reptiles, and Crocodilians 6^{th} Edition, Collins and Taggert (2009) for amphibians and reptiles, and the American Ornithologists' Union Checklist 7^{th} Edition (2009) for birds. The methodology (including any applicable survey protocols) utilized to conduct general surveys, habitat assessments, and/or focused surveys for special-status animals are included below.

2.3.1 General Surveys

Birds

During the general biological and reconnaissance survey within the Project site, birds were identified incidentally within each habitat type. Birds were detected by both direct observation and by vocalizations, and were recorded in field notes.

Mammals

During general biological and reconnaissance survey within the Project site, mammals were identified incidentally within each habitat type. Mammals were detected both by direct observations and by the presence of diagnostic sign (i.e., tracks, burrows, scat, etc.).

Reptiles and Amphibians

During general biological and reconnaissance surveys within the Project site, reptiles and amphibians were identified incidentally during surveys within each habitat type. Habitats were examined for diagnostic reptile sign, which include shed skins, scat, tracks, snake prints, and lizard tail drag marks. All reptiles and amphibian species observed, as well as diagnostic sign, were recorded in field notes.

2.3.2 Special-Status Animal Species Evaluated for the Project Site

A literature search was conducted in order to obtain a list of special-status wildlife species with the potential to occur within the Project site. Species were evaluated based on two factors, including: 1) species identified by the CNDDB as occurring (either currently or historically) on or in the vicinity of the Project site, and 2) any other special-status animals that are known to occur within the vicinity of the Project site, or for which potentially suitable habitat occurs on the Project site.

2.3.3 Habitat Assessment for Special Status Animal Species

GLA biologist David Moskovitz conducted habitat assessments for special-status animal species on August 21, 2014. An aerial photograph, soil map and/or topographic map were used to determine the community types and other physical features that may support special-status and uncommon taxa within the Project site.

2.3.4 Focused Burrowing Owl Surveys

The Project site is located within the MSHCP burrowing owl survey area. GLA biologists David Moskovitz and David Smith conducted focused surveys for the burrowing owl for all suitable habitat areas within the Project site. Surveys were conducted in accordance with survey guidelines described in the 2006 MSHCP Burrowing Owl Survey Instructions. The guidelines stipulate that four focused survey visits should be conducted between March 1 and August 31. Within areas of suitable habitat, the MSHCP first requires a focused burrow survey to map all suitable burrows. The focused burrow survey was conducted on August 21, 2014. Focused burrowing owl surveys were conducted on August 27, 28, and 29, 2014. Weather conditions during the surveys were conducive to a high level of bird activity.

Surveys were conducted by walking meandering transects throughout areas of suitable habitat. Transects were spaced no more than 30 meters apart, adjusting for vegetation height and density, in order to provide adequate visual coverage of the survey areas. At the start of each transect, and at least every 100 meters along transects, the survey area was scanned for burrowing owls using binoculars. All suitable burrows were inspected for diagnostic owl sign (e.g., pellets, prey remains, whitewash, feathers, bones, and/or decoration) in order to identify potentially occupied burrows. Exhibit 6 provides locations of suitable burrows mapped during the transect surveys. Table 2-2 summarizes the burrowing owl survey visits. The results of the burrowing owl surveys are documented in Section 4.0 of this report.

Table 2-2. Summary of Burrowing Owl Surveys

Survey Date	Biologist	Start/End Time	Start/End Temperature	Start/End Wind Speed (mph)	Cloud Cover
8/21/14	DM	7:05/10:30	66/73	0-2	40%/20%
8/27/14	DS	6:00/7:15	60/66	0-2	Clear
8/28/14	DS	6:05/7:15	60/69	0-2	20%/Clear
8/29/14	DM	7:10/10:00	62/82	0-2	Clear

DM = David Moskovitz, DS = David Smith

2.4 Jurisdictional Delineation

Prior to beginning the field delineation a 200-scale color aerial photograph and the previously cited USGS topographic maps were examined to determine the locations of potential areas of Corps/CDFW jurisdiction. Suspected jurisdictional areas were field checked for the presence of definable channels and/or wetland vegetation, soils and hydrology. Potential wetland habitats at the subject site were evaluated using the methodology set forth in the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual[1] (Wetland Manual) and the 2008 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Supplement (Arid West Supplement)[2]. The presence of an Ordinary High Water Mark (OHWM) was determined using the 2008 Field Guide to Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States[3] in conjunction with the Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States.[4] While in the field the limits of the OHWM, wetlands, and CDFW jurisdiction were recorded using GPS technology and/or on copies of the aerial photography. Other data were recorded onto the appropriate datasheets.

2.5 MSHCP Riparian/Riverine Areas and Vernal Pools

GLA surveyed the site for riparian/riverine areas and vernal pool/seasonal pool habitat. *Volume I, Section 6.1.2* of the MSHCP describes the process through which protection of riparian/riverine areas and vernal pools would occur within the MSCHP Plan Area. The purpose is to ensure that the biological functions and values of these areas throughout the MSHCP Plan Area are maintained such that habitat values for species inside the MSCHP Conservation Area

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[1] Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, U.S. Army Engineer Waterways Experimental Station, Vicksburg, Mississippi.

[2] U.S. Army Corps of Engineers. 2008. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Supplement (Version 2.0). Ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-06-16. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

[3] Lichvar, R. W., and S. M. McColley. 2008. A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States. ERDC/CRREL TR-08-12. Hanover, NH: U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory. (http://www.crrel.usace.army.mil/library/technicalreports/ERDC-CRREL-TR-08-12.pdf).

[4] Curtis, Katherine E. and Robert Lichevar. 2010. Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States. ERDC/CRREL TN-10-1. Hanover, NH: U.S. Army Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory.

are maintained. The MSHCP requires that as projects are proposed within the overall Plan Area, the effect of those projects on riparian/riverine areas and vernal pools must be addressed.

The MSHCP defines riparian/riverine areas as *lands which contain Habitat dominated by trees, shrubs, persistent emergent mosses and lichens, which occur close to or which depend upon soils moisture from a nearby fresh water source; or areas with fresh water flow during all or a portion of the year*.

The MSHCP defines vernal pools as *seasonal wetlands that occur in depression areas that have wetlands indicators of all three parameters (soils, vegetation, and hydrology) during the wetter portion of the growing season but normally lack wetland indictors of hydrology and/or vegetation during the drier portion of the growing season.*

With the exception of wetlands created for the purpose of providing wetlands Habitat or resulting from human actions to create open waters or from the alteration of natural stream courses, areas demonstrating characteristics as described above which are artificially created are not included in these definitions.

3.0 REGULATORY SETTING

The proposed Project is subject to state and federal regulations associated with a number of regulatory programs. These programs often overlap and were developed to protect natural resources, including: state- and federally listed plants and animals; aquatic resources including rivers and creeks, ephemeral streambeds, wetlands, and areas of riparian habitat; other special-status species which are not listed as threatened or endangered by the state or federal governments; and other special-status vegetation communities.

3.1 State and/or Federally Listed Plants or Animals

3.1.1 State of California Endangered Species Act

California's Endangered Species Act (CESA) defines an endangered species as "a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease." The State defines a threatened species as "a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an Endangered species in the foreseeable future in the absence of the special protection and management efforts required by this chapter. Any animal determined by the commission as rare on or before January 1, 1985 is a threatened species." Candidate species are defined as "a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that the commission has formally noticed as being under review by the department for addition to either the list of endangered species or the list of threatened species, or a species for which the commission has published a notice of proposed regulation to add the species to either list." Candidate species may be afforded temporary protection as though they were already listed as threatened or endangered at the discretion of the Fish and Game Commission. Unlike the Federal Endangered Species Act (FESA), CESA does not list invertebrate species.

Article 3, Sections 2080 through 2085, of the CESA addresses the taking of threatened, endangered, or candidate species by stating "No person shall import into this state, export out of this state, or take, possess, purchase, or sell within this state, any species, or any part or product thereof, that the commission determines to be an endangered species or a threatened species, or attempt any of those acts, except as otherwise provided." Under the CESA, "take" is defined as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." Exceptions authorized by the state to allow "take" require permits or memoranda of understanding and can be authorized for endangered species, threatened species, or candidate species for scientific, educational, or management purposes and for take incidental to otherwise lawful activities. Sections 1901 and 1913 of the California Fish and Game Code provide that notification is required prior to disturbance.

3.1.2 Federal Endangered Species Act

The FESA of 1973 defines an endangered species as "any species that is in danger of extinction throughout all or a significant portion of its range." A threatened species is defined as "any species that is likely to become an Endangered species within the foreseeable future throughout all or a significant portion of its range." Under provisions of Section 9(a)(1)(B) of the FESA it is unlawful to "take" any listed species. "Take" is defined in Section 3(18) of FESA: "...harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Further, the USFWS, through regulation, has interpreted the terms "harm" and "harass" to include certain types of habitat modification that result in injury to, or death of species as forms of "take." These interpretations, however, are generally considered and applied on a case-by-case basis and often vary from species to species. In a case where a property owner seeks permission from a Federal agency for an action that could affect a federally listed plant and animal species, the property owner and agency are required to consult with USFWS. Section 9(a)(2)(b) of the FESA addresses the protections afforded to listed plants.

3.1.3 State and Federal Take Authorizations for Listed Species

Federal or state authorizations of impacts to or incidental take of a listed species by a private individual or other private entity would be granted in one of the following ways:

- Section 7 of the FESA stipulates that any federal action that may affect a species listed as threatened or endangered requires a formal consultation with USFWS to ensure that the action is not likely to jeopardize the continued existence of the listed species or result in destruction or adverse modification of designated critical habitat. 16 U.S.C. 1536(a)(2).
- In 1982, the FESA was amended to give private landowners the ability to develop Habitat Conservation Plans (HCP) pursuant to Section 10(a) of the FESA. Upon development of an HCP, the USFWS can issue incidental take permits for listed species where the HCP specifies at minimum, the following: (1) the level of impact that will result from the taking, (2) steps that will minimize and mitigate the impacts, (3) funding necessary to implement the plan, (4) alternative actions to the taking considered by the applicant and the reasons why such alternatives were not chosen, and (5) such other measures that the Secretary of the Interior may require as being necessary or appropriate for the plan.
- Sections 2090-2097 of the CESA require that the state lead agency consult with CDFW on projects with potential impacts on state-listed species. These provisions also require CDFW to coordinate consultations with USFWS for actions involving federally listed as well as state-listed species. In certain circumstances, Section 2080.1 of the California Fish and Game Code allows CDFW to adopt the federal incidental take statement or the 10(a) permit as its own based on its findings that the federal permit adequately protects the species under state law.

3.1.4 Take Authorizations Pursuant to the MSHCP

The Western Riverside County MSHCP was adopted on June 17, 2003, and an Implementing Agreement (IA) was executed between the Federal and State Wildlife Agencies (USFWS and CDFW) and participating entities. The MSHCP is a comprehensive habitat conservation-planning program for western Riverside County. The intent of the MSHCP is to preserve native vegetation and meet the habitat needs of multiple species, rather than focusing preservation efforts on one species at a time. As such, the MSHCP is intended to streamline review of individual projects with respect to the species and habitats addressed in the MSHCP, and to provide for an overall

Conservation Area that would be of greater benefit to biological resources than would result from a piecemeal regulatory approach. The MSHCP provides coverage (including take authorization for listed species) for special-status plant and animal species, as well as mitigation for impacts to sensitive species.

Through agreements with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW), the MSHCP designates 146 special-status animal and plant species that receive some level of coverage under the plan. Of the 146 "Covered Species" designated under the MSHCP, the majority of these species have no additional survey/conservation requirements. In addition, through project participation with the MSHCP, the MSHCP provides mitigation for project-specific impacts to Covered Species so that the impacts would be reduced to below a level of significance pursuant to CEQA. As noted above, project-specific survey requirements exist for species designated as "Covered Species not yet adequately conserved". These include Narrow Endemic Plant Species, as identified by the Narrow Endemic Plant Species Survey Areas (NEPSSA); Criteria Area Plant Species identified by the Criteria Area Species Survey Areas (CASSA); animals species as identified by survey area; and plant and animal species associated with riparian/riverine areas and vernal pool habitats (*Volume I, Section 6.1.2* of the MSHCP document).

3.2 California Environmental Quality Act

3.2.1 CEQA Guidelines Section 15380

CEQA requires evaluation of a project's impacts on biological resources and provides guidelines and thresholds for use by lead agencies for evaluating the significance of proposed impacts. Sections 5.1.1 and 5.2.2 below set forth these thresholds and guidelines. Furthermore, pursuant to the CEQA Guidelines Section 15380, CEQA provides protection for non-listed species that could potentially meet the criteria for state listing. For plants, CDFW recognizes that plants on Lists 1A, 1B, or 2 of the CNPS *Inventory of Rare and Endangered Plants in California* may meet the criteria for listing and should be considered under CEQA. CDFW also recommends protection of plants, which are regionally important, such as locally rare species, disjunct populations of more common plants, or plants on the CNPS Lists 3 or 4.

3.2.2 Non-Listed Special-Status Plants, Wildlife and Vegetation Communities Evaluated Under CEQA

Federally Designated Special-Status Species

Within recent years, the USFWS instituted changes in the listing status of candidate species. Former C1 (candidate) species are now referred to simply as candidate species and represent the only candidates for listing. Former C2 species (for which the USFWS had insufficient evidence to warrant listing) and C3 species (either extinct, no longer a valid taxon or more abundant than was formerly believed) are no longer considered as candidate species. Therefore, these species are no longer maintained in list form by the USFWS, nor are they formally protected. This term is employed in this document, but carries no official protections. All references to federally protected species in this report (whether listed, proposed for listing, or candidate) include the most current published status or candidate category to which each species has been assigned by USFWS.

For this report the following acronyms are used for federal special-status species:

- FE Federally listed as Endangered
- FT Federally listed as Threatened
- FPE Federally proposed for listing as Endangered
- FPT Federally proposed for listing as Threatened
- FC Federal Candidate Species (former C1 species)
- FSC Federal Species of Concern (former C2 species)

State-Designated Special-Status Species

Some mammals and birds are protected by the state as Fully Protected (SFP) Mammals or Fully Protected Birds, as described in the California Fish and Game Code, Sections 4700 and 3511, respectively. California SSC are designated as vulnerable to extinction due to declining population levels, limited ranges, and/or continuing threats. This list is primarily a working document for the CDFW's CNDDB project. Informally listed taxa are not protected, but warrant consideration in the preparation of biotic assessments. For some species, the CNDDB is only concerned with specific portions of the life history, such as roosts, rookeries, or nest sites.

For this report the following acronyms are used for State special-status species:

- SE State-listed as Endangered
- ST State-listed as Threatened
- SR State-listed as Rare
- SCE State Candidate for listing as Endangered
- SCT State Candidate for listing as Threatened
- SFP State Fully Protected
- SP State Protected
- SSC State Species of Special Concern

CNDDB Global/State Rankings

The CNDDB provides global and state rankings for species and communities based on a system developed by The Nature Conservancy to measure rarity of a species. The ranking provides a shorthand formula about how rare a species/community is, and is based on the best information available from multiple sources, including state and federal listings, and other groups that recognize species as sensitive (e.g., Bureau of Land Management, Audubon Society, etc.). State and global rankings are used to prioritize conservation and protection efforts so that the rarest species/communities receive immediate attention. In both cases, the lower ranking (i.e., G1 or S1) indicates extreme rarity. Rare species are given a ranking from 1 to 3. Species with a ranking of 4 or 5 is considered to be common. If the exact global/state ranking is undetermined, a range is generally provided. For example, a global ranking of "G1G3" indicates that a species/community global rarity is between G1 and G3. If the animal being considered is a subspecies of a broader species, a "T" ranking is attached to the global ranking. The following are descriptions of global and state rankings:

Global Rankings

- G1 – Critically imperiled globally because of extreme rarity (5 or fewer occurrences), or because of some factor(s) making it especially vulnerable to extinction.
- G2 – Imperiled globally because of rarity (6-20 occurrences), or because of some other factor(s) making it very vulnerable to extinction throughout its range.
- G3 – Either very rare and local throughout its range (21 to 100 occurrences), or found locally (even abundantly at some of its locations) in a restricted range (e.g., a physiographic region), or because of some other factor(s) making it vulnerable to extinction throughout its range.
- G4 – Uncommon but not rare; some cause for long-term concern due to declines or other factors.
- G5 – Common, widespread and abundant.

State Rankings

- S1 – Extremely rare; typically 5 or fewer known occurrences in the state; or only a few remaining individuals; may be especially vulnerable to extirpation.
- S2 – Very rare; typically between 6 and 20 known occurrences; may be susceptible to becoming extirpated.
- S3 – Rare to uncommon; typically 21 to 50 known occurrences; S3 ranked species are not yet susceptible to becoming extirpated in the state but may be if additional populations are destroyed.
- S4 - Uncommon but not rare; some cause for long-term concern due to declines or other factors.
- S5 - Common, widespread, and abundant in the state.

California Native Plant Society

The CNPS is a private plant conservation organization dedicated to the monitoring and protection of sensitive species in California. The CNPS's Eighth Edition of the *California Native Plant Society's Inventory of Rare and Endangered Plants of California* separates plants of interest into five ranks. CNPS has compiled an inventory comprised of the information focusing on geographic distribution and qualitative characterization of Rare, Threatened, or Endangered vascular plant species of California. The list serves as the candidate list for listing as threatened and endangered by CDFW. CNPS has developed five categories of rarity that are summarized in Table 3-1.

Table 3-1. CNPS Ranks 1, 2, 3, & 4, and Threat Code Extensions

CNPS Rank	Comments
Rank 1A – Presumed Extinct in California	Thought to be extinct in California based on a lack of observation or detection for many years.
Rank 1B – Rare or Endangered in California and Elsewhere	Species, which are generally rare throughout their range that are also judged to be vulnerable to other threats such as declining habitat.
Rank 2A – Presumed Extinct in California, More Common Elsewhere	Species that are presumed extinct in California but more common outside of California
Rank 2B - Rare or Endangered in California, More Common Elsewhere	Species that are rare in California but more common outside of California
Rank 3 – Need More Information	Species that are thought to be rare or in decline but CNPS lacks the information needed to assign to the appropriate list. In most instances, the extent of surveys for these species is not sufficient to allow CNPS to accurately assess whether these species should be assigned to a specific rank. In addition, many of the Rank 3 species have associated taxonomic problems such that the validity of their current taxonomy is unclear.
Rank 4 – Plants of Limited Distribution	Species that are currently thought to be limited in distribution or range whose vulnerability or susceptibility to threat is currently low. In some cases, as noted above for Rank 3 species, CNPS lacks survey data to accurately determine status in California. Many species have been placed on Rank 4 in previous editions of the "Inventory" and have been removed as survey data has indicated that the species are more common than previously thought. CNPS recommends that species currently included on this list should be monitored to ensure that future substantial declines are minimized.
Extension	**Comments**
.1 – Seriously endangered in California	Species with over 80% of occurrences threatened and/or have a high degree and immediacy of threat.
.2 – Fairly endangered in California	Species with 20-80% of occurrences threatened.
.3 – Not very endangered in California	Species with <20% of occurrences threatened or with no current threats known.

3.3 Jurisdictional Waters

3.3.1 Army Corps of Engineers

Pursuant to Section 404 of the Clean Water Act, the Corps regulates the discharge of dredged and/or fill material into waters of the United States. The term "waters of the United States" is defined in Corps regulations at 33 CFR Part 328.3(a) as:

(1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
(2) All interstate waters including interstate wetlands;

(3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect foreign commerce including any such waters:

(i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or

(ii) From which fish or shell fish are or could be taken and sold in interstate or foreign commerce; or

(iii) Which are used or could be used for industrial purpose by industries in interstate commerce;

(4) All impoundments of waters otherwise defined as waters of the United States under the definition;

(5) Tributaries of waters identified in paragraphs (a) (1)-(4) of this section;

(6) The territorial seas;

(7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) (1)-(6) of this section.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 123.11(m) which also meet the criteria of this definition) are not waters of the United States.

(8) Waters of the United States do not include prior converted cropland.[5]

Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA.

In the absence of wetlands, the limits of Corps jurisdiction in non-tidal waters, such as intermittent streams, extend to the OHWM which is defined at 33 CFR 328.3(e) as:

...that line on the shore established by the fluctuation of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

The term “wetlands” (a subset of “waters of the United States”) is defined at 33 CFR 328.3(b) as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support...a prevalence of vegetation typically adapted for life in saturated soil conditions." In 1987 the Corps published a manual to guide its field personnel in determining jurisdictional wetland boundaries. The methodology set forth in the 1987 Wetland

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[5] The term “prior converted cropland” is defined in the Corps’ Regulatory Guidance Letter 90-7 (dated September 26, 1990) as “wetlands which were both manipulated (drained or otherwise physically altered to remove excess water from the land) and cropped before 23 December 1985, to the extent that they no longer exhibit important wetland values. Specifically, prior converted cropland is <u>inundated for no more than 14 consecutive days</u> during the growing season….” [Emphasis added.]

Delineation Manual and the Arid West Supplement generally require that, in order to be considered a wetland, the vegetation, soils, and hydrology of an area exhibit at least minimal hydric characteristics. While the manual and Supplement provide great detail in methodology and allow for varying special conditions, a wetland should normally meet each of the following three criteria:

- more than 50 percent of the dominant plant species at the site must be typical of wetlands (i.e., rated as facultative or wetter in the National List of Plant Species that Occur in Wetlands[6]);

- soils must exhibit physical and/or chemical characteristics indicative of permanent or periodic saturation (e.g., a gleyed color, or mottles with a matrix of low chroma indicating a relatively consistent fluctuation between aerobic and anaerobic conditions); and

- Whereas the 1987 Manual requires that hydrologic characteristics indicate that the ground is saturated to within 12 inches of the surface for at least five percent of the growing season during a normal rainfall year, the Arid West Supplement does not include a quantitative criteria with the exception for areas with "problematic hydrophytic vegetation", which require a minimum of 14 days of ponding to be considered a wetland.

On January 9, 2001 and June 5, 2007 the Supreme Court of the United States issued two rulings *(Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers, et al [SWANCC]. and Rapanos v. United States and Carabell v. United States [Rapanos], respectively). The first case reiterated that "isolated" waters (those with no interstate commerce connection) are not subject to federal jurisdiction under Section 404 of the Clean Water Act. The second case determined (in a plurality vote) that a water must have a nexus with a "traditionally navigable water (an undefined term) to be subject to federal jurisdiction under Section 404 of the Clean Water Act. The Corps and EPA continue to grapple with providing clear guidance on these two decisions and continue to propose and/or issue guidance. In the meantime, applicants who believe they have waters that would be exempt from federal jurisdiction pursuant to these two rulings must go through a formal process with the Corps* ***and*** *EPA to obtain concurrence.*

3.3.2 Regional Water Quality Control Board

Section 401 of the Clean Water Act requires any applicant for a Section 404 permit to obtain certification from the State that the discharge (and the operation of the facility being constructed) will comply with the applicable effluent limitation and water quality standards. In California this 401 certification is obtained from the Regional Water Quality Control Board. The Corps, by law, cannot issue a Section 404 permit until a 401 certification is issued or waived.

Subsequent to the SWANCC decision, the Chief Counsel for the State Water Resources Control Board issued a memorandum that addressed the effects of the SWANCC decision on the Section

[6] Lichvar, R. W. 2013. *The National Wetland Plant List:* 2013 wetland ratings. Phytoneuron 2013-49: 1-241.

401 Water Quality Certification Program.[7] The memorandum stating that for waters that are no longer considered subject to federal jurisdiction pursuant to Section 404 of the Clean Water Act, but which remain "waters of the state", the State will continue to regulate discharges under the Porter-Cologne Act. In such cases the applicant must apply for and obtain a Waste Discharge Requirement from the Regional Board.

3.3.3 California Department of Fish and Wildlife

Pursuant to Division 2, Chapter 6, Sections 1600-1603 of the California Fish and Game Code, the CDFCDFW regulates all diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake, which supports fish or wildlife.

CDFW defines a "stream" (including creeks and rivers) as "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having surface or subsurface flow that supports or has supported riparian vegetation." CDFW's definition of "lake" includes "natural lakes or man-made reservoirs."

CDFW jurisdiction within altered or artificial waterways is based upon the value of those waterways to fish and wildlife. CDFW Legal Advisor has prepared the following opinion[8]:

- Natural waterways that have been subsequently modified and which have the potential to contain fish, aquatic insects and riparian vegetation will be treated like natural waterways...

- Artificial waterways that have acquired the physical attributes of natural stream courses and which have been viewed by the community as natural stream courses, should be treated by [CDFW] as natural waterways...

- Artificial waterways without the attributes of natural waterways should generally not be subject to Fish and Game Code provisions...

Thus, CDFW jurisdictional limits closely mirror those of the Corps. Exceptions are CDFW's addition of artificial stock ponds and irrigation ditches constructed on uplands, and the addition of riparian habitat supported by a river, stream, or lake regardless of the riparian area's federal wetland status.

[7] Wilson, Craig M. January 25, 2001. Memorandum addressed to State Board Members and Regional Board Executive Officers.
[8] California Department of Fish and Game. Environmental Services Division (ESD). 1994. A Field Guide to Lake and Streambed Alteration Agreements, Sections 1600-1607, California Fish and Game Code.

4.0 RESULTS

This section provides the results of general biological surveys, vegetation mapping, habitat assessments for special-status plants and animals, focused burrowing owl surveys, an assessment for MSHCP riparian/riverine areas and vernal pools, and an assessment for Waters of the United States (including wetlands) subject to the jurisdiction of the Corps and Regional Board, and streams (including riparian vegetation) and lakes subject to the jurisdiction of CDFW.

4.1 Existing Conditions

The Project site consists of a flat, undeveloped parcel that has been heavily disturbed through past and ongoing activities, including disking. The majority of the site is dominated by plants associated with ruderal areas. The dominant plant at the site is Russian thistle (*Salsola tragus*). Additional plant species detected onsite include tumbling pigweed (*Amaranthus albus*), puncture vine (*Tribulus terrestris*), vinegar weed (*Trichostema lanceolatum*), telegraph weed (*Heterotheca grandiflora*), annual bur-sage (*Ambrosia acanthicarpa*), lamb's quarters (*Chenopodium album*), and common sunflower (*Helianthus annuus*).

Wildlife detected during the surveys included birds such as mourning dove (*Zenaida macroura*), rock dove (*Columbia livia*), American crow (*Corvus brachyrhynchos*), American kestrel (*Falco sparverius*), California horned lark (*Eremophila alpestris actia*), house finch (*Carpodacus mexicanus*), European starling (*Sturnus vulgaris*), Brewer's blackbird (*Euphagus cyanocephalus*), lark sparrow (*Chondestes grammacus*), killdeer (*Charadrius vociferus*), barn swallow (*Hirundo rustica*), cliff swallow (*Petrochelidon pyrrhonota*), red-tailed hawk (*Buteo jamaicensis*), western kingbird (*Tyrannus verticalis*), and black phoebe (*Sayornis nigricans*). Mammals observed at the Project site included coyote (*Canis latrans*) and Audubon's cottontail (*Sylvilagus audubonii*).

4.2 Vegetation Mapping

The entire Project site is disturbed by past and ongoing activities, including disking. The majority of the site supports plant species typical of ruderal areas. A Vegetation Map is attached as Exhibit 4. Photographs depicting the various vegetation types and land uses are attached as Exhibit 5.

4.3 Special-Status Habitats

The CNDDB identifies the following special-status vegetation communities for the Sunnymead and surrounding quadrangle maps: Southern Coast Live Oak Riparian Forest, Southern Cottonwood Willow Riparian Forest, Southern Sycamore Alder Riparian Woodland, and Southern Riparian Scrub. The Project site does not contain any special-status vegetation types, including those identified by the CNDDB.

4.4 Special-Status Plants

No special-status plants were detected at the Project site, and in general no special-status plants are expected to occur due to the lack of suitable habitat. Table 4-1 provides a list of special-status plants evaluated for the Project site through general biological surveys and habitat assessments. Species were evaluated based the following factors: 1) species identified by the CNDDB and CNPS as occurring (either currently or historically) on or in the vicinity of the Project site, 2) applicable MSHCP survey areas, and 3) any other special-status plants that are known to occur within the vicinity of the Project site, or for which potentially suitable habitat occurs within the site.

Table 4-1. Special-Status Plants Evaluated for the Project Site

Status

Federal
FE – Federally Endangered
FT – Federally Threatened
FC – Federal Candidate

State
SE – State Endangered
ST – State Threatened

CNPS
Rank 1B – Plants rare, threatened, or endangered in California and elsewhere.
Rank 2A – Plants rare, threatened, or endangered in California, but more common elsewhere.
Rank 2B – Plants rare, threatened, or endangered in California, but more common elsewhere.
Rank 3 – Plants about which more information is needed.
Rank 4 – Plants of limited distribution (a watch list).

Threat Code extension
.1 – Seriously endangered in California (over 80% occurrences threatened)
.2 – Fairly endangered in California (20-80% occurrences threatened)
.3 – Not very endangered in California (<20% of occurrences threatened or no current threats known)

Occurrence

- Does not occur – The site does not contain habitat for the species and/or the site does not occur within the geographic range of the species.
- Absent – The site contains suitable habitat for the species, but the species has been confirmed absent through focused surveys.
- Not expected to occur – The species is not expected to occur onsite due to low habitat quality, however absence cannot be ruled out.
- Potential to occur – The species has a potential to occur onsite based on suitable habitat, however its presence/absence could not be confirmed.
- Present – The species was detected onsite incidentally or through focused surveys.

Species Name	Status	Habitat Requirements	Occurrence
California screw-moss *Tortula californica*	Federal: None State: None CNPS: List 1B.2	Sandy soil in chenopod scrub, and valley and foothill grassland.	Does not occur.
California Orcutt grass *Orcuttia californica*	Federal: FE State: SE CNPS: List 1B	Vernal pools	Does not occur.

Species Name	Status	Habitat Requirements	Occurrence
Chaparral sand verbena *Abronia villosa* var. *aurita*	Federal: None State: None CNPS: List 1B.1	Sandy soils in chaparral, coastal sage scrub.	Does not occur.
Coulter's goldfields *Lasthenia glabrata* ssp. *coulteri*	Federal: None State: None CNPS: List 1B.1	Playas, vernal pools, marshes and swamps (coastal salt).	Does not occur.
Coulter's saltbush *Atriplex coulteri*	Federal: None State: None CNPS: List 1B.2	Coastal bluff scrub, coastal dunes, coastal sage scrub, valley and foothill grassland. Occurring on alkaline or clay soils.	Does not occur.
Davidson's saltscale *Atriplex serenana* var. *davidsonii*	Federal: None State: None CNPS: List 1B	Alkaline soils in coastal sage scrub, coastal bluff scrub.	Does not occur.
Jaeger's milk-vetch *Astragalus pachypus* var. *jaegeri*	Federal: None State: None CNPS: List 1B.1	Sandy or rocky soils in chaparral, cismontane woodland, coastal scrub, and valley and foothill grassland.	Does not occur.
Little mousetail *Myosurus minimus* ssp. *apus*	Federal: SOC State: None CNPS: List 3	Valley and foothill grassland, vernal pools (alkaline soils).	Does not occur.
Long-spined spineflower *Chorizanthe polygonoides* var. *longispina*	Federal: None State: None CNPS: List 1B.2	Clay soils in chaparral, coastal sage scrub, meadows and seeps, and valley and foothill grasslands	Does not occur.
Many-stemmed dudleya *Dudleya multicaulis*	Federal: None State: None CNPS: List 1B.2	Chaparral, coastal sage scrub, valley and foothill grassland. Often occurring in clay soils.	Does not occur.
Marsh sandwort *Arenaria paludicola*	Federal: FE State: SE CNPS: List 1B.1	Bogs and fens, freshwater marshes and swamps.	Does not occur.
Mud nama *Nama stenocarpum*	Federal: None State: None CNPS: List 2	Marshes and swamps	Does not occur.
Munz's onion *Allium munzii*	Federal: FE State: ST CNPS: List 1B.1	Clay soils in chaparral, coastal sage scrub, and valley and foothill grasslands	Does not occur.
Nevin's barberry *Berberis nevinii*	Federal: FE State: SE CNPS: List 1B.1	Sandy or gravelly soils in chaparral, cismontane woodland, coastal scrub, and riparian scrub.	Does not occur.
Palmer's grapplinghook *Harpagonella palmeri*	Federal: None State: None CNPS: List 4.2	Chaparral, coastal sage scrub, valley and foothill grassland. Occurring in clay soils.	Does not occur.

Species Name	Status	Habitat Requirements	Occurrence
Parish's brittlescale *Atriplex parishii*	Federal: None State: None CNPS: List 1B	Chenopod scrub, playas, vernal pools.	Does not occur.
Parry's spineflower *Chorizanthe parryi* var. *parryi*	Federal: None State: None CNPS: List 1B.1	Sandy or rocky soils in open habitats of chaparral and coastal sage scrub.	Does not occur.
Payson's jewelflower *Caulanthus simulans*	Federal: None State: None CNPS: List 4.2	Sandy or granitic soils in chaparral and coastal scrub.	Does not occur.
Plummer's mariposa lily *Calochortus plummerae*	Federal: None State: None CNPS: List 1B.2	Granitic, rock soils within chaparral, cismontane woodland, coastal sage scrub, lower montane coniferous forest, valley and foothill grassland.	Does not occur.
Prostrate navarretia *Navarretia prostrata*	Federal: None State: None CNPS: List 1B.1	Coastal sage scrub, valley and foothill grassland (alkaline), vernal pools. Occurring in mesic soils.	Does not occur.
Robinson's pepper grass *Lepidium virginicum* var. *robinsonii*	Federal: None State: None CNPS: List 1B.2	Chaparral, coastal sage scrub	Does not occur.
Round-leaved filaree *California macrophylla*	Federal: None State: None CNPS: List 1B.1	Clay soils in cismontane woodland, valley and foothill grassland	Does not occur.
Salt marsh bird's-beak *Chloropyron maritimum* ssp. *maritimum*	Federal: FE State: SE CNPS: List 1B.2	Coastal dune, coastal salt marshes and swamps.	Does not occur.
Salt spring checkerbloom *Sidalcea neomexicana*	Federal: None State: None CNPS: List 2.2	Mesic, alkaline soils in chaparral, coastal sage scrub, lower montane coniferous forest, Mojavean desert scrub, and playas.	Does not occur.
San Bernardino aster *Symphyotrichum defoliatum*	Federal: None State: None CNPS: List 1B.2	Cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, marshes and swamps, valley and foothill grassland (vernally mesic).	Does not occur.
San Diego ambrosia *Ambrosia pumila*	Federal: FE State: None CNPS: List 1B.1	Chaparral, coastal sage scrub, valley and foothill grassland, vernal pools. Often in disturbed habitats.	Does not occur.
San Jacinto Valley crownscale *Atriplex coronata* var. *notatior*	Federal: FE State: None CNPS: List 1B	Alkaline soils in chenopod scrub, valley and foothill grassland, vernal pools.	Does not occur.

Species Name	Status	Habitat Requirements	Occurrence
Slender-horned spineflower *Dodecahema leptoceras*	Federal: FE State: SE CNPS: List 1B.1	Sandy soils in alluvial scrub, chaparral, cismontane woodland.	Does not occur.
Smooth tarplant *Centromadia pungens* ssp. *laevis*	Federal: None State: None CNPS: List 1B.1	Alkaline soils in chenopod scrub, meadows and seeps, playas, riparian woodland, valley and foothill grasslands, disturbed habitats.	Does not occur.
Thread-leaved brodiaea *Brodiaea filifolia*	Federal: FT State: SE CNPS: List 1B.1	Clay soils in chaparral (openings), cismontane woodland, coastal sage scrub, playas, valley and foothill grassland, vernal pools.	Does not occur.
Wright's trichocoronis *Trichocoronis wrightii* var. *wrightii*	Federal: None State: None CNPS: List 2	Alkaline soils in meadows and seeps, marshes and swamps, riparian scrub, vernal pools.	Does not occur.

4.5 Special-Status Animals

One special-status animal (California horned lark) was detected onsite during biological surveys, although this species is covered under the MSHCP without additional survey/conservation requirements. Additional special-status animals have some potential to occur onsite, though the potential for use is limited due to the disturbed nature of the site, and the fact that the site is surrounded by development. Table 4-2 provides a list of special-status animals evaluated for the Project site through general biological surveys, habitat assessments, and focused surveys. Species were evaluated based on two factors, including: 1) species identified by the CNDDB as occurring (either currently or historically) on or in the vicinity of the Project site, 2) applicable MSHCP survey areas, and 3) any other special-status animals that are known to occur within the vicinity of the Project site, for which potentially suitable habitat occurs on the site.

Table 4-2. Special Status Animals Evaluated for the Project Site

Status

Federal
FE – Federally Endangered
FT – Federally Threatened
FPT – Federally Proposed Threatened
FC – Federal Candidate

State
SE – State Endangered
ST – State Threatened
CFP – California Fully-Protected Species
SSC – Species of Special Concern

Western Bat Working Group (WBWG)
H – High Priority
LM – Low-Medium Priority
M – Medium Priority
MH – Medium-High Priority

Occurrence

- Does not occur – The site does not contain habitat for the species and/or the site does not occur within the geographic range of the species.
- Absent – The site contains suitable habitat for the species, but the species has been confirmed absent through focused surveys.
- Not expected to occur – The species is not expected to occur onsite due to low habitat quality, however absence cannot be ruled out.
- Potential to occur – The species has a potential to occur onsite based on suitable habitat, however its presence/absence could not be confirmed.
- Present – The species was detected onsite incidentally or through focused surveys.

Species Name	Status	Habitat Requirements	Occurrence
Invertebrates			
Riverside fairy shrimp *Streptocephalus woottoni*	Federal: FE State: None	Restricted to deep seasonal vernal pools, vernal pool-like ephemeral ponds, and stock ponds.	Does not occur.
Vernal pool fairy shrimp *Branchinecta lynchi*	Federal: FT State: None	Seasonal vernal pools	Does not occur.
Amphibians			
Western spadefoot *Scaphiopus hammondii*	Federal: None State: SSC	Seasonal pools in coastal sage scrub, chaparral, and grassland habitats.	Does not occur.
Reptiles			
Coast patch-nosed snake *Salvadora hexalepis virgultea*	Federal: None State: SSC	Occurs in coastal chaparral, desert scrub, washes, sandy flats, and rocky areas.	Does not occur.
Coast horned lizard *Phrynosoma blainvillii*	Federal: None State: SSC	Occurs in a variety of vegetation types including coastal sage scrub, chaparral, annual grassland, oak woodland, and riparian woodlands.	Does not occur.

Species Name	Status	Habitat Requirements	Occurrence
Coastal whiptail *Aspidoscelis tigris*	Federal: None State: None	Open, often rocky areas with little vegetation, or sunny microhabitats within shrub or grassland associations.	Potential to occur.
Northern red-diamond rattlesnake *Crotalus exsul*	Federal: None State: SSC	Habitats with heavy brush and rock outcrops, including coastal sage scrub and chaparral.	Does not occur.
Orangethroat whiptail *Aspidoscelis hyperythra*	Federal: None State: SSC	Coastal sage scrub, chaparral, non-native grassland, oak woodland, and juniper woodland.	Does not occur.
Rosy boa *Charina trivirgata*	Federal: None State: SSC	Coastal sage scrub, chaparral, or mixed habitats, commonly with rocky soils and outcrops. Also in oak woodlands and riparian areas bordering scrub habitats.	Does not occur.
San Bernardino ringneck snake *Diadophis punctatus modestus*	Federal: None State: None	Moist habitats including woodlands, forest, grasslands, chaparral, farms, and gardens.	Does not occur.
Silvery legless lizard *Anniella pulchra pulchra*	Federal: None State: SSC	Occurs primarily in areas with sandy or loose organic soil, or where there is plenty of leaf litter. Associated with coastal sage scrub, chaparral, coastal dunes, valley/foothill grasslands, oak woodlands, and pine forests.	Does not occur.
Southwestern pond turtle *Emys marmorata pallida*	Federal: None State: SSC	Slow-moving permanent or intermittent streams, small ponds and lakes, reservoirs, abandoned gravel pits, permanent and ephemeral shallow wetlands, stock ponds, and treatment lagoons. Abundant basking sites and cover necessary, including logs, rocks, submerged vegetation, and undercut banks.	Does not occur.
Two-striped garter snake *Thamnophis hammondii*	Federal: None State: SSC	Aquatic snake typically associated with wetland habitats such as streams, creeks, and pools.	Does not occur.

Attachment: Biological Report (2444 : Legacy Park Project)

Species Name	Status	Habitat Requirements	Occurrence
Birds			
Bell's sage sparrow *Amphispiza belli belli*	Federal: FSC State: SSC	Chaparral and coastal sage scrub along the coastal lowlands, inland valleys, and in the lower foothills of local mountains.	Does not occur.
Burrowing owl *Athene cunicularia*	Federal: None State: SSC	Shortgrass prairies, grasslands, lowland scrub, agricultural lands (particularly rangelands), coastal dunes, desert floors, and some artificial, open areas as a year-long resident. Occupies abandoned ground squirrel burrows as well as artificial structures such as culverts and underpasses.	Potential to occur.
California horned lark *Eremophila alpestris actia*	Federal: None State: None	Occupies a variety of open habitats, usually where trees and large shrubs are absent.	Present.
Coastal cactus wren *Campylorhynchus brunneicapillus couesi*	Federal: None State: SSC	Occurs almost exclusively in cactus (cholla and prickly pear) dominated coastal sage scrub.	Does not occur.
Coastal California gnatcatcher *Polioptila californica californica*	Federal: FT State: SSC	Low elevation coastal sage scrub and coastal bluff scrub.	Does not occur.
Ferruginous hawk (wintering) *Buteo regalis*	Federal: FSC State: SSC	Open, dry country, perching on trees, posts, and mounds. In California, wintering habitat consists of open terrain and grasslands of the plains and foothills.	Potential to occur for winter foraging.
Golden eagle *Aquila chrysaetos*	Federal: None State: SSC	In southern California, occupies grasslands, brushlands, deserts, oak savannas, open coniferous forests, and montane valleys. Nests on rock outcrops and ledges.	Does not occur.
Least Bell's vireo *Vireo bellii pusillus*	Federal: FE State: SE	Dense riparian habitats with a stratified canopy, including southern willow scrub, mule fat scrub, and riparian forest.	Does not occur.

Species Name	Status	Habitat Requirements	Occurrence
Loggerhead shrike *Lanius ludovicianus*	Federal: None State: SSC	Forages over open ground within areas of short vegetation, pastures with fence rows, old orchards, mowed roadsides, cemeteries, golf courses, riparian areas, open woodland, agricultural fields, desert washes, desert scrub, grassland, broken chaparral and beach with scattered shrubs.	Potential to occur.
Long-eared owl *Asio otus*	Federal: None State: SSC	Riparian habitats are required by the long-eared owl, but it also uses live-oak thickets and other dense stands of trees.	Does not occur.
Northern harrier (nesting) *Circus cyaneus*	Federal: None State: SSC	A variety of habitats, including open wetlands, grasslands, wet pasture, old fields, dry uplands, and croplands.	Does not occur.
Southwestern willow flycatcher *Empidonax traillii extimus*	Federal: FE State: SE	Riparian woodlands along streams and rivers with mature dense thickets of trees and shrubs.	Does not occur.
Tricolored blackbird *Agelaius tricolor*	Federal: FSC State: SSC	Breeding colonies require nearby water, a suitable nesting substrate, and open-range foraging habitat of natural grassland, woodland, or agricultural cropland.	Does not occur.
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	Federal: FC State: SE	Dense, wide riparian woodlands with well-developed understories.	Does not occur.
White-faced ibis (nesting colony) *Plegadis chihi*	Federal: FSC State: SSC	Winter foraging occurs in wet meadows, marshes, ponds, lakes, rivers, and agricultural fields. Requires extensive marshes for nesting.	Does not occur.
White-tailed kite (nesting) *Elanus leucurus*	Federal: None State: CFP	Low elevation open grasslands, savannah-like habitats, agricultural areas, wetlands, and oak woodlands. Dense canopies used for nesting and cover.	Does not occur.

Attachment: Biological Report (2444 : Legacy Park Project)

Species Name	Status	Habitat Requirements	Occurrence
Yellow-breasted chat *Icteria virens*	Federal: None State: SSC	Dense, relatively wide riparian woodlands and thickets of willows, vine tangles, and dense brush with well-developed understories.	Does not occur.
Yellow warbler *Setophaga petechia*	Federal: None State: SSC	Breed in lowland and foothill riparian woodlands dominated by cottonwoods, alders, or willows and other small trees and shrubs typical of low, open-canopy riparian woodland. During migration, forages in woodland, forest, and shrub habitats.	Does not occur.
Mammals			
American badger *Taxidea taxus*	Federal: None State: SSC	Most abundant in drier open stages of most scrub, forest, and herbaceous habitats, with friable soils.	Does not occur.
Los Angeles pocket mouse *Perognathus longimembris brevinasus*	Federal: None State: SSC	Fine, sandy soils in coastal sage scrub and grasslands.	Does not occur.
Northwestern San Diego pocket mouse *Chaetodipus fallax fallax*	Federal: None State: SSC	Coastal sage scrub, sage scrub/grassland ecotones, and chaparral.	Does not occur.
Pallid bat *Antrozous pallidus*	Federal: None State: SSC	Deserts, grasslands, shrublands, woodlands, and forests. Most common in open, dry habitats with rocky areas for roosting.	Does not occur.
Pocketed free-tailed bat *Nyctinomops femorosaccus*	Federal: None State: SSC	Rocky areas with high cliffs in pine-juniper woodlands, desert scrub, palm oasis, desert wash, and desert riparian.	Does not occur.
San Bernardino kangaroo rat *Dipodomys merriami parvus*	Federal: FE State: SSC	Typically found in Riversidean alluvial fan sage scrub and sandy loam soils, alluvial fans and floodplains, and along washes with nearby sage scrub.	Does not occur.
San Diego black-tailed jackrabbit *Lepus californicus bennettii*	Federal: None State: SSC	Occupies a variety of habitats, but is most common among shortgrass habitats. Also occurs in sage scrub, but needs open habitats.	Potential to occur.

Species Name	Status	Habitat Requirements	Occurrence
San Diego desert woodrat *Neotoma lepida intermedia*	Federal: None State: SSC	Occurs in a variety of shrub and desert habitats, primarily associated with rock outcrops, boulders, cacti, or areas of dense undergrowth.	Does not occur.
Southern grasshopper mouse *Onychomys torridus ramona*	Federal: None State: SSC	Desert areas, especially scrub habitats with friable soils for digging. Prefers low to moderate shrub cover.	Does not occur.
Stephens' kangaroo rat *Dipodomys stephensi*	Federal: FE State: ST	Open grasslands or sparse shrublands with less than 50% vegetation cover during the summer.	Potential to occur.
Western mastiff bat *Eumops perotis californicus*	Federal: None State: SSC	Occurs in many open, semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, grasslands, and chaparral. Roosts in crevices in cliff faces, high buildings, trees, and tunnels.	Does not occur.
Western yellow bat *Lasiurus xanthinus*	Federal: None State: SSC	Found in valley foothill riparian, desert riparian, desert wash, and palm oasis habitats. Roosts in trees, particularly palms. Forages over water and among trees.	Does not occur.
Yuma Myotis Myotis yumanensis	Federal: None State: None CDFG: CSC	Optimal habitats are open forests and woodlands with sources of water over which to feed. Distribution is closely tied to bodies of water. Maternity colonies in caves, mines, buildings or crevices.	Does not occur.

4.5.1 Special-Status Wildlife Species Observed or with a Potential to Occur within the Project Site

As noted in the above table, one special-status wildlife species (California horned lark) was detected at the Project site. Several other species have the potential to occur, including the coastal whiptail, burrowing owl, ferruginous hawk, loggerhead shrike, San Diego black-tailed jackrabbit, and Stephens' kangaroo rat (SKR). With the exception of the SKR, all of the other species are designated as Covered Species under the MSHCP. The SKR is covered under the prior SKR Habitat Conservation Plan (HCP).

Of these species, only one species (burrowing owl) has project-specific survey/conservation requirements under the MSHCP. The MSHCP requires focused surveys for the burrowing for projects located within the burrowing owl survey area, and that contain suitable habitat. As noted above, the Project site is located within the MSHCP Burrowing Owl Survey Area and so focused burrowing owl surveys were conducted for the site. No burrowing owls or burrows with owl sign were detected onsite. Pursuant to the MSHCP, pre-construction burrowing owl surveys will be required prior to grading to confirm the absence of burrowing owls. The requirement for pre-construction burrowing owl surveys is further discussed in Section 6.0 of this report.

The Project site has a low potential to support SKR, but as noted impacts to SKR are covered pursuant to the SKR HCP. The Project site is located within the SKR Fee Area, and so the Project is required to pay an SKR Fee in compliance with the SKR HCP.

4.6 Critical Habitat

The Project site is not located within any Critical Habitat areas designated by the USFWS.

4.7 Raptor Use

The Project Site provides suitable foraging habitat for a number of raptor species, but does not contain suitable breeding habitat for raptors, including special-status species identified above in Table 4-2.

4.8 Nesting Birds

The Project site contains vegetation that provides suitable habitat for nesting migratory birds. Impacts to nesting birds are prohibited under the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code.[9]

4.9 Soil Mapping

The Natural Resource Conservation Service (NRCS) identifies the following soil types (series) as occurring (currently or historically) within the Project site [Exhibit 7]:

- Greenfield Sandy Loam (Gya), 0 to 2 percent slopes
- Hanford Coarse Sandy Loam (HcA), 0 to 2 percent slopes

Neither of these soil types is considered sensitive by the MSHCP, since neither are generally associated with Narrow Endemic or Criteria Area Plants.

[9] The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 C.F.R. Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 C.F.R.21). In addition, sections 3505, 3503.5, and 3800 of the California Department of Fish and Game Code prohibit the take, possession, or destruction of birds, their nests or eggs.

4.10 Jurisdictional Delineation

The Project site does not contain any waters subject to the jurisdictions of the Corps, Regional Board, and/or CDFW.

4.11 MSHCP Riparian/Riverine Areas and Vernal Pools

The Project site does not contain any MSHCP riparian/riverine areas or vernal pools.

5.0 IMPACT ANALYSIS

The following discussion examines the potential impacts to plant and wildlife resources that would occur as a result of the proposed project. Impacts (or effects) can occur in two forms, direct and indirect. Direct impacts are considered to be those that involve the loss, modification or disturbance of plant communities, which in turn, directly affect the flora and fauna of those habitats. Direct impacts also include the destruction of individual plants or animals, which may also directly affect regional population numbers of a species or result in the physical isolation of populations thereby reducing genetic diversity and population stability.

Indirect impacts pertain to those impacts that result in a change to the physical environment, but which is not immediately related to a project. Indirect (or secondary) impacts are those that are reasonably foreseeable and caused by a project, but occur at a different time or place. Indirect impacts can occur at the urban/wildland interface of projects, to biological resources located downstream from projects, and other off site areas where the effects of the project may be experienced by plants and wildlife. Examples of indirect impacts include the effects of increases in ambient levels of noise or light; predation by domestic pets; competition with exotic plants and animals; introduction of toxics, including pesticides; and other human disturbances such as hiking, off-road vehicle use, unauthorized dumping, etc. Indirect impacts are often attributed to the subsequent day-to-day activities associated with project build-out, such as increased noise, the use of artificial light sources, and invasive ornamental plantings that may encroach into native areas. Indirect effects may be both short-term and long-term in their duration. These impacts are commonly referred to as “edge effects” and may result in a slow replacement of native plants by non-native invasives, as well as changes in the behavioral patterns of wildlife and reduced wildlife diversity and abundance in habitats adjacent to project sites.

Cumulative impacts refer to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. A cumulative impact can occur from multiple individual effects from the same project, or from several projects. The cumulative impact from several projects is the change in the environment resulting from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

5.1 California Environmental Quality Act (CEQA)

5.1.1 Thresholds of Significance

Environmental impacts to biological resources are assessed using impact significance threshold criteria, which reflect the policy statement contained in CEQA, Section 21001(c) of the California Public Resources Code. Accordingly, the State Legislature has established it to be the policy of the State of California:

> *"Prevent the elimination of fish or wildlife species due to man's activities, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities..."*

Determining whether a project may have a significant effect, or impact, plays a critical role in the CEQA process. According to CEQA, Section 15064.7 (Thresholds of Significance), each public agency is encouraged to develop and adopt (by ordinance, resolution, rule, or regulation) thresholds of significance that the agency uses in the determination of the significance of environmental effects. A threshold of significance is an identifiable quantitative, qualitative or performance level of a particular environmental effect, non-compliance with which means the effect will normally be determined to be significant by the agency and compliance with which means the effect normally will be determined to be less than significant. In the development of thresholds of significance for impacts to biological resources CEQA provides guidance primarily in Section 15065, Mandatory Findings of Significance, and the CEQA Guidelines, Appendix G, Environmental Checklist Form. Section 15065(a) states that a project may have a significant effect where:

> *"The project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or wildlife community, reduce the number or restrict the range of an endangered, rare, or threatened species, ..."*

Therefore, for the purpose of this analysis, impacts to biological resources are considered potentially significant (before considering offsetting mitigation measures) if one or more of the following criteria discussed below would result from implementation of the proposed project.

5.1.2 Criteria for Determining Significance Pursuant to CEQA

Appendix G of the 1998 State CEQA guidelines indicate that a project may be deemed to have a significant effect on the environment if the project is likely to:

> *a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.*

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

5.2 Impacts to Native Vegetation

The proposed Project will not impact any native vegetation communities, including special-status communities. Impacts to vegetation would be less than significant and do not require mitigation.

5.3 Impacts to Special-Status Plants

The proposed Project will not impact special-status plants.

5.4 Impacts to Special-Status Animals

The proposed Project will result in the loss of habitat that supports special-status species, including the California horned lark, and with the potential to support other special-status animals as discussed above in Section 4.5 and Table 4-2. Potential impacts include one federally and state-listed species (Stephens' kangaroo rat), which if present would be considered potentially significant under CEQA. As noted above, the SKR is covered under the SKR HCP, and with payment of the SKR Fee, the Project would receive coverage or the actual or potential loss of habitat for SKR. With this measure, any impacts to SKR would be covered by the existing HCP, and those impacts would be reduced to below a level of significance.

The Project site has the potential to support burrowing owls. As discussed above, burrowing owls were not detected onsite during focused surveys. However, the MSHCP requires that pre-construction surveys be conducted prior to grading in order to confirm the absence of burrowing owls. The loss of occupied burrowing owl habitat and exclusion of individual owls is considered potentially significant under CEQA. However, compliance with MSHCP, including performance of pre-construction surveys and owl relocation (if present), would reduce impacts to below a level of significance. Pre-construction surveys are further described in Section 6.0 of this report as a project-specific avoidance/mitigation measure.

For the additional special-status species with a potential to occur onsite, due to the low degree of sensitivity and the disturbed nature of the property, the loss of habitat for these species would be less than significant.

5.5 Impacts to Critical Habitat

The proposed Project will not impact lands designated as critical habitat by the USFWS.

5.6 Impacts to Nesting Birds

The proposed Project has the potential to impact active bird nests if vegetation is removed during the nesting season (February 1 to August 31). Impacts to nesting birds are prohibited by the MBTA and California Fish and Game Code. A project-specific avoidance measure is identified in Section 6.0 of this report to avoid impacts to nesting birds.

5.7 Impacts to MSHCP Riparian/Riverine Areas

The proposed Project will not impact MSHCP riparian/riverine areas.

5.8 Impacts to Jurisdictional Waters

The proposed Project will not impact jurisdictional waters.

5.9 Indirect Impacts to Biological Resources

In the context of biological resources, indirect effects are those effects associated with developing areas adjacent to adjacent native open space. Potential indirect effects associated with development include water quality impacts from associated with drainage into adjacent open space/downstream aquatic resources; lighting effects; noise effects; invasive plant species from landscaping; and effects from human access into adjacent open space, such as recreational activities (including off-road vehicles and hiking), pets, dumping, etc. Temporary, indirect effects may also occur as a result of construction-related activities. The MSHCP requires the implementation of Urban/Wildlands Interface Guidelines (*Volume I, Section 6.1.4* of the MSHCP) for those projects (particularly development) located in proximity to the MSHCP Conservation Area.

The proposed Project is not located adjacent to the MSHCP Conservation Area or any other native open space. The Project will not result in indirect impacts to sensitive biological resources.

5.10 Cumulative Impacts to Biological Resources

Cumulative impacts are defined as the direct and indirect effects of a proposed project which, when considered alone, would not be deemed a substantial impact, but when considered in addition to the impacts of related projects in the area, would be considered potentially significant. "Related projects" refers to past, present, and reasonably foreseeable probable future projects, which would have similar impacts to the proposed project. Through compliance with the MSHCP and the SKR HCP, any cumulative impacts would be reduced to below a level of significance.

6.0 MITIGATION/AVOIDANCE MEASURES

The following discussion provides project-specific mitigation/avoidance measures for actual or potential impacts to special-status resources.

6.1 Burrowing Owl

The Project site contains suitable habitat for burrowing owls; however, burrowing owls were not detected onsite during focused surveys. MSHCP Objective 6 for burrowing owls requires that pre-construction surveys prior to site grading. As such, the following measure is recommended to avoid direct impacts to burrowing owls and to ensure consistency with the MSHCP:

- A qualified biologist will conduct a pre-construction presence/absence survey for burrowing owls within 14 days prior to site disturbance. If burrowing owls are detected onsite, the owls will be relocated/excluded from the site outside of the breeding season following accepted protocols, and subject to the approval of the RCA and wildlife agencies.

6.2 Nesting Birds

The Project site contains vegetation with the potential to support nesting birds. As discussed above, the MBTA and California Fish and Game Code prohibit impacts to nesting birds. The following measure is recommended to avoid impacts to nesting birds:

- As feasible, vegetation clearing should be conducted outside of the nesting season, which is generally identified as February 1 through September 15. If avoidance of the nesting season is not feasible, then a qualified biologist shall conduct a nesting bird survey within three days prior to any disturbance of the site, including disking, demolition activities, and grading. If active nests are identified, the biologist shall establish suitable buffers around the nests, and the buffer areas shall be avoided until the nests are no longer occupied and the juvenile birds can survive independently from the nests.

7.0 MSHCP CONSISTENCY ANALYSIS

The purpose of this section is to provide an analysis of the proposed Project with respect to compliance with biological aspects of the Western Riverside County MSHCP. Specifically, this analysis evaluates the proposed Project with respect to the Project's consistency with MSHCP Reserve assembly requirements, *Section 6.1.2* (Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools), *Section 6.1.3* (Protection of Narrow Endemic Plant Species), *Section 6.1.4* (Guidelines Pertaining to the Urban/Wildlands Interface), and *Section 6.3.2* (Additional Survey Needs and Procedures).

7.1 Project Relationship to Reserve Assembly

The proposed Project is not located within the MSHCP Criteria Area, and therefore is not subject to the Habitat Evaluation and Acquisition Negotiation Strategy (HANS) process or Joint Project Review (JPR). The proposed Project will be consistent with MSHCP Reserve Assembly requirements.

7.2 Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools

Volume I, Section 6.1.2 of the MSHCP describes the process through which protection of riparian/riverine areas and vernal pools would occur within the MSCHP Plan Area. The purpose is to ensure that the biological functions and values of these areas throughout the MSHCP Plan Area are maintained such that habitat values for species inside the MSCHP Conservation Area are maintained. The MSHCP requires that as projects are proposed within the overall Plan Area, the effect of those projects on riparian/riverine areas and vernal pools must be addressed.

The MSHCP defines riparian/riverine areas as *lands which contain Habitat dominated by trees, shrubs, persistent emergent mosses and lichens, which occur close to or which depend upon soils moisture from a nearby fresh water source; or areas with fresh water flow during all or a portion of the year.*

The MSHCP defines vernal pools as *seasonal wetlands that occur in depression areas that have wetlands indicators of all three parameters (soils, vegetation, and hydrology) during the wetter portion of the growing season but normally lack wetland indictors of hydrology and/or vegetation during the drier portion of the growing season.*

The Project will not impact MSHCP riparian/riverine areas of vernal pools, and therefore will be consistent with riparian/riverine policies as identified in Volume I, Section 6.1.2 of the MSHCP.

7.3 Protection of Narrow Endemic Plants

Volume I, Section 6.1.3 of the MSHCP requires that within identified Narrow Endemic Plant Species Survey Areas (NEPSSA), site-specific focused surveys for Narrow Endemic Plants Species will be required for all public and private projects where appropriate soils and habitat are present.

The Project is not located within the NEPSSA, and therefore is not required to perform focused plant surveys for Narrow Endemic Plants. The proposed Project will be consistent with *Volume I, Section 6.1.3* of the MSHCP.

7.4 Guidelines Pertaining to the Urban/Wildland Interface

The MSHCP Urban/Wildland Interface Guidelines are intended to address indirect effects associated with locating development in proximity to the MSHCP Conservation Area. As the MSHCP Conservation Area is assembled, development is expected to occur adjacent to the Conservation Area. Future development in proximity to the MSHCP Conservation Area may result in edge effects with the potential to adversely affect biological resources within the Conservation Area. To minimize such edge effects, the guidelines shall be implemented in conjunction with review of individual public and private development projects in proximity to the MSHCP Conservation Area and address the following:

- Drainage;
- Toxics;
- Lighting;
- Noise;
- Invasive species;
- Barriers;
- Grading/Land Development.

As discussed in Section 5.0 of this report, the Urban/Wildland Interface Guidelines do not apply to the proposed Project since the Project site is not located adjacent to the MSHCP Conservation Area. The Project will be consistent with *Volume I, Section 6.1.4* of the MSHCP.

7.5 Additional Survey Needs and Procedures

Volume I, Section 6.3.2 of the MSHCP identifies survey and conservation requirements for projects located within designated survey areas, including CAPSSA, burrowing owl, mammals, and amphibians. The Project site is located within the burrowing owl survey area, but not within any other survey area. Focused burrowing owl surveys were conducted for the Project due to the presence of suitable habitat, but no burrowing owls or burrows with owl sign were detected during the surveys. As identified above in Section 6.2 of this report, the Project will perform a pre-construction survey prior to site disturbance to avoid direct impacts to burrowing owls. Any owl detected onsite will be relocated/excluded subject to the approval of the RCA and wildlife agencies. With the implementation of this measure, the proposed Project will be consistent with *Volume I, Section 6.3.2* of the MSHCP.

7.6 Conclusion of MSHCP Consistency

As outlined above, the proposed Project will be consistent with the biological requirements of the MSHCP; specifically pertaining to the Project's relationship to reserve assembly, *Section 6.1.2* (Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools), *Section*

6.1.3 (Protection of Narrow Endemic Plant Species), *Section 6.1.4* (Guidelines Pertaining to the Urban/Wildlands Interface), and *Section 6.3.2* (Additional Survey Needs and Procedures).

8.0 REFERENCES

American Ornithologists' Union (AOU). 2009. Checklist of North American Birds, (7th Edition; 1998-2009).

Baldwin, B.G., D.H. Goldman, D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken. 2012. The Jepson Manual: Vascular Plants of California. University of California Press. 1,568 pp.

California Department of Fish and Wildlife. September 2008. Complete List of Amphibian, Reptile, Bird and Mammal Species in California.

California Department of Fish and Wildlife. 2014. Special Animals. State of California Resources Agency, Sacramento, California.

California Department of Fish and Wildlife. 2014. State and Federally Listed Endangered and Threatened Animals of California. State of California Resources Agency. Sacramento, California.

California Department of Fish and Wildlife. 2014. California Natural Diversity Database: RareFind 5. Records of occurrence for U.S.G.S. 7.5- minute Quadrangle maps: Sunnymead and surrounding quadrangles. California Department of Fish and Wildlife, State of California Resources Agency. Sacramento, California.

California Native Plant Society. 2010. Inventory of Rare and Endangered Plants of California. (Eighth Edition). Accessible online at <http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi>

Collins, Joseph T. and Travis W. Taggart. 2009. Standard Common and Current Scientific Names for North American Amphibians, Turtles, Reptiles, and Crocodilians. Sixth Edition. Publication of The Center For North American Herpetology, Lawrence. iv+44p.

Garrett, K. and J. Dunn. 1981. Birds of Southern California: Status and Distribution. Los Angeles Audubon Society. 407 pp.

Holland, R. F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Nongame-Heritage Program, California Department of Fish and Wildlife.

Munz, P.A. 1974. A Flora of Southern California. University of California Press. 1,086 pp.

Nelson, J. 1984. Rare plant survey guidelines. In: Inventory of rare and endangered vascular plants of California. J. Smith and R. York (eds.). Special Publication No. 1. California Native Plant Society.

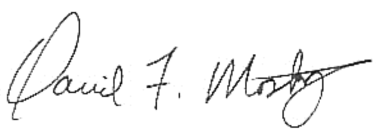
Sawyer, J.O, T. Keeler-Wolf, and J.M. Evens. A Manual of California Vegetation. Second Edition. California Native Plant Society Press. Sacramento, California. 1,300 pp.

Stebbins, R. C. 1954. Amphibians and reptiles of western North America. McGraw-Hill, New York. 536pp.

Stebbins, R.C. 1985. A field guide to western reptiles and amphibians, 2nd ed. Houghton Mifflin Co., Boston, Massachusetts.

9.0 CERTIFICATION

I hereby certify that the statements furnished above and in the attached exhibits present data and information required for this biological evaluation, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.



Signed:______________________________ Date: 9/18/2014

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Exhibit 1

Regional Map

Source: ESRI World Street Map

N

0
2
4
8
Miles

TENTATIVE TRACT 36760

Regional Map

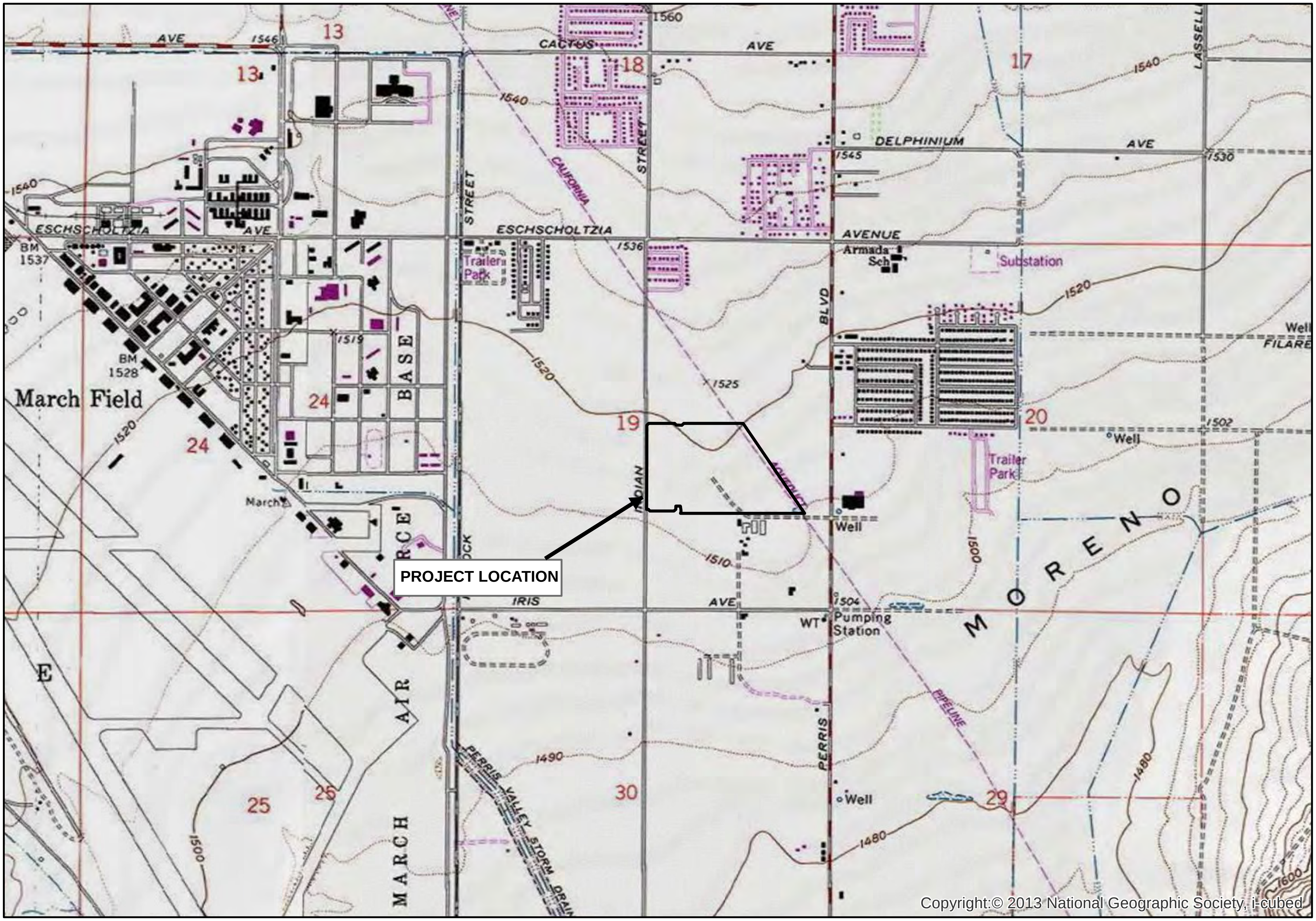
GLENN LUKOS ASSOCIATES

Exhibit 1

Exhibit 2

Vicinity Map

Adapted from USGS Perris CA quadrangle



N

0 1,000 2,000 4,000 Feet

TENTATIVE TRACT 36760

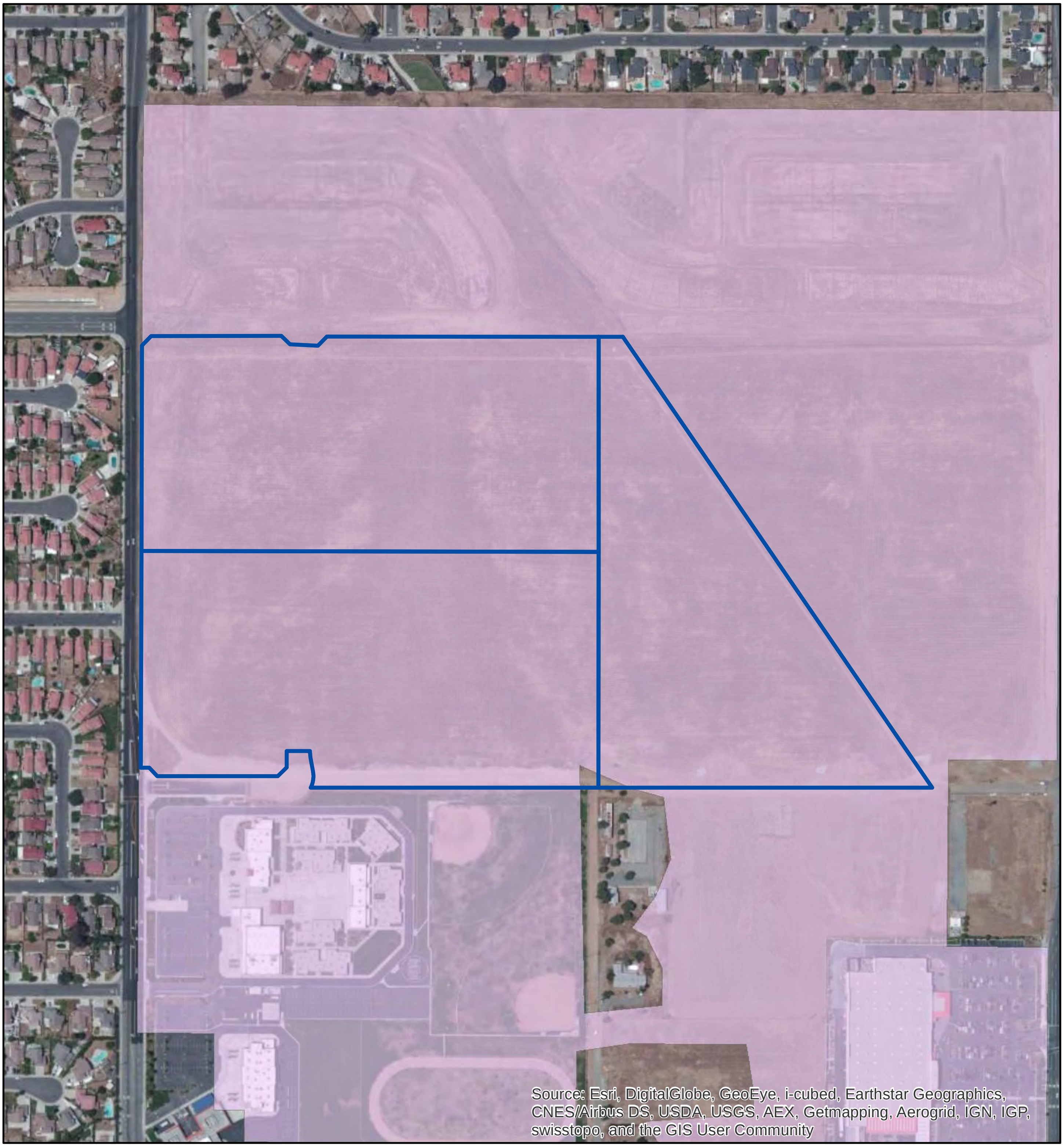
Vicinity Map

GLENN LUKOS ASSOCIATES

Exhibit 2

Exhibit 3

MSHCP Overlay Map



Legend

Site Boundary

BurrowingOwlSurvey

TENTATIVE TRACT 36760

MSHCP Map

GLENN LUKOS ASSOCIATES

Exhibit 3

Exhibit 4

Vegetation Map

Legend

Project Boundary

Disturbed/Ruderal

N

0 125 250 500
Feet

TENTATIVE TRACT 36760

Vegetation Map

GLENN LUKOS ASSOCIATES

Exhibit 4

Packet Pg

Exhibit 5

Site Photographs

Photograph 1: View of Project site looking east along the southern boundary.

Photograph 2: View of Project site looking north.

GLENN LUKOS ASSOCIATES

Exhibit 5

TENTATIVE TRACT 36760

Site Photographs

Photograph 3: View of Project site looking east.

Photograph 4: View of burrow complex located in the southwestern portion of the Project site.

GLENN LUKOS ASSOCIATES

Exhibit 5

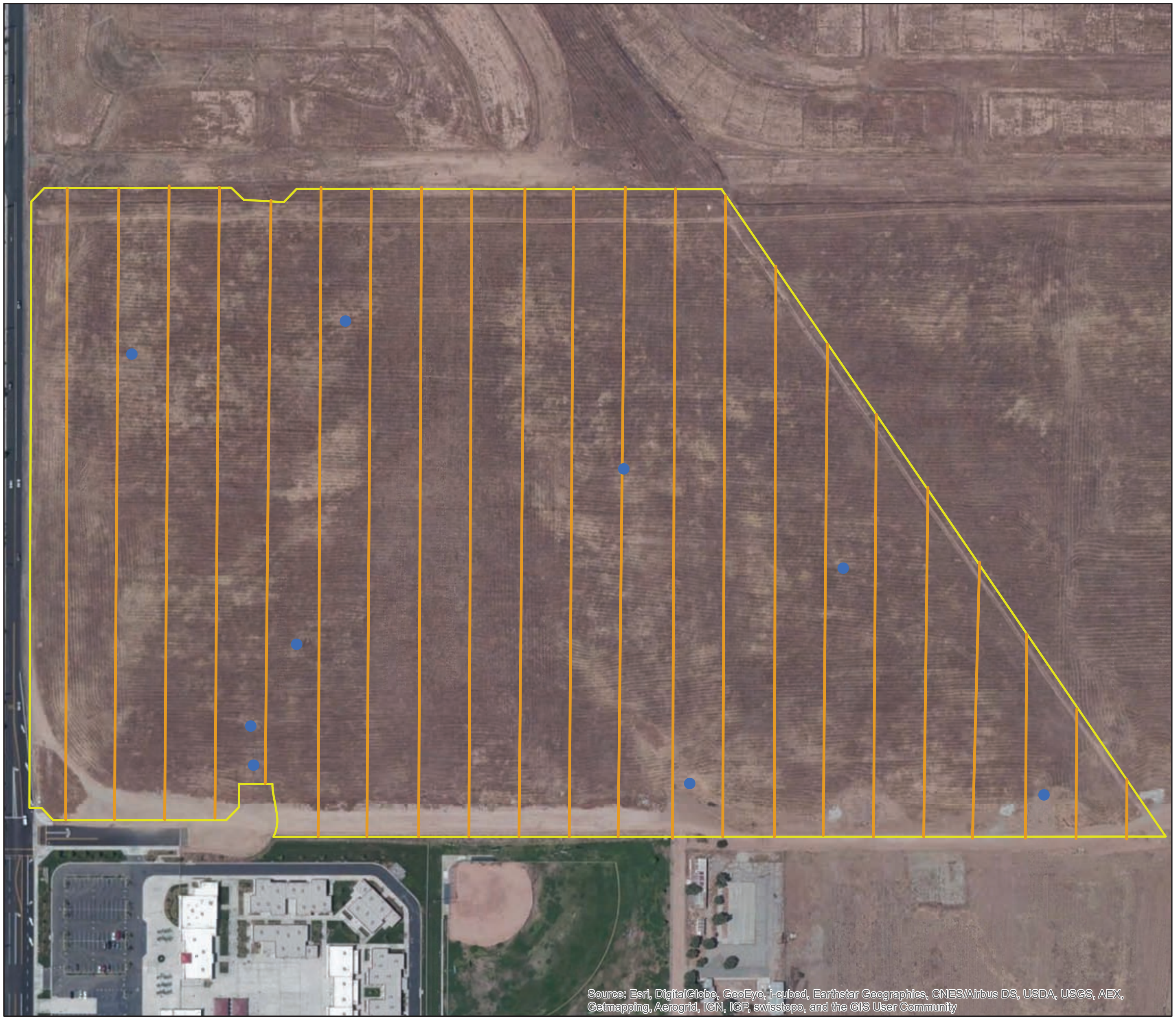
TENTATIVE TRACT 36760

Site Photographs

Attachment: Biological Report (2444 : Legacy Park Project)

Exhibit 6

Burrowing Owl Transect Map



Legend

Project Boundary

Suitable Burrows

Transect

TENTATIVE TRACT 36760

Burrowing Owl Transect Map

GLENN LUKOS ASSOCIATES

Exhibit 6

Packet Pg

Exhibit 7

Soils Map

Legend

- Project Boundary
- GyA - Greenfield sandy loam, 0 to 2 percent slopes
- HcA - Hanford coarse sandy loam, 0 to 2 percent slopes

N

0 125 250 500
Feet

TENTATIVE TRACT 36760

Soils Map

GLENN LUKOS ASSOCIATES

Exhibit 7

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942
619.462.1515 tel
619.462.0552 fax
www.**helixepi**.com

April 13, 2016 MPL-01

Mr. Jason Keller, PE
Mission Pacific Land Company
4100 Newport Place, Suite 480
Newport Beach, CA 92660

Subject: Moreno Valley Tentative Tract Map 36760 Project Cultural Resources Study Report

Dear Mr. Keller:

HELIX Environmental Planning, Inc., (HELIX) was contracted to conduct a cultural resources study for the Moreno Valley Tentative Tract Map 36760 Project (project) in the City of Moreno Valley, California. The cultural resources study included a record search, a Sacred Lands File search, tribal outreach, a review of historic maps and aerial photographs, an intensive survey by a HELIX archaeologist and a Native American monitor, and preparation of this letter report. While one historic feature has been identified within the project property, it is not considered a significant resource. This letter report details the methods and results of the cultural resources study.

PROJECT DESCRIPTION

The Moreno Valley Tentative Tract Map 36760 project is located near March Air Force Base, in the City of Moreno Valley (City) in northwestern Riverside County. The project is located east of March Air Force Base and northwest of Perris Reservoir (Figures 1 and 2, *Regional Location Map*, and *Project Vicinity [USGS Topography]*, respectively). The approximately 53-acre parcel is bordered by Indian Street on the west, with Santiago Drive and March Middle School on the south and empty lots to the east and north. Perris Boulevard is the nearest road to the east, and Fay Avenue is the nearest road to the north (Figure 3, *Project Vicinity [Aerial Photograph]*). The project is bordered on the east by the California Aqueduct easement. The continuation of Gentian Avenue between its current termini on the east and west of the project site will form the northern project boundary (Figure 4, *Project Plan*). The parcel is within Township 3 South, Range 3 West, Section 19, on the U.S. Geological Survey (USGS) 7.5’ Sunnymead quadrangle (Figure 2).

The applicant proposes to develop 221 suburban residences including the installation of all necessary utilities and new roads leading from Gentian Avenue and Santiago Drive. Construction activities would produce an estimated 114,545 cubic yards of excavated soil.

ENVIRONMENTAL BACKGROUND

The project area is in the Moreno Valley in the foothills of Riverside County. The Badlands, San Bernardino and San Jacinto Mountains lie to the east, the Santa Ana Mountains lie to the west, and the Box Spring Mountains are to the north. Average annual temperatures range from a January low of about 46.9 degrees Fahrenheit (°F) to an August high of about 95.8°F, and maximum monthly rainfall averages around 2.98 inches in December (Weather Currents 2016). The property is located on a flat field previously used for agriculture (Figure 2). Elevation remains fairly level between 1,510 and 1,520 feet above mean sea level (amsl). The property is about 6.5 miles northwest of the current location of the San Jacinto River (the alignment of the river has changed over time) and about 3.25 miles northwest of the Perris Reservoir. Various drainages in the vicinity would have made fresh water easily accessible to native populations living in the area.

Geologically, the project area is underlain by young alluvium, as is the whole of Moreno Valley and the connecting Perris Valley. The nearby hills south and west of the Valley are Mesozoic granitic formations, and the Badlands to the east are of undivided Pliocene nonmarine formations (Morton et al. 1999). Two soil series are mapped for the project site: Greenfield sandy loam, 0 to 2 percent slopes, and Hanford coarse sandy loam, 0 to 2 percent slopes. The Greenfield soil comprises about 59 percent of the site and Hanford about 41 percent (Web Soil Survey n.d.). Both soil series are granite-derived alluviums found in alluvial fans and terraces that generally support wild oats, ripgut brome, soft chess, filaree, foxtail, mustard, and coast live oak (Bowman 1973). The project area has been disturbed by past agricultural activities yet many of these grass, brome, and forb species are present on site. Native grassland species and coast live oak would have been used by native populations for food, medicine, tools, and ceremonial and other uses (Christenson 1990; Hedges and Beresford 1986). Many of the animal species living within these communities (such as rabbits, deer, small mammals, and birds) would have been used by native inhabitants as well.

CULTURAL BACKGROUND

The culture history presented here (up to the discussion of the Late Prehistoric period) is based on Wallace's (1978) discussion of the Post-Pleistocene for Southern California (circa 9000 BCE to 2000 BCE). The earliest inhabitants of California subsisted mainly by hunting, as attested to by "the finding of projectile points and other stone implements adapted to the chase at ancient campsites" throughout California (Wallace 1978:25). Wallace refers to this early period as Period I: Hunting. It generally equates with the Paleoindian or Lithic stage (Willey and Phillips 1958), in which little diversity of resource exploitation is evident.

Wallace's (1978) Period II: Food Collecting equates with Willey and Phillips (1958) Archaic stage and is often referred to in Southern California as the Early Archaic, Early Milling period, or Milling Stone Horizon. "A changeover from hunting to the collection of seed foods is clearly reflected in the archaeological record for the period between 6000 and 3000 B.C. The importance of seeds in the diet of the prehistoric peoples can be seen in the numbers of food-grinding implements present at their settlements" (Wallace 1978:28).

After about 3000 BCE, a more diversified subsistence strategy is evident throughout Southern California. "Everywhere increased subsistence efficiency in the form of wider exploitation of available food resources can be seen" (Wallace 1978:30). The artifact assemblages changed slowly over time, with a few additions or changes. "By the end of the millennium the new ways and techniques had become firmly established and formed the basis for succeeding cultural traditions" (Wallace 1978:35).

"Perhaps as early as 1500-1000 B.C. the Takic branch of Uto-Aztecan [including the forebears of the Luiseño and Cahuilla people] began to spread westward across the Mojave Desert" (Moratto 1984:560). There is disagreement about the date of the "Shoshonean intrusion" into various parts of Southern California, including Riverside County. Moratto indicated that Kowta (1969:50) "proposed dates of circa 1000 B.C. for the entry of 'Shoshoneans' in the Los Angeles Basin" (Moratto 1984:560). "Considering both linguistic and archaeological data, C. Bull (1977:56) sets the western movement of the 'Luisenic language family' at circa 500 B.C." (Moratto 1984:165).

It must be noted that this interpretation by archaeologists and linguistic anthropologists differs from the beliefs of the Luiseño and Cahuilla people. The creation stories indicates that the Luiseño and Cahuilla people have always been here, not migrating from elsewhere. The creation story of the Pechanga Band of the Luiseño tells that the world was created at Temecula. "The Káamalam [first people] moved to a place called Nachíivo Pomíisavo, but it was too small so they moved to a place called 'exva Teméeku, this place you now know as Temeku. Here they settled while everything was still in darkness (DuBois 1908)" (Masiel-Zamora 2013:2).

While some ethnographers place the area of the project site in the traditional territory of the Luiseño people (see Kroeber 1976:Plate 57), others show it as within traditional Cahuilla territory (see Bean 1978; Bean and Shipek 1978). Most probably, this is a transitional area between the two related cultural groups.

"During the Spanish Period, Riverside County proved to be too far inland to include any missions or asistencias within its limits. Although both San Luis Rey and San Juan Capistrano claimed a large part of southwestern Riverside County. Mission San Juan Capistrano and San Luis Rey were established in 1776 and 1798, respectively" (Goodwin 2013:6).

The project area is in proximity to the former Mexican land grant Rancho San Jacinto Nuevo y Potrero, which was granted to Miguel Pedrorena, in 1846. Pedrorena was the son-in-law of Jose Antonio Estudillo, administrator and major domo of Mission San Luis Rey. The land grant was later patented to Thomas W. Sutherland, guardian of the minor children of Pedrorena and his widow.

In the late 1800s, John Butterfield's Overland Mail Company stagecoach route ran through Moreno and Perris Valleys on its way between Tucson and San Francisco via San Diego and

Los Angeles. The Moreno Valley, which consisted of small, unincorporated communities, got its name from Frank E. Brown ("Moreno" in Spanish), who formed the Bear Valley Land and Water Company in 1883. Brown built a dam at Bear Valley and provided water to the Perris and Moreno communities until 1899, when he lost a legal suit, and thereby water rights, to the City of Redlands. This litigation and a period of natural drought devastated the local farming communities, forcing families to either move or abandon their homes in favor of better irrigated areas. The few who remained turned to "the dry farming of hay, grain, and grapes" (City of Moreno Valley, n.d.).

The community was revived in 1918, with the construction of March Field in anticipation of America's entry into World War I. It began as a temporary base for training fighter pilots but was established as a permanent base and flight training school in the late 1920s. This led to a population boom in the Moreno Valley, with the Base supporting up to 85,000 troops at a time. The establishment of the Riverside International Raceway in 1958 and the Lake Perris Recreation Area in 1973 led to further population increases until the unincorporated communities of Moreno, Edgemont, and Sunnymead were combined into the City of Moreno Valley in 1984 (City of Moreno Valley, n.d.).

The site record for CA-RIV-11757 (P-33-023936) gives a detailed history of the ownership and agricultural use of the section in which the project site is located (McKenna 2014a).

REGULATORY FRAMEWORK

Resource importance is assigned to districts, sites, buildings, structures, and objects that possess exceptional value or quality illustrating or interpreting the heritage of the region in history, architecture, archaeology, engineering, and culture. Several criteria are used in demonstrating resource importance. Specifically, criteria outlined in the California Environmental Quality Act (CEQA) provide the guidance for making such a determination. The City's General Plan also addresses cultural resources. This section details the criteria that a resource must meet in order to be determined significant.

California Environmental Quality Act (CEQA)

The CEQA Guidelines (§15064.5) address determining the significance of impacts to archaeological and historic resources.

(a) For purposes to this section, the term "historical resources" shall include the following:

(1) A resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the California Register of Historical Resources (CRHR) (Public Resources Code §5024.1, Title 14 California Code of Regulations [CCR], Section 4850 et seq.).

(2) A resource included in a local register of historical resources, as defined in Section 5020.1(k) of the Public Resources Code or identified as significant in an historical resource survey meeting the requirements of section 5024.1(g) of the Public

Resources Code, shall be presumed to be historically or culturally significant. Public agencies must treat any such resource as significant unless the preponderance of evidence demonstrates that it is not historically or culturally significant.

(3) Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be an historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a resource shall be considered by the lead agency to be "historically significant" if the resource meets the criteria for listing on the California Register of Historical Resources (Public Resources Code §5024.1, Title 14, Section 4852) including the following:

(A) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

(B) Is associated with the lives of persons important in our past;

(C) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

(D) Has yielded, or may be likely to yield, information important in prehistory or history.

(4) The fact that a resource is not listed in or determined eligible for listing in the California Register of Historical Resources, not included in a local register of historical resources (pursuant to section 5020.1(k) of the Public Resources Code), or identified in an historical resources survey (meeting the criteria in section 5024.1(g) of the Public Resources Code) does not preclude a lead agency from determining that the resource may be an historical resource as defined in Public Resources Code Section 5020.1(j) or 5024.1.

(b) A project with an effect that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment.

(1) Substantial adverse change in the significance of an historical resource means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired.

(2) The significance of an historical resource is materially impaired when a project:

(A) Demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register of Historical Resources; or

(B) Demolishes or materially alters in an adverse manner those physical characteristics that account for its inclusion in a local register of historical resources pursuant to section 5020.1(k) of the Public Resources Code or its identification in an historical resources survey meeting the requirements of Section 5024.1(g) of the Public Resources Code, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or

(C) Demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its eligibility for inclusion in the California Register of Historical Resources as determined by a lead agency for purposes of CEQA.

(c) CEQA applies to effects on archaeological sites.

(1) When a project will impact an archaeological site, a lead agency shall first determine whether the site is an historical resource, as defined in subsection (a).

(2) If a lead agency determines that the archaeological site is an historical resource, it shall refer to the provisions of Section 21084.1 of the Public Resources Code, and this section, Section 15126.4 of the Guidelines, and the limits contained in Section 21083.2 of the Public Resources Code do not apply.

(3) If an archaeological site does not meet the criteria defined in subsection (a), but does meet the definition of a unique archaeological resource in Section 21083.2 of the Public Resources Code, the site shall be treated in accordance with the provisions of Section 21083.2. The time and cost limitations described in Public Resources Code Section 21083.2 (c-f) do not apply to surveys and site evaluation activities intended to determine whether the project location contains unique archaeological resources.

(4) If an archaeological resource is neither a unique archaeological nor an historical resource, the effects of the project on those resources shall not be considered a significant effect on the environment. It shall be sufficient that both the resource and the effect on it are noted in the Initial Study or Environmental Impact Report (EIR), if one is prepared to address impacts on other resources, but they need not be considered further in the CEQA process.

Section 15064.5 (d) & (e) contain additional provisions regarding human remains. Regarding Native American human remains, paragraph (d) provides:

(d) When an Initial Study identifies the existence of, or the probable likelihood, of Native American human remains within the project, a lead agency shall work with the appropriate Native Americans as identified by the Native American Heritage Commission as provided in

Public Resources Code §5097.98. The applicant may develop an agreement for treating or disposing of, with appropriate dignity, the human remains and any items associated with Native American burials with the appropriate Native Americans as identified by the Native American Heritage Commission. Action implementing such an agreement is exempt from:

(1) The general prohibition on disinterring, disturbing, or removing human remains from any location other than a dedicated cemetery (Health and Safety Code Section 7050.5).

(2) The requirements of CEQA and the Coastal Act.

City of Moreno Valley General Plan

The City's General Plan (2006) includes Objective 7.6 and related policies regarding cultural and historical resources as part of the Conservation Element.

Objective 7.6

Identify and preserve Moreno Valley's unique historical and archaeological resources for future generations.

Policies:

7.6.1: Historical, cultural and archaeological resources shall be located and preserved, or mitigated consistent with their intrinsic value.

7.6.2: Implement appropriate mitigation measures to conserve cultural resources that are uncovered during excavation and construction activities.

7.6.3: Minimize damage to the integrity of historic structures when they are altered.

7.6.4: Encourage restoration and adaptive reuse of historical buildings worthy of preservation.

7.6.5: Encourage documentation of historic buildings when such buildings must be demolished (City of Moreno Valley 2006: 9-37).

METHODS

HELIX submitted a record search request of all previously recorded cultural resources, archaeological studies, and historic addresses within the project area and a one-mile radius to the Eastern Information Center (EIC) on March 4, 2016. This was received on March 24, 2016 and is attached to this report as Confidential Appendix A. Historic aerial photographs ranging from 1966 to 2012 (NETR Online 2016) and historic topographic maps were reviewed to assess historic land usage and the potential for historic archaeological resources. A Sacred Lands File search was requested from the Native American Heritage Commission (NAHC) on March 4, 2016.

HELIX archaeologists Nicole Falvey and Mary Villalobos and Native American monitor Billy Swan from the Soboba Band of Luiseño Indians surveyed the property on March 25, 2016. The survey was conducted in parallel transects spaced 15 meters (m) apart across the project site; all areas of visible soil, including rodent backfill piles, were carefully examined for cultural resources.

RESULTS

A record search of the project area and a one-mile radius from the EIC indicated that eight cultural resources had been recorded within the search radius (see Table 1). One resource (P-33-023936) was mapped within the project property. This resource is a historic period alfalfa farm that encompasses the property adjacent to the project area on the east as well as the southeastern corner of the project area. One feature from this site is located in the project area: the remnants of a grain loading dock from the Barron/Lantz Holdings, tentatively dated for use between 1948 and 1970 (McKenna 2014a). The following description of the feature is from the site record. The "project area" referred to is immediately east of the TPM 36760 project area.

> This wooden structure consists of two walls oriented at 90 degree angles (south and west sides) and two earthen embankments (north and east sides). The wooden walls are fashioned with a series of upright and lateral beams to the exterior and supplemental planks lining the inside of the structure. The structure is finished with an earthen core, creating a platform supported by the wooden walls. The walls are approximately four feet high. The tops of the walls are covered with cut truck tires, forming a buffer to protect the cap of the walls.
>
> McKenna et al. has interpreted this structure as a loading dock associated with the harvesting of the grains grown by the Barrons and Lantzes (post-1948). The grains would be harvested and taken to this feature on the southern property boundary, loaded into the hauling truck(s), and carried off the property along the Santiago Drive access route. The hauling truck would back up to the structure and the tires used to cap the walls would protect the structure from damage, should the truck "bump" the structure.
>
> Although located outside the project area, McKenna et al. has recorded this feature as part of the larger holdings of Henry and Emile Barrow (approximately 20 acres). This property, in turn, was also part of the larger holdings of Camillo and Francis Martin (pre-1892-1912). Despite the recording of this historic property, McKenna et al. has also concluded the property is not a significant resource. It fails to meet any of the four criteria for consideration as a historical resource worthy of listing on any of the applicable registries. The property is not associated with any significant event, person, architectural feature or sensitive for archaeological resources [McKenna 2014a:6-7].

Of the other resources in the search radius, two are prehistoric isolates (P-33-017967 and -015301), and the remaining five are historic. These include three structures associated with the March Village Medical Campus (P-33-017968, -017969, and -017970), one historic residence (P-33-007290), and one historic site (P-33-024195) consisting of the Brown-Bridges farm and associated materials.

Table 1
PREVIOUSLY RECORDED CULTURAL RESOURCES WITHIN ONE-MILE RADIUS

Site (P-33-#)	Site Type	Recorder, Date
023936	Flat, open farmland once under alfalfa. Loading dock located in western half. Currently bisected by the modern California Aqueduct. Site boundaries defined by property definition and ownership history. CA-RIV-11757	McKenna, 2014
007290	Historic residence	Warner, 1983
015301	Prehistoric pestle isolate	Chandler, 2005
017967	Prehistoric mano isolate	McKenna, 2008
017968	March Village Medical Campus Works Progress Administration (WPA) Canal	McKenna, 2008
017969	March Village Medical Campus Building 768	McKenna, 2008
017970	March Village Medical Campus Building 755	McKenna, 2008
024195	Historic Brown-Bridges farm and associated material remains (privy/dump/trash scatter, multiple family property, farm/ranch)	McKenna, 2015

The EIC has a record of 18 cultural resource studies that have been conducted within the search radius, one of which covered a portion of the project. This study (Foster et al. 1991) was a cultural resource field survey for The Metropolitan Water District of Southern California and followed the California Pipeline that runs along the eastern perimeter of the project area. No resources were recorded within the project area during this study. Two studies were conducted adjacent to the project area, one immediately east (McKenna 2014b) and one across Santiago Drive to the south (McKenna et al. 2005). Both consisted of a field survey and the former recorded one historic resource (P-33-023936, as addressed above).

A review of historic aerial photographs revealed that the project property was used as agricultural fields from 1966 to at least 2012; no earlier historic aerial photographs were available for review. No structures are visible on site in historic topographic maps from 1901 (Elsinore 30') and 1943 (Perris 15'), nor do any appear on the property in historic aerial photographs (NETR Online 2016). Indian Street, Perris Boulevard, Iris Avenue (to the south), and Eschscholtzia Avenue (to the north, renamed John F Kennedy Drive) are present in the 1901 topographic map. By the 1966 aerial photograph, structures are located just south of the property at the modern location of residential houses on Emma Lane.

The Sacred Lands File search results were received from the NAHC on March 8, 2016. The search was negative for any sacred lands within the project vicinity. Letters were sent to the tribal contacts indicated by the NAHC in April 2016. The applicant and the City of Moreno Valley will be kept apprised of any tribal responses.

The field survey was conducted on March 25, 2016. The property consisted of a flat, open field. Visibility was good overall, with areas of poor to no visibility where Russian thistle obscured the ground, particularly in the west and southwest. Other vegetation included seasonal grasses and forbs such as wild oats, ripgut brome, and nettle. All visible soil was brown alluvium sandy silt. The entire property is scarred by tractor marks, and modern trash was scattered throughout, collecting in piles around the western and southern perimeters. The loading dock feature (P-33-023936) recorded by McKenna (2014) was observed in the southeastern corner of the project area along the southern perimeter. It was covered in modern trash and had modern tire rubber attached over the tops of the wooden posts that constitute the walls. As noted in the site record, it did not appear to be architecturally, aesthetically, or historically significant. No other historic and no cultural resources were observed.

CONCLUSIONS

A cultural resources survey was conducted by HELIX for the Moreno Valley Tentative Tract Map 36760 project including a record search, a review of historic maps and aerial photographs, a Sacred Lands File search, tribal outreach, an intensive field survey, and this letter report. The record search revealed eight previously recorded cultural resources within a one-mile radius of the property. The current survey did not identify any cultural resources within the project area other than the previously recorded historic feature, which is not a significant resource. Therefore, no impacts to cultural resources are anticipated.

However, the project site is in alluvial soils, where there is a potential for buried cultural resources. Based on this, it is recommended that an archaeological and Native American monitoring program be implemented. The monitoring program would include attendance by the archaeologist and Native American monitor at a preconstruction meeting with the grading contractor and the presence of archaeological and Native American monitors during initial ground-disturbing activities on site. Both archaeological and Native American monitors would have the authority to temporarily halt or redirect grading and other ground-disturbing activity in the event that cultural resources are encountered. If significant cultural material is encountered, the monitors will coordinate with the applicant and City staff to develop and implement appropriate mitigation measures.

If you have any questions, please contact Mary Robbins-Wade at (619) 462-1515.

Nicole Falvey
Staff Archaeologist

Mary Robbins-Wade, RPA
Director of Cultural Resources
Southern California

Enclosures:
Figure 1 Regional Location Map
Figure 2 Project Vicinity (USGS Topography)
Figure 3 Project Vicinity (Aerial Photograph)
Figure 4 Project Plan

Confidential Attachment:

A Records Search Map

REFERENCES

Bean, Lowell John
1978 Cahuilla. In *California*, edited by Robert F. Heizer, pp. 575-587. *The Handbook of North American Indians*, vol. 8. William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Bean, Lowell John, and Florence C. Shipek
1978 Luiseño. In *California*, edited by Robert F. Heizer, pp. 550-563. *The Handbook of North American Indians*, vol. 8. William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Bowman, Roy H.
1973 *Soil Survey: San Diego Area*. United States Department of Agriculture. Beltsville, MD.

Bull, Charles S.
1977 *Archaeology and Linguistics, Coastal Southern California*. Unpublished Master's Thesis, Department of Anthropology, San Diego State University.

City of Moreno Valley
n.d. *About Moreno Valley: History*. Electronic document, available at: http://www.moreno-valley.ca.us/community/about.shtml, accessed on March 28, 2016.

2006 *City of Moreno Valley General Plan*. Electronic document, available at: http://www.moreno-valley.ca.us/city_hall/general-plan/06gpfinal/gp/gp-tot.pdf, accessed on March 28, 2016.

Christenson, Lynne E.
1990 *The Late Prehistoric Yuman People of San Diego County, California: Their Settlement and Subsistence System*. Ph.D. dissertation, Department of Anthropology, Arizona State University, Tempe. University Microfilms, Ann Arbor.

DuBois, Constance
1908 *The Religion of the Luiseño Indians of Southern California*. University of California Publications in American Archaeology and Ethnology 8(3):69-186.

Foster, John M., James J. Schmidt, Carmen A. Weber, Gwendolyn R. Romani, and Roberta S. Greenwood
1991 Cultural Resource Investigation: Inland Feeder Project, Metropolitan Water District of Southern California. Greenwood & Associates. Report on file at Eastern Information Center, UC Riverside.

Hedges, Ken, and Christina Beresford
1986 *Santa Ysabel Ethnobotany*. San Diego Museum of Man Ethnic Technology Notes No. 20.

Kowta, M.
1969 *The Sayles Complex: A Late Milling Stone Assemblage from Cajon Pass and the Ecological Implications of its Scraper Planes*. University of California Publications in Anthropology 6, Berkeley.

Kroeber, A.L.
1976 *Handbook of the Indians of California*. Dover Publications, New York. Originally published in 1925 as *Bulletin 78* of the Bureau of American Ethnology of the Smithsonian Institution, Washington, D.C.

Masiel-Zamora, Myra Ruth
2013 *Analysis of 'Éxva Teméeku, a Luiseño Indian Village Site Named Temeku, Located In Temecula, California*. Master's thesis, Department of Anthropology, San Diego State University.

McKenna, Jeannette
2014a Site record for P-33-023936(CA-RIV-11757). On file at Eastern Information Center, UC Riverside.

2015b A Phase I Cultural Resources Survey for the Proposed Walmart Supercenter on Approximately 22.28 Acres of Land in the City of Moreno Valley, Riverside County, California. Report on file at Eastern Information Center, UC Riverside.

McKenna, et al.
2005 Letter Report: Monitoring at the Site of the Proposed Indian Middle School in the City of Perris, Riverside County, California. Report on file at Eastern Information Center, UC Riverside.

Moratto, Michael J.
1984 *California Archaeology*. Academic Press, Orlando.

Morton, D.M., R.M. Hauser, and K.R. Ruppert
1999 *Preliminary Digital Geologic Map of the Santa Ana 30'x60' Quadrangle, Southern California, version 1.0*. United States Geological Survey. Electronic document, available at http://www.quake.ca.gov/gmaps/GAM/santaana/santaana.html#, accessed on March 29, 2016.

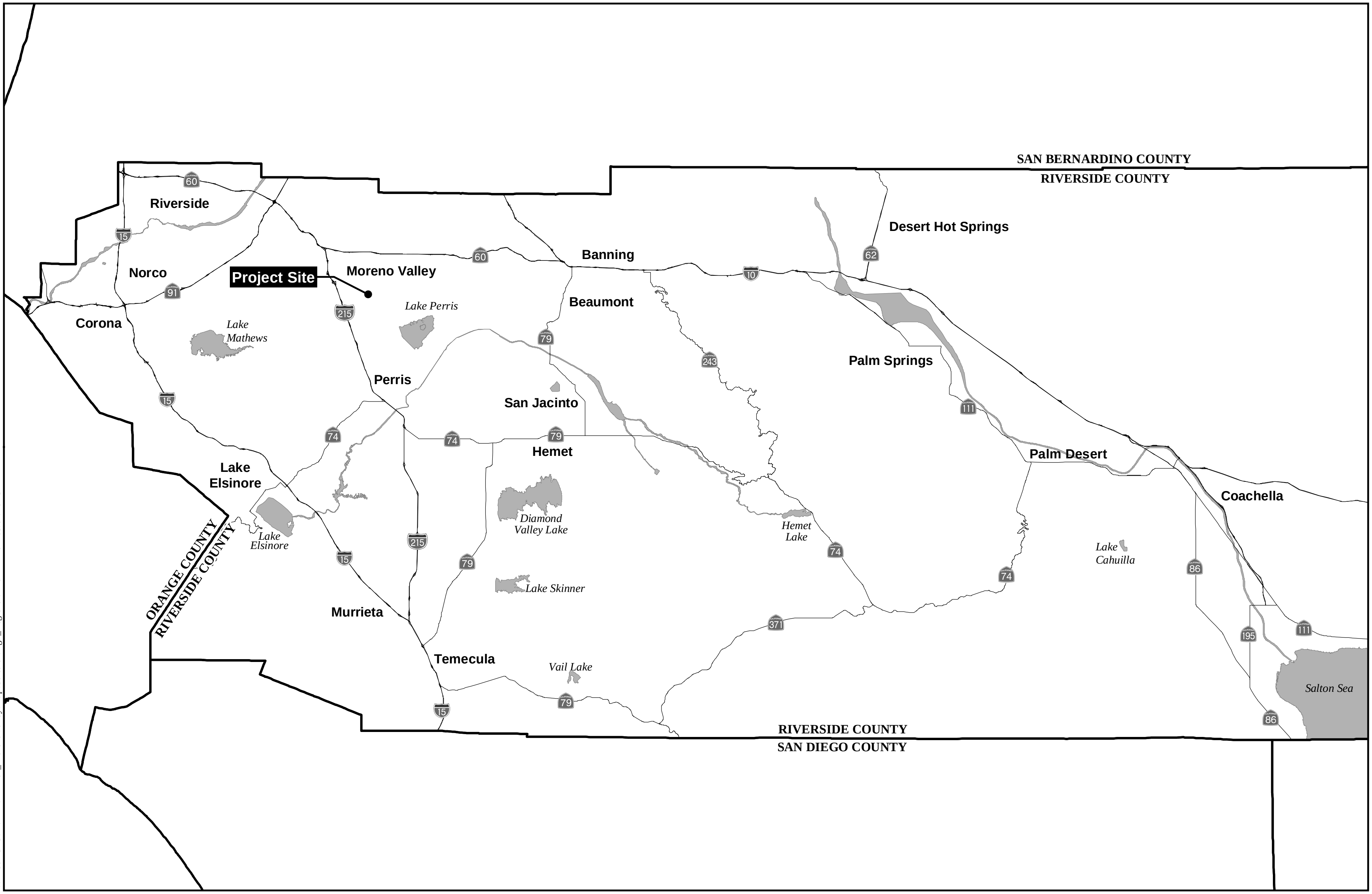
NETR Online
2016 Historic Aerials. Nationwide Environmental Title Research, LLC. Electronic document, available at: http://www.historicaerials.com, accessed March 28, 2016.

Wallace, William J.
1978 Post-Pleistocene Archeology, 9000 to 2000 B.C. In *California*, edited by Robert F. Heizer, pp. 25-36. *The Handbook of North American Indians*, vol. 8. W.C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Weather Currents
2016 *Moreno Valley, California Climate Summary*. Weather Currents. Electronic document, available at: https://weathercurrents.com/morenovalley/Climate.do, accessed on March 29, 2016.

Web Soil Survey
n.d. Natural Resource Conservation Service. United States Department of Agriculture. Electronic document, available at: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx, accessed on March 29, 2016.

Willey, George R., and Philip Phillips
1958 *Method and Theory in American Archaeology*. University of Chicago Press, Chicago.



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Regional Location Map

MORENO VALLEY

HELIX Environmental Planning

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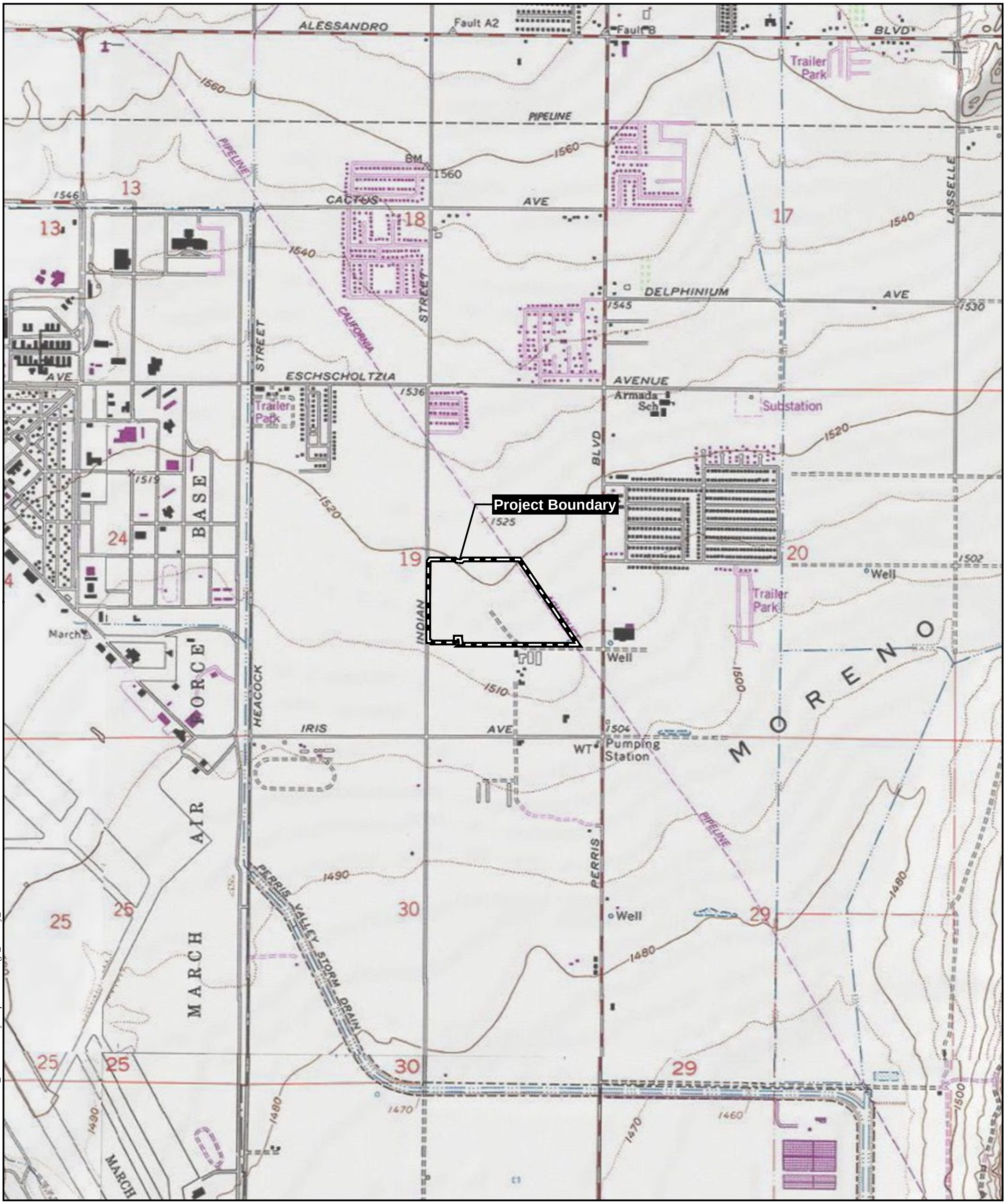
Figure 1

Attachment: Cultural Resource Study (2444 : Legacy Park Project)



Project Vicinity (USGS Topography)

MORENO VALLEY

HELIX Environmental Planning

N

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Figure 2

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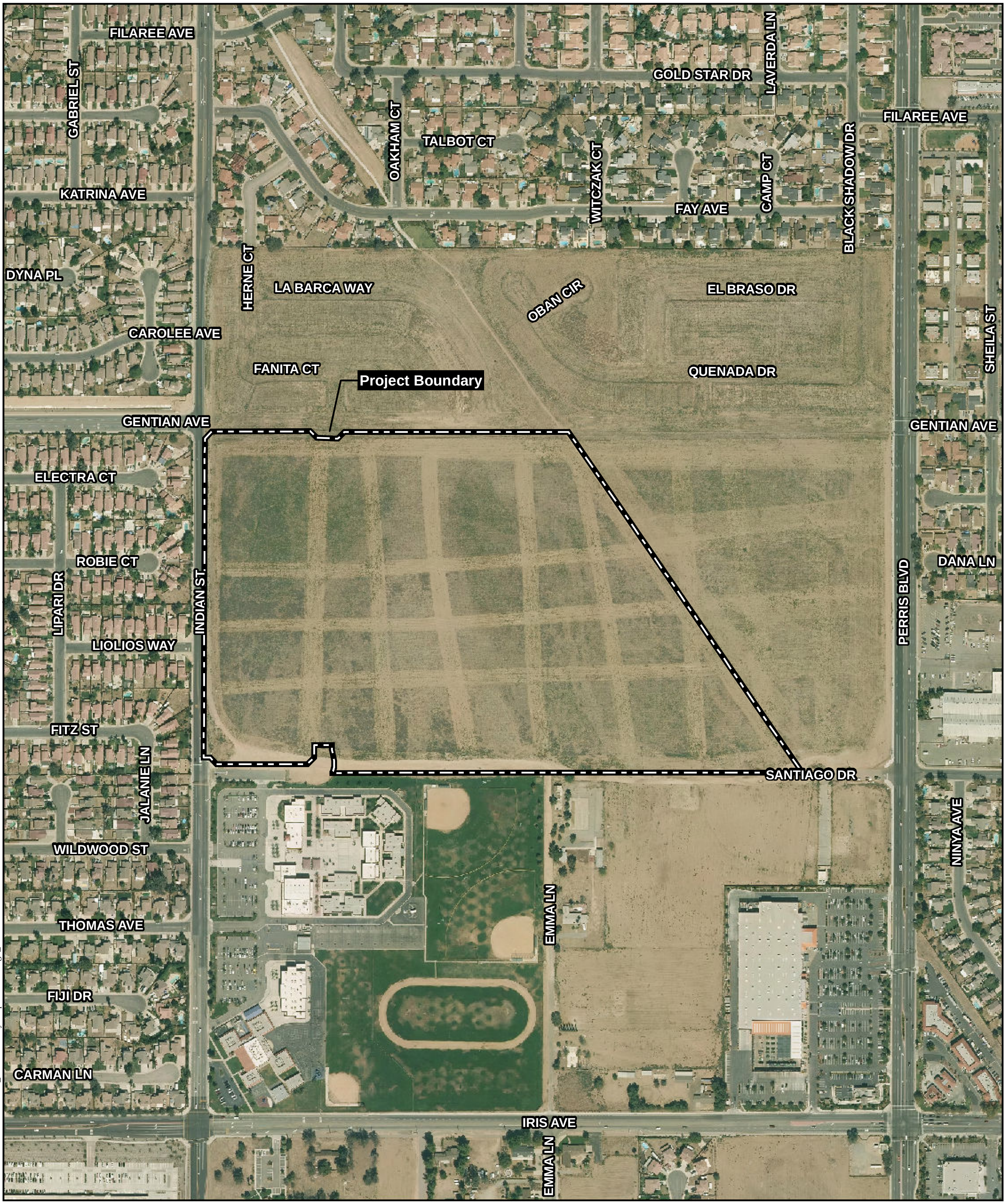
Attachment: Cultural Resource Study (2444 : Legacy Park Project)



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Attachment: Cultural Resource Study (2444 : Legacy Park Project)

Project Vicinity (Aerial Photograph)

MORENO VALLEY

HELIX Environmental Planning

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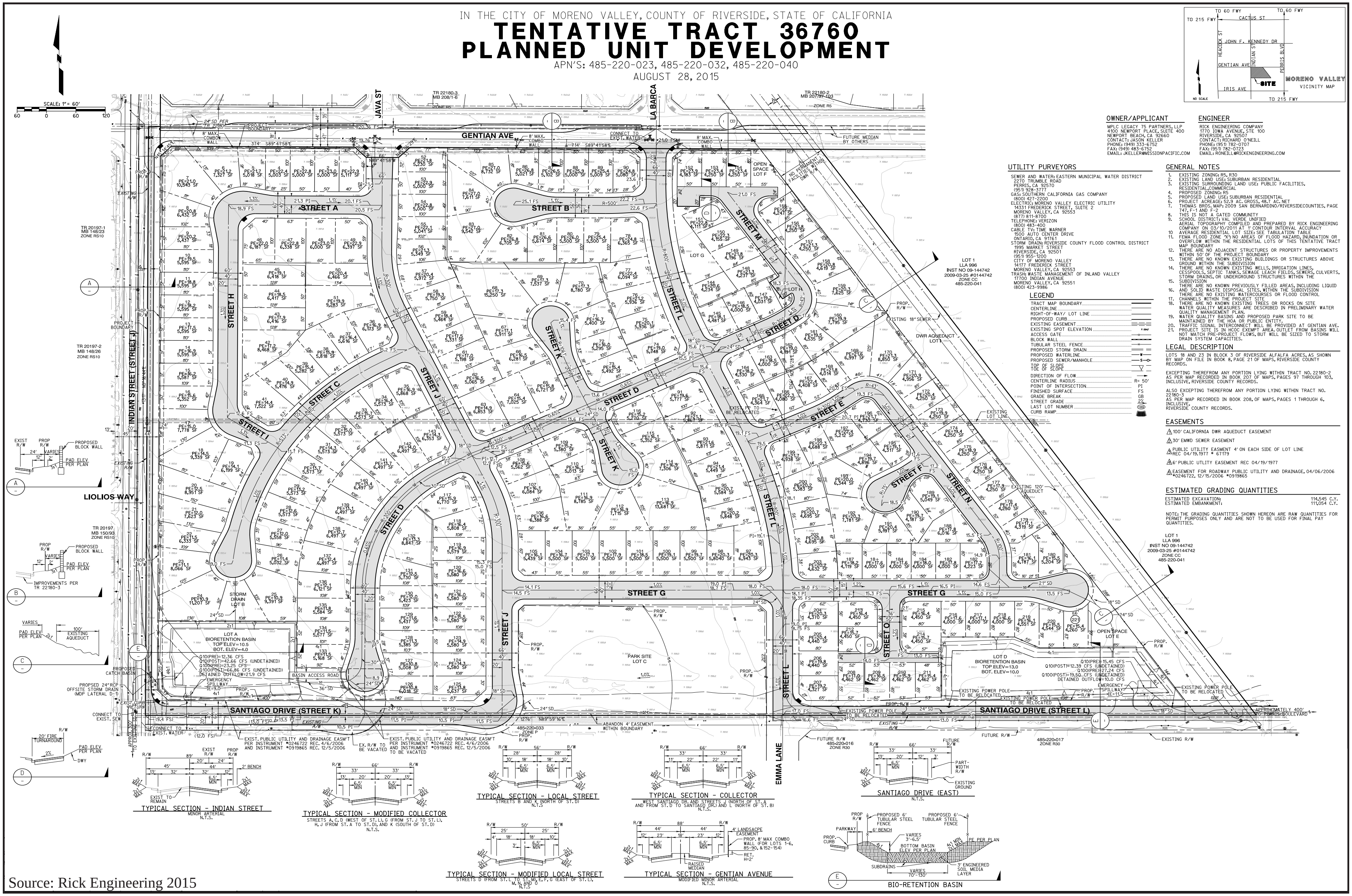
Figure 3



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Attachment: Cultural Resource Study (2444 : Legacy Park Project)

Project Plan

MORENO VALLEY

HELIX Environmental Planning

Figure 4

PRELIMINARY GEOTECHNICAL INVESTIGATION, PROPOSED 104-ACRE RESIDENTIAL DEVELOPMENT, NORTHWEST OF PERRIS BOULEVARD AND IRIS AVENUE, CITY OF MORENO VALLEY, CALIFORNIA

Prepared for:

YOUNG HOMES
10370 Trademark Street
Rancho Cucamonga, California 91730

Project No. 021164-001

June 9, 2004

Leighton and Associates, Inc.
A LEIGHTON GROUP COMPANY

Leighton and Associates, Inc.
A LEIGHTON GROUP COMPANY

June 9, 2004

Project No. 021164-001

To: Young Homes
10370 Trademark Street
Rancho Cucamonga, California 91730

Attention: Mr. Thomas Owen

Subject: Preliminary Geotechnical Investigation, Proposed 104-Acre Residential Development, Northwest of Perris Boulevard and Iris Avenue, City of Moreno Valley, California

In response to your request, Leighton and Associates, Inc. has conducted a preliminary geotechnical investigation of the proposed residential development to be located northwest of Perris Boulevard and Iris Avenue in the City of Moreno Valley, California. The purpose of our investigation has been to explore the subsurface conditions at the site, to evaluate the general soil characteristics, and to provide preliminary geotechnical recommendations for the design and construction of the proposed improvements.

Based upon our investigation, the proposed development is feasible from a geotechnical viewpoint, provided our recommendations are incorporated in the design and construction of the project. The following report presents our geotechnical findings, conclusions, and preliminary recommendations. Additional geotechnical investigation and analysis may be necessary, based on the actual development plans for submittal with the project grading plans.

10532 Acacia Street, Suite B-6 ▪ Rancho Cucamonga, CA 91730
909.484.2205 ▪ Fax 909.484.2170 ▪ www.leightongeo.com

021164-001

We appreciate the opportunity to work with you on this project. If you have any questions, or if we can be of further service, please call us at your convenience.

Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.

REGISTERED PROFESSIONAL ENGINEER
JASON D. HERTZBERG
No. 61778
Exp. 6-30-05
CIVIL
STATE OF CALIFORNIA

Jason Hertzberg, RCE 61778
Project Engineer

Philip A. Buchiarelli, CEG 1715
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Vice President/Principal Engineer

DAG/JDH/PB/DCS/rsh

Distribution: (4) Addressee

Leighton

021135-001

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Appendices

LIST OF ILLUSTRATIONS

1.0 INTRODUCTION

1.1 Site Location and Project Description

The site is located northwest of Perris Boulevard and Iris Avenue in the City of Moreno Valley, California (see Figure 1, Site Location Map). The project area is bounded on the east by Perris Boulevard and the Home Depot shopping center, on the south by Iris Avenue, on the west by Indian Street and an elementary school, and on the north by vacant land. March Air Reserve Base is approximately one mile west. The East Branch California Aqueduct crosses the eastern portion of the site. The approximately 104-acre flat site is irregular in shape and is currently vacant. Vegetation consists of seasonal grasses, brush, and several scattered small trees.

Based on our review of historic aerial photographs, the site was used for agricultural purposes within the period of at least 1953 to 1980, and was otherwise vacant.

It is our understanding that the intended use of the site is a residential development. Although grading and construction plans are not yet available, we anticipate that minor cuts and fills will be required to attain the desired finish grades. We anticipate the one- and two-story single-family residences will be constructed. A parcel map provided by you was used as the base map for our Geotechnical Map, Figure 2 (rear of text).

1.2 Purpose of Investigation

The purpose of this study has been to evaluate the general geotechnical conditions at the site, to identify significant geotechnical or geologic issues that would impact site development, and to provide preliminary geotechnical recommendations for design and construction.

1.3 Scope of Investigation

The scope of our investigation has included the following tasks:

- Background Review - A background review of readily available, relevant, in-house geotechnical literature, and aerial photographs was performed.
- Pre-field Investigation Activities - Coordinated with Underground Service Alert (USA) to have existing underground utilities located and marked prior to our subsurface investigation.

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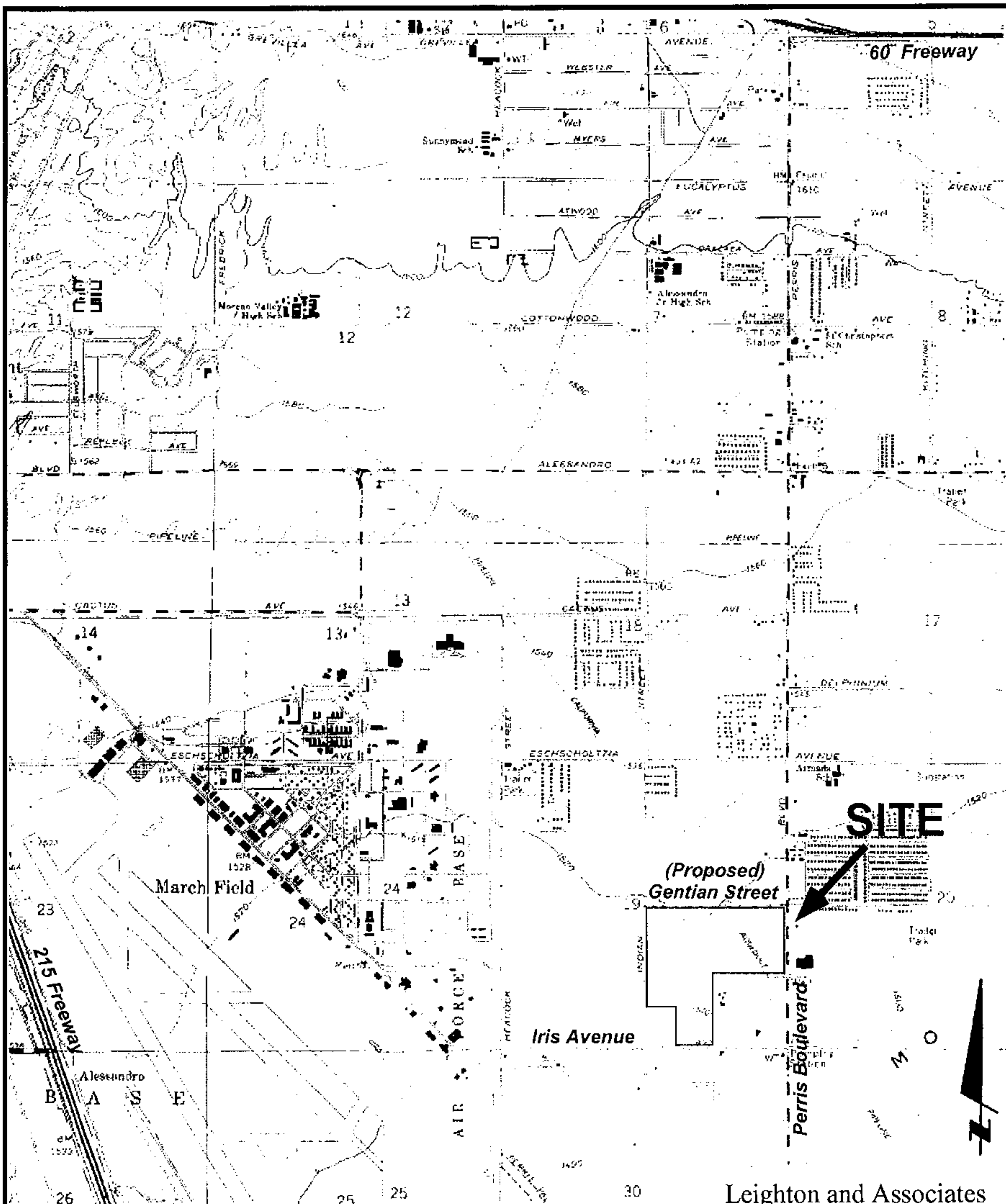

PROPOSED 104-ACRE RESIDENTIAL DEVELOPMENT NORTHWEST OF PERRIS BOULEVARD AND IRIS AVENUE, City of Moreno Valley, California	SITE LOCATION MAP	PROJECT NO. 021164-001 DATE June, 2004 Figure 1

Attachment: Geotechnical Study (2444 : Legacy Park Project)

- Field Investigation - Our field investigation consisted of the excavation of borings and test pits as follows:

  Borings
  Eight hollow-stem auger borings were excavated, logged and sampled at representative locations within the site. One boring was excavated to a depth of 51.5 feet and seven borings were excavated to depths of 21.5 feet below the existing ground surface. Each boring was logged by a member of our technical staff. Relatively undisturbed soil samples were obtained at selected intervals within the borings using Standard Penetration Testing and a California Ring Sampler. Logs of the geotechnical borings are presented in Appendix B. Approximate boring locations are shown on the accompanying Geotechnical Map, Figure 2.

  Test Pits
  Eight backhoe test pits were excavated and logged at representative locations within the site to a maximum depth of 5.5 feet below the existing ground surface. Each test pit was logged by a member of our technical staff. Bulk soil samples were obtained from the test pits. Logs of the test pits are presented in Appendix C. Approximate test pit locations are shown on the accompanying Geotechnical Map, Figure 2.

- Laboratory Tests - Laboratory tests were conducted on selected relatively undisturbed and bulk soil samples obtained during our field investigation. The laboratory testing program was designed to evaluate the engineering characteristics of the onsite soil. Results of the laboratory testing are presented in Appendix D. The laboratory tests conducted during this investigation include:

  - In situ moisture content and dry density.
  - Sieve analysis for grain size distribution.
  - Consolidation and hydrocollapse characteristics.
  - Expansion Index.
  - Maximum dry density and optimum moisture content.
  - R-value for pavement recommendations.

- Water-soluble sulfate concentration in the soil for cement type recommendations.

- Resistivity, chloride content and pH to evaluate corrosion potential.

- Engineering Analysis - The data obtained from our background review and field exploration was evaluated and analyzed in order to provide the conclusions and preliminary recommendations in the following sections.

- Report Preparation - The results of our geotechnical investigation have been summarized in this report, presenting our findings, conclusions and preliminary recommendations.

2.0 FINDINGS

2.1 Site Geology

The site is located in the Perris block of the Peninsular Ranges Geomorphic Province of southern California. The Perris block is a structural block bounded on the north by the San Jacinto Fault Zone (located 8 kilometers northeast of the site) and on the south by the Elsinore Fault Zone (located 29 kilometers southwest of the site). These faults have experienced significant activity in the recent geologic past. These and other northwest-trending right lateral strike slip faults dominate the structure of the Peninsular Ranges. Cretaceous igneous rocks of the Southern California Batholith underlie the Peninsular Ranges in this area. Locally, the site vicinity is underlain by older alluvial soil deposits of clay, silt, sand and gravel (SCGS, 1982; Morton, 1978). Bedrock outcrops of quartz diorite are present approximately ¾ mile east of the site.

2.2 Subsurface Soil Conditions

Based upon our review of pertinent geotechnical literature, and our subsurface exploration, the site is underlain by alluvial soil deposits. The soil encountered during our subsurface exploration in the upper 15 feet generally consisted of loose to medium dense silty sand to gravelly sand and soft to stiff sandy silt. Below a depth of 15 feet, the soil generally consisted of stiff to very stiff sandy silt to clay. These soils were typically characterized as slightly moist to very moist to the depths excavated. Moisture contents in the upper 10 feet ranged from 2 to 10 percent.

2.3 Groundwater

Groundwater was not encountered in any of our borings performed during this investigation to a depth of 51.5 feet. Based on our review of regional groundwater data, groundwater is expected to be on the order of 120 to 140 feet below the ground surface in the site vicinity (CDWR, 2000). However, relatively shallow perched ground water may occur locally (WMWD, 2003).

2.4 Faulting and Seismicity

The two principal seismic considerations for most sites in southern California are surface rupture along active fault traces and damage to structures due to seismically-induced ground shaking. An active fault is one that has moved in the Holocene (last 11,000 years). The closest mapped active fault that could affect the site is the San Jacinto (San

Jacinto Valley) fault, located approximately 9 kilometers northeast of the site. The San Jacinto fault is capable of producing a maximum moment magnitude of 6.9 and an average slip rate of 12 millimeter per year (CDMG, 1998). Other known regional active faults that could affect the site include the San Jacinto (San Bernardino), San Andreas, Elsinore, Chino-Central Avenue and Cucamonga faults.

No traces of active or potentially active faults have been observed to cross the project site. The site is not within an Alquist-Priolo Earthquake Fault Zone (CDMG, 2000). The potential for fault ground rupture at the site is considered very low.

Peak Horizontal Ground Accelerations (PHGA) for the site were estimated using a deterministic seismic hazard analysis, based on currently available earthquake and fault information. The analysis computes the site PHGA that could be expected to result from an earthquake on a specific fault using the estimated maximum magnitude earthquake event. PHGA's were estimated using the EQFAULT computer program (Blake, 2000), based on the attenuation relationship by Sadigh et al. (1997). Based on the analysis, the San Jacinto (San Jacinto Valley) Fault Zone is potentially capable of producing the greatest PHGA at the site, due to its proximity, fault type, and its maximum earthquake magnitude of 6.9 (M_W). It is estimated that such an earthquake on this fault near the site could produce seismic shaking with a PHGA of 0.32g.

The PHGA was also estimated using a probabilistic seismic hazard analsyis. The computer program FRISKSP (Blake, 2000) was used for the analysis. Attenuation relationships used in the computer analysis were developed by Abrahamson and Silva (1997) for soil, Campbell (1997 and 2000) for alluvium, and Sadigh et al. (1997) for deep soil deposits. The analysis indicated an average value of 0.59g for peak horizontal ground acceleration (PHGA) with a 10 percent probability of exceedance in 50 years. The predominant magnitude is approximately 6.8 (Mw) at a distance on the order of 10 kilometers.

2.5 Secondary Seismic Hazards

Liquefaction Potential

Liquefaction is the loss of soil strength or stiffness due to a buildup of excess pore-water pressure during strong ground shaking. Liquefaction is associated primarily with loose (low density), granular, saturated soil. Effects of severe liquefaction can include sand boils, excessive settlement, bearing capacity failures, and lateral spreading.

The Generalized Liquefaction Map for Riverside County (2003) indicates the site is located in an area of shallow groundwater with sediments considered highly susceptible to liquefaction. Our exploratory borings indicate that moderately dense soil underlies the site. In addition, regional groundwater data indicates that shallow groundwater conditions do not exist locally, nor have they existed historically. Based on these findings, the potential for liquefaction appears to be low.

Seismically Induced Settlement

During a strong seismic event, seismically induced settlement can occur within loose to moderately dense, dry or saturated granular soil. Settlement caused by ground shaking can be nonuniformly distributed, resulting in differential settlement. We have performed analyses to estimate seismically-induced settlement using the simplified method set forth by Tokimatsu and Seed (1987).

Based on this preliminary study, the potential total settlement resulting from seismic loading is estimated to be approximately 1½ inches. Differential settlement resulting from seismic loading is generally assumed to be one-half of the total seismically induced settlement over a distance of 40 feet. Seismic settlement is not considered a geotechnical constraint to the project.

2.6 Compressible and Collapsible Soil

Based on our investigation, the upper 5 to 15 feet of older alluvium is generally considered to be slightly to moderately compressible. Partial removal and recompaction of this material will be necessary to reduce the potential for excessive total and differential settlement of the proposed structures.

Hydrocollapse potential refers to the potential settlement of a soil under existing stresses upon being wetted. Representative samples of the upper 5 to 20 feet of the subsurface soil were tested for hydrocollapse potential. Test results indicate that the near-surface soil onsite has a negligible to minor hydrocollapse potential (1 percent or less).

2.7 Expansive Soils

Representative samples of the subsurface soil were tested for expansion potential. Test results indicate an Expansion Index of 0 to 5. Based on these results and the relatively granular nature of the near-surface soil, the onsite soil generally has a very low expansion potential.

2.8 Sulfate Content

Water-soluble sulfates in soil can react adversely with concrete. However, concrete in contact with soil containing sulfate concentrations of less than 0.10 percent are considered to have negligible sulfate exposure (UBC, 1997 edition, Chapter 19).

Near-surface soil samples were tested during this investigation for soluble sulfate content. The results of these tests indicated sulfate contents of less than 0.01 percent by weight, indicating negligible sulfate exposure. As such, the soils exposed at pad grade are not expected to pose a significant potential for sulfate reaction with concrete.

2.9 Resistivity, Chloride and pH

Soil corrosivity to ferrous metals can be estimated by the soil's pH level, electrical resistivity, and chloride content. In general, soil having a minimum resistivity less than 2,000 ohm-cm is considered corrosive. Soil with a chloride content of 500 ppm or more is considered corrosive to ferrous metals.

As a screening for potentially corrosive soil, representative soil samples were tested during this investigation to determine minimum resistivity, chloride content, and pH level. The tests indicated a chloride content of 42 ppm, a pH value of approximately 7.0, and a minimum resistivity of 7,000 ohm-cm. Based on the test results, the onsite soil is considered mildly corrosive to buried ferrous metals.

3.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon this study, the proposed improvements are feasible from a geotechnical standpoint. The recommendations presented below are preliminary. Additional geotechnical investigation and analysis may be necessary, based on the actual development plans for submittal with the project grading plans.

3.1 General Earthwork and Grading

All grading should be performed in accordance with the General Earthwork and Grading Specifications presented in Appendix D, unless specifically revised or amended below or by future recommendations based on final development plans.

Site Preparation

Prior to construction, the site should be cleared of vegetation, trash, and debris. Trees should be removed and grubbed out, and the excavations should be backfilled with compacted fill. Any underground obstructions onsite should be removed. The resulting cavities should be properly backfilled and compacted. Efforts should be made to locate any existing utility lines. Those lines should be removed or rerouted if they interfere with the proposed construction, and the resulting cavities should be properly backfilled and compacted. In addition, any uncontrolled artificial fill, if encountered, should be removed.

Overexcavation and Recompaction

To reduce the potential for adverse differential settlement of the proposed structures, the underlying subgrade soil should be prepared in such a manner that a uniform response to the applied loads is achieved. The soil underneath conventional shallow footings should be overexcavated and recompacted to a minimum depth of 3 feet below the bottom of the proposed foundations for residential structures or 3 feet below the existing grade, whichever is deeper. The overexcavation and recompaction should extend a minimum lateral distance of 5 feet from the footings. Local conditions may require that deeper overexcavation be performed; such areas should be evaluated by Leighton and Associates during grading.

Areas outside the overexcavation limits of buildings planned for asphalt or concrete pavement, flatwork, site walls, and retaining walls (less than 6 feet in height), and areas to receive fill should be overexcavated to a minimum depth of 12 inches below the existing ground surface or 12 inches below the proposed finish subgrade, whichever is deeper.

After completion of the overexcavation, and prior to fill placement, the exposed surfaces should be scarified to a minimum depth of 6 inches, moisture-conditioned to or slightly above optimum moisture content, and recompacted to a minimum 90 percent relative compaction.

Fill Placement and Compaction

The onsite soil is suitable for use as compacted structural fill, provided it is free of debris, and oversized material (greater than 8 inches in largest dimension). Any soil to be placed as fill, whether onsite or imported material, should be accepted by Leighton and Associates.

All fill soil should be placed in thin, loose lifts, moisture-conditioned, as necessary, to near optimum moisture content, and compacted to a minimum 90 percent relative compaction as determined by ASTM Test Method D1557. Aggregate base should be compacted to a minimum of 95 percent relative compaction.

Shrinkage and Subsidence

The change in volume of excavated and recompacted soil varies according to soil type and location. This volume change is represented as a percentage increase (bulking) or decrease (shrinkage) in volume of fill after removal and recompaction. Subsidence occurs as natural ground is moisture-conditioned and densified to receive fill. Field and laboratory data used in our calculations included laboratory-measured maximum dry densities for soil types encountered at the subject site and the measured in-place densities of soils encountered. We estimate the following earth volume changes will occur during grading:

Shrinkage	Approximately 15 percent
Subsidence	Approximately 0.15 foot

The level of fill compaction, variations in the dry density of the existing soils and other factors influence the amount of volume change. Some adjustments to earthwork volume should be anticipated during grading of the site.

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3.2 Foundations

Based on our preliminary investigation and our experience in the region, conventional shallow or post-tensioned foundations may be used to support the loads of one- to two-story, frame-type structures. Overexcavation and recompaction of the footing subgrade soil should be performed as detailed in Section 3.1.

Conventional Shallow Foundations

Based on our preliminary investigation, the footings for 2-story structures should have an embedment depth of 18 inches, with a minimum width of 24 and 15 inches for isolated and continuous footings, respectively. The footings for 1-story residential structures should have an embedment depth of 12 inches, with a minimum width of 24 and 12 inches for isolated and continuous footings, respectively.

An allowable bearing capacity of 2,000 psf may be used for preliminary design, based on the minimum embedment depth and width. The allowable bearing value may be increased by 300 psf per foot increase in depth or width to a maximum allowable bearing pressure of 3,500 psf. The allowable bearing pressure is for the total dead load and frequently applied live loads.

The soil resistance available to withstand lateral loads on a shallow foundation is a function of the frictional resistance along the base of the footing and the passive resistance that may develop as the face of the structure tends to move into the soil. The frictional resistance between the base of the foundation and the subgrade soil may be computed using a coefficient of friction of 0.35. The passive resistance may be computed using an equivalent fluid pressure of 350 pounds per cubic foot (pcf), assuming there is constant contact between the footing and undisturbed soil.

The allowable bearing pressure and coefficient of friction values may be increased by one third when considering loads of short duration, such as those imposed by wind and seismic forces.

Footing reinforcement should be designed by the structural engineer.

The recommended allowable bearing capacity is generally based on a total allowable, post construction settlement of 1 inch. Differential settlement is estimated at ½ inch over a horizontal distance of 30 feet. Since settlement is a function of footing size and contact bearing pressure, differential settlement can be expected between adjacent columns or walls where a large differential loading condition exists. These settlement estimates should be reevaluated by Leighton and Associates when foundation plans for the proposed structures become available.

Post-Tensioned Foundations

As an alternative to conventional spread footings, post-tension foundation systems can be used. Post-tension slab foundations should be designed by the project structural engineer. The following table provides post-tension slab design information for soil with a low expansion potential. Post-tension slabs should be designed in accordance with Section 1816 of the current edition of the UBC.

Post-Tension Foundation Design Recommendations		
Very Low Expansion		
Edge Moisture Variation Distance, e_m	Center Lift	5.5 feet
	Edge Lift	3.0 feet
Differential Swell, Y_m	Center Lift	1.0 inch
	Edge Lift	0.4 inch
Modulus of subgrade Reaction		120 pci

Exterior footings (thickened edges) should have a minimum depth of 12 inches below the lowest adjacent soil grade and a minimum width of 12 inches. These footings may be designed for a maximum allowable bearing pressure of 2,000 pounds per square foot. The allowable bearing capacity may be increased by one-third for short-term loading.

These recommendations are based on preliminary data. Additional testing of the soil present near finish grade will be conducted to confirm the final foundation design information. Local agencies, the structural engineer or the Uniform Building Code may have requirements that are more stringent.

3.3 Slab-On-Grade

Concrete slabs subjected to special loads should be designed by the structural engineer. Where conventional light floor loading conditions exist, the following minimum recommendations, which are based on a very low soil expansion potential, should be used:

- A minimum slab thickness of 4 inches (nominal). Reinforcement steel should be design by the structural engineer, but as a minimum should be No. 3 rebar placed at 24 inches on center. Reinforcement should be supported on "chairs" to position the reinforcement within the middle third of the slab thickness.

- A moisture barrier consisting of 6-mil Visqueen (or equivalent) placed below slabs where moisture-sensitive floor coverings or equipment is planned. The moisture barrier should be covered with a minimum of 2 inches of sand.

- The subgrade soil should be moisture conditioned to at least optimum moisture content to a minimum depth of 12 inches prior to placing the moisture barrier, steel or concrete.

The use of reinforcement or post-tensioned cables in slabs and foundations can generally reduce the potential for concrete cracking. However, minor cracking of the concrete as it cures, due to drying and shrinkage, is normal and should be expected. However, cracking is often aggravated by a high water/cement ratio, high concrete temperature at the time of placement, small nominal aggregate size, and rapid moisture loss due to hot, dry, and/or windy weather conditions during placement and curing. Cracking due to temperature and moisture fluctuations can also be expected. The use of low slump concrete can reduce the potential for shrinkage cracking.

Moisture barriers can retard, but not eliminate moisture vapor movement from the underlying soils up through the slab. Floor covering manufacturers should be consulted for specific recommendations.

3.4 Seismic Design Parameters

Seismic parameters presented in this report should be considered during project design. In order to reduce the effects of ground shaking produced by regional seismic events, seismic design should be performed in accordance with the most recent edition of the Uniform Building Code (UBC). The following data should be considered for the seismic analysis of the subject site:

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Seismic Design Parameters	
Seismic Source	San Jacinto (San Jacinto Valley) Fault
Distance	Approximately 9 km
Seismic Source Type (UBC, Table 16-U):	B
Seismic Zone Factor, Z (UBC, Table 16-I):	0.4
Soil Profile Type (UBC, 16-J):	S_D
Near-Source Factor N_a (UBC, Table 16-S):	1.0
Source Factor N_v (UBC, Table 16-T):	1.04

3.5 Retaining Walls

We recommend that retaining walls be backfilled with onsite, very low expansive soil and constructed with a backdrain in accordance with the recommendations provided on Figure 3 (rear of text). Using expansive soil as retaining wall backfill will result in higher lateral earth pressures exerted on the wall. Based on these recommendations, the following parameters may be used for the design of conventional retaining walls up to 6 feet tall:

Static Equivalent Fluid Weight (pcf)	
Conditions	Level
Active	35
At-Rest	55
Passive	350 (Maximum of 3,500 psf)

The above values do not contain an appreciable factor of safety, so the structural engineer should apply the applicable factors of safety and/or load factors during design.

Cantilever walls that are designed to yield at least 0.001H, where H is equal to the wall height, may be designed using the active condition. Rigid walls and walls braced at the top should be designed using the at-rest condition.

Passive pressure is used to compute soil resistance to lateral structural movement. In addition, for sliding resistance, a frictional resistance coefficient of 0.35 may be used at the concrete and soil interface. The lateral passive resistance should be taken into account only if it is ensured that the soil providing passive resistance, embedded against the foundation elements, will remain intact with time.

In addition to the above lateral forces due to retained earth, surcharge due to improvements, such as an adjacent structure or traffic loading, should be considered in the design of the retaining wall. Loads applied within a 1:1 projection from the surcharging structure on the stem of the wall should be considered in the design.

A soil unit weight of 120 pcf may be assumed for calculating the actual weight of the soil over the wall footing.

Retaining wall footings should have a minimum width of 12 inches and a minimum embedment of 12 inches below the lowest adjacent grade. An allowable bearing capacity of 2,000 psf may be used for retaining wall footing design, based on the minimum footing width and depth. This bearing value may be increased by 300 psf per foot increase in width or depth to a maximum allowable bearing pressure of 3,500 psf.

3.6 Pavement Design

A representative soil sample tested during this investigation had an R-value of 61. Based on the design procedures outlined in the current Caltrans Highway Design Manual, preliminary flexible pavement section recommendations are presented in the following table for the Traffic Indices indicated. Final pavement design should be based on the Traffic Index determined by the project civil engineer and R-value testing provided near the completion of street grading. These pavement sections meet the City of Moreno Valley's current minimum pavement requirements.

AC PAVEMENT SECTION THICKNESS		
Traffic Index	Asphaltic Concrete (AC) Thickness (feet)	Class 2 Aggregate Base (AB) Thickness (feet)
6 or less	0.30	.040
7	0.35	0.40

If the pavement is to be constructed prior to construction of the structures, we recommend that the full depth of the pavement section be placed in order to support heavy construction traffic.

All pavement construction should be performed in accordance with the Standard Specifications for Public Works Construction. Field inspection and periodic testing, as needed during placement of the base course materials, should be undertaken to ensure that the requirements of the standard specifications are fulfilled. Prior to placement of aggregate base, the subgrade soil should be processed to a minimum depth of 6 inches, moisture-conditioned, as necessary, and recompacted to a minimum of 90 percent relative compaction. Aggregate base should be moisture conditioned, as necessary, and compacted to a minimum of 95 percent relative compaction.

3.7 Temporary Excavations

All temporary excavations, including utility trenches, retaining wall excavations, etc. should be performed in accordance with project plans, specifications and all OSHA requirements.

No surcharge loads should be permitted within a horizontal distance equal to the height of cut or 5 feet, whichever is greater from the top of the slope, unless the cut is shored appropriately. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of any adjacent existing structure should be properly shored to maintain support of the structure.

Typical cantilever shoring should be designed based on the active fluid pressure presented in the retaining wall section. If excavations are braced at the top and at specific design intervals, the active pressure may then be approximated by a rectangular soil pressure distribution with the pressure per foot of width equal to 22H, where H is equal to the depth of the excavation being shored.

During construction, the soil conditions should be regularly evaluated to verify that conditions are as anticipated. The contractor should be responsible for providing the "competent person" required by OSHA standards to evaluate soil conditions. Close coordination between the competent person and the geotechnical engineer should be maintained to facilitate construction while providing safe excavations.

3.8 Trench Backfill

Utility-type trenches onsite can be backfilled with the onsite material, provided it is free of debris, significant organic material and oversized material. Prior to backfilling the trench, pipes should be bedded and shaded in a granular material that has a sand equivalent of 30 or greater. The sand should extend 12 inches above the top of the pipe. The bedding/shading sand should be densified in-place by jetting. The native backfill should be placed in loose layers, moisture conditioned, as necessary, and mechanically compacted using a minimum standard of 90 percent relative compaction.

3.9 Surface Drainage

Surface drainage should be designed to be directed away from foundations and toward approved drainage devices. Irrigation of landscaping should be controlled to maintain, as much as possible, a consistent moisture content sufficient to provide healthy plant growth without overwatering.

3.10 Cement Type and Corrosion Protection

Based on the results of laboratory testing, concrete structures in contact with the onsite soil will have negligible exposure to water-soluble sulfates in the soil. Common Type II cement may be used for concrete construction onsite and the concrete should be designed in accordance with Table 19-A-4 of the Uniform Building Code.

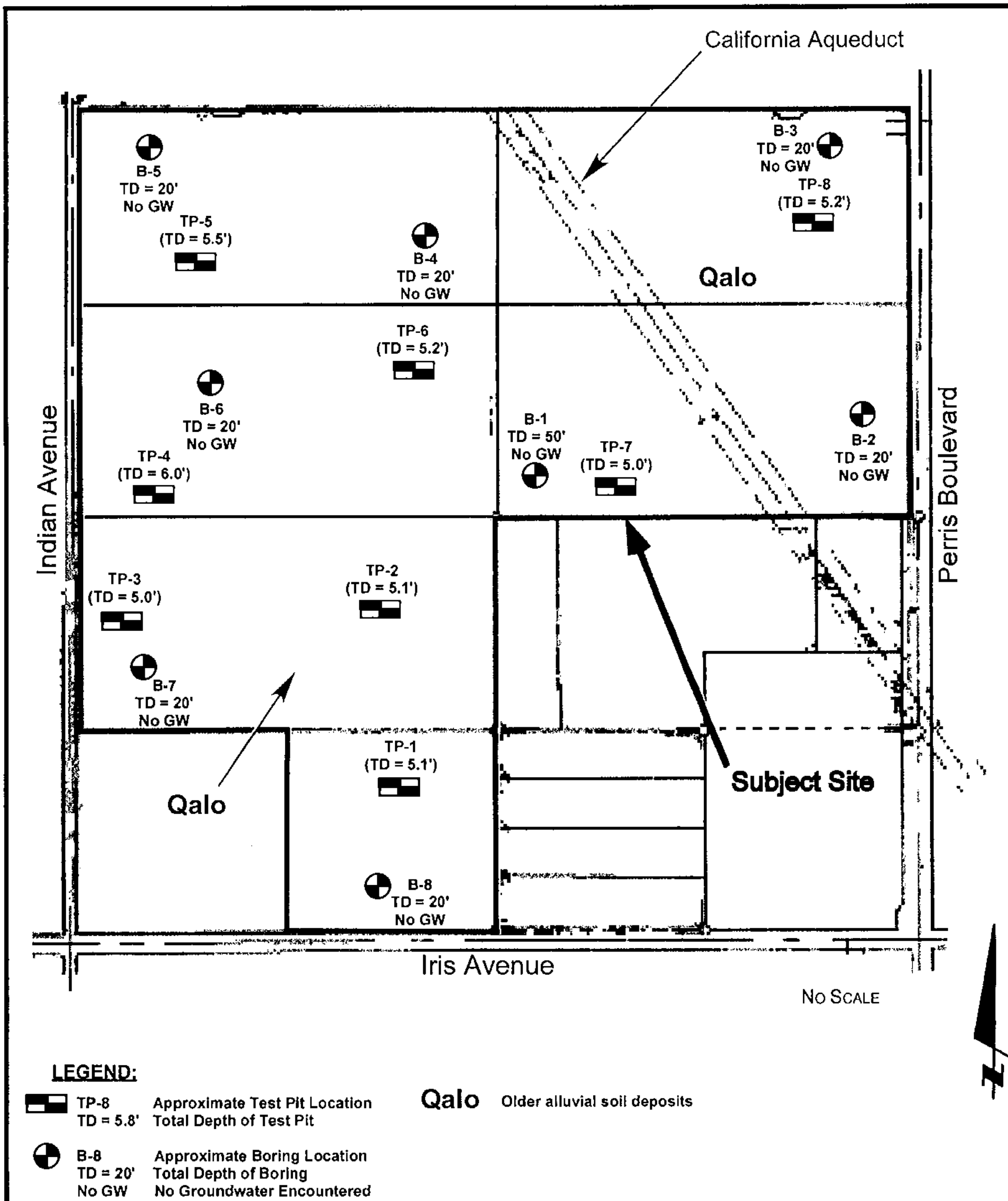
Based on our laboratory testing, the onsite soil is considered mildly corrosive to ferrous metals. The corrosion information presented in this report should be provided to your underground utility subcontractors.

3.11 Additional Geotechnical Investigation and Services

The preliminary geotechnical recommendations presented in this report are based on subsurfacc conditions as interpreted from limited subsurface explorations and limited laboratory testing. Our preliminary geotechnical recommendations provided in this report are based on information available at the time the report was prepared and may change as plans are developed. Additional geotechnical investigation and analysis may be required based on final development plans. Leighton and Associates should review the site and grading plans when available and comment further on the geotechnical aspects of the project. Geotechnical observation and testing should be conducted during excavation and all phases of grading operations. The conclusions and preliminary recommendations presented herein should be reviewed and verified by Leighton and Associates during construction and revised accordingly if geotechnical conditions encountered vary from our preliminary findings and interpretations. Geotechnical observation and testing should be provided:

- After completion of site clearing.
- During overexcavation of compressible soil.
- During compaction of all fill materials.

- After excavation of all footings and prior to placement of concrete.
- During utility trench backfilling and compaction.
- During pavement subgrade and base preparation.
- When any unusual conditions are encountered.



Proposed 104-Acre Residential Development Northwest of Perris Boulevard and Iris Avenue, City of Moreno Valley, California	**Geotechnical Map**	Project No. 021164-001 Date June, 2004 Figure 2

APPENDIX A

References

Abrahamson, N. A. and Silva, W. J., 1997, Empirical Response Spectral Attenuation Relations for Shallow Crustal Earthquakes: Seismological Research Letters, Volume 68, No. 1, pp. 94-127.

Blake, T. F., 2000, FRISKSP, A Computer Program for the Probabilistic Estimation of Peak Acceleration and Uniform Hazard Spectra Using 3-D Faults as Earthquake Sources, Version 4.00, User's Manual.

California Division of Mines and Geology (CDMG), 1998, *Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada,* to be used with the 1997 Uniform Building Code, International Conference of Building Officials, February 1998.

________, 2000, CD-ROM containing digital images of Official Maps of Alquist-Priolo Earthquake Fault Zones that affect the Southern Region, DMG CD 2000-003 2000.

California Department of Water Resources (CDWR), 2000, Water Data Library (WDL) home page, http://well.water.ca.gov/.

Campbell, K. W., 1997, Empirical Near-Source Attenuation Relationships for Horizontal and Vertical Components of Peak Ground Acceleration, Peak Ground Velocity, and Pseudo-Absolute Acceleration Response Spectra: Seismological Research Letters, Volume 68, No. 1, pp. 154-179.

_______, 2000, Erratum, Empirical Near-Source Attenuation Relationships for Horizontal and Vertical Components of Peak Ground Acceleration, Peak Ground Velocity, and Pseudo-Absolute Acceleration Response Spectra: Seismological Research Letters, Volume 71, No. 3, pp. 352-354.

Hart, E. W. and Bryant, W. A., 1999, Fault Rupture Hazard Zones in California, Aquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps: California Division of Mines and Geology Special Publications 42, 38p.

International Conference of Building Officials (ICBO), 1997, Uniform Building Code, Volume II - Structural Engineering Design Provisions.

Petersen, M. D., Bryant, W. A., Cramer, C. H., Cao, T., Reichle, M. S., Frankel, A. D., Lienkaemper, J. J., McCrory, P. A., and Schwartz, D. P., 1996, Probabilistic Seismic Hazard Assessment for the State of California: California Division of Mines and Geology Open-File Report 96-08; U.S. Geological Survey Open File-Report 96-706.

Petersen, M. D. and Wesnousky, S. G., 1994, Fault Slip Rates and Earthquake Histories for Active Faults in Southern California: Seismological Society of America Bulletin, Volume 84, No. 5, pp. 1608-1649.

Public Works Standard, Inc., 2002, Greenbook, Standard Specifications for Public Works Construction: BNI Building News, Anaheim, California, 471 p.

Sadigh, K., Chang, C. Y., Egan, J. A., Makdisi, F., and Young R. R., 1997, "Attenuation Relations for Shallow Crustal Earthquakes Based on California Strong Motion Data" *Seismological Research Letters*, Vol 68, No. 1, January/February, pp. 180-189.

San Bernardino County Planning Department, 1994, San Bernardino County Official Land Use Plan, General Plan, Geologic Hazard Overlay,

Tokimatsu, K., Seed, H. B., 1987, "Evaluation of Settlements in Sands Due to Earthquake Shaking," *Journal of the Geotechnical Engineering*, American Society of Civil Engineers, Vol. 113, No. 8, pp. 861-878.

Western Municipal Water District / San Bernardino Valley Municipal Water District, 2003, Cooperative Well Measuring Program, Fall 2003.

Aerial Photographs Reviewed

Date	Flight	Frame	Agency
10/16/1959	R 10165 9	33 and 34	RCFCD
5/24/1974	RCFC 74	234	RCFCD
2/7/1984	RCFC 83	1341	RCFCD

Leighton

GEOTECHNICAL BORING LOG B-1

Date 3-31-04

Sheet 1 of 2

Project Young Homes Moreno Valley

Project No. 021164-001

Drilling Co. Redman Drilling

Type of Rig Hollow Stem Auger

Hole Diameter 8 inches

Drive Weight 140 pounds Automatic Hammer

Drop 30"

Elevation Top of Hole '

Location See Boring Location Map

Logged By RSB

Sampled By RSB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION
	0								**ALLUVIUM (Qal)**
				R-1	5	116.2	10.8	ML	2': TOP: Sandy SILT, yellow brown, slightly moist, soft, fine to medium sand, trace gravel up to 1/16" diameter BOTTOM: Sandy SILT, dark brown, very moist, soft, fine to coarse sand, trace gravel up to 1/16" diameter
	5			R-2	7			SM	5': Silty SAND, dark brown, very moist, loose, fine to coarse sand, trace gravel up to 1/8" diameter
	10			R-3	15	105.7	1.8	SW	10': Gravelly SAND, well graded, light yellow brown, moist to very moist, loose, fine to coarse sand, trace gravel up to 1/4" diameter
	15			R-4	22	124.2	11.2	ML	15': Sandy SILT/Clayey SILT, dark brown, very moist, stiff, fine to medium sand, trace gravel up to 1/8" diameter
	20			S-1	13			CL	20': Sandy CLAY/Silty CLAY, dark brown, very moist, medium stiff to stiff, fine to medium sand
	25			S-2	11			CL	25': Silty CLAY, dark brown, very moist, medium stiff, trace fine sand
	30								

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

Attachment: Geotechnical Study (2444 : Legacy Park Project)

GEOTECHNICAL BORING LOG B-1

Date 3-31-04 **Sheet** 2 **of** 2

Project Young Homes Moreno Valley **Project No.** 021164-001

Drilling Co. Redman Drilling **Type of Rig** Hollow Stem Auger

Hole Diameter 8 inches **Drive Weight** 140 pounds Automatic Hammer **Drop** 30"

Elevation Top of Hole ' **Location** See Boring Location Map

Logged By RSB

Sampled By RSB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION
	30			S-3	13			SM ML	30': TOP: Silty SAND, yellow brown, very moist, loose, fine sand BOTTOM: Sandy SILT, yellow brown, very moist, medium stiff to stiff, fine to medium sand, trace gravel up to 1/8" diameter
	35			S-4	12			ML CL	35': TOP: Sandy SILT, yellow brown, very moist, medium stiff, fine to medium sand, trace gravel up to 1/16" diameter BOTTOM: Sandy CLAy/Silty CLAY, dark brown, very moist, medium stiff, fine to medium sand, trace gravel up to 1/16" diameter
	40			S-5	14			ML	40': Sandy SILT, yellow brown, very moist, stiff, fine to medium sand, trace gravel up to 1/16" diameter
	45			S-6	27			SM ML	45': TOP: Silty SAND, yellow brown, moist, medium dense, fine to coarse sand, some gravel up to 1/4" diameter BOTTOM: Sandy SILT, yellow brown, moist, very stiff, fine to medium sand, trace gravel up to 1/8" diameter
	50			S-2	19			ML	50': TOP: Sandy SILT, yellow brown, very moist, stiff, fine to medium sand, trace gravel up to 1/8" diameter BOTTOM: SILT, dark yellow brown, very moist, stiff, some fine
									Total Depth 50 feet No Groundwater encountered No Bedrock encountered Boring Backfilled with Native Soil
	55								
	60								

SAMPLE TYPES:

- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

Attachment: Geotechnical Study (2444 : Legacy Park Project)

GEOTECHNICAL BORING LOG B-2

Date 3-31-04 **Sheet** 1 **of** 1

Project Young Homes Moreno Valley **Project No.** 021164-001

Drilling Co. Redman Drilling **Type of Rig** Hollow Stem Auger

Hole Diameter 8 inches **Drive Weight** 140 pounds Automatic Hammer **Drop** 30"

Elevation Top of Hole ' **Location** See Boring Location Map

Logged By RSB

Sampled By RSB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION
	0								**ALLUVIUM (Qal)**
				R-1	8	117.6	5.4	SM ML	2': TOP: Silty SAND, light yellow brown, slightly moist, loose, fine to medium sand, trace gravel up to 1/4" diameter, rootlets BOTTOM: Sandy SILT, dark brown, very moist, medium stiff, fine to coarse sand, trace gravel up to 1/4" diameter
	5			R-2	11			ML SM	5': TOP: Sandy SILT, dark brown, very moist, medium stiff, fine to medium sand, trace gravel up to 1/4" diameter BOTTOM: Silty SAND, dark yellow brown, very moist, loose, fine to coarse sand, trace gravel up to 1/4" diameter
				R-3	14	105.3	1.4	SW	7': Gravelly SAND, well graded, light yellow brown, moist to very moist, loose, fine to coarse sand, gravel up to 1" diameter
	10			R-4	21	124.7	8.4	SW SM	10': TOP: Gravelly SAND, well graded, light yellow brown, moist to very moist, medium dense, fine to coarse sand, gravel up to 1/2" diameter BOTTOM: Silty SAND, dark brown, very moist, medium dense, fine to coarse sand, trace gravel up to 1/4" diameter
	15			R-5	35	127.5	10.3	ML CL	15': TOP: Sandy SILT, dark brown, very moist, very stiff, fine to medium sand, trace gravel up to 1/8" diameter BOTTOM: Silty CLAY/Sandy CLAY, dark brown, very moist, very stiff, some fine sand, trace gravel up to 1/8" diameter
	20			R-6	25			SM	20': Silty SAND, yellow brown, very moist, medium dense, fine to coarse sand, gravel up to 1/4" diameter
									Total Depth 20 feet No Groundwater encountered No Bedrock encountered Boring Backfilled with Native Soil
	25								
	30								

SAMPLE TYPES:
- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

Attachment: Geotechnical Study (2444 : Legacy Park Project)

GEOTECHNICAL BORING LOG B-3

Date	3-31-04	Sheet	1 of 1
Project	Young Homes Moreno Valley	Project No.	021164-001
Drilling Co.	Redman Drilling	Type of Rig	Hollow Stem Auger
Hole Diameter	8 inches	Drive Weight	140 pounds Automatic Hammer, Drop 30"
Elevation Top of Hole	'	Location	See Boring Location Map

Logged By: RSB
Sampled By: RSB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION
	0								**ALLUVIUM (Qal)**
				R-1	18	107.9	4.2	ML	2': Sandy SILT, dark yellow brown, slightly moist, stiff, fine to medium sand, trace gravel up to 1/8" diameter, porosity 3%, rootlets
	5			R-2	12			SM	5': Silty SAND, yellow brown, slightly moist to moist, loose, fine to medium sand, trace gravel up to 1/4" diameter
	10			R-3	17			CL	10': Sandy CLAY/Silty CLAY, dark brown, very moist, stiff, some fine sand, trace gravel up to 1/8" diameter
	15			S-1	17			ML	15': Sandy SILT, dark brown, moist to very moist, stiff, fine to medium sand
	20			S-2	8			SM	20': Silty SAND, yellow brown, very moist, loose, fine to coarse sand, some gravel up to 1/4" diameter
									Total Depth 20 feet No Groundwater encountered No Bedrock encountered Boring Backfilled with Native Soil
	25								
	30								

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

Attachment: Geotechnical Study (2444 : Legacy Park Project)

GEOTECHNICAL BORING LOG B-4

Date 3-31-04 | Sheet 1 of 1
Project Young Homes Moreno Valley | Project No. 021164-001
Drilling Co. Redman Drilling | Type of Rig Hollow Stem Auger
Hole Diameter 8 inches | Drive Weight 140 pounds Automatic Hammer | Drop 30"
Elevation Top of Hole ' | Location See Boring Location Map

Logged By RSB
Sampled By RSB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION
	0								**ALLUVIUM (Qal)**
				R-1	15	116.6	2.7	SW	2': Gravelly SAND, well graded, yellow brown, slightly moist to moist, loose, fine to coarse sand, gravel up to 1/4" diameter
	5			R-2	10	103.5	1.1	SW	5': Gravelly SAND, well graded, yellow brown, slightly moist to moist, loose, fine to coarse sand, gravel up to 1/2" diameter
				R-3	16	103.5	1.6	SW	7': Gravelly SAND, well graded, yellow brown, slightly moist, loose, fine to coarse sand, gravel up to 1/2" diameter
	10			R-4	15	102.0	1.9	SW	10': Gravelly SAND, well graded, yellow brown, slightly moist, loose, fine to coarse sand, gravel up to 1/2" diameter
	15			R-5	33			SM	15': Silty SAND, dark brown, very moist, medium dense, fine to coarse sand, trace gravel up to 1/4" diameter
	20			R-6	36			ML CL	20': TOP: Sandy SILT/Clayey SILT, dark brown, very moist to wet, very stiff, fine to medium sand, trace gravel up to 1/4" diameter BOTTOM: Sandy CLAY/Silty CLAY, dark red brown, very moist, very stiff, fine to medium sand, trace gravel up to 1/4" diameter
									Total Depth 20 feet No Groundwater encountered No Bedrock encountered Boring Backfilled with Native Soil
	25								
	30								

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

Attachment: Geotechnical Study (2444 : Legacy Park Project)

GEOTECHNICAL BORING LOG B-5

Date: 3-31-04 | Sheet 1 of 1

Project: Young Homes Moreno Valley | Project No.: 021164-001

Drilling Co.: Redman Drilling | Type of Rig: Hollow Stem Auger

Hole Diameter: 8 inches | Drive Weight: 140 pounds Automatic Hammer | Drop: 30"

Elevation Top of Hole: ' | Location: See Boring Location Map

Logged By: RSB

Sampled By: RSB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION
	0								**ALLUVIUM (Qal)**
				R-1	8	109.5	6.8	ML	2': Sandy SILT, dark brown, very moist, medium stiff, fine to coarse sand, trace gravel up to 1/8" diameter
	5			R-2	10			SM	5': Silty SAND, yellow brown, highly moist, loose, fine to medium sand, trace gravel up to 1/4" diameter
	10			R-3	22			SW	10': SAND, well graded, light brown, very moist, medium dense, fine to coarse sand, gravel up to 1/8" diameter, some fines
	15			S-1	13			SM	15': Silty SAND, dark brown, very moist to wet, loose, fine to medium sand, trace gravel up to 1/8" diameter
	20			S-2	50/3"			CL	20': Sandy CLAY/Silty CLAY, dark brown, very moist, hard, fine to medium sand, some black stain
									Total Depth 20 feet No Groundwater encountered No Bedrock encountered Boring Backfilled with Native Soil
	25								
	30								

SAMPLE TYPES:

- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG B-6

Date 3-31-04 **Sheet** 1 of 1
Project Young Homes Moreno Valley **Project No.** 021164-001
Drilling Co. Redman Drilling **Type of Rig** Hollow Stem Auger
Hole Diameter 8 inches **Drive Weight** 140 pounds Automatic Hammer **Drop** 30"
Elevation Top of Hole ' **Location** See Boring Location Map

Logged By RSB
Sampled By RSB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION
	0								**ALLUVIUM (Qal)**
				R-1	12	112.0	4.3	ML	2': Sandy SILT, yellow brown, slightly moist to moist, medium stiff, fine to medium sand, trace gravel up to 1/8" diameter
	5			R-2	22	114.7	1.7	SM	5': Silty SAND, yellow brown, slightly moist to dry, medium dense, fine to coarse sand, with gravel up to 1/4" diameter
				R-3	13			SW	7': Gravelly SAND, well graded, yellow brown, slightly moist to dry, loose, fine to coarse sand, gravel up to 1/4" diameter
	10			R-4	31	117.7	5.3	ML	10': Sandy SILT, dark brown, moist to very moist, very stiff, fine sand
	15			R-5	20			ML SM	15': TOP: Sandy SILT, dark brown, moist to very moist, stiff, fine to medium sand, trace gravel up to 1/8" diameter BOTTOM: Silty SAND, dark brown, very moist, medium dense, fine to medium sand, trace gravel up to 1/8" diameter
	20			R-6	23			SW CL	20': TOP: Gravelly SAND, well graded, dark yellow brown, very moist, medium dense, fine to coarse sand, gravel up to 1/2" diameter BOTTOM: Silty CLAY, olive brown, very moist, stiff, trace fine sand
	25								Total Depth 20 feet No Groundwater encountered No Bedrock encountered Boring Backfilled with Native Soil
	30								

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

Attachment: Geotechnical Study (2444 : Legacy Park Project)

GEOTECHNICAL BORING LOG B-7

Date: 3-31-04 | Sheet 1 of 1

Project: Young Homes Moreno Valley | Project No. 021164-001

Drilling Co.: Redman Drilling | Type of Rig: Hollow Stem Auger

Hole Diameter: 8 inches | Drive Weight: 140 pounds Automatic Hammer | Drop: 30"

Elevation Top of Hole: ' | Location: See Boring Location Map

Logged By: RSB

Sampled By: RSB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION
	0								**ALLUVIUM (Qal)**
				R-1	13	120.7	3.4	SM	2': Silty SAND, dark brown, moist, loose, fine to coarse sand, with gravel up to 1/8" diameter
	5			R-2	11	109.9	1.6	SW	5': Gravelly SAND, well graded, yellow brown, very moist, loose, fine to coarse sand, gravel up to 1/4" diameter, some fines
	10			R-3	19			SW	10': Gravelly SAND, well graded, light yellow brown, slightly moist to moist, medium dense, fine to coarse sand, gravel up to 1/2" diameter
	15			S-1	13			CL	15': CLAY, dark brown, very moist, medium stiff to stiff, some silt, trace fine sand
	20			S-2	17			CL	20': Silty CLAY, dark brown, very moist, stiff, some fine sand
									Total Depth 20 feet No Groundwater encountered No Bedrock encountered Boring Backfilled with Native Soil
	25								
	30								

SAMPLE TYPES:
- S SPLIT SPOON
- R RING SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE
- G GRAB SAMPLE
- SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

Attachment: Geotechnical Study (2444 : Legacy Park Project)

GEOTECHNICAL BORING LOG B-8

Date 3-31-04 | Sheet 1 of 1
Project Young Homes Moreno Valley | Project No. 021164-001
Drilling Co. Redman Drilling | Type of Rig Hollow Stem Auger
Hole Diameter 8 inches | Drive Weight 140 pounds Automatic Hammer | Drop 30"
Elevation Top of Hole ' | Location See Boring Location Map

Logged By RSB
Sampled By RSB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION
	0								**ALLUVIUM (Qal)**
				R-1	13	115.7	2.6	SM	2': Silty SAND, yellow brown, slightly moist, loose, fine sand, trace gravel up to 1/8" diameter
	5			R-2	13	114.4	1.6	SW	5': Gravelly SAND, well graded, yellow brown, slightly moist, loose, fine to coarse sand, gravel up to 1/4" diameter, trace fines
				R-3	11			SP	7': SAND, poorly graded, yellow brown, slightly moist to moist, loose, fine to medium sand, trace gravel up to 1/8" diameter, trace fines
	10			R-4	18			SM	10': Silty SAND, dark yellow brown, very moist, medium dense, fine sand, trace gravel up to 1/8" diameter
	15			R-5	20			SW CL	15': TOP: Gravelly SAND, yellow brown, very moist, medium dense, fine to coarse sand, gravel up to 1/8" diameter BOTTOM: Silty CLAY, dark brown, very moist to wet, stiff
	20			R-6	23			CL	20': CLAY, dark brown, very moist to wet, stiff, some fine sand, trace gravel up to 1/16" diameter
									Total Depth 20 feet No Groundwater encountered No Bedrock encountered Boring Backfilled with Native Soil
	25								
	30								

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

Attachment: Geotechnical Study (2444 : Legacy Park Project)

P:\Leighton Associates\021000-021499\021164-001 Young Homes M.V. Prelim\Test pit logs\testpit logs.xls

Geotechnical Test Pit Logs

Young Homes / Moreno Valley
Project No. 021164-001

Logged by: MM
Sampled by: MM

Test Pit TP-1

Date: April 2004 Location: See Geotechnical Map

Depth Top (ft)	Depth Bottom (ft)	Soil symbol (USCS)	Description	Geologic Unit	Test Results: Sample number	Depth ft	Density (dry)pfc	Moisture %
0	1.1	SM	Silty SAND, light gray brown, dry, dense, fine to medium grain sand, rootlets (tilled)	Afu				
1.1	2.6	SM	Silty SAND, dark brown, slightly moist, medium dense, fine to coarse grain sand, porous to 1% up to 1/8" in diameter, some rootlets	Qal	Bag-1	2.5'		10.1
2.6	5.1	SW	Sand with gravel, light brown, dry to slightly moist, loose, fine to coarse grain sand, gravel up to 1/4", no apparent porosity	Qal		5.1		2.2

Total Depth (ft): 5.1
No ground water encountered.
Test pit backfilled, wheel rolled at surface.

Test Pit TP-2

Date: April 2004 Location: See Geotechnical Map

Depth Top (ft)	Depth Bottom (ft)	Soil symbol (USCS)	Description	Geologic Unit	Test Results: Sample number	Depth ft	Density (dry)pfc	Moisture %
0	1.6	SM	Silty SAND, light gray, dry, dense, fine to medium sand, rootlets (tilled)	Afu				
1.6	3.3	SM	Silty SAND, dark olive brown, slightly moist, medium dense, fine to medium grain with some coarse grain sand, porous to < 1% up to 1/8" in diameter, some rootlets	Qal	Bag-1	2		4.5
3.3	4	SP	SAND, dark brown, slightly moist, very dense, medium to coarse grain sand	Qal				
4	5.1	SW	SAND with gravel and some silt, light brown, dry to slightly moist, loose, fine to coarse grain sand, gravel up to 1/4", porous to < 0.5% up to 1/16" in diameter	Qal		5.1		4.1

Total Depth (ft): 5.1
No ground water encountered.
Test pit backfilled, wheel rolled at surface.

Test Pit TP-3

Date: April 2004 Location: See Geotechnical Map

Depth Top (ft)	Depth Bottom (ft)	Soil symbol (USCS)	Description	Geologic Unit	Test Results: Sample number	Depth ft	Density (dry)pfc	Moisture %
0	1.3		Fill - weathered alluvium (tilled)	Afu				
1.3	3	SW	SAND with some gravel and thin layers of silt, light to dark brown, slightly moist, dense to medium dense, fine to coarse grain sand with fine gravel, porous to < 1% up to 1/8" in diameter	Qal	Bag-1	2.3		3.6
3	5	SP	SAND, light to dark brown, slightly moist, medium dense to loose, medium to coarse grain sand with some fine gravel, no apparent porosity	Qal		5		3.4

Total Depth (ft): 5.0
No ground water encountered.
Test pit backfilled, wheel rolled at surface.

Attachment: Geotechnical Study (2444 : Legacy Park Project)

P:\Leighton Associates\021000-021499\021164-001 Young Homes M.V. Prelim\Test pit logs\testpit logs.xls

Geotechnical Test Pit Logs

Young Homes / Moreno Valley
Project No. 021164-001

Logged by: MM
Sampled by: MM

Test Pit TP-4

Date: April 2004 Location: See Geotechnical Map

Depth		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top (ft)	Bottom (ft)				Sample number	Depth ft	Density (dry)pfc	Moisture %
0	1.6		Fill - weathered alluvium (tilled)	Afu				
1.6	6	SM	Silty SAND, light brown, slightly moist, medium dense, fine to coarse grain sand, porous to < 0.5% up to 1/16" in diameter	Qal	Bag-1	2.5		4.1
				Qal		6		5.8

Total Depth (ft): 6.0
No ground water encountered.
Test pit backfilled, wheel rolled at surface.

Test Pit TP-5

Date: April 2004 Location: See Geotechnical Map

Depth		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top (ft)	Bottom (ft)				Sample number	Depth ft	Density (dry)pfc	Moisture %
0	1.4		Fill - weathered alluvium (tilled)	Afu				
1.4	3.2	SM	Silty SAND, light brown, dry to slightly moist, dense to medium dense, fine to coarse grain sand, thin layers of dark silt, porous to < 0.5% up to 1/16" in diameter, rootlets	Qal	Bag-1	2.5		2.6
3.2	5.5	SW	SAND with gravel, light brown, slightly moist, medium dense to loose, fine to coarse grain sand, fine gravel, no apparent porosity	Qal		5.5		3.3

Total Depth (ft): 5.5
No ground water encountered.
Test pit backfilled, wheel rolled at surface.

Test Pit TP-6

Date: April 2004 Location: See Geotechnical Map

Depth		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top (ft)	Bottom (ft)				Sample number	Depth ft	Density (dry)pfc	Moisture %
0	1.8		Fill - weathered alluvium (tilled)	Afu				
1.8	4.1	SM	Silty SAND, dark brown, slightly moist, medium dense, fine to coarse grain sand, porous to < 1% up to 1/8" in diameter, some rootlets	Qal	Bag-1	2.5		6.1
4.1	5.2	SW	SAND with gravel, light brown, dry to slightly moist, loose, fine to coarse grain sand, no apparent porosity	Qal		5.2		3.6

Total Depth (ft): 5.2
No ground water encountered.
Test pit backfilled, wheel rolled at surface.

Attachment: Geotechnical Study (2444 : Legacy Park Project)

P:\Leighton Associates\021000-021499\021164-001 Young Homes M.V. Prelim\Test pit logs\testpit logs.xls

Geotechnical Test Pit Logs

Young Homes / Moreno Valley
Project No. 021164-001

Logged by: MM
Sampled by: MM

Test Pit TP-7

Date: April 2004 Location: See Geotechnical Map

Depth		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top (ft)	Bottom (ft)				Sample number	Depth ft	Density (dry)pfc	Moisture %
0	1.5		Fill - weathered alluvium (tilled)	Afu				
1.5	3.3	SM	Silty SAND, dark brown, dry to slightly moist, medium dense, fine to coarse grain sand, porous to <0.5% up to 1/16" in diameter	Qal	Bag-1	3		2.9
3.3	5	SW	Gravelly SAND, light brown, dry to slightly moist, loose, fine to coarse grain sand and fine gravel, no apparent porosity	Qal		5		3.3

Total Depth (ft): 5.0
No ground water encountered.
Test pit backfilled, wheel rolled at surface.

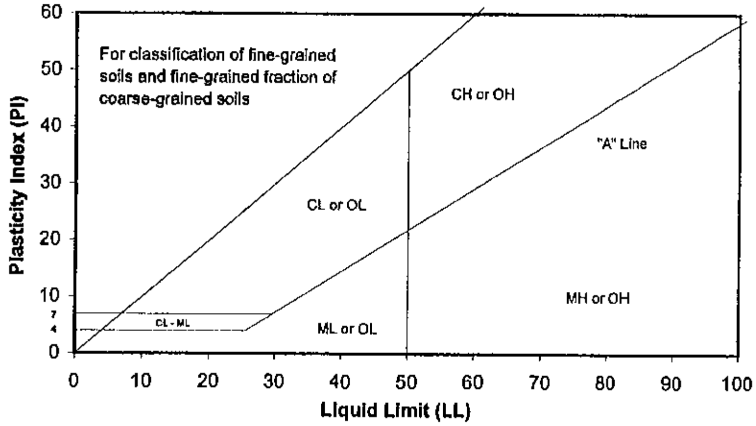
Test Pit TP-8

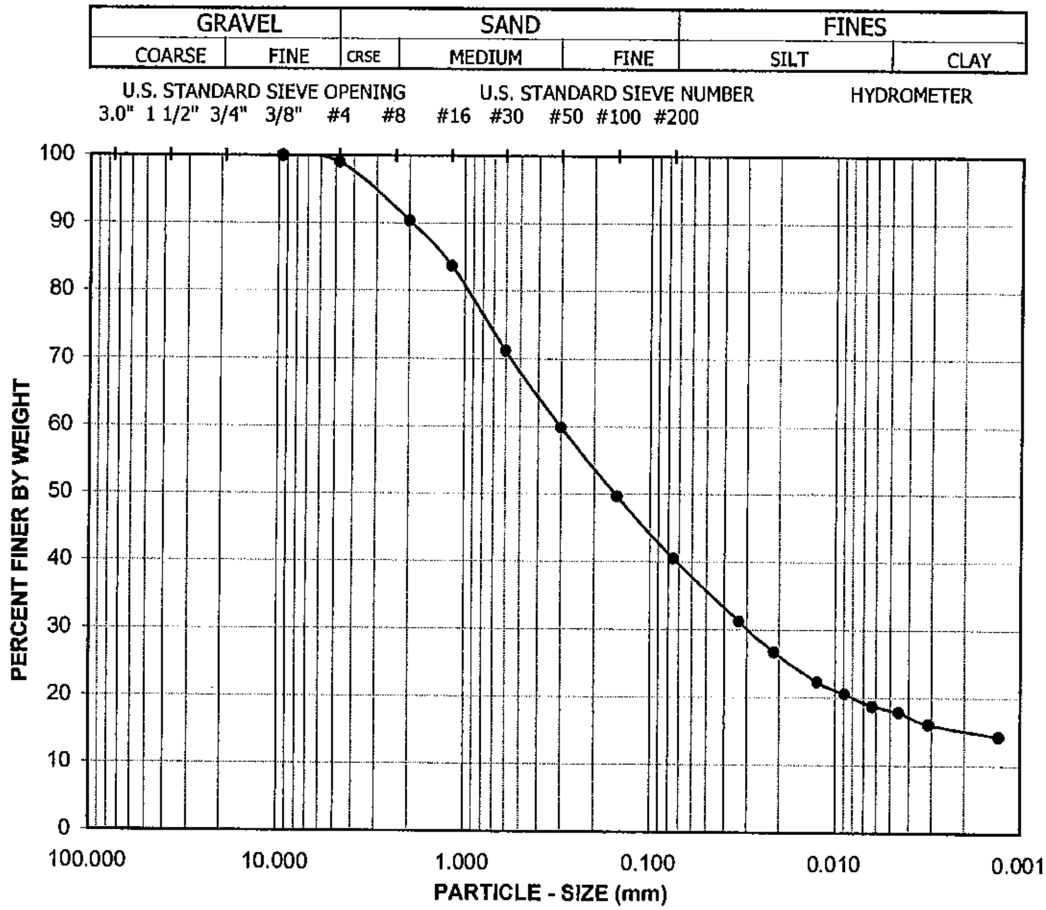
Date: April 2004 Location: See Geotechnical Map

Depth		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top (ft)	Bottom (ft)				Sample number	Depth ft	Density (dry)pfc	Moisture %
0	1.5		Fill - weathered alluvium (tilled)	Afu				
1.5	4.5	SM	Silty SAND with some gravel, light to dark brown, dry to slightly moist, medium dense, fine to coarse grain sand and fine gravel, porous to < 1% up to 1/16" in diameter, some rootlets	Qal	Bag-1	2.3		3.9
4.5	5.2	SW	SAND with some gravel, light brown, dry to slightly moist, medium dense to loose, fine to coarse grain sand and fine gravel, no apparent porosity	Qal		5.2		3.5

Total Depth (ft): 5.2
No ground water encountered.
Test pit backfilled, wheel rolled at surface.

Attachment: Geotechnical Study (2444 : Legacy Park Project)





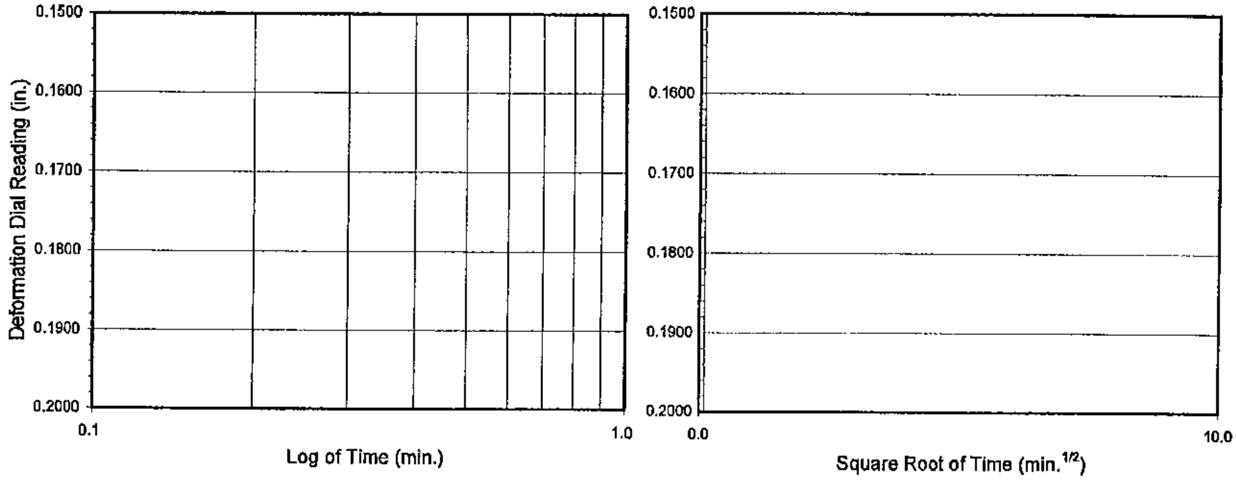
Boring No.:	Sample No.:	Depth (ft.) :	Soil Type	GR:SA:FI	LL,PL,PI
TP-1	Bag-1	2.5	SC-SM	1:58:41	NA,,

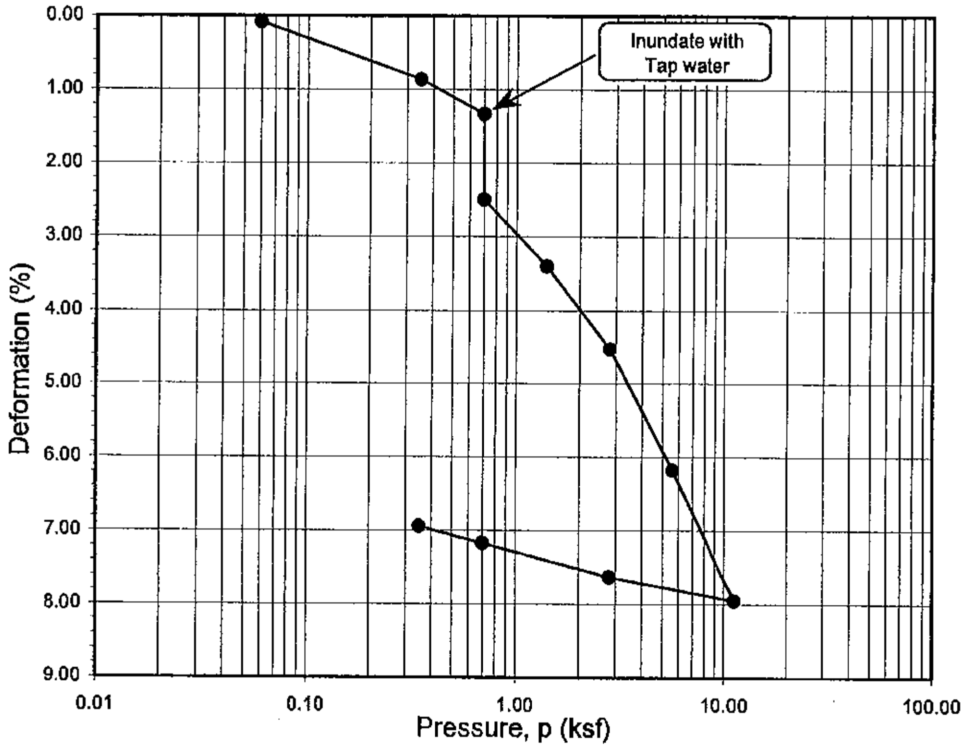
Soil Description: Brown silty, clayey sand (SC-SM)

Teratest Labs, Inc. A LEIGHTON GROUP COMPANY	**ATTERBERG LIMITS, PARTICLE - SIZE CURVE** ASTM D 4318, D 422	Project No.: 021164-001 Young Homes / MV 05-04

SA & Hyd TP-1 Bag-1 @ 2.5

No Time Readings



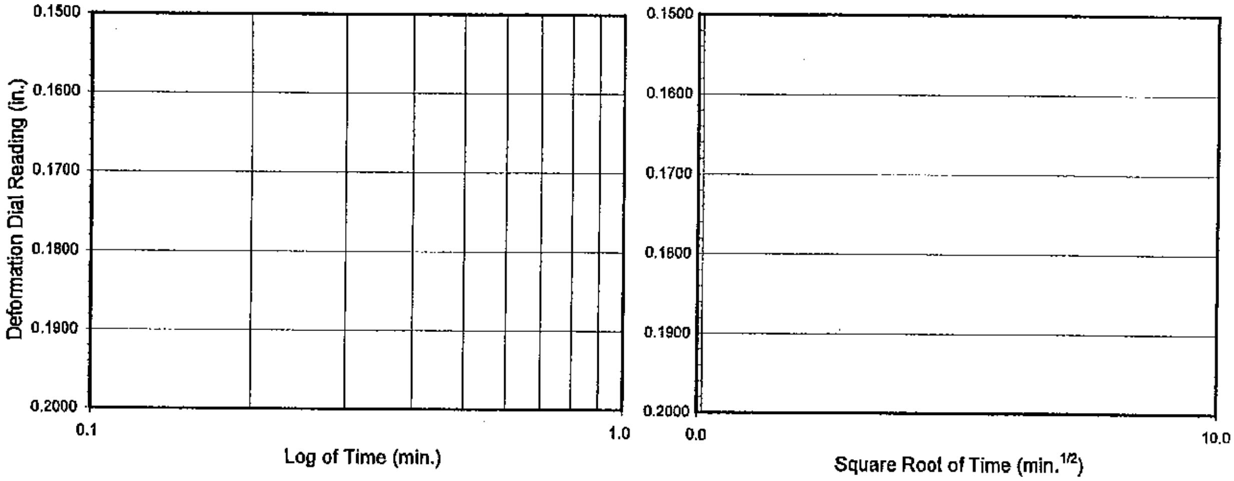


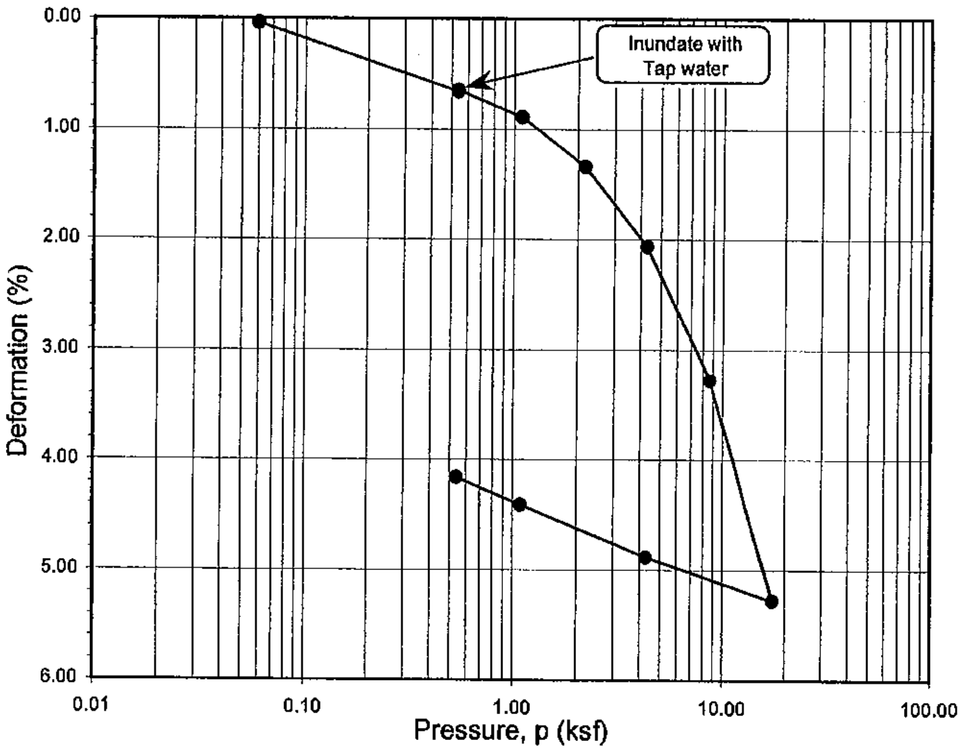
Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
B-3	**R-2**	**5**	**2.4**	**14.3**	**112.7**	**120.6**	**0.495**	**0.391**	**13**	**97**

Soil Identification: Brown silty sand (SM)

Teratest Labs, Inc. A LEIGHTON GROUP COMPANY	**ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS (ASTM D 2435)**	Project No.: 021164-001 Young Homes / MV

No Time Readings





Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
B-1	**R-2**	**5**	**8.9**	**12.6**	**118.2**	**122.5**	**0.426**	**0.366**	**57**	**90**

Soil Identification: Brown clayey sand (SC)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
(ASTM D 2435)

Project No.: 021164-001

Young Homes / MV

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name:	Young Homes / MV	Tested By:	FT
Project No.:	021164-001	Checked By:	LF
Boring No.:	B-8	Sample Type:	Drive
Sample No.:	R-4	Depth (ft.)	10.0
Sample Description:	Brown silty sand (SM)		

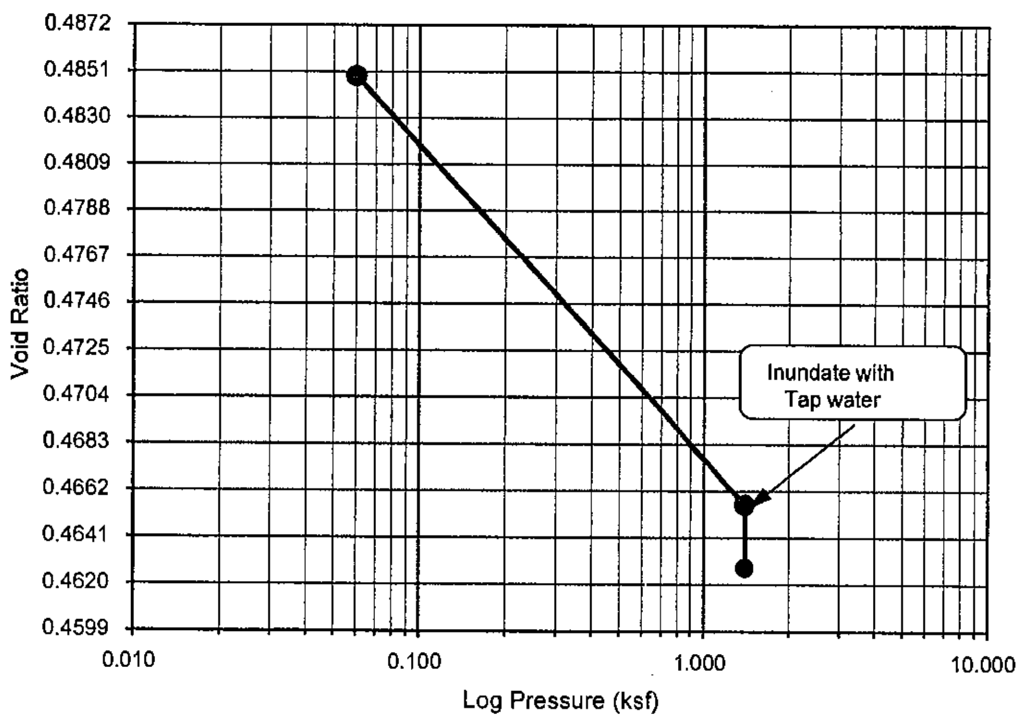
Initial Dry Density (pcf):	113.4
Initial Moisture (%):	5.80
Initial Length (in.):	1.0000
Initial Dial Reading:	0.2563
Diameter(in):	2.416

Final Dry Density (pcf):	113.7
Final Moisture (%) :	17.8
Initial Void ratio:	0.4859
Specific Gravity(assumed):	2.70
Initial Saturation (%)	32.2

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.2570	0.9993	0.00	-0.07	0.4849	-0.07
1.400	0.2700	0.9863	0.00	-1.37	0.4656	-1.37
H2O	0.2719	0.9844	0.00	-1.56	0.4628	-1.56

Percent Swell (+) / Settlement (-) After Inundation = -0.19

Void Ratio - Log Pressure Curve



Collapse B-8 R-4 @ 10

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name:	Young Homes / MV	Tested By:	FT
Project No.:	021164-001	Checked By:	LF
Boring No.:	B-6	Sample Type:	Drive
Sample No.:	R-5	Depth (ft.)	15.0
Sample Description:	Brown silty sand (SM)		

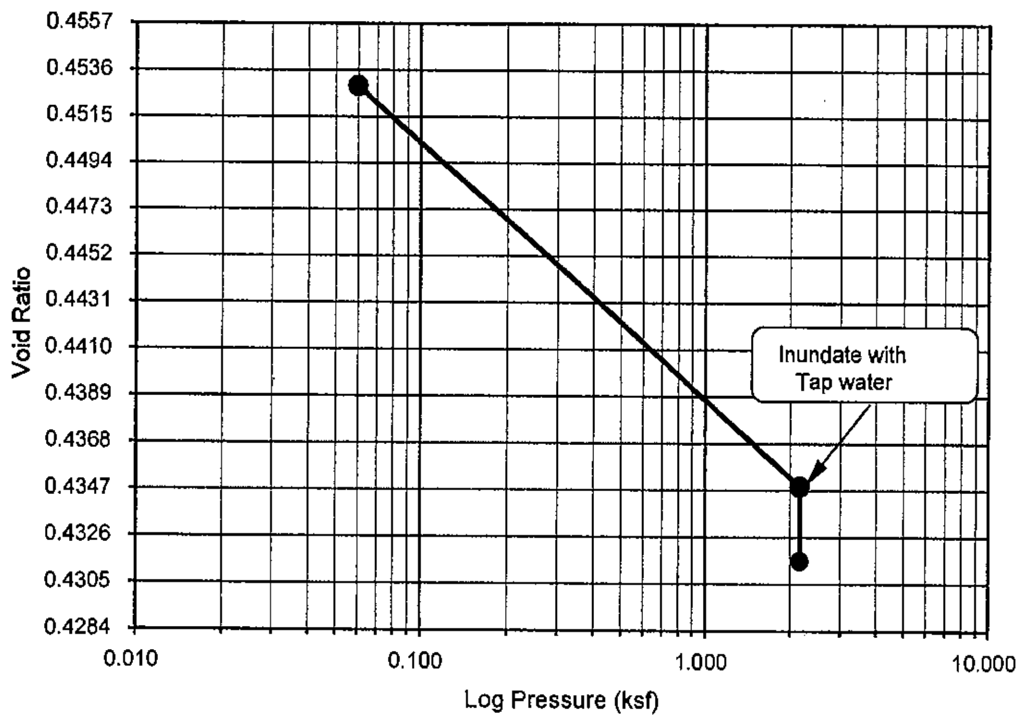
Initial Dry Density (pcf):	116.0
Initial Moisture (%):	6.69
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1000
Diameter(in):	2.416

Final Dry Density (pcf):	117.4
Final Moisture (%) :	16.3
Initial Void ratio:	0.4533
Specific Gravity(assumed):	2.70
Initial Saturation (%)	39.8

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.1003	0.9997	0.00	-0.03	0.4529	-0.03
2.170	0.1127	0.9873	0.00	-1.27	0.4349	-1.27
H2O	0.1150	0.9850	0.00	-1.50	0.4315	-1.50

Percent Swell (+) / Settlement (-) After Inundation = -0.23

Void Ratio - Log Pressure Curve



Collapse B-6 R-5 @ 15

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name:	Young Homes / MV	Tested By:	FT
Project No.:	021164-001	Checked By:	LF
Boring No.:	B-5	Sample Type:	Drive
Sample No.:	R-3	Depth (ft.)	10.0
Sample Description:	Brown silty sand (SM)		

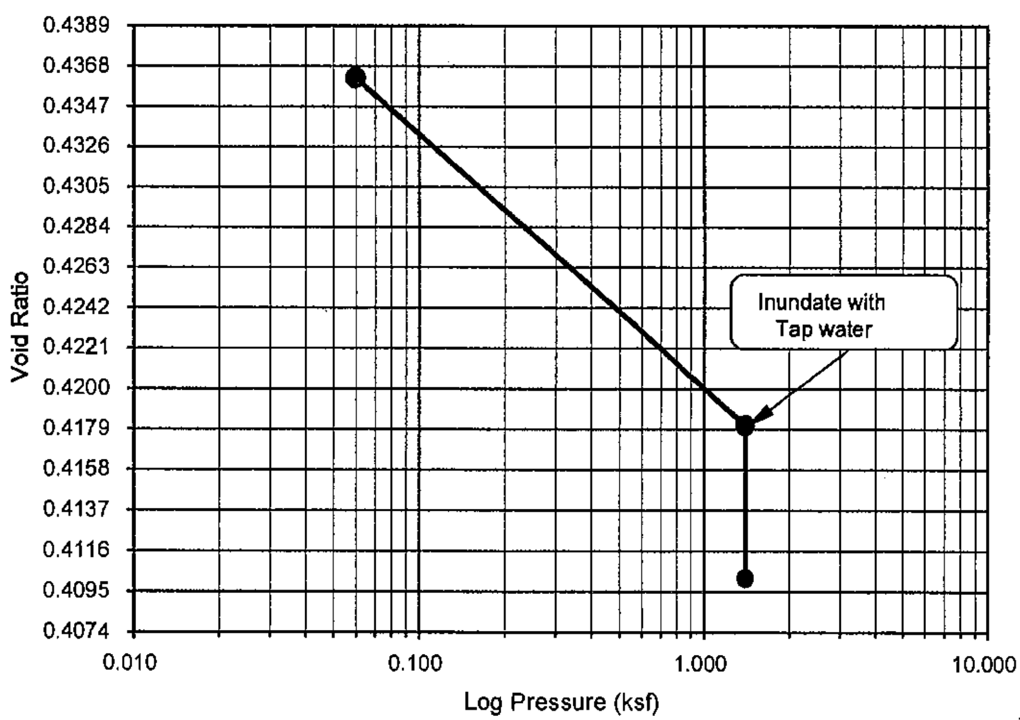
Initial Dry Density (pcf):	117.4
Initial Moisture (%):	1.92
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1000
Diameter(in):	2.416

Final Dry Density (pcf):	118.6
Final Moisture (%) :	14.6
Initial Void ratio:	0.4363
Specific Gravity(assumed):	2.70
Initial Saturation (%)	11.9

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.1001	0.9999	0.00	-0.01	0.4362	-0.01
1.400	0.1127	0.9873	0.00	-1.27	0.4181	-1.27
H2O	0.1182	0.9818	0.00	-1.82	0.4102	-1.82

Percent Swell (+) / Settlement (-) After Inundation = -0.56

Void Ratio - Log Pressure Curve



Collapse B-5 R-3 @ 10

Attachment: Geotechnical Study (2444 : Legacy Park Project)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name:	Young Homes / MV	Tested By:	FT
Project No.:	021164-001	Checked By:	LF
Boring No.:	B-5	Sample Type:	Drive
Sample No.:	R-2	Depth (ft.)	5.0
Sample Description:	Brown silty sand (SM)		

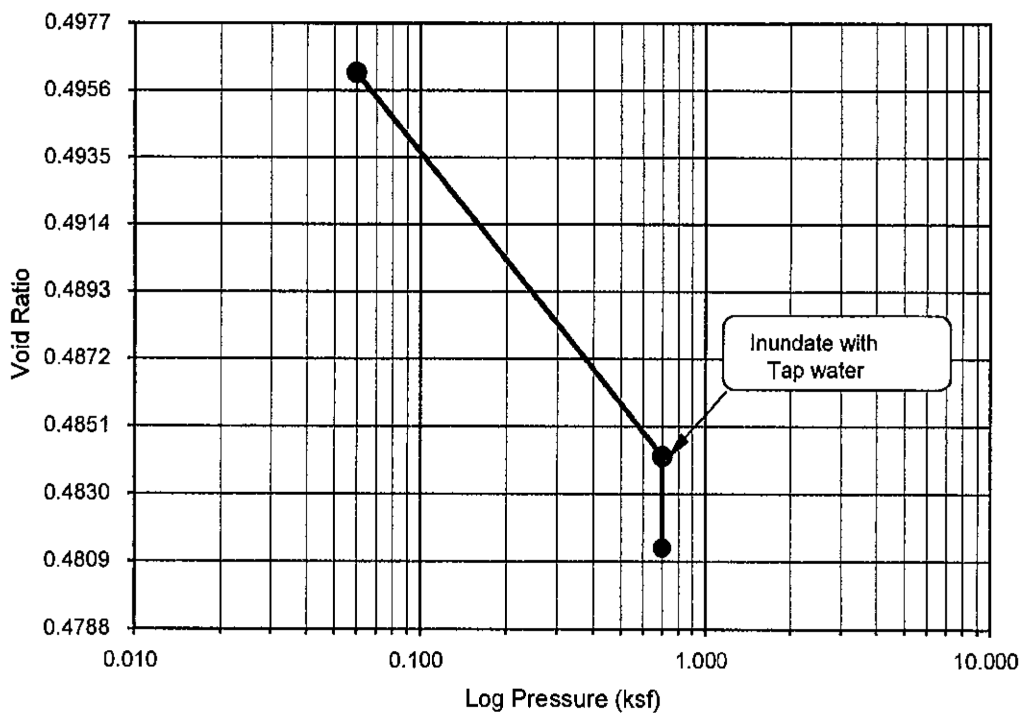
Initial Dry Density (pcf):	112.6
Initial Moisture (%):	4.73
Initial Length (in.):	1.0000
Initial Dial Reading:	0.2300
Diameter(in):	2.416

Final Dry Density (pcf):	112.5
Final Moisture (%) :	17.2
Initial Void ratio:	0.4967
Specific Gravity(assumed):	2.70
Initial Saturation (%)	25.7

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.2304	0.9996	0.00	-0.04	0.4961	-0.04
0.700	0.2384	0.9916	0.00	-0.84	0.4842	-0.84
H2O	0.2403	0.9897	0.00	-1.03	0.4813	-1.03

Percent Swell (+) / Settlement (-) After Inundation = -0.19

Void Ratio - Log Pressure Curve



Collapse B-5 R-2 @ 5

Attachment: Geotechnical Study (2444 : Legacy Park Project)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name:	Young Homes / MV	Tested By:	FT
Project No.:	021164-001	Checked By:	LF
Boring No.:	B-4	Sample Type:	Drive
Sample No.:	R-5	Depth (ft.)	15.0
Sample Description:	Brown clayey sand (SC)		

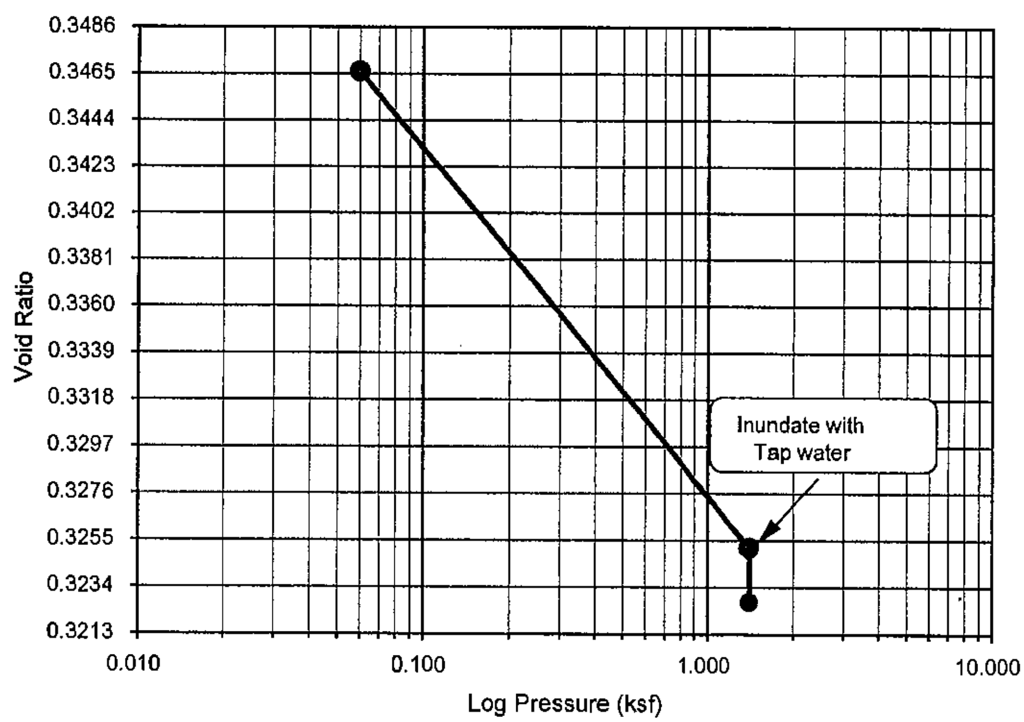
Initial Dry Density (pcf):	125.0
Initial Moisture (%):	7.31
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1590
Diameter(in):	2.416

Final Dry Density (pcf):	126.3
Final Moisture (%) :	10.8
Initial Void ratio:	0.3481
Specific Gravity(assumed):	2.70
Initial Saturation (%)	56.7

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.1601	0.9989	0.00	-0.11	0.3466	-0.11
1.400	0.1760	0.9830	0.00	-1.70	0.3252	-1.70
H2O	0.1778	0.9812	0.00	-1.88	0.3227	-1.88

Percent Swell (+) / Settlement (-) After Inundation = -0.18

Void Ratio - Log Pressure Curve



Collapse B-4 R-5 @ 15

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name: Young Homes / MV
Project No.: 021164-001
Boring No.: B-3
Sample No.: R-3
Sample Description: Brown sandy lean clay s(CL)

Tested By: FT, ESS
Checked By: LF
Sample Type: Drive
Depth (ft.) 10.0

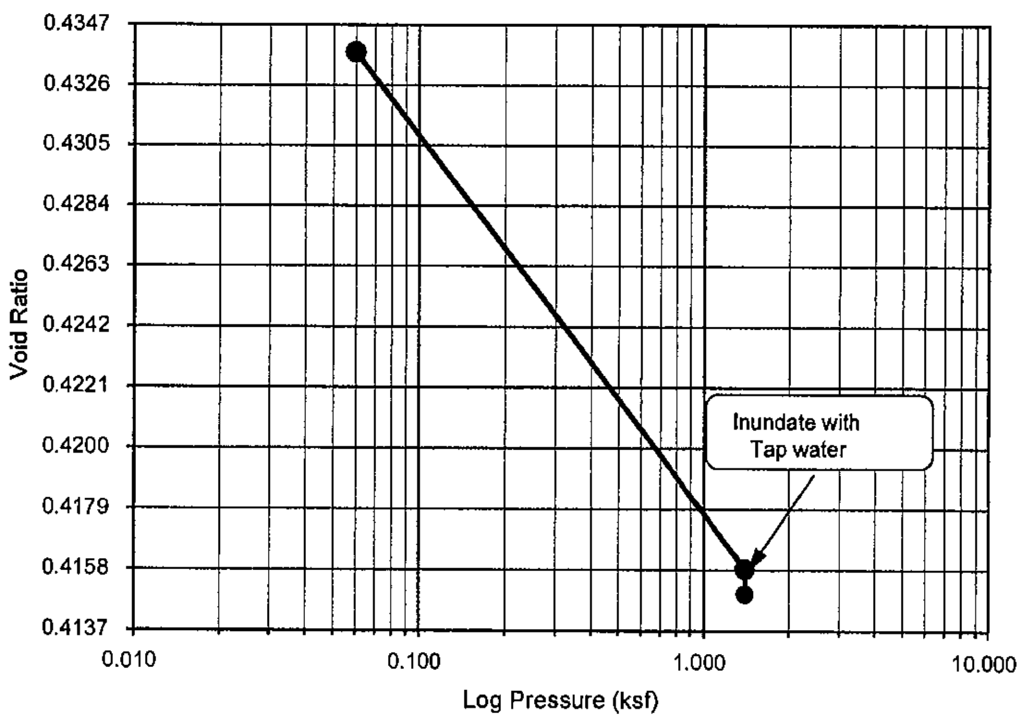
Initial Dry Density (pcf):	117.6
Initial Moisture (%):	11.23
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1441
Diameter(in):	2.416

Final Dry Density (pcf):	118.8
Final Moisture (%) :	15.7
Initial Void ratio:	0.4338
Specific Gravity(assumed):	2.70
Initial Saturation (%)	69.9

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.1441	1.0000	0.00	0.00	0.4338	0.00
1.400	0.1566	0.9875	0.00	-1.25	0.4158	-1.25
H2O	0.1572	0.9869	0.00	-1.31	0.4150	-1.31

Percent Swell (+) / Settlement (-) After Inundation = -0.06

Void Ratio - Log Pressure Curve



Collapse B-3 R-3 @ 10

Attachment: Geotechnical Study (2444 : Legacy Park Project)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name: Young Homes / MV
Project No.: 021164-001
Boring No.: B-2
Sample No.: R-6
Sample Description: Brown silty sand (SM)

Tested By: FT, ESS
Checked By: LF
Sample Type: Drive
Depth (ft.) 20.0

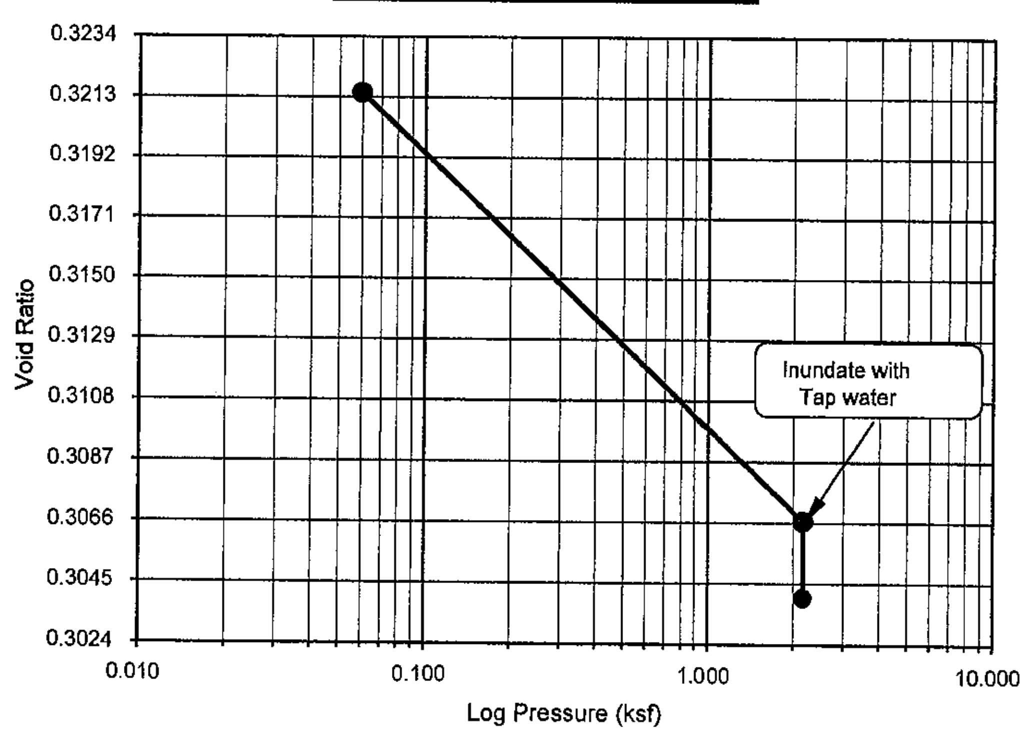
Initial Dry Density (pcf):	127.5
Initial Moisture (%):	5.38
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1000
Diameter(in):	2.416

Final Dry Density (pcf):	127.9
Final Moisture (%) :	11.3
Initial Void ratio:	0.3216
Specific Gravity(assumed):	2.70
Initial Saturation (%)	45.1

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.1001	0.9999	0.00	-0.01	0.3215	-0.01
2.170	0.1113	0.9887	0.00	-1.13	0.3067	-1.13
H2O	0.1133	0.9867	0.00	-1.33	0.3040	-1.33

Percent Swell (+) / Settlement (-) After Inundation = -0.20

Void Ratio - Log Pressure Curve



Collapse B-2 R-6 @ 20

Attachment: Geotechnical Study (2444 : Legacy Park Project)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name:	Young Homes / MV	Tested By:	FT, ESS
Project No.:	021164-001	Checked By:	LF
Boring No.:	B-2	Sample Type:	Drive
Sample No.:	R-2	Depth (ft.)	5.0
Sample Description:	Brown silty sand (SM)		

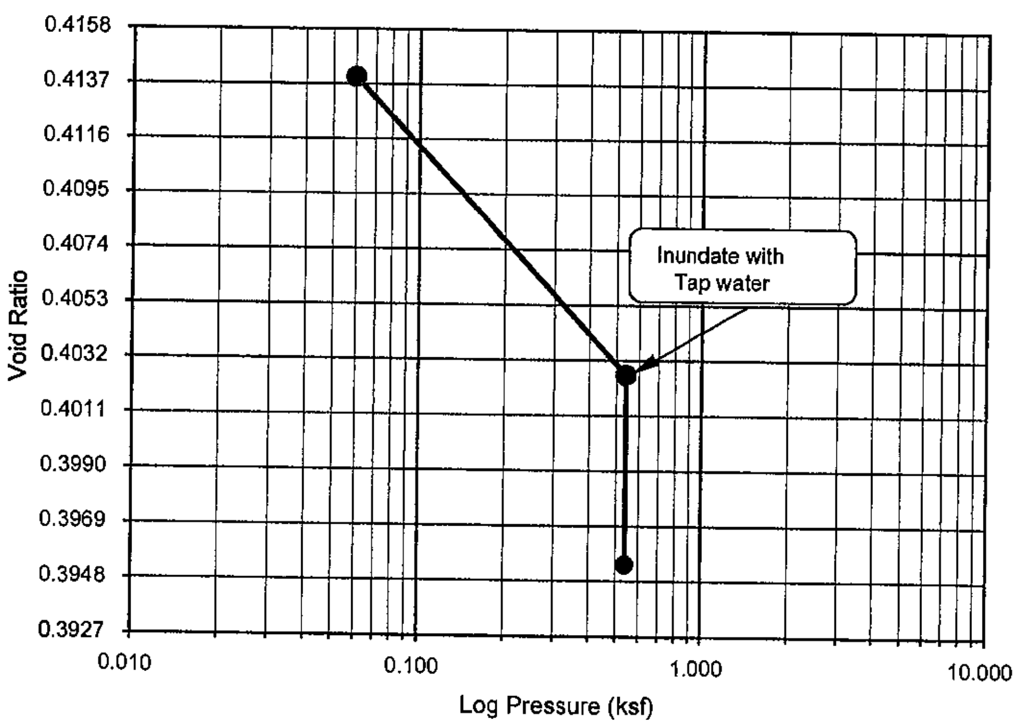
Initial Dry Density (pcf):	119.2
Initial Moisture (%):	3.19
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1093
Diameter(in):	2.416

Final Dry Density (pcf):	119.0
Final Moisture (%) :	13.5
Initial Void ratio:	0.4147
Specific Gravity(assumed):	2.70
Initial Saturation (%)	20.8

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.1098	0.9995	0.00	-0.05	0.4140	-0.05
0.540	0.1178	0.9915	0.00	-0.85	0.4027	-0.85
H2O	0.1229	0.9864	0.00	-1.36	0.3954	-1.36

Percent Swell (+) / Settlement (-) After Inundation = -0.51

Void Ratio - Log Pressure Curve



Collapse B-2 R-2 @ 5

Attachment: Geotechnical Study (2444 : Legacy Park Project)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	Young Homes / MV	Tested By :	GB
Project No.:	021164-001	Input By :	LF
Boring No.:	TP-3	Depth (ft.)	2-3
Sample No. :	Bag-1		
Soil Identification:	Olive brown poorly graded sand (SP)		

Preparation Method: ☐ Moist ☒ Dry — ☒ Mechanical Ram ☐ Manual Ram

Mold Volume (ft^3) 0.03323 — *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	3753.6	3855.7	3946.2	3901.9		
Weight of Mold (g)	1771.0	1771.0	1771.0	1771.0		
Net Weight of Soil (g)	1982.6	2084.7	2175.2	2130.9		
Wet Weight of Soil + Cont. (g)	411.70	355.40	374.30	399.80		
Dry Weight of Soil + Cont. (g)	404.20	341.80	353.40	369.80		
Weight of Container (g)	51.80	51.20	52.10	49.30		
Moisture Content (%)	2.13	4.68	6.94	9.36		
Wet Density (pcf)	131.5	138.3	144.3	141.4		
Dry Density (pcf)	128.8	132.1	134.9	129.3		

Maximum Dry Density (pcf) 135.0 **Optimum Moisture Content (%)** 7.0

PROCEDURE USED

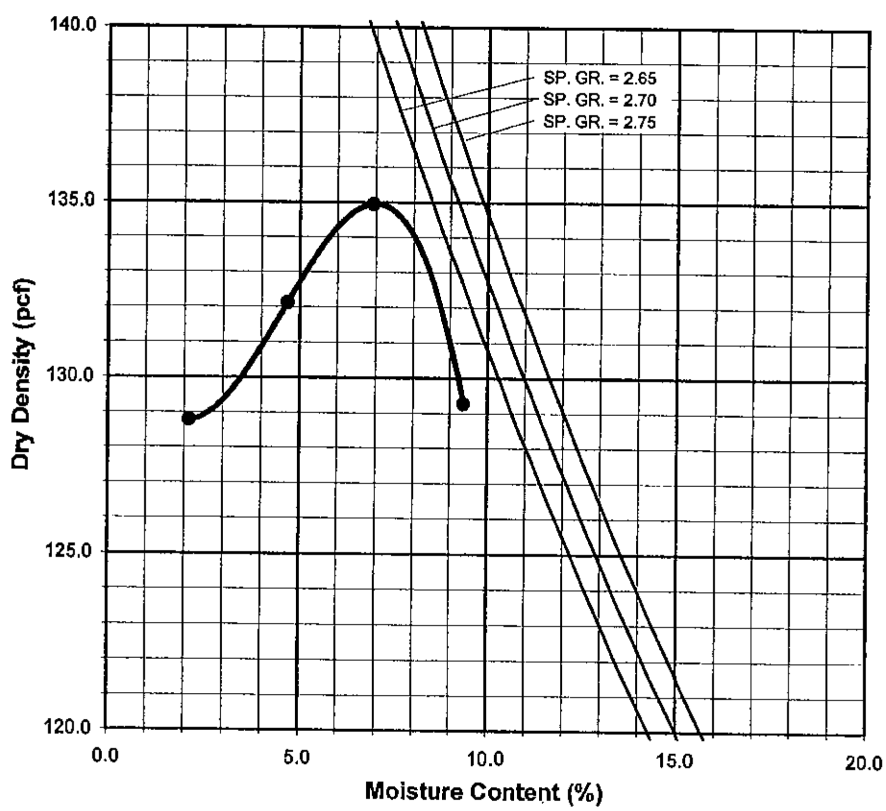
☒ **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

☐ **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

☐ **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:
GR:SA:FI

Atterberg Limits:
LL,PL,PI



MX TP-3 Bag-1

Attachment: Geotechnical Study (2444 : Legacy Park Project)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	Young Homes / MV	Tested By :	GB
Project No.:	021164-001	Input By :	LF
Boring No.:	TP-6	Depth (ft.)	2-5
Sample No. :	Bag-1		
Soil Identification:	Dark reddish brown silty clay (CL-ML)		

Preparation Method:

- [ ] Moist
- [X] Dry

- [X] Mechanical Ram
- [ ] Manual Ram

Mold Volume (ft^3) 0.03323

Ram Weight = 10 lb.; Drop = 18 in.

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	3683.6	3842.9	3913.2	3810.1		
Weight of Mold (g)	1771.0	1771.0	1771.0	1771.0		
Net Weight of Soil (g)	1912.6	2071.9	2142.2	2039.1		
Wet Weight of Soil + Cont. (g)	369.90	347.80	312.20	329.70		
Dry Weight of Soil + Cont. (g)	354.20	326.10	287.80	298.20		
Weight of Container (g)	52.00	51.00	52.50	54.00		
Moisture Content (%)	5.20	7.89	10.37	12.90		
Wet Density (pcf)	126.9	137.5	142.1	135.3		
Dry Density (pcf)	120.6	127.4	128.8	119.8		

Maximum Dry Density (pcf) 129.0 **Optimum Moisture Content (%)** 9.5

PROCEDURE USED

[X] Procedure A
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] Procedure B
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

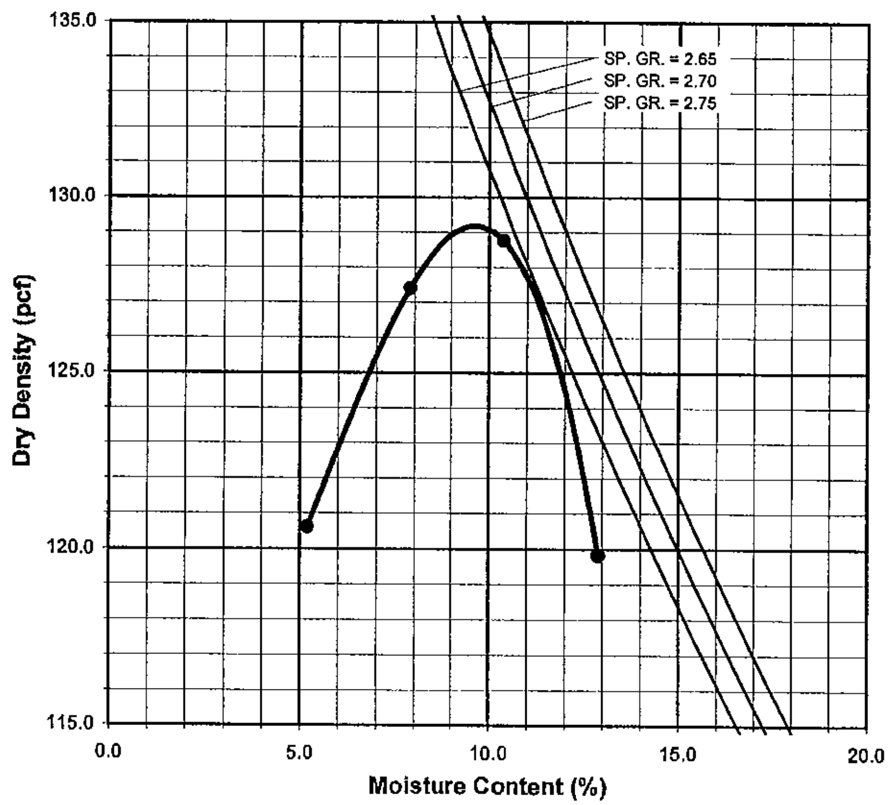
[ ] Procedure C
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI



MX TP-6 Bag-1

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

EXPANSION INDEX of SOILS
ASTM D 4829

Project Name:	Young Homes / MV	Tested By:	GB
Project No. :	021164-001	Checked By:	LF
Boring No.:	TP-1	Depth (ft.)	2-5
Sample No. :	Bag-1		
Soil Identification:	Dark yellowish brown clayey sand (SC)		

Dry Wt. of Soil + Cont.	(g)	1000.00
Wt. of Container No.	(g)	0.00
Dry Wt. of Soil	(g)	1000.00
Weight Soil Retained on #4 Sieve		0.00
Percent Passing # 4		100.00

MOLDED SPECIMEN		Before Test	After Test
Specimen Diameter	(in.)	4.01	4.01
Specimen Height	(in.)	1.0000	1.0043
Wt. Comp. Soil + Mold	(g)	636.10	443.00
Wt. of Mold	(g)	210.80	0.00
Specific Gravity (Assumed)		2.70	2.70
Container No.		O	O
Wet Wt. of Soil + Cont.	(g)	848.50	653.80
Dry Wt. of Soil + Cont.	(g)	787.90	605.70
Wt. of Container	(g)	0.00	210.80
Moisture Content	(%)	7.69	12.18
Wet Density	(pcf)	128.3	133.1
Dry Density	(pcf)	119.1	118.6
Void Ratio		0.415	0.421
Total Porosity		0.293	0.296
Pore Volume	(cc)	60.7	61.6
Degree of Saturation (%) [S meas]		**50.0**	78.1

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
04/21/04	16:02	1.0	0	0.0710
04/21/04	16:12	1.0	10	0.0703
Add Distilled Water to the Specimen				
04/21/04	17:07	1.0	55	0.0742
04/22/04	6:45	1.0	873	0.0753
04/22/04	10:10	1.0	1078	0.0753

Expansion Index (EI_{meas})	= ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	5.0
Expansion Index (EI)$_{50}$	= EI_{meas} - (50 -S_{meas})x((65+EI_{meas}) / (220-S_{meas}))	**5**

Attachment: Geotechnical Study (2444 : Legacy Park Project)

EXPANSION INDEX of SOILS

ASTM D 4829

Terratest Labs, Inc.
A LEIGHTON GROUP COMPANY

Project Name:	Young Homes / MV	Tested By:	GB
Project No. :	021164-001	Checked By:	LF
Boring No.:	TP-5	Depth (ft.)	2-5
Sample No. :	Bag-1		
Soil Identification:	Dark yellowish brown poorly graded sand (SP)		

Dry Wt. of Soil + Cont.	(g)	1000.00
Wt. of Container No.	(g)	0.00
Dry Wt. of Soil	(g)	1000.00
Weight Soil Retained on #4 Sieve		0.00
Percent Passing # 4		100.00

MOLDED SPECIMEN		Before Test	After Test
Specimen Diameter	(in.)	4.01	4.01
Specimen Height	(in.)	1.0000	1.0004
Wt. Comp. Soil + Mold	(g)	629.40	449.10
Wt. of Mold	(g)	190.80	0.00
Specific Gravity (Assumed)		2.70	2.70
Container No.		O	O
Wet Wt. of Soil + Cont.	(g)	854.10	639.90
Dry Wt. of Soil + Cont.	(g)	794.50	598.80
Wt. of Container	(g)	0.00	190.80
Moisture Content	(%)	7.50	10.07
Wet Density	(pcf)	132.3	135.4
Dry Density	(pcf)	123.1	123.0
Void Ratio		0.370	0.370
Total Porosity		0.270	0.270
Pore Volume	(cc)	55.9	56.0
Degree of Saturation (%) [S_{meas}]		**54.8**	73.4

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
04/21/04	16:29	1.0	0	0.0508
04/21/04	16:39	1.0	10	0.0507
Add Distilled Water to the Specimen				
04/21/04	17:06	1.0	27	0.0509
04/22/04	6:47	1.0	848	0.0512
04/22/04	10:02	1.0	1043	0.0512

Expansion Index (EI_{meas})	=	((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	0.5
Expansion Index (EI)$_{50}$	=	EI_{meas} - (50 -S_{meas})x((65+EI_{meas}) / (220-S_{meas}))	**2**

Attachment: Geotechnical Study (2444 : Legacy Park Project)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

EXPANSION INDEX of SOILS
ASTM D 4829

Project Name:	Young Homes / MV	Tested By:	GB
Project No. :	021164-001	Checked By:	LF
Boring No.:	TP-8	Depth (ft.)	2-3
Sample No. :	Bag-1		
Soil Identification:	Dark yellowish brown silty sand (SM)		

Dry Wt. of Soil + Cont.	(g)	1000.00
Wt. of Container No.	(g)	0.00
Dry Wt. of Soil	(g)	1000.00
Weight Soil Retained on #4 Sieve		0.00
Percent Passing # 4		100.00

MOLDED SPECIMEN		Before Test	After Test
Specimen Diameter	(in.)	4.01	4.01
Specimen Height	(in.)	1.0000	1.0000
Wt. Comp. Soil + Mold	(g)	620.80	440.00
Wt. of Mold	(g)	201.80	0.00
Specific Gravity (Assumed)		2.70	2.70
Container No.		O	O
Wet Wt. of Soil + Cont.	(g)	862.40	641.80
Dry Wt. of Soil + Cont.	(g)	804.50	592.70
Wt. of Container	(g)	0.00	201.80
Moisture Content	(%)	7.20	12.56
Wet Density	(pcf)	126.4	132.7
Dry Density	(pcf)	117.9	117.9
Void Ratio		0.430	0.430
Total Porosity		0.301	0.301
Pore Volume	(cc)	62.2	62.2
Degree of Saturation (%) [S meas]		**45.2**	78.9

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
04/21/04	16:55	1.0	0	0.1090
04/21/04	17:05	1.0	10	0.1087
Add Distilled Water to the Specimen				
04/21/04	17:10	1.0	5	0.1087
04/22/04	6:44	1.0	819	0.1090
04/22/04	10:15	1.0	1030	0.1090

Expansion Index (EI_{meas})	=	((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	0.3
Expansion Index (EI)$_{50}$	=	EI_{meas} - (50 -S_{meas})x((65+EI_{meas}) / (220-S_{meas}))	**0**

Attachment: Geotechnical Study (2444 : Legacy Park Project)

Leighton Consulting, Inc.
A LEIGHTON GROUP COMPANY

R-VALUE TEST RESULTS

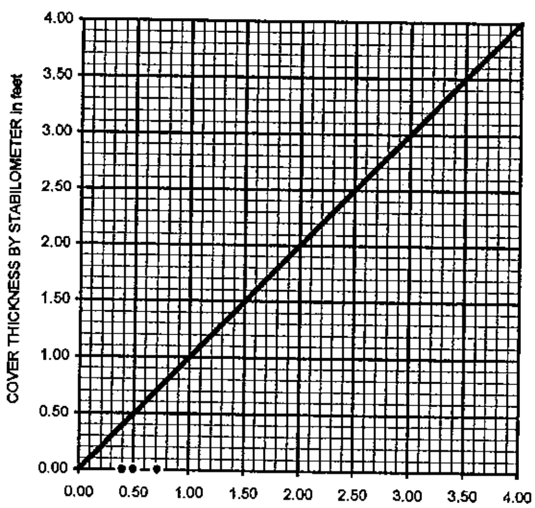
PROJECT NAME: Young Homes / MV
SAMPLE NUMBER: Bag 1
SAMPLE DESCRIPTION: Si. Sa.

PROJECT NUMBER: 021164-001
SAMPLE LOCATION: TP-8 2-3'
TECHNICIAN: SCF

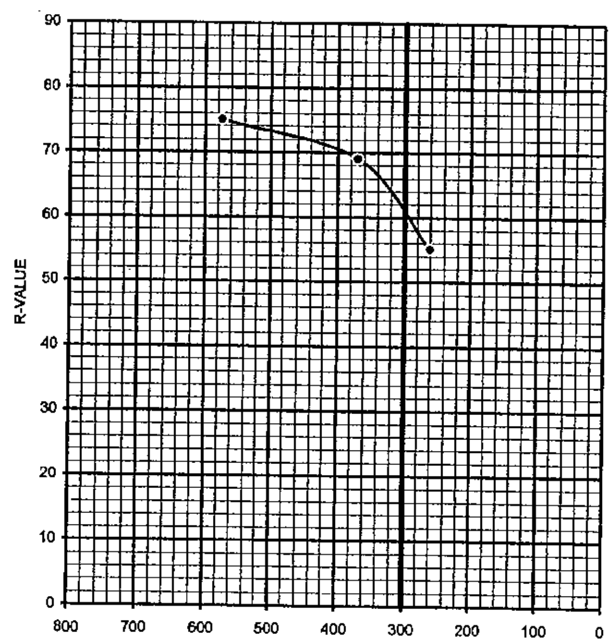
TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	9.5	9.9	10.3
HEIGHT OF SAMPLE, Inches	2.44	2.57	2.53
DRY DENSITY, pcf	126.6	125.6	127.4
COMPACTOR AIR PRESSURE, psf	200	150	100
EXUDATION PRESSURE, psf	574	369	261
EXPANSION, Inches x 10exp-4	0	0	0
STABILITY Ph 2,000 lbs (160 psi)	25	30	43
TURNS DISPLACEMENT	4.58	4.98	5.56
R-VALUE UNCORRECTED	75	69	55
R-VALUE CORRECTED	75	69	55

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	0.40	0.50	0.72
EXPANSION PRESSURE THICKNESS, ft.	0.00	0.00	0.00

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION: 100
R-VALUE BY EXUDATION: 61
EQUILIBRIUM R-VALUE: 61

Attachment: Geotechnical Study (2444 : Legacy Park Project)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

TESTS for SULFATE CONTENT CHLORIDE CONTENT and pH of SOILS

Project Name: Young Homes / MV
Project No. : 021164-001
Tested By : VJ
Data Input By: LF

Boring No.	TP-1	TP-8		
Sample No.	Bag-1	Bag-1		
Sample Depth (ft)	2-5	2-3		
Soil Identification:	SC	SM		
Wet Weight of Soil + Container (g)	222.36	193.02		
Dry Weight of Soil + Container (g)	215.40	187.60		
Weight of Container (g)	74.75	38.66		
Moisture Content (%)	4.95	3.64		
Weight of Soaked Soil (g)	100.24	100.39		

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	14	15		
Crucible No.	19	20		
Furnace Temperature (°C)	830	830		
Time In / Time Out	7:45 / 8:30	7:45 / 8:30		
Duration of Combustion (min)	45	45		
Wt. of Crucible + Residue (g)	20.9062	21.2107		
Wt. of Crucible (g)	20.9043	21.2096		
Wt. of Residue (g) (A)	0.0019	0.0011		
PPM of Sulfate (A) x 41150	78.18	45.27		
PPM of Sulfate, Dry Weight Basis	**82**	**47**		

CHLORIDE CONTENT, DOT California Test 422

ml of Chloride Soln. For Titration (B)	30	30		
ml of AgNO3 Soln. Used in Titration (C)	0.6	0.6		
PPM of Chloride (C -0.2) * 100 * 30 / B	40	40		
PPM of Chloride, Dry Wt. Basis	**42**	**42**		

pH TEST, DOT California Test 532/643

pH Value	**7.02**	**7.07**		
Temperature °C	20.7	20.6		

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

SOIL RESISTIVITY TEST

DOT CA TEST 532 / 643

Project Name: Young Homes / MV

Project No. : 021164-001

Boring No.: TP-1

Sample No. : Bag-1

Soil Identification: SC

Tested By : VJ

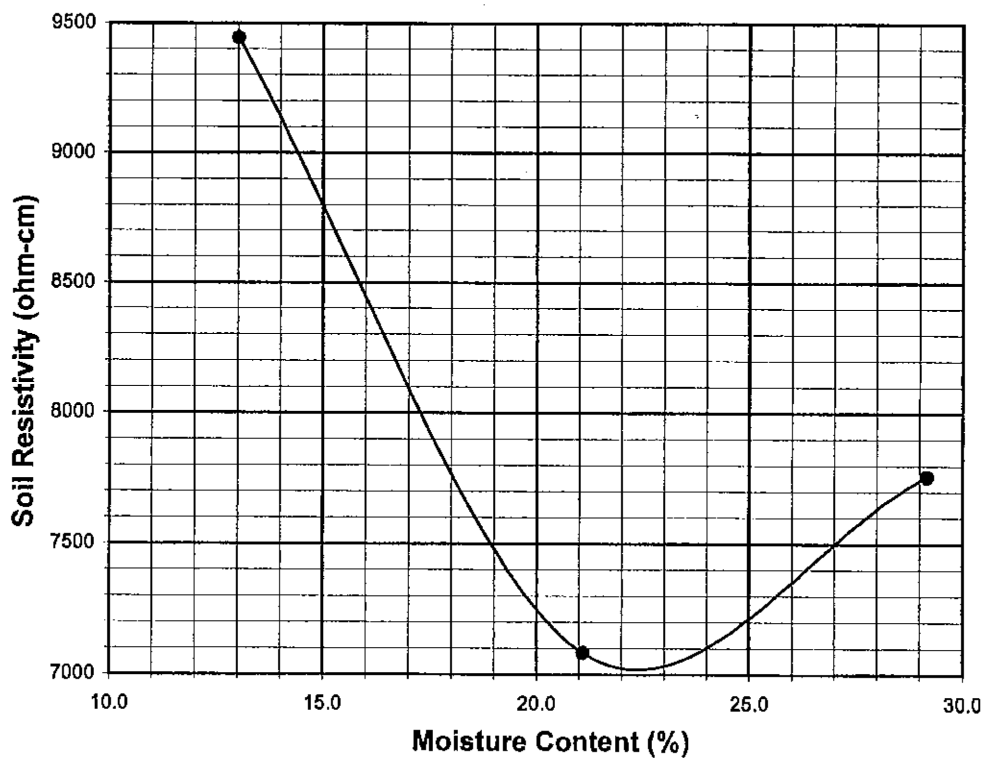
Data Input By: LF

Depth (ft.) : 2-5

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	100	13.02	1400	9444
2	200	21.09	1050	7083
3	300	29.17	1150	7758
4				
5				

Moisture Content (%) (MCi)	4.95
Wet Wt. of Soil + Cont. (g)	222.36
Dry Wt. of Soil + Cont. (g)	215.40
Wt. of Container (g)	74.75
Container No.	
Initial Soil Wt. (g) (Wt)	1300.00
Box Constant	6.746
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 532 / 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 532 / 643	
7020	**22.3**	**82**	**42**	**7.02**	**20.7**



Attachment: Geotechnical Study (2444 : Legacy Park Project)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

SOIL RESISTIVITY TEST

DOT CA TEST 532 / 643

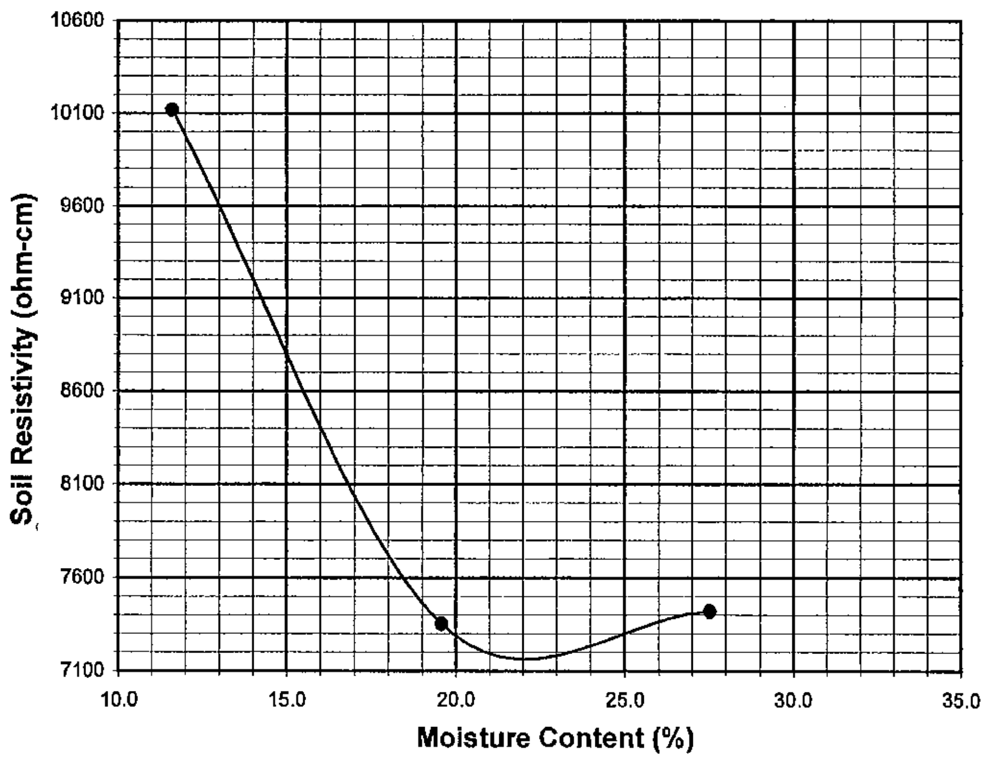
Project Name: Young Homes / MV
Project No. : 021164-001
Boring No.: TP-8
Sample No. : Bag-1
Soil Identification: SM

Tested By : VJ
Data Input By: LF
Depth (ft.) : 2-3

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	100	11.61	1500	10119
2	200	19.58	1090	7353
3	300	27.56	1100	7421
4				
5				

Moisture Content (%) (MCi)	3.64
Wet Wt. of Soil + Cont. (g)	193.02
Dry Wt. of Soil + Cont. (g)	187.60
Wt. of Container (g)	38.66
Container No.	
Initial Soil Wt. (g) (Wt)	1300.00
Box Constant	6.746
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 532 / 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 532 / 643	
7170	**22.0**	**47**	**42**	**7.07**	**20.6**



Attachment: Geotechnical Study (2444 : Legacy Park Project)

APPENDIX E

LEIGHTON AND ASSOCIATES, INC.

GENERAL EARTHWORK AND GRADING SPECIFICATIONS FOR ROUGH GRADING

Table of Contents

Attachment: Geotechnical Study (2444 : Legacy Park Project)

1.0 General

1.1 Intent: These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 The Geotechnical Consultant of Record: Prior to commencement of work, the owner shall employ the Geotechnical Consultant of Record (Geotechnical Consultant). The Geotechnical Consultants shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include natural ground after it has been cleared for receiving fill but before fill is placed, bottoms of all "remedial removal" areas, all key bottoms, and benches made on sloping ground to receive fill.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to determine the attained level of compaction. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

1.3 The Earthwork Contractor: The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The

Contractor shall be solely responsible for performing the grading in accordance with the plans and specifications.

The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "spreads" of work and the estimated quantities of daily earthwork contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified.

2.0 Preparation of Areas to be Filled

2.1 Clearing and Grubbing: Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 5 percent of organic matter. Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

2.2 Processing: Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

2.3 Overexcavation: In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be overexcavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.4 Benching: Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.

2.5 Evaluation/Acceptance of Fill Areas: All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

Attachment: Geotechnical Study (2444 : Legacy Park Project)

3.0 Fill Material

3.1 General: Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

3.2 Oversize: Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 8 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 Import: If importing of fill material is required for grading, proposed import material shall meet the requirements of Section 3.1. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

4.1 Fill Layers: Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 Fill Moisture Conditioning: Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557-91).

4.3 Compaction of Fill: After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557-91). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

4.4 Compaction of Fill Slopes: In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557-91.

4.5 Compaction Testing: Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 Frequency of Compaction Testing: Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than 5 feet apart from potential test locations shall be provided.

5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 Excavation

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 Trench Backfills

7.1 Safety: The Contractor shall follow all OHSA and Cal/OSHA requirements for safety of trench excavations.

7.2 Bedding and Backfill: All bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1 foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum of 90 percent of maximum from 1 foot above the top of the conduit to the surface.

The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

7.3 Lift Thickness: Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

7.4 Observation and Testing: The jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

Leighton and Associates, Inc.
A LEIGHTON GROUP COMPANY

August 29, 2016

Project No. 11427.001

Mission Pacific Land Company
4100 Newport Place, Suite 480
Newport Beach, California 92660

Attention: Mr. Jason Keller, P.E.

Subject: Geotechnical Update Report
Residential Development, Tentative Tract Map 36760
APNs: 485-220-023, 485-220-032, 485-220-040
Moreno Valley, California

In accordance with your request, Leighton & Associates Inc. (Leighton) is pleased to present herewith a geotechnical update for the subject project. We understand that you are requesting this update letter to confirm that the soils conditions and the recommendations included in our referenced reports still apply to the proposed development. Our previous investigation evaluated approximately 104 acres, of which the subject 53 acre property is a part. We include herein updated CBC seismic design coefficients for foundation design. Percolation testing for the proposed 1.2 Acre water quality bioretention basin in the southeast corner will be performed later and the results presented in a separate report.

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The subject site generally consists of approximately 53 acres located southeast of the intersection of Indian Street and Gentian Avenue (See Figure 1). The site is bounded on the west by Indian Street, on the north by the eastward extension of Gentian Avenue, on the east by the California Aqueduct easement, and on the south by the westward extension of Santiago Drive. The attached Geotechnical Map (Figure 2) depicts the planned development area. Based on our past history on this site and recent site observations this site was used for agricultural purposes within the period of at least 1953 to 1980, and was otherwise vacant. At the time of our observation on August 25, 2016, the site is vacant with some local debris and concrete rubble. The property has been disced and some weeds and grasses exist throughout the property.

41715 Enterprise Circle N., Suite 103 ▪ Temecula, CA 92590-5661
951.296.053

Based on the project Tentative Tract Map (Rick, 2016) we understand that the overall site will be developed to host 221 typical one- and two-story residential structures similar to those anticipated during our original site evaluation. Additionally, two bioretention basins are proposed in the southwest and southeast corners and approximately 2.8 acres in the center of the southern boundary are reserved for a park site. Grading will consist of cut and fill typically on the order of 2 to 3 feet. Remedial removal and recompaction will increase the fill thickness by approximately 3 feet. The maximum depth of excavation is approximately 9 feet for the southwest water quality Basin.

SUMMARY OF OBSERVATIONS AND UPDATED RECOMMENDATIONS

Based on the above, it is our opinion that the proposed development is feasible from a geotechnical/geologic standpoint and may be constructed as planned provided the recommendations included the referenced soils report (Leighton, 2004) and those provided below are incorporated into the design and construction phases of development.

In case of conflict the recommendations presented below should superseded those previously included in the referenced soils report. However, if new rough grading plans become available, additional reviews and/or geotechnical evaluations will be required to confirm that the as-graded site conditions remain suitable for the proposed improvements.

Seismic Design Parameters

For the purpose of structural design and based on current codes (2013 CBC) and utilizing a software program published by United States Geological Survey (USGS, 2016), the seismic design coefficients for this site are presented in table below:

CBC Categorization/Coefficient	Value
Site Latitude	**33.893976**
Site Longitude	**-117.232060**
Site Class Definition	**D**
Mapped Spectral Response Acceleration at 0.2s Period, S_s	**1.500 g**
Mapped Spectral Response Acceleration at 1s Period, S_1	**0.605 g**
Short Period Site Coefficient at 0.2s Period, F_a	***1.00***
Long Period Site Coefficient at 1s Period, F_v `	***1.50***
Adjusted Spectral Response Acceleration at 0.2s Period, S_{MS}	**1.500 g**
Adjusted Spectral Response Acceleration at 1s Period, S_{M1}	**0.907 g**
Design Spectral Response Acceleration at 0.2s Period, S_{DS}	**1.000 g**
Design Spectral Response Acceleration at 1s Period, S_{D1}	**0.605 g**

g=Gravity acceleration

PLANS AND SPECIFICATIONS

We recommend that the project rough grading plans and specifications be reviewed by the geotechnical consultant to determine whether the geotechnical recommendations in this and previous reports have been effectively implemented in the project design and remain applicable to the proposed development. Additional recommendations may be provided based on that review.

LIMITATIONS

This report was prepared solely for the use of our client and his design consulting team, for the design of the proposed improvements described in this report, in accordance with generally accepted geotechnical engineering practices at this time in California. No warranty is expressed or implied.

This report was necessarily based in part upon data obtained from a limited number of observations and existing reports. Such information is necessarily incomplete. It should be understood that additional subsurface verification is necessary for the completion of the geotechnical evaluation of this site during construction. The nature of many sites is such that differing characteristics can be experienced within small distances and under various climatic conditions. Changes in subsurface conditions can, and do, occur over time.

This report is not authorized for use by, and is not to be relied upon by any party except, our client and/or his design team, with whom Leighton & Associates, Inc. has contracted for the work. In addition, this report is subject to review and approval by the City of Moreno Valley. Use of or reliance on this report by any other party prior to approval is at that party's risk. Unauthorized use of or reliance on this report constitutes an agreement to defend and indemnify Leighton & Associates, Inc. from and against any liability which may arise as a result of such use or reliance, regardless of any fault, negligence, or strict liability of Leighton & Associates, Inc.

If you have any questions regarding this report, please do not hesitate to contact this office. We appreciate the opportunity to be of service.

Respectfully submitted,

LEIGHTON & ASSOCIATES, INC.

PROFESSIONAL ENGINEER KENNETH EDWIN COX 2793 GEOTECHNICAL STATE OF CALIFORNIA

REGISTERED GEOLOGIST ROBERT F. RIHA No. 1921 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

Kenneth E. Cox, GE 2793
Senior Project Engineer

Robert F. Riha, CEG 1921
Sr. Principal Geologist

Attachments: References
Site Location Map (Figure 1)
Geotechnical Map (Figure 2)

Distribution: (1) Addressee (pdf via email)

REFERENCES

ASCE, 2010, ASCE Standard 7-10, Minimum Design Loads for Buildings and Other Structures by Structural Engineering Institute, ISBN 0-7844-0809-2, Second Printing.

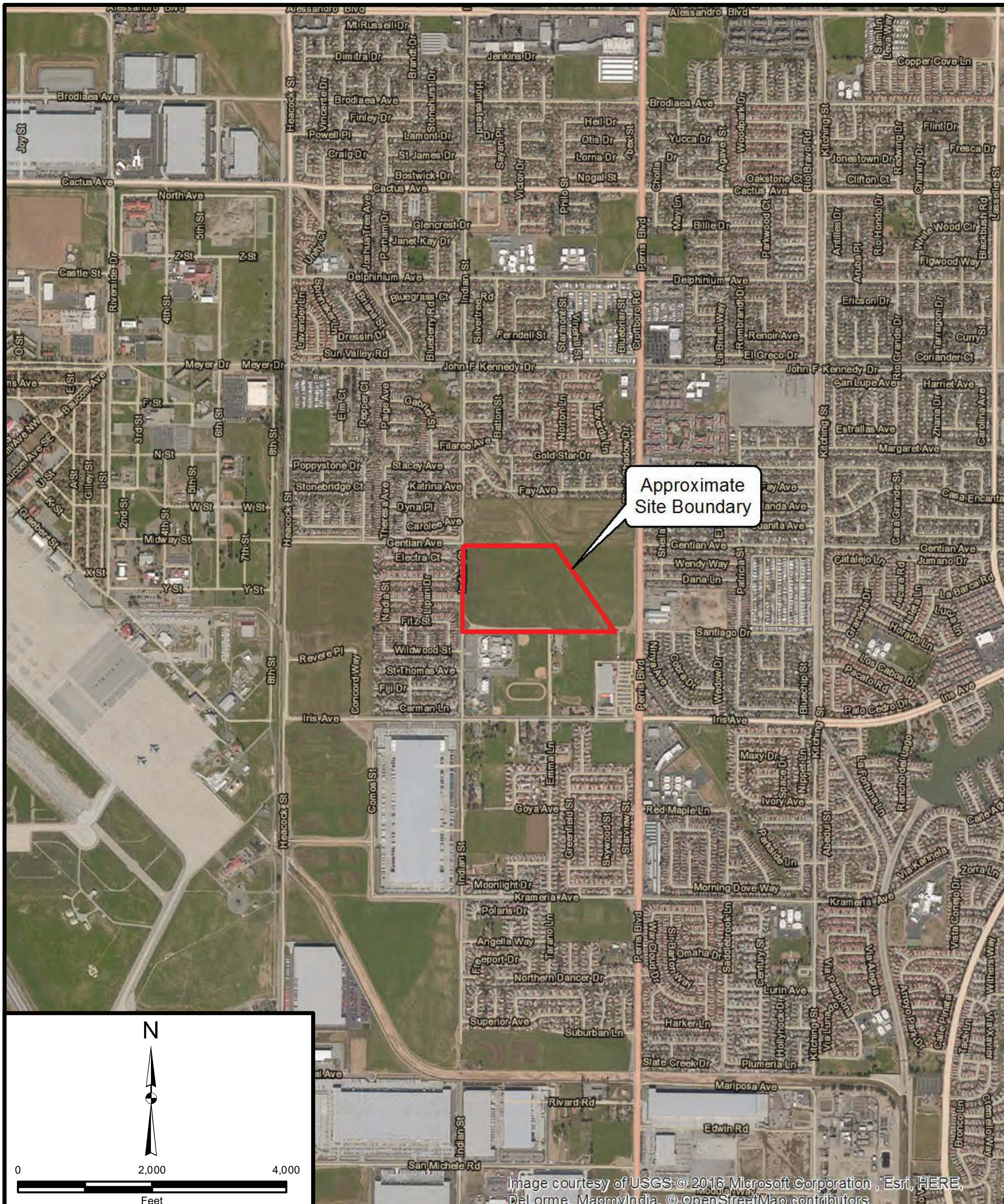
California Building Code, 2013, California Code of Regulations Title 24, Part 2, Volume 2 of 2.

Leighton & Associates, Inc., 2004, Preliminary Geotechnical Investigation, Proposed 104-Acre Residential Development, Northwest of Perris Boulevard and Iris Avenue, City of Moreno Valley, California

Public Works Standard, Inc., 2015, Greenbook, Standard Specifications for Public Works Construction: 2015 Edition, BNI Building News, Anaheim, California.

Rick Engineering Company, 2016, Tentative Tract 36760, Planned Unit Development, dated March 8, 2016, revised July 26, 2016, 60-scale, 1 sheet.

USGS, 2016, A Web Based Computer Program Published by USGS to calculate Seismic Hazard Curves and Response and Design Parameters based on ASCE 7-10 seismic procedures.



Project: 11427.001	Eng/Geol: KC/RFR
Scale: 1 " = 2,000 '	Date: August 2016

Base Map: ESRI ArcGIS Online 2016
Thematic Information: Leighton
Author: Leighton Geomatics (mmurphy)

SITE LOCATION MAP

Residential Development, Tentative Tract Map 36760
APNs: 485-220-023, 485-220-032, 485-220-040
Moreno Valley, California

Figure 1

Leighton

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Project: 11427.001	Eng/Geol: KC/RFR
Scale: 1 " = 200 '	Date: August 2016

Base Map:Tentative Tract 36760 Planned Unit Development by Rick Engineering Company, dated March 8, 2016.

Author: Leighton Geomatics (mmurphy)

GEOTECHNICAL MAP

Residential Development, Tentative Tract Map 36760
APNs: 485-220-023, 485-220-032, 485-220-040
Moreno Valley, California

Figure 2

Leighton

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Attachment: Updated Geotechnical Study (2444 : Legacy Park Project)

Legacy Park (Tentative Tract Map No. 36760)

Greenhouse Gas Analysis

City of Moreno Valley

PREPARED BY:

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NOVEMBER 3, 2016

09377-04 GHG Report

TABLE OF CONTENTS

Attachment: Greenhouse Gas Analysis (2444 : Legacy Park Project)

APPENDICES

LIST OF EXHIBITS

LIST OF TABLES

LIST OF ABBREVIATED TERMS

(1)	Reference
APS	Alternative Planning Organizations
ARB	California Air Resources Board
CAA	Federal Clean Air Act
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resource Board
CAT	Climate Action Team
CBSC	California Building Standards Commission
CEC	California Energy Commission
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFC	Chlorofluorocarbons
CFR	Code of Federal Regulations
CH4	Methane
CO	Carbon Monoxide
CO2	Carbon Dioxide
CO2e	Carbon Dioxide Equivalent
CPUC	California Public Utilities Commission
EPA	Environmental Protection Agency
EPS	Emission Performance Standard
GCC	Global Climate Change
GHGA	Greenhouse Gas Analysis
GWP	Global Warming Potential
HFC	Hydrofluorocarbons
LCA	Life-Cycle Analysis
MMs	Mitigation Measures
MMTCO2e	Million Metric Ton of Carbon Dioxide Equivalent
MPOs	Metropolitan Planning Organizations
MTCO2e	Metric Ton of Carbon Dioxide Equivalent
N20	Nitrogen Dioxide
NIOSH	National Institute for Occupational Safety and Health
NOx	Oxides of Nitrogen
PFC	Perfluorocarbons
PM10	Particulate Matter 10 microns in diameter or less

PM2.5	Particulate Matter 2.5 microns in diameter or less
PPM	Parts Per Million
Project	Legacy Park (Tentative Tract Map No. 36760)
RTP	Regional Transportation Plan
SB	Senate Bill
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Communities Strategies
UNFCCC	United Nations' Framework Convention on Climate Change
VOC	Volatile Organic Compounds

EXECUTIVE SUMMARY

SUMMARY OF FINDINGS

The City of Moreno Valley has not adopted its own numeric threshold of significance for determining impacts with respect to greenhouse gas (GHG) emissions. The SCAQMD has convened a GHG CEQA Significance Threshold Working Group (Working Group). Based on the last Working Group meeting (Meeting No. 15) held in September 2010, SCAQMD is proposing to adopt a tiered approach for evaluating GHG emissions for development projects where SCAQMD is not the lead agency. SCAQMD had proposed a Project level efficiency significance threshold, in which a 2020 statewide population and employment for land use sectors was divided by 2020 statewide service population (SP), amounting to a 4.8 MTCO2e per service population threshold (1). The City will utilize the Project level efficiency significance threshold approach recommended in the SCAQMD's Interim Thresholds document for commercial, residential, and mixed use projects.

Thus, and based on guidance from the SCAQMD, if a residential project would emit GHGs less than 4.8 MTCO2e per service population, the project is not considered a substantial GHG emitter and the GHG impact is less than significant. On the other hand, if a residential project would emit GHGs in excess of 4.8 MTCO2e per service population, then the project could be considered a substantial GHG emitter, requiring additional analysis and potential mitigation.

As shown in Table ES-1, the proposed project would result in approximately 4.62 MTCO2e per service population and would not exceed the threshold of 4.8 MTCO2e per service population. Therefore, project-related emissions would not have a significant direct or indirect impact on GHG and climate change.

TABLE ES-1: TOTAL PROJECT GREENHOUSE GAS EMISSIONS (ANNUAL)

Emission Source	Emissions (metric tons per year)			
	CO_2	CH_4	N_2O	Total CO_2E
Annual construction-related emissions amortized over 30 years	37.06	4.16E-03	0.00	37.16
Area	56.79	4.63E-03	9.70E-04	57.20
Energy	888.47	4.00E-02	1.00E-02	523.66
Mobile Source	3,157.07	1.60E-01	0	3,161.18
Waste	52.60	3.11	0.00	130.31
Water Usage	67.33	0.47	1.00E-02	82.69
Total CO_2E (All Sources)	**3,992.20**			
Total Service Population (Persons Per Household)	**864**			
Total CO2E (All Sources/ Service Population))	**4.62**			
Threshold (Persons Per Household	**4.8**			
Significant?	**NO**			

The Project would not conflict with the City of Moreno Valley Energy Efficiency and Climate Action Strategy

The Project is consistent with and supports the City of Moreno Valley Energy Efficiency and Climate Action Strategy (CAS), which is the applicable plan, policy or regulation adopted for the purpose of reducing greenhouse gases. Project consistency with the CAS is detailed in Section 2.10.

CONSTRUCTION AND OPERATIONAL-SOURCE MITIGATION MEASURES

No significant impacts were identified, therefore, no mitigation measures are required.

1 INTRODUCTION

This report presents the results of the greenhouse gas analysis (GHGA) prepared by Urban Crossroads, Inc., for the proposed Legacy Park (Tentative Tract Map No. 36760) Project (referred to as "Project").

The purpose of this GHGA is to evaluate Project-related construction and operational emissions and determine the level of greenhouse gas (GHG) impacts as a result of constructing and operating the proposed Project.

1.1 SITE LOCATION

The proposed Legacy Park (Tentative Tract Map No. 36760) site is located on the southeast corner of Indian Street and Gentian Avenue in the City of Moreno Valley. The Project site is currently vacant. Residential land uses are located west of the Project site. The vacant land use located adjacent north and east of the Project site is designated as Residential and Commercial, respectively. March Middle School is located adjacent south of the Project. The Interstate 215 (I-215) Freeway is located approximately 2.20 miles west of the Project site.

1.2 PROJECT DESCRIPTION

The Project consists of 221 single family residential dwelling units, as shown on Exhibit 1-A.

For the purposes of this AQIA, it is assumed that the Project will be constructed and at full occupancy by 2021.

1.3 REGULATORY REQUIREMENTS

The Project would be required to comply with all mandates imposed by the State of California and the South Coast Air Quality Management District aimed at the reduction of air quality emissions. Those that are applicable to the Project and that would assist in the reduction of greenhouse gas emissions are:

- Global Warming Solutions Act of 2006 (AB32) (2)
- Regional GHG Emissions Reduction Targets/Sustainable Communities Strategies (SB 375) (3)
- Pavely Fuel Efficiency Standards (AB1493). Establishes fuel efficiency ratings for new vehicles (4).
- Title 24 California Code of Regulations (California Building Code). Establishes energy efficiency requirements for new construction (5).
- Title 20 California Code of Regulations (Appliance Energy Efficiency Standards). Establishes energy efficiency requirements for appliances (6).
- Title 17 California Code of Regulations (Low Carbon Fuel Standard). Requires carbon content of fuel sold in California to be 10% less by 2020 (7).
- California Water Conservation in Landscaping Act of 2006 (AB1881). Requires local agencies to adopt the Department of Water Resources updated Water Efficient Landscape Ordinance or

equivalent by January 1, 2010 to ensure efficient landscapes in new development and reduced water waste in existing landscapes (8).

- Statewide Retail Provider Emissions Performance Standards (SB 1368). Requires energy generators to achieve performance standards for GHG emissions (9).
- Renewable Portfolio Standards (SB 1078). Requires electric corporations to increase the amount of energy obtained from eligible renewable energy resources to 20 percent by 2010 and 33 percent by 2020 (10).

Promulgated regulations that will affect the Project's emissions are accounted for in the Project's GHG calculations provided in this report. In particular, the Pavley Standards, Low Carbon Fuel Standards, and Renewable Portfolio Standards (RPS) will be in effect for the AB 32 target year of 2020, and therefore are accounted for in the Project's emission calculations.

1.4 PROJECT DESIGN FEATURES

Energy-saving and sustainable design features and operational programs would be incorporated into facilities developed pursuant to the currently-proposed Legacy Park (Tentative Tract Map No. 36760). The Project also incorporates and expresses the following design features and attributes promoting energy efficiency and sustainability. Because these features/attributes are integral to the Project, and/or are regulatory requirements, they are not considered to be mitigation measures.

- Regional vehicle miles traveled (VMT) and associated vehicular-source emissions are reduced by the following Project design features/attributes:
    - Pedestrian connections shall be provided to surrounding areas consistent with the City's General Plan. Providing a pedestrian access network to link areas of the Project site encourages people to walk instead of drive. The Project would provide a pedestrian access network that internally links all uses. The Project would minimize barriers to pedestrian access and interconnectivity.
    - The Project's proposed collocation of varied residential, school, park, and open spaces within ¼ mile proximity together with supporting amenities would tend to decrease the propensity for vehicle travel for local residents.

1.5 CONSTRUCTION AND OPERATIONAL-SOURCE MITIGATION MEASURES

No significant impacts were identified, therefore, no mitigation measures are required.

EXHIBIT 1-A: SITE PLAN

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2 CLIMATE CHANGE SETTING

2.1 INTRODUCTION TO GLOBAL CLIMATE CHANGE

Global Climate Change (GCC) is defined as the change in average meteorological conditions on the earth with respect to temperature, precipitation, and storms. GCC is currently one of the most controversial environmental issues in the United States, and much debate exists within the scientific community about whether or not GCC is occurring naturally or as a result of human activity. Some data suggests that GCC has occurred in the past over the course of thousands or millions of years. These historical changes to the Earth's climate have occurred naturally without human influence, as in the case of an ice age. However, many scientists believe that the climate shift taking place since the industrial revolution (1900) is occurring at a quicker rate and magnitude than in the past. Scientific evidence suggests that GCC is the result of increased concentrations of greenhouse gases in the earth's atmosphere, including carbon dioxide, methane, nitrous oxide, and fluorinated gases. Many scientists believe that this increased rate of climate change is the result of greenhouse gases resulting from human activity and industrialization over the past 200 years.

An individual project like the proposed Project evaluated in this GHGA cannot generate enough greenhouse gas emissions to affect a discernible change in global climate. However, the proposed Project may participate in the potential for GCC by its incremental contribution of greenhouse gasses combined with the cumulative increase of all other sources of greenhouse gases, which when taken together constitute potential influences on GCC. Because these changes may have serious environmental consequences, Section 3.0 will evaluate the potential for the proposed Project to have a significant effect upon the environment as a result of its potential contribution to the greenhouse effect.

2.2 GREENHOUSE GAS EMISSIONS INVENTORIES

Global

Worldwide anthropogenic (man-made) GHG emissions are tracked by the Intergovernmental Panel on Climate Change for industrialized nations (referred to as Annex I) and developing nations (referred to as Non-Annex I). Man-made GHG emissions data for Annex I nations are available through 2012. For the Year 2012 the sum of these emissions totaled approximately 28,865,994 Gg CO2e[1] (11) (12). The GHG emissions in more recent years may differ from the inventories presented in Table 2-1; however, the data is representative of currently available inventory data.

United States

As noted in Table 2-1, the United States, as a single country, was the number two producer of GHG emissions in 2012. The primary greenhouse gas emitted by human activities in the United

[1] The global emissions are the sum of Annex I and non-Annex I countries, without counting Land-Use, Land-Use Change and Forestry (LULUCF). For countries without 2005 data, the UNFCCC data for the most recent year were used. United Nations Framework Convention on Climate Change, "Annex I Parties – GHG total without LULUCF,"

States was CO_2, representing approximately 83 percent of total greenhouse gas emissions (13). Carbon dioxide from fossil fuel combustion, the largest source of US greenhouse gas emissions, accounted for approximately 78 percent of the GHG emissions.

TABLE 2-1: TOP GHG PRODUCER COUNTRIES AND THE EUROPEAN UNION[2]

Emitting Countries	GHG Emissions (Gg CO2e)
China	10,975,500
United States	6,665,700
European Union (27 member countries)	4,544,224
India	3,013,770
Russian Federation	2,322,220
Japan	1,344,580
Total	**28,865,994**

State of California

CARB compiles GHG inventories for the State of California. CARB GHG inventory data indicates that in 2013 (the most recent inventory of record) California GHG emissions totaled approximately 459.3 Million Metric Tons of Carbon Dioxide Equivalent ($MMTCO_2e$).[3] "In 2010, California accounted for 6.8 percent of all emissions in the country [United States], and ranked second highest among the states with total emissions of 453 $MMTCO_2e$, only behind Texas with 763 $MMTCO_2e$. From a per capita standpoint, California has the 45th lowest emissions with 12.1 $MMTCO_2e$ /person in 2010."[4]

2.3 GLOBAL CLIMATE CHANGE DEFINED

Global Climate Change (GCC) refers to the change in average meteorological conditions on the earth with respect to temperature, wind patterns, precipitation and storms. Global temperatures are regulated by naturally occurring atmospheric gases such as water vapor, CO_2 (Carbon Dioxide), N_2O (Nitrous Oxide), CH_4 (Methane), hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride. These particular gases are important due to their residence time (duration they stay) in the atmosphere, which ranges from 10 years to more than 100 years. These gases allow solar radiation into the Earth's atmosphere, but prevent radioactive heat from escaping, thus warming the Earth's atmosphere. GCC can occur naturally as it has in the past with the previous ice ages. According to the CARB, the climate change since the industrial revolution differs from previous climate changes in both rate and magnitude (14).

Gases that trap heat in the atmosphere are often referred to as greenhouse gases. Greenhouse gases are released into the atmosphere by both natural and anthropogenic (human) activity.

2 Used http://unfccc.int data for Annex I countries. Consulted the CAIT Climate Data Explorer http://www.wrig.org site to reference Non-Annex I countries such as China and India.

3 Cal EPA. "California Greenhouse Gas Emission Inventory - 2015 Edition." California's Greenhouse Gas Emission Inventory. Cal EPA, n.d. Web. 29 Oct. 2015.

4 California Environmental Protection Agency. Air Resources Board. California's Greenhouse Gas Emission Inventory - 2014 Edition (May 2014), p. 28.

Without the natural greenhouse gas effect, the Earth's average temperature would be approximately 61° Fahrenheit (F) cooler than it is currently. The cumulative accumulation of these gases in the earth's atmosphere is considered to be the cause for the observed increase in the earth's temperature.

Although California's rate of growth of greenhouse gas emissions is slowing, the state is still a substantial contributor to the U.S. emissions inventory total. In 2004, California is estimated to have produced 492 million gross metric tons of carbon dioxide equivalent (CO2e) greenhouse gas emissions. Despite a population increase of 16 percent from 1990 to 2004, California has significantly slowed the rate of growth of greenhouse gas emissions due to the implementation of energy efficiency programs as well as adoption of strict emission controls (15).

2.4 GREENHOUSE GASES

For the purposes of this analysis, emissions of carbon dioxide, methane, and nitrous oxide were evaluated (see Table 3-1 later in this report) because these gasses are the primary contributors to GCC from development projects. Although other substances such as fluorinated gases also contribute to GCC, sources of fluorinated gases are not well-defined and no accepted emissions factors or methodology exist to accurately calculate these gases.

Greenhouse gases have varying global warming potential (GWP) values; GWP values represent the potential of a gas to trap heat in the atmosphere. Carbon dioxide is utilized as the reference gas for GWP, and thus has a GWP of 1.

The atmospheric lifetime and GWP of selected greenhouse gases are summarized at Table 2-2. As shown in the table below, GWP range from 1 for carbon dioxide to 23,900 for sulfur hexafluoride.

TABLE 2-2: GLOBAL WARMING POTENTIAL AND ATMOSPHERIC LIFETIME OF SELECT GHGS

Gas	Atmospheric Lifetime (years)	Global Warming Potential (100 year time horizon)	
		Second Assessment Report (SAR)	4th Assessment Report (AR4)
Carbon Dioxide	50-200	1	1
Methane	12 ± 3	21	25
Nitrous Oxide	120	310	298
HFC-23	264	11,700	14,800
HFC-134a	14.6	1,300	1,430
HFC-152a	1.5	140	124
Sulfur Hexafluoride (SF6)	3,200	23,900	22,800

Source: Table 2.14 of the IPCC Fourth Assessment Report, 2007

Water Vapor: Water vapor (H_2O) is the most abundant, important, and variable greenhouse gas in the atmosphere. Water vapor is not considered a pollutant; in the atmosphere it maintains a climate necessary for life. Changes in its concentration are primarily considered to be a result of climate feedbacks related to the warming of the atmosphere rather than a direct result of industrialization. A climate feedback is an indirect, or secondary, change, either positive or negative, that occurs within the climate system in response to a forcing mechanism. The feedback loop in which water is involved is critically important to projecting future climate change.

As the temperature of the atmosphere rises, more water is evaporated from ground storage (rivers, oceans, reservoirs, soil). Because the air is warmer, the relative humidity can be higher (in essence, the air is able to 'hold' more water when it is warmer), leading to more water vapor in the atmosphere. As a GHG, the higher concentration of water vapor is then able to absorb more thermal indirect energy radiated from the Earth, thus further warming the atmosphere. The warmer atmosphere can then hold more water vapor and so on and so on. This is referred to as a "positive feedback loop." The extent to which this positive feedback loop will continue is unknown as there are also dynamics that hold the positive feedback loop in check. As an example, when water vapor increases in the atmosphere, more of it will eventually also condense into clouds, which are more able to reflect incoming solar radiation (thus allowing less energy to reach the Earth's surface and heat it up).

There are no human health effects from water vapor itself; however, when some pollutants come in contact with water vapor, they can dissolve and the water vapor can then act as a pollutant-carrying agent. The main source of water vapor is evaporation from the oceans (approximately 85 percent). Other sources include: evaporation from other water bodies, sublimation (change from solid to gas) from sea ice and snow, and transpiration from plant leaves.

Carbon Dioxide: Carbon dioxide (CO_2) is an odorless and colorless GHG. Outdoor levels of carbon dioxide are not high enough to result in negative health effects. Carbon dioxide is emitted from natural and manmade sources. Natural sources include: the decomposition of dead organic matter; respiration of bacteria, plants, animals and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources include: the burning of coal, oil, natural gas, and wood. Carbon dioxide is naturally removed from the air by photosynthesis, dissolution into ocean water, transfer to soils and ice caps, and chemical weathering of carbonate rocks (16).

Since the industrial revolution began in the mid-1700s, the sort of human activity that increases GHG emissions has increased dramatically in scale and distribution. Data from the past 50 years suggests a corollary increase in levels and concentrations. As an example, prior to the industrial revolution, CO_2 concentrations were fairly stable at 280 parts per million (ppm). Today, they are around 370 ppm, an increase of more than 30 percent. Left unchecked, the concentration of carbon dioxide in the atmosphere is projected to increase to a minimum of 540 ppm by 2100 as a direct result of anthropogenic sources (17).

Methane: Methane (CH_4) is an extremely effective absorber of radiation, though its atmospheric concentration is less than carbon dioxide and its lifetime in the atmosphere is brief (10-12 years), compared to other GHGs. No health effects are known to occur from exposure to methane.

Methane has both natural and anthropogenic sources. It is released as part of the biological processes in low oxygen environments, such as in swamplands or in rice production (at the roots of the plants). Over the last 50 years, human activities such as growing rice, raising cattle, using natural gas, and mining coal have added to the atmospheric concentration of methane. Other anthropocentric sources include fossil-fuel combustion and biomass burning.

Nitrous Oxide: Nitrous oxide (N_2O), also known as laughing gas, is a colorless greenhouse gas. Nitrous oxide can cause dizziness, euphoria, and sometimes slight hallucinations. In small doses, it is considered harmless. However, in some cases, heavy and extended use can cause Olney's Lesions (brain damage) (18).

Concentrations of nitrous oxide also began to rise at the beginning of the industrial revolution. In 1998, the global concentration was 314 parts per billion (ppb). Nitrous oxide is produced by microbial processes in soil and water, including those reactions which occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load. It is used as an aerosol spray propellant, i.e., in whipped cream bottles. It is also used in potato chip bags to keep chips fresh. It is used in rocket engines and in race cars. Nitrous oxide can be transported into the stratosphere, be deposited on the Earth's surface, and be converted to other compounds by chemical reaction

Chlorofluorocarbons: Chlorofluorocarbons (CFCs) are gases formed synthetically by replacing all hydrogen atoms in methane or ethane (C_2H_6) with chlorine and/or fluorine atoms. CFCs are nontoxic, nonflammable, insoluble and chemically unreactive in the troposphere (the level of air at the Earth's surface). CFCs are no longer being used; therefore, it is not likely that health effects would be experienced. Nonetheless, in confined indoor locations, working with CFC-113 or other CFCs is thought to result in death by cardiac arrhythmia (heart frequency too high or too low) or asphyxiation.

CFCs have no natural source, but were first synthesized in 1928. They were used for refrigerants, aerosol propellants and cleaning solvents. Due to the discovery that they are able to destroy stratospheric ozone, a global effort to halt their production was undertaken and was extremely successful, so much so that levels of the major CFCs are now remaining steady or declining. However, their long atmospheric lifetimes mean that some of the CFCs will remain in the atmosphere for over 100 years.

Hydrofluorocarbons: Hydrofluorocarbons (HFCs) are synthetic, man-made chemicals that are used as a substitute for CFCs. Out of all the greenhouse gases, they are one of three groups with the highest global warming potential. The HFCs with the largest measured atmospheric abundances are (in order), HFC-23 (CHF_3), HFC-134a (CF_3CH_2F), and HFC-152a (CH_3CHF_2). Prior to 1990, the only significant emissions were of HFC-23. HFC-134a emissions are increasing due to its use as a refrigerant. The U.S. EPA estimates that concentrations of HFC-23 and HFC-134a are now about 10 parts per trillion (ppt) each; and that concentrations of HFC-152a are about 1 ppt (19). No health effects are known to result from exposure to HFCs, which are manmade for applications such as automobile air conditioners and refrigerants.

Perfluorocarbons: Perfluorocarbons (PFCs) have stable molecular structures and do not break down through chemical processes in the lower atmosphere. High-energy ultraviolet rays, which occur about 60 kilometers above Earth's surface, are able to destroy the compounds. Because of this, PFCs have very long lifetimes, between 10,000 and 50,000 years. Two common PFCs are tetrafluoromethane (CF4) and hexafluoroethane (C2F6). The U.S. EPA estimates that concentrations of CF4 in the atmosphere are over 70 ppt.

No health effects are known to result from exposure to PFCs. The two main sources of PFCs are primary aluminum production and semiconductor manufacture.

Sulfur Hexafluoride: Sulfur hexafluoride (SF6) is an inorganic, odorless, colorless, nontoxic, nonflammable gas. It also has the highest GWP of any gas evaluated (23,900). The U.S. EPA indicates that concentrations in the 1990s were about 4 ppt. In high concentrations in confined areas, the gas presents the hazard of suffocation because it displaces the oxygen needed for breathing.

Sulfur hexafluoride is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.

2.5 EFFECTS OF CLIMATE CHANGE IN CALIFORNIA

Public Health

Higher temperatures may increase the frequency, duration, and intensity of conditions conducive to air pollution formation. For example, days with weather conducive to ozone formation could increase from 25 to 35 percent under the lower warming range to 75 to 85 percent under the medium warming range. In addition, if global background ozone levels increase as predicted in some scenarios, it may become impossible to meet local air quality standards. Air quality could be further compromised by increases in wildfires, which emit fine particulate matter that can travel long distances, depending on wind conditions. The Climate Scenarios report indicates that large wildfires could become up to 55 percent more frequent if GHG emissions are not significantly reduced.

In addition, under the higher warming range scenario, there could be up to 100 more days per year with temperatures above 90oF in Los Angeles and 95oF in Sacramento by 2100. This is a large increase over historical patterns and approximately twice the increase projected if temperatures remain within or below the lower warming range. Rising temperatures could increase the risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat.

Water Resources

A vast network of man-made reservoirs and aqueducts captures and transports water throughout the state from northern California rivers and the Colorado River. The current distribution system relies on Sierra Nevada snowpack to supply water during the dry spring and summer months. Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snowpack, increasing the risk of summer water shortages.

If temperatures continue to increase, more precipitation could fall as rain instead of snow, and the snow that does fall could melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. Under the lower warming range scenario, snowpack losses could be only half as large as those possible if temperatures were to rise to the higher warming range. How much snowpack could be lost depends in part on future precipitation patterns, the projections for which remain uncertain. However, even under the wetter climate projections, the loss of snowpack could pose challenges to water managers and hamper hydropower generation. It could also adversely affect winter tourism. Under the lower warming range, the ski season at lower elevations could be reduced by as much as a month. If temperatures reach the higher warming range and precipitation declines, there might be many years with insufficient snow for skiing and snowboarding.

The State's water supplies are also at risk from rising sea levels. An influx of saltwater could degrade California's estuaries, wetlands, and groundwater aquifers. Saltwater intrusion caused by rising sea levels is a major threat to the quality and reliability of water within the southern edge of the Sacramento/San Joaquin River Delta – a major fresh water supply.

Agriculture

Increased temperatures could cause widespread changes to the agriculture industry reducing the quantity and quality of agricultural products statewide. First, California farmers could possibly lose as much as 25 percent of the water supply they need. Although higher $CO2$ levels can stimulate plant production and increase plant water-use efficiency, California's farmers could face greater water demand for crops and a less reliable water supply as temperatures rise. Crop growth and development could change, as could the intensity and frequency of pest and disease outbreaks. Rising temperatures could aggravate $O3$ pollution, which makes plants more susceptible to disease and pests and interferes with plant growth.

Plant growth tends to be slow at low temperatures, increasing with rising temperatures up to a threshold. However, faster growth can result in less-than-optimal development for many crops, so rising temperatures could worsen the quantity and quality of yield for a number of California's agricultural products. Products likely to be most affected include wine grapes, fruits and nuts.

In addition, continued global climate change could shift the ranges of existing invasive plants and weeds and alter competition patterns with native plants. Range expansion could occur in many species while range contractions may be less likely in rapidly evolving species with significant populations already established. Should range contractions occur, new or different weed species could fill the emerging gaps. Continued global climate change could alter the abundance and types of many pests, lengthen pests' breeding season, and increase pathogen growth rates.

Forests and Landscapes

Global climate change has the potential to intensify the current threat to forests and landscapes by increasing the risk of wildfire and altering the distribution and character of natural vegetation. If temperatures rise into the medium warming range, the risk of large wildfires in California could increase by as much as 55 percent, which is almost twice the increase expected if temperatures stay in the lower warming range. However, since wildfire risk is determined by a combination of factors, including precipitation, winds, temperature, and landscape and vegetation conditions, future risks will not be uniform throughout the state. In contrast, wildfires in northern California could increase by up to 90 percent due to decreased precipitation.

Moreover, continued global climate change has the potential to alter natural ecosystems and biological diversity within the state. For example, alpine and subalpine ecosystems could decline by as much as 60 to 80 percent by the end of the century as a result of increasing temperatures. The productivity of the state's forests has the potential to decrease as a result of global climate change.

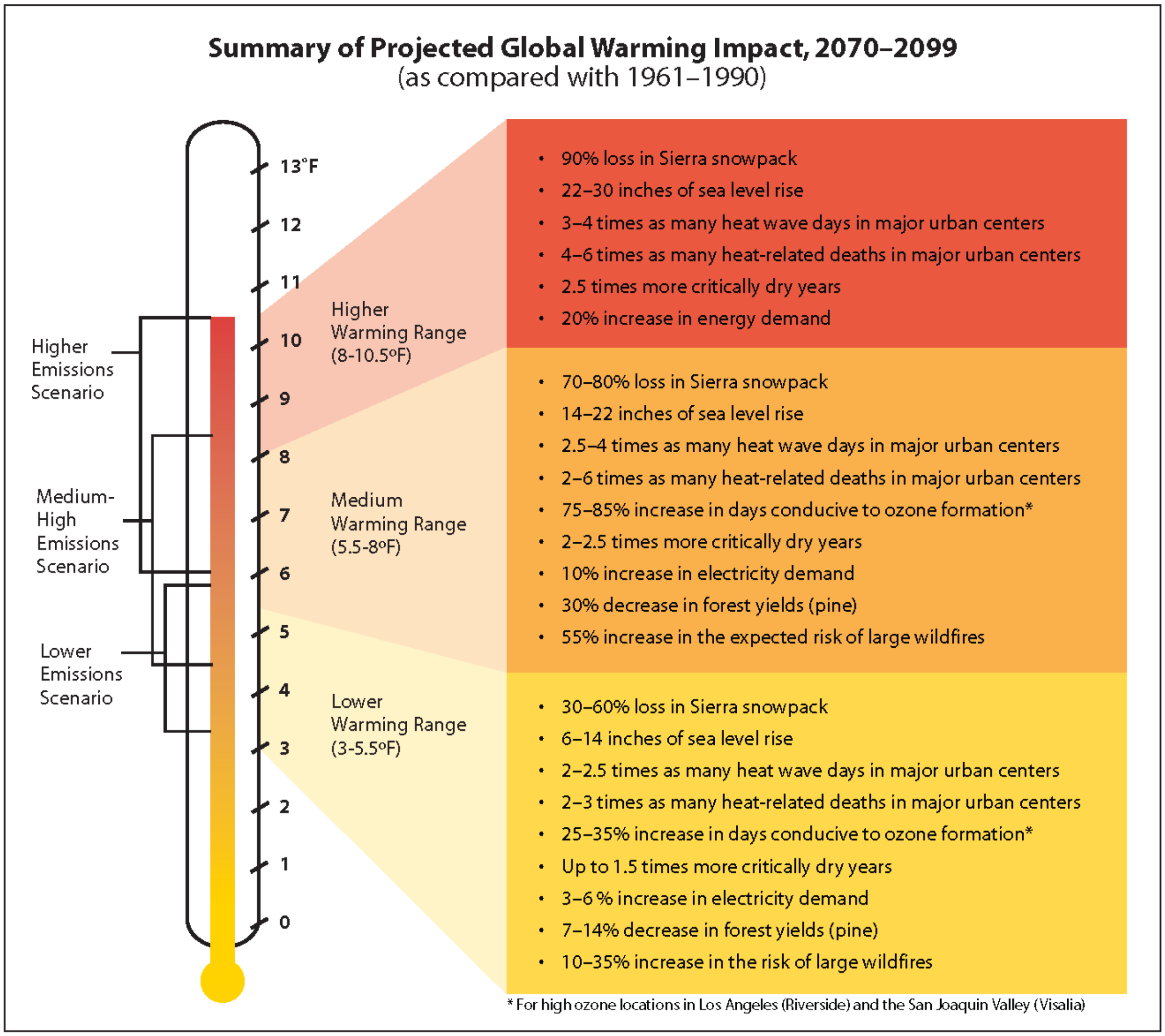
Rising Sea Levels

Rising sea levels, more intense coastal storms, and warmer water temperatures could increasingly threaten the state's coastal regions. Under the higher warming range scenario, sea level is anticipated to rise 22 to 35 inches by 2100. Elevations of this magnitude would inundate low-lying coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats. Under the lower warming range scenario, sea level could rise 12-14 inches.

2.6 HUMAN HEALTH EFFECTS

The potential health effects related directly to the emissions of carbon dioxide, methane, and nitrous oxide as they relate to development projects such as the proposed Project are still being debated in the scientific community. Their cumulative effects to global climate change have the potential to cause adverse effects to human health. Increases in Earth's ambient temperatures would result in more intense heat waves, causing more heat-related deaths. Scientists also purport that higher ambient temperatures would increase disease survival rates and result in more widespread disease. Climate change will likely cause shifts in weather patterns, potentially resulting in devastating droughts and food shortages in some areas (20). Exhibit 2-A presents the potential impacts of global warming.

EXHIBIT 2-A: SUMMARY OF PROJECTED GLOBAL WARMING IMPACT



Specific health effects associated with directly emitted GHG emissions are as follows:

Water Vapor: There are no known direct health effects related to water vapor at this time. It should be noted however that when some pollutants react with water vapor, the reaction forms a transport mechanism for some of these pollutants to enter the human body through water vapor.

Carbon Dioxide: According to the National Institute for Occupational Safety and Health (NIOSH) high concentrations of carbon dioxide can result in health effects such as: headaches, dizziness, restlessness, difficulty breathing, sweating, increased heart rate, increased cardiac output, increased blood pressure, coma, asphyxia, and/or convulsions. It should be noted that current concentrations of carbon dioxide in the earth's atmosphere are estimated to be approximately 370 parts per million (ppm), the actual reference exposure level (level at which adverse health effects typically occur) is at exposure levels of 5,000 ppm averaged over 10 hours in a 40-hour workweek and short-term reference exposure levels of 30,000 ppm averaged over a 15-minute period (21).

Methane: Methane is extremely reactive with oxidizers, halogens, and other halogen-containing compounds. Methane is also an asphyxiant and may displace oxygen in an enclosed space (22).

Nitrous Oxide: Nitrous Oxide is often referred to as laughing gas; it is a colorless greenhouse gas. The health effects associated with exposure to elevated concentrations of nitrous oxide include dizziness, euphoria, slight hallucinations, and in extreme cases of elevated concentrations nitrous oxide can also cause brain damage (22).

Fluorinated Gases: High concentrations of fluorinated gases can also result in adverse health effects such as asphyxiation, dizziness, headache, cardiovascular disease, cardiac disorders, and in extreme cases, increased mortality (21).

Aerosols: The health effects of aerosols are similar to that of other fine particulate matter. Thus aerosols can cause elevated respiratory and cardiovascular diseases as well as increased mortality (23).

2.7 REGULATORY SETTING

International Regulation and the Kyoto Protocol:

In 1988, the United Nations established the Intergovernmental Panel on Climate Change to evaluate the impacts of global warming and to develop strategies that nations could implement to curtail global climate change. In 1992, the United States joined other countries around the world in signing the United Nations' Framework Convention on Climate Change (UNFCCC) agreement with the goal of controlling greenhouse gas emissions. As a result, the Climate Change Action Plan was developed to address the reduction of GHGs in the United States. The Plan currently consists of more than 50 voluntary programs for member nations to adopt.

The Kyoto protocol is a treaty made under the UNFCCC and was the first international agreement to regulate GHG emissions. Some have estimated that if the commitments outlined in the Kyoto protocol are met, global GHG emissions could be reduced an estimated five percent from 1990 levels during the first commitment period of 2008-2012. Notably, while the United States is a signatory to the Kyoto protocol, Congress has not ratified the Protocol and the United States is not bound by the Protocol's commitments. In December 2009, international leaders from 192 nations met in Copenhagen to address the future of international climate change commitments post-Kyoto.

Climate Action Plan

On June 25, 2013, President Obama announced the Climate Action Plan, a national plan for tackling climate change. This marked a historic turning point, as the President used his executive authority to push forward a climate change agenda. The plan, divided in to three sections, outlines the steps to cut carbon pollution in the United States, including standards for both new and existing power plants, action to prepare the US for the impacts of climate change, and plans to lead international efforts to address global climate change (24).

Clean Power Plan

In June 2014, the Environmental Protection Agency (EPA) proposed the Clean Power Plan – the first-ever carbon pollution standards for existing power plants that will protect the health of our children and put our nation on the path toward a 30 percent reduction in carbon pollution from the power sector by 2030. Power plants are the largest single source of carbon pollution, accounting for about one-third of all domestic greenhouse gas emissions. The Clean Power Plan will set standards for carbon pollution from power plants, just as we have set limits on power plant emissions of arsenic, mercury, sulfur dioxide, nitrogen oxides, and soot.

In November 2014, in a historic joint announcement with China, President Obama laid out an ambitious but achievable target to reduce greenhouse gas emissions in the United States in the range of 26 to 28 percent below 2005 levels by 2025, while China announced its intent to peak carbon emissions around 2030 and to double its share of zero-carbon energy to 20 percent. The announcement was a historic step for climate change action and for the U.S.-China relationship, as the world's two largest economies, energy consumers, and carbon emitters came together to demonstrate leadership on an issue that affects the entire world (25).

2015 United Nations Paris Climate Change Conference

On December 12, 2015, which marks the 11th meeting of the Parties to the Kyoto Protocol, 195 nations, including the United States and China, agreed upon a strategy for combatting global climate change to be in effect in 2020. This historic meeting, known as the 21st annual Conference of the Parties (COP21), focused on five key elements: mitigation, a transparency system and global stock-take, adaptation, loss and damage, and support.

In mitigating global climate change, COP 21 participating nations agreed upon a universal long-term goal of keeping the global temperature to well below 2°C or 3.6°F well above pre-industrial levels. The agreement also encouraged participating nations to limit temperature increases even further to 1.5°C or 2.7°F above pre-industrial levels. In addition to that, nations agreed to peak their GHG emissions as soon as possible, with the recognition that developing countries may take longer than developed countries. Thereafter, nations are to undergo rapid reductions in accordance to best available technological advances. The nations are to submit national climate action plans that detail future objectives to address climate change.

In supporting a transparency system and global stock-take, the participating nations agreed to meet every 5 years to set more ambitious targets on global climate change as technologically feasible. The nations are to report to each other and to the public on their progress towards implementing targets and goals through a transparency and accountability system.

In adaptation, participating nations are to strengthen the ability of nations to deal with climate impacts and provide continued international support for adaptation to developing countries.

In supporting loss and damage, participating nations understand the importance of minimizing and addressing the loss and damage associated with adverse effects of global climate change.

These nations acknowledge the need to cooperate with each other and support each other through safeguards, such as early warning systems, emergency preparedness, and risk insurance.

Participating nations are to support each other in their efforts to fight against global climate change. Developed countries within the COP21 are to continue their existing collective goal of utilizing 100 billion per year in support of the poorest and most vulnerable participating nations, known as climate finance, until 2025, when a new collective goal will be set (26) (27)

In accordance with Article 21, paragraph 1, of the Paris Agreement, the Agreement shall enter into force on the thirtieth day after the date on which at least 55 Parties to the COP21 accounting in total for at least an estimated 55% of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval, or accession with the Depositary.

On October 5, 2016, the threshold for entry into force of the Paris Agreement was achieved. The Paris Agreement will enter into force on November 4, 2016 (28).

Federal Regulation and the Clean Air Act:

Coinciding 2009 meeting in Copenhagen, on December 7, 2009, the U.S. Environmental Protection Agency issued an Endangerment Finding under Section 202(a) of the Clean Air Act, opening the door to federal regulation of GHGs. The Endangerment Finding notes that GHGs threaten public health and welfare and are subject to regulation under the Clean Air Act.

The Act requires that when new industrial facilities are designed and built, good pollution control must be part of the design. This means that as new, cleaner facilities are built, the country's industrial base becomes cleaner overall. Public health is protected as economic growth proceeds. In areas not meeting air quality standards, to avoid making pollution worse, new and modified large plants and factories must meet the lowest achievable emission rate and obtain offsetting emissions reductions from other sources. In areas that meet air quality standards, new and modified large plants and factories must apply the best available technology considering cost and avoid causing significant degradation of air quality or visibility impairment in national parks. For example, new coal-fired power plants typically install control devices that capture up to 98 percent of the sulfur dioxide and in many cases 90 percent of the nitrogen oxide emissions, relative to uncontrolled levels.

These requirements are applied through pre-construction permitting programs that are administered by state, local, tribal, or EPA permitting authorities, depending on the location. State and local permitting authorities usually administer the pre-construction permit programs that determine how to apply these requirements to facilities.

To date, the EPA has not promulgated regulations on GHG emissions, but it has already begun to develop them. Previously the EPA had not regulated GHGs under the Clean Air Act (29) because it asserted that the Act did not authorize it to issue mandatory regulations to address global climate change and that such regulation would be unwise without an unequivocally established causal link between GHGs and the increase in global surface air temperatures. In

Massachusetts v. Environmental Protection Agency et al. (127 S. Ct. 1438 (2007), however, the U.S. Supreme Court held that GHGs are pollutants under the Clean Air Act and directed the EPA to decide whether the gases endangered public health or welfare. The EPA had also not moved aggressively to regulate GHGs because it expected Congress to make progress on GHG legislation, primarily from the standpoint of a cap-and-trade system. However, proposals circulated in both the House of Representative and Senate have been controversial and it may be some time before the U.S. Congress adopts major climate change legislation. The EPA's Endangerment Finding paves the way for federal regulation of GHGs with or without Congress.

Title 24 Energy Standards:

Although global climate change did not become an international concern until the 1980s, efforts to reduce energy consumption began in California in response to the oil crisis in the 1970s, resulting in the unintended reduction of greenhouse gas emissions. In order to manage the state's energy needs and promote energy efficiency, AB 1575 created the California Energy Commission (CEC) in 1975.

The California Energy Commission (CEC) first adopted Energy Efficiency Standards for Residential and Nonresidential Buildings (30) in 1978 in response to a legislative mandate to reduce energy consumption in the state. Although not originally intended to reduce GHG emissions, increased energy efficiency, and reduced consumption of electricity, natural gas, and other fuels would result in fewer GHG emissions from residential and nonresidential buildings subject to the standard. The standards are updated periodically to allow for the consideration and inclusion of new energy efficiency technologies and methods. The Energy Commission's 2013 Building Energy Efficiency Standard is 25 percent more efficient than previous standards for residential construction and 30 percent better for nonresidential construction. The Standards, which took effect on January 1, 2014, offer builders better windows, insulation, lighting, ventilation systems and other features that reduce energy consumption in homes and businesses. Some improved measures in the Standards include:

Residential:

- Solar-ready roofs to allow homeowners to add solar photovoltaic panels at a future date
- More efficient windows to allow increased sunlight, while decreasing heat gain
- Insulated hot water pipes, to save water and energy and reduce the time it takes to deliver hot water
- Whole house fans to cool homes and attics with evening air reducing the need for air conditioning load
- Air conditioner installation verification to insure efficient operation

Nonresidential:

- High performance windows, sensors and controls that allow buildings to use "daylighting"
- Efficient process equipment in supermarkets, computer data centers, commercial kitchens, laboratories, and parking garages

- Advanced lighting controls to synchronize light levels with daylight and building occupancy, and provide demand response capability
- Solar-ready roofs to allow businesses to add solar photovoltaic panels at a future date
- Cool roof technologies

It should be noted that the 2016 Building Energy Efficiency Standards were released in June 2015. The 2016 Standards, which will take effect on January 1, 2017, will continue to improve upon the 2013 Standards for new construction of and additions and alterations to residential and nonresidential buildings. The Impact Analysis for the 2016 Standards, which estimates the percent savings for residential and nonresidential buildings from the previous Standards, have not yet been released. As such, the 2013 Title 24 Standards are utilized in the report.

CALGreen

Part 11 of the Title 24 Building Standards Code is referred to as the California Green Building Standards Code (CALGreen Code) (31). The purpose of the CALGreen Code is to "improve public health, safety and general welfare by enhancing the design and construction of buildings through the use of building concepts having a positive environmental impact and encouraging sustainable construction practices in the following categories: (1) Planning and design; (2) Energy efficiency; (3) Water efficiency and conservation; (4) Material conservation and resource efficiency; and (5) Environmental air quality." The CALGreen Code is not intended to substitute or be identified as meeting the certification requirements of any green building program that is not established and adopted by the California Building Standards Commission (CBSC). The CBSC has released the 2010 California Green Building Standards Code on its Web site. Unless otherwise noted in the regulation, all newly constructed buildings in California are subject of the requirements of the CALGreen Code.

CALGreen contains both mandatory and voluntary measures, for Non-Residential land uses there are 39 mandatory measures including, but not limited to: exterior light pollution reduction, wastewater reduction by 20%, and commissioning of projects over 10,000 sf. There are two tiers of voluntary measures for Non-Residential land uses for a total of 36 additional elective measures.

The 2013 CALGreen includes additions and amendments to the water efficiency standards for non-residential buildings in order to comply with the reduced flow rate table. The 2013 CALGreen has also been rewritten to clarify and definitively identify the requirements and applicability for residential and nonresidential buildings.

California Assembly Bill No. 1493 (AB 1493):

AB 1493 requires CARB to develop and adopt the nation's first greenhouse gas emission standards for automobiles. The Legislature declared in AB 1493 that global warming was a matter of increasing concern for public health and environment in California (32). Further, the legislature stated that technological solutions to reduce greenhouse gas emissions would stimulate the California economy and provide jobs.

To meet the requirements of AB 1493, ARB approved amendments to the California Code of Regulations (CCR) adding GHG emission standards to California's existing motor vehicle emission standards in 2004. Amendments to CCR Title 13 Sections 1900 (CCR 13 1900) and 1961 (CCR 13 1961) and adoption of Section 1961.1 (CCR 13 1961.1) require automobile manufacturers to meet fleet average GHG emission limits for all passenger cars, light-duty trucks within various weight criteria, and medium-duty passenger vehicle weight classes beginning with the 2009 model year. Emission limits are further reduced each model year through 2016.

In December 2004 a group of car dealerships, automobile manufacturers, and trade groups representing automobile manufacturers filed suit against ARB to prevent enforcement of CCR 13 1900 and CCR 13 1961 as amended by AB 1493 and CCR 13 1961.1 (Central Valley Chrysler-Jeep et al. v. Catherine E. Witherspoon, in her official capacity as Executive Director of the California Air Resources Board, et al.). The suit, heard in the U.S. District Court for the Eastern District of California, contended that California's implementation of regulations that in effect regulate vehicle fuel economy violates various federal laws, regulations, and policies. In January 2007, the judge hearing the case accepted a request from the State Attorney General's office that the trial be postponed until a decision is reached by the U.S. Supreme Court on a separate case addressing GHGs. In the Supreme Court Case, Massachusetts vs. EPA, the primary issue in question is whether the federal CAA provides authority for USEPA to regulate CO2 emissions. In April 2007, the U.S. Supreme Court ruled in Massachusetts' favor, holding that GHGs are air pollutants under the CAA. On December 11, 2007, the judge in the Central Valley Chrysler-Jeep case rejected each plaintiff's arguments and ruled in California's favor. On December 19, 2007, the USEPA denied California's waiver request. California filed a petition with the Ninth Circuit Court of Appeals challenging USEPA's denial on January 2, 2008.

The Obama administration subsequently directed the USEPA to re-examine their decision. On May 19, 2009, challenging parties, automakers, the State of California, and the federal government reached an agreement on a series of actions that would resolve these current and potential future disputes over the standards through model year 2016. In summary, the USEPA and the U.S. Department of Transportation agreed to adopt a federal program to reduce GHGs and improve fuel economy, respectively, from passenger vehicles in order to achieve equivalent or greater greenhouse gas benefits as the AB 1493 regulations for the 2012–2016 model years. Manufacturers agreed to ultimately drop current and forego similar future legal challenges, including challenging a waiver grant, which occurred on June 30, 2009. The State of California committed to (1) revise its standards to allow manufacturers to demonstrate compliance with the fleet-average GHG emission standard by "pooling" California and specified State vehicle sales; (2) revise its standards for 2012–2016 model year vehicles so that compliance with USEPA-adopted GHG standards would also comply with California's standards; and (3) revise its standards, as necessary, to allow manufacturers to use emissions data from the federal CAFE program to demonstrate compliance with the AB 1493 regulations (CARB 2009, http://www.arb.ca.gov/regact/2009/ghgpv09/ghgpvisor.pdf) both of these programs are aimed at light-duty auto and light-duty trucks.

Executive Order S-3-05:

Executive Order S-3-05, which was signed by Governor Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change (33). It declares that increased temperatures could reduce the Sierra's snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the Executive Order established total greenhouse gas emission targets. Specifically, emissions are to be reduced to the 1990 level by 2020, and to 80% below the 1990 level by 2050. The Executive Order directed the Secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce greenhouse gas emissions to the target levels. The Secretary also is required to submit biannual reports to the Governor and state Legislature describing: (1) progress made toward reaching the emission targets; (2) impacts of global warming on California's resources; and (3) mitigation and adaptation plans to combat these impacts. To comply with the Executive Order, the Secretary of the CalEPA created a Climate Action Team (CAT) made up of members from various state agencies and commission. CAT released its first report in March 2006. The report proposed to achieve the targets by building on voluntary actions of California businesses, local government and community actions, as well as through state incentive and regulatory programs.

<u>California Assembly Bill 32 (AB 32):</u>

In September 2006, Governor Arnold Schwarzenegger signed AB 32, the California Climate Solutions Act of 2006. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by the year 2020 (34). This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs CARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then CARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires that CARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the state achieves reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

In November 2007, CARB completed its estimates of 1990 GHG levels. Net emission 1990 levels were estimated at 427 MMTs (emission sources by sector were: transportation – 35 percent; electricity generation – 26 percent; industrial – 24 percent; residential – 7 percent; agriculture – 5 percent; and commercial – 3 percent). Accordingly, 427 MMTs of CO2 equivalent was established as the emissions limit for 2020. For comparison, CARB's estimate for baseline GHG emissions was 473 MMT for 2000 and 532 MMT for 2010. "Business as usual" conditions (without the 28.4 percent reduction to be implemented by CARB regulations) for 2020 were projected to be 596 MMTs.

In December 2007, CARB approved a regulation for mandatory reporting and verification of GHG emissions for major sources. This regulation covered major stationary sources such as cement plants, oil refineries, electric generating facilities/providers, and co-generation facilities, which comprise 94 percent of the point source CO2 emissions in the State.

On December 11, 2008, CARB adopted a scoping plan to reduce GHG emissions to 1990 levels. The Scoping Plan's recommendations for reducing GHG emissions to 1990 levels by 2020 include emission reduction measures, including a cap-and-trade program linked to Western Climate Initiative partner jurisdictions, green building strategies, recycling and waste-related measures, as well as Voluntary Early Actions and Reductions. Implementation of individual measures must begin no later than January 1, 2012, so that the emissions reduction target can be fully achieved by 2020.

Table 2-3 shows the proposed reductions from regulations and programs outlined in the Scoping Plan. While local government operations were not accounted for in achieving the 2020 emissions reduction, local land use changes are estimated to result in a reduction of 5 MMTons of CO2e, which is approximately 3 percent of the 2020 GHG emissions reduction goal. In recognition of the critical role local governments will play in successful implementation of AB 32, CARB is recommending GHG reduction goals of 15 percent of 2006 levels by 2020 to ensure that municipal and community-wide emissions match the state's reduction target. According to the Measure Documentation Supplement to the Scoping Plan, local government actions and targets are anticipated to reduce vehicle miles by approximately 2 percent through land use planning, resulting in a potential GHG reduction of 2 MM Tons of CO2e (or approximately 1.2 percent of the GHG reduction target).

TABLE 2-3: SCOPING PLAN GHG REDUCTION MEASURES TOWARDS 2020 TARGET

Recommended Reduction Measures	*Reductions Counted toward 2020 Target of 169 MMT CO2e*	*Percentage of Statewide 2020 Target*
Cap and Trade Program and Associated Measures		
California Light-Duty Vehicle GHG Standards	31.7	19%
Energy Efficiency	26.3	16%
Renewable Portfolio Standard (33 percent by 2020)	21.3	13%
Low Carbon Fuel Standard	15	9%
Regional Transportation-Related GHG Targets[1]	5	3%
Vehicle Efficiency Measures	4.5	3%
Goods Movement	3.7	2%
Million Solar Roofs	2.1	1%
Medium/Heavy Duty Vehicles	1.4	1%
High Speed Rail	1.0	1%
Industrial Measures	0.3	0%
Additional Reduction Necessary to Achieve Cap	34.4	20%
Total Cap and Trade Program Reductions	146.7	87%
Uncapped Sources/Sectors Measures		
High Global Warming Potential Gas Measures	20.2	12%
Sustainable Forests	5	3%

Industrial Measures (for sources not covered under cap and trade program)	1.1	1%
Recycling and Waste (landfill methane capture)	1	1%
Total Uncapped Sources/Sectors Reductions	27.3	16%
Total Reductions Counted toward 2020 Target	174	100%
Other Recommended Measures – Not Counted toward 2020 Target		
State Government Operations	1.0 to 2.0	1%
Local Government Operations	To Be Determined[2]	NA
Green Buildings	26	15%
Recycling and Waste	9	5%
Water Sector Measures	4.8	3%
Methane Capture at Large Dairies	1	1%
Total Other Recommended Measures – Not Counted toward 2020 Target	42.8	NA

Source: CARB. 2008, MMTons CO2e: million metric tons of CO2e
[1]Reductions represent an estimate of what may be achieved from local land use changes. It is not the SB 375 regional target.
[2]According to the Measure Documentation Supplement to the Scoping Plan, local government actions and targets are anticipated to reduce vehicle miles by approximately 2 percent through land use planning, resulting in a potential GHG reduction of 2 million metric tons of CO2e (or approximately 1.2 percent of the GHG reduction target). However, these reductions were not included in the Scoping Plan reductions to achieve the 2020 Target

Overall, CARB determined that achieving the 1990 emission level in 2020 would require a reduction in GHG emissions of approximately 30 percent in the absence of new laws and regulations (referred to as "Business-As-Usual" [BAU]). The Scoping Plan evaluates opportunities for sector-specific reductions, integrates all CARB and California Climate Action Team early actions and additional GHG reduction measures, identifies additional measures to be pursued as regulations, and outlines the role of the cap-and-trade program.

When the 2020 emissions level projection also was updated to account for implemented regulatory measures, including Pavley (vehicle model-years 2009 - 2016) and the renewable portfolio standard (12% - 20%), the 2020 projection in the BAU condition was reduced further to 507 MTCO2e. As a result, based on the updated economic and regulatory data, CARB determined that achieving the 1990 emissions level in 2020 would now only require a reduction of GHG emissions of 80 MTCO2e, or approximately 16 percent (down from 30 percent), from the BAU condition. (35) (36)

On February 10, 2014, CARB released a Draft Proposed First Update of the Scoping Plan. The draft recalculates 1990 GHG emissions using new global warming potentials identified in the IPCC Fourth Assessment Report released in 2007. Using those GWPs, the 427 MTCO2e 1990 emissions level and 2020 GHG emissions limit identified in the 2008 Scoping Plan would be slightly higher, at 431 MTCO2e. (37) Based on the revised 2020 emissions level projection identified in the 2011 Final Supplement and the updated 1990 emissions levels identified in the discussion draft of the First Update, achieving the 1990 emissions level in 2020 would require a reduction of 78 MTCO2e (down from 509 MTCO2e), or approximately 15.3 percent (down from 30 percent), from the BAU condition. (35) (36) (37)

Although CARB has released an update to the Scoping Plan and reduction targets from BAU, it is still appropriate to utilize the previous 30% reduction from BAU since the modeling tools available are not able to easily segregate the inclusion of the renewable portfolio standards, and Pavley requirements that are now included in the revised BAU scenario.

Senate Bill 97 (SB 97):

Pursuant to the direction of SB 97, OPR released preliminary draft CEQA Guideline amendments for greenhouse gas emissions on January 8, 2009, and submitted its final proposed guidelines to the Secretary for Natural Resources on April 13, 2009 (38). The Natural Resources Agency adopted the Guideline amendments and they became effective on March 18, 2010.

Of note, the new guidelines state that a lead agency shall have discretion to determine whether to use a quantitative model or methodology, or in the alternative, rely on a qualitative analysis or performance based standards. CEQA Guideline § 15064.4(a)"A lead agency shall have discretion to determine, in the context of a particular project, whether to: (1) Use a model or methodology to quantify greenhouse gas emissions resulting from a project, and which model or methodology to use . . .; or (2) Rely on a qualitative analysis or performance based standards."

Also amended were CEQA Guidelines Sections 15126.4 and 15130, which address mitigation measures and cumulative impacts respectively. Greenhouse gas mitigation measures are referenced in general terms, but no specific measures are championed. The revision to the cumulative impact discussion requirement (Section 15130) simply directs agencies to analyze greenhouse gas emissions in an EIR when a Project's incremental contribution of emissions may be cumulatively considerable, however it does not answer the question of when emission are cumulatively considerable.

Section 15183.5 permits programmatic greenhouse gas analysis and later project-specific tiering, as well as the preparation of Greenhouse Gas Reduction Plans. Compliance with such plans can support determination that a Project's cumulative effect is not cumulatively considerable, according to proposed Section 15183.5(b).

CEQA emphasizes that the effects of greenhouse gas emissions are cumulative, and should be analyzed in the context of CEQA's requirements for cumulative impacts analysis. (See CEQA Guidelines Section 15130(f)).

Section 15064.4(b) of the CEQA Guidelines provides direction for lead agencies for assessing the significance of impacts of greenhouse gas emissions:

1. The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;
2. Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project; or
3. The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such regulations or requirements must be adopted by the relevant public agency through a public review process and must include specific

requirements that reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

The CEQA Guideline amendments do not identify a threshold of significance for greenhouse gas emissions, nor do they prescribe assessment methodologies or specific mitigation measures. Instead, they call for a "good-faith effort, based on available information, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project." The amendments encourage lead agencies to consider many factors in performing a CEQA analysis and preserve lead agencies' discretion to make their own determinations based upon substantial evidence. The amendments also encourage public agencies to make use of programmatic mitigation plans and programs from which to tier when they perform individual project analyses. Specific GHG language incorporated in the Guidelines' suggested Environmental Checklist (Guidelines Appendix G) is as follows:

VII. GREENHOUSE GAS EMISSIONS

Would the project:

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

<u>Executive Order S-01-07:</u>

On January 18, 2007 California Governor Arnold Schwarzenegger, through Executive Order S-01-07, mandated a statewide goal to reduce the carbon intensity of California's transportation fuel by at least ten percent by 2020 (39). The order also requires that a California specific Low Carbon Fuel Standard be established for transportation fuels.

<u>Executive Order B-30-15:</u>

In January 2015, Governor Brown, in his inaugural address and annual report to the Legislature, established supplementary goals which would further reduce GHG emissions over the next 15 years. These goals include an increase in California's renewable energy portfolio from 33% to 50%, a reduction in vehicle petroleum use for cars and trucks by up to 50% measures to double the efficiency of existing buildings, and decreasing emissions associated with heating fuels.

On April 29, 2015 California Governor Jerry Brown, through Executive Order B-30-15 ("BEO") states a new statewide policy goal to reduce GHG emissions 40 percent below their 1990 levels by 2030.

The BEO sets an ambitious new Statewide GHG emissions reduction target of 40% below 1990 levels by 2030 as a "mid-term" benchmark needed to achieve the 80% below 1990 levels by 2050 (40).

Senate Bill 32:

On September 8, 2016, Governor Jerry Brown signed the Senate Bill (SB) 32 and its companion bill, Assembly Bill (AB) 197. SB 32 requires the state to reduce statewide greenhouse gas emissions to 40% below 1990 levels by 2030, a reduction target that was first introduced in Executive Order B-30-15. The new legislation builds upon the AB 32 goal of 1990 levels by 2020 and provides an intermediate goal to achieving S-3-05, which sets a statewide greenhouse gas reduction target of 80% below 1990 levels by 2050 (41) (42).

The Project reduces its GHG emissions to the maximum extent feasible as discussed in this document. At this time, no further analysis is necessary or required by CEQA as it pertains to Executive Order B-30-15 and SB 32.

Additionally, as described previously, the project applicant would not actively interfere with any future City-mandated, state-mandated, or federally-mandated retrofit obligations enacted or promulgated to legally require development City-wide, state-wide, or nation-wide to assist in meeting state-adopted greenhouse gas emissions reduction targets, including that established under Executive Order S-3-05, Executive Order B-30-15, or SB 32.

Based on the foregoing, the Project does not interfere with the state's implementation of (i) Executive Order B-30-15 and SB 32's target of reducing statewide GHG emissions to 40% below 1990 levels by 2030 or (ii) Executive Order S-3-05's target of reducing statewide GHG emissions to 80% below 1990 levels by 2050 because it does not interfere with the state's implementation of GHG reduction plans described in the CARB's Updated Scoping Plan, including the state providing for 12,000 MW of renewable distributed generation by 2020, the California Building Commission mandating net zero energy homes in the building code after 2020, or existing building retrofits under AB 758. Therefore, the project's impacts on greenhouse gas emissions in the 2030 and 2050 horizon years are less than significant.

Senate Bills 1078 and 107 and Executive Order S-14-08:

SB 1078 (Chapter 516, Statutes of 2002) requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20% of their supply from renewable sources by 2017 (43). SB 107 (Chapter 464, Statutes of 2006) changed the target date to 2010 (39). In November 2008 Governor Schwarzenegger signed Executive Order S-14-08, which expands the state's Renewable Energy Standard to 33% renewable power by 2020 (44).

Senate Bill 375:

SB 375, signed in September 2008 (Chapter 728, Statutes of 2008), aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation (45). SB 375 requires metropolitan planning organizations (MPOs) to adopt a sustainable communities strategy (SCS) or alternative planning strategy (APS) that will prescribe land use allocation in that MPO's regional transportation plan. ARB, in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035.

These reduction targets will be updated every 8 years but can be updated every 4 years if advancements in emissions technologies affect the reduction strategies to achieve the targets. ARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, transportation projects will not be eligible for funding programmed after January 1, 2012.

This law also extends the minimum time period for the regional housing needs allocation cycle from 5 years to 8 years for local governments located within an MPO that meets certain requirements. City or county land use policies (including general plans) are not required to be consistent with the regional transportation plan (and associated SCS or APS). However, new provisions of CEQA would incentivize (through streamlining and other provisions) qualified projects that are consistent with an approved SCS or APS, categorized as "transit priority projects."

The Southern California Association of Governments (SCAG) is required by law to update the Southern California Regional Transportation Plan (RTP) every four years. On April 7, 2016, the SCAG's Regional Council adopted the 2016-2040 RTP/SCS (46). The 2016 RTP/SCS incorporates transportation, land use, and housing policies that would result in an eight percent reduction in greenhouse gas emissions per capita by 2020, an 18 percent reduction by 2035, and a 21 percent reduction by 2040 —compared with 2005 levels. This would meet or exceed the GHG emissions targets established by the California Air Resource Board (CARB) for 2020 (8% reduction) and 2035 (13% reduction). In June 2016, the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) indicated that all air conformity requirements for the 2016 RTP/SCS have been met (47).

<u>CARB's Preliminary Draft Staff Proposal for Interim Significance Thresholds:</u>

Separate from its Scoping Plan approved in December of 2008 (48), CARB issued a Staff Proposal in October 2008, as its first step toward developing recommended statewide interim thresholds of significance for GHGs that may be adopted by local agencies for their own use. CARB staff's objective in this proposal is to develop a threshold of significance that will result in the vast majority (approximately 90 percent statewide) of GHG emissions from new industrial projects being subject to CEQA's requirement to impose feasible mitigation. The proposal does not attempt to address every type of project that may be subject to CEQA, but instead focuses on common project types that, collectively, are responsible for substantial GHG emissions – specifically, industrial, residential, and commercial projects. CARB is developing these thresholds in these sectors to advance climate objectives, streamline project review, and encourage consistency and uniformity in the CEQA analysis of GHG emissions throughout the state. These draft thresholds are under revision in response to comments. There is currently no timetable for finalized thresholds at this time.

As currently proposed by CARB, a quantitative threshold of 7,000 metric tons (MT) of CO2e per year for operational emissions (excluding transportation), and performance standards yet to be defined for construction and transportation emissions are under consideration. However, CARB's proposal is not yet final, and thus cannot be applied to the Project.

South Coast Air Quality Management District Recommendations for Significance Thresholds:

In April 2008, the South Coast Air Quality Management District (SCAQMD), in order to provide guidance to local lead agencies on determining the significance of GHG emissions identified in CEQA documents, convened a "GHG CEQA Significance Threshold Working Group." The goal of the working group is to develop and reach consensus on an acceptable CEQA significance threshold for GHG emissions that would be utilized on an interim basis until CARB (or some other state agency) develops statewide guidance on assessing the significance of GHG emissions under CEQA.

Initially, SCAQMD staff presented the working group with a significance threshold that could be applied to various types of projects—residential; non-residential; industrial; etc (49). However, the threshold is still under development. In December 2008, staff presented the SCAQMD Governing Board with a significance threshold for stationary source projects where it is the lead agency. This threshold uses a tiered approach to determine a project's significance, with 10,000 metric tons of carbon dioxide equivalent (MTCO2e) as a screening numerical threshold for stationary sources. More importantly it should be noted that when setting the 10,000 MTCO2e threshold, the SCAQMD did not consider mobile sources (vehicular travel), rather the threshold is based mainly on stationary source generators such as boilers, refineries, power plants, etc. Therefore, it would be misleading to apply a threshold that was developed without consideration for mobile sources to a Project where the majority of emissions are related to mobile sources. Thus there is no SCAQMD threshold that can be applied to this Project.

In September 2010 (1), the Working Group released additional revisions that consist of the following recommended tiered approach:

- Tier 1 consists of evaluating whether or not the Project qualifies for applicable CEQA exemptions.
- Tier 2 consists of determining whether or not a Project is consistent with a greenhouse gas reduction plan. If a Project is consistent with a greenhouse gas reduction plan, it would not have a significant impact.
- Tier 3 consists of screening values at the discretion of the lead agency; however they should be consistent for all projects within its jurisdiction. Project-related construction emissions should be amortized over 30 years and should be added back the Project's operational emissions. The following thresholds are proposed for consideration:
    - o 3,000 MTCO2e per year for all land use types

      or
    - o 3,500 MTCO2e per year for residential; 1,400 MTCO2e per year for commercial; or 3,000 MTCO2e per year for mixed-use projects
- Tier 4 has the following options:
    - o Option 1: Reduce emissions from business as usual by a certain percentage (currently undefined)
    - o Option 2: Early implementation of applicable AB 32 Scoping Plan measures
    - o Option 3: A project-level efficiency target of 4.8 MTCO2e per service population as a 2020 target and 3.0 MTCO2e per service population as a 2035 target. The recommended

plan-level target for 2020 is 6.6 MTCO2e and the plan level target for 2035 is 4.1 MTCO2e

- Tier 5 involves mitigation offsets to achieve target significance thresholds

The SCAQMD has also adopted Rules 2700, 2701, and 2702 that address GHG reductions. However, these rules address boilers and process heater, forestry, and manure management projects, none of which are required by the Project

2.9 CITY OF MORENO VALLEY GENERAL PLAN MEASURES

Although the City of Moreno Valley General Plan does not identify specific GHG or climate change policies or goal, a number of the measures identified in the General Plan's Air Quality Element act to reduce or control criteria pollutant emissions and peripherally reduce GHG emissions. The proposed Project has been evaluated for consistency with the City's General Plan Air Quality Element, as shown on Table 2-4.

TABLE 2-4: CITY OF MORENO VALLEY GENERAL PLAN CONSISTENCY

Objective 6.6: Promote land use patterns that reduce daily automotive trips and reduce trip distance for work, shopping, school, and recreation.	**Consistent.** *The Project site is developed approximately 0.50 miles north of a regional shopping center (Stoneridge Towne Centre)*
Objective 6.7: Reduce mobile and stationary source air pollutant emissions.	**Consistent.** *The Project site is located proximate to existing and proposed major roadways, acting to generally reduce vehicle trip lengths, thereby reducing mobile source emissions.*
Policy 6.7.5: Require grading activities to comply with South Coast Air Quality Management District's Rule 403 regarding the control of fugitive dust.	**Consistent.** *The Project will be required to implement fugitive dust control measures consistent with SCAQMD Rule 403.*
Policy 6.7.6: Require building construction to comply with the energy conservation requirements of Title 24 of the California Administrative Code [California Code of Regulations].	**Consistent.** *Pursuant to City and State Building Code requirements, the Project will meet or surpass applicable CCR Title 24 energy conservation requirements.*

Source: City of Moreno Valley General Plan, Safety Element

2.10 CITY OF MORENO VALLEY ENERGY EFFICIENCY AND CLIMATE ACTION STRATEGY

The City of Moreno Valley released an Energy Efficiency and Climate Action Strategy (CAS) as well as a Greenhouse Gas Analysis for public review on May 8, 2012. The documents were approved on October 9, 2012. The CAS identifies ways that the City can reduce energy and water consumption and greenhouse gas emissions as an organization (its employees and the operation of its facilities) and outlines the actions that the City can encourage and community members can employ to reduce their own energy and water consumption and greenhouse gas emissions. The policies in the document are to reduce greenhouse gas emissions in 2010 by 15 percent by 2020. The following consists of an analysis of project consistency with the policies in the CAS.

- R2-T1: Land Use Based Trips and VMT Reduction Policies. Encourage the development of Transit Priority Projects along High Quality Transit Corridors identified in the SCAG Sustainable Communities Plan, to allow a reduction in vehicle miles traveled.

Project consistency: Not applicable.

- R2-T3: Employment-Based Trip Reductions. Require a Transportation Demand Management (TDM) program for new development to reduce automobile travel by encouraging ride-sharing, carpooling, and alternative modes of transportation.

  Project consistency: Not applicable.

- R2-E1: New Construction Residential Energy Efficiency Requirements. Require energy efficient design for all new residential buildings to be 10 percent beyond the current Title 24 standards. (Reach Code)

  Project consistency: Consistent; the Project will comply with this measure if adopted by the City.

- R2-E2: New Construction Residential Renewable Energy. Facilitate the use of renewable energy (such as solar (photovoltaic) panels or small wind turbines) for new residential developments. Alternative approach would be the purchase of renewable energy resources offsite.

  Project consistency: Consistent; the Project will comply with this measure if adopted by the city.

- R2-E5: New Construction Commercial Energy Efficiency Requirements. Require energy efficient design for all new commercial buildings to be 10% beyond the current Title 24 standards. (Reach Code)

  Project consistency: Not applicable.

- R3-E1: Energy Efficient Development, and Renewable Energy Deployment Facilitation and Streamlining. Updating of codes and zoning requirements and guidelines to further implement green building practices. This could include incentives for energy efficient projects.
- Project consistency: Not applicable.
- R3-L2: Heat Island Plan. Develop measures that address "heat islands." Potential measures include using strategically placed shade trees, using paving materials with a Solar Reflective Index of at least 29, an open grid pavement system, or covered parking.

  Project consistency: Consistent; the Project will comply with the City of Moreno Valley's landscaping requirements.

- R2-W1: Water Use Reduction Initiative. Consider adopting a per capita water use reduction goal, which mandates the reduction of water use of 20 percent per capita with requirements applicable to new development and with cooperative support of the water agencies.

  Project consistency: Consistent. California Green Building Standards Code, Chapter 5, Division 5.3, Section 5.303.2 requires that indoor water use be reduced by 20 percent. The Project will be consistent with this measure.

- R3-W1: Water Efficiency Training and Education. Work with EMWD and local water companies to implement a public information and education program that promotes water conservation.

  Project consistency: Not applicable.

- R2-S1: City Diversion Program. For Solid Waste, consider a target of increasing the waste diverted from the landfill to a total of 75 percent by 2020.

  Project consistency: Consistent; the Project will comply with the City of Moreno Valley's citywide goal of solid waste reduction. Additionally the Project will be compliant with the City of Moreno Valley's Municipal Code 8.80.030 by implementing a Waste Management Plan.

As shown above, Project Consistency with Moreno Valley Energy Efficiency and Climate Action Strategy, of this report, many of the measures are not applicable to the project. The project is consistent with the applicable measures in the Strategy. Therefore, the project is consistent with the CAS.

2.11 DISCUSSION ON ESTABLISHMENT OF SIGNIFICANCE THRESHOLDS

The City of Moreno Valley has not adopted its own numeric threshold of significance for determining impacts with respect to greenhouse gas (GHG) emissions. The SCAQMD has convened a GHG CEQA Significance Threshold Working Group (Working Group). Based on the last Working Group meeting (Meeting No. 15) held in September 2010, SCAQMD is proposing to adopt a tiered approach for evaluating GHG emissions for development projects where SCAQMD is not the lead agency. SCAQMD had proposed a Project level efficiency significance threshold, in which a 2020 statewide population and employment for land use sectors was divided by 2020 statewide service population (SP), amounting to a 4.8 MTCO2e per service population threshold (1). The City will utilize the Project level efficiency significance threshold approach recommended in the SCAQMD's Interim Thresholds document for commercial, residential, and mixed use projects.

Thus, and based on guidance from the SCAQMD, if a residential project would emit GHGs less than 4.8 MTCO2e per service population, the project is not considered a substantial GHG emitter and the GHG impact is less than significant. On the other hand, if a residential project would emit GHGs in excess of 4.8 MTCO2e per service population, then the project could be considered a substantial GHG emitter, requiring additional analysis and potential mitigation.

Furthermore, and based on Item b) of the CEQA Guidelines Appendix, the analysis presented would determine if the Project would conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing emissions of greenhouse gases. As the Project is located within the City of Moreno Valley, Project consistency will be based on the CAS. Project consistency with the CAS is determined in Section 2.10.

3 PROJECT GREENHOUSE GAS IMPACT

3.1 INTRODUCTION

The Project has been evaluated to determine if it will result in a significant greenhouse gas impact. The significance of these potential impacts is described in the following section.

3.2 PROJECT RELATED GREENHOUSE GAS EMISSIONS

CEQA Guidelines 15064.4 (b) (1) states that a lead agency may use a model or methodology to quantify greenhouse gas emissions associated with a project (50).

On October 14, 2016, the SCAQMD in conjunction with the California Air Pollution Control Officers Association (CAPCOA) and other California air districts, released the latest version of the California Emissions Estimator Model™ (CalEEMod™) v2016.3.1. The purpose of this model is to more accurately calculate construction-source and operational-source criteria pollutant (NO_x, VOC, PM_{10}, $PM_{2.5}$, SO_x, and CO) and greenhouse gas (GHG) emissions from direct and indirect sources; and quantify applicable air quality and GHG reductions achieved from mitigation measures (51). Accordingly, the latest version of CalEEMod™ has been used for this Project to determine construction and operational air quality impacts. Output from the model runs for both construction and operational activity are provided in Appendix 3.1.

3.3 CONSTRUCTION AND OPERATIONAL LIFE-CYCLE ANALYSIS

A full life-cycle analysis (LCA) for construction and operational activity is not included in this analysis due to the lack of consensus guidance on LCA methodology at this time. Life-cycle analysis (i.e., assessing economy-wide GHG emissions from the processes in manufacturing and transporting all raw materials used in the project development, infrastructure and on-going operations) depends on emission factors or econometric factors that are not well established for all processes. At this time a LCA would be extremely speculative and thus has not been prepared.

3.4 CONSTRUCTION EMISSIONS

Construction activities associated with the proposed Project will result in emissions of CO2 and CH4 from construction activities.

The report Legacy Park (Tentative Tract Map No. 36760) Air Quality Impact Analysis Report, Urban Crossroads, Inc. (2016) contains detailed information regarding construction activity (52).

For construction phase Project emissions, GHGs are quantified and amortized over the life of the Project. To amortize the emissions over the life of the Project, the SCAQMD recommends calculating the total greenhouse gas emissions for the construction activities, dividing it by a 30-year project life then adding that number to the annual operational phase GHG emissions (53). As such, construction emissions were amortized over a 30-year period and added to the annual operational phase GHG emissions.

3.5 OPERATIONAL EMISSIONS

Operational activities associated with the proposed Project will result in emissions of CO2, CH4, and N2O from the following primary sources:

- Area Source Emissions
- Energy Source Emissions
- Mobile Source Emissions
- Solid Waste
- Water Supply, Treatment and Distribution

3.5.1 AREA SOURCE EMISSIONS

Hearths/Fireplaces

GHG emissions would result from the combustion of wood or biomass and are considered biogenic emissions of CO2. The emissions associated with use of hearths/fireplaces were calculated based on assumptions provided in the CalEEMod model. The Project is required to comply with SCAQMD Rule 445, which prohibits the use of wood burning stoves and fireplaces in new development. In order to account for the requirements of this Rule, the unmitigated CalEEMod model estimates were adjusted to remove wood burning stoves and fireplaces. As the project is required to comply with SCAQMD Rule 445, the removal of wood burning stoves and fireplaces is not considered "mitigation" although it must be identified as such in CalEEMod in order to treat the case appropriately.

Landscape Maintenance Equipment

Landscape maintenance equipment would generate emissions from fuel combustion and evaporation of unburned fuel. Equipment in this category would include lawnmowers, shedders/grinders, blowers, trimmers, chain saws, and hedge trimmers used to maintain the landscaping of the Project. CalEEMod default parameters were used to estimate emissions associated with landscape maintenance equipment for the Project scenario.

3.5.2 ENERGY SOURCE EMISSIONS

Combustion Emissions Associated with Natural Gas and Electricity

GHGs are emitted from buildings as a result of activities for which electricity and natural gas are typically used as energy sources. Combustion of any type of fuel emits CO2 and other GHGs directly into the atmosphere; these emissions are considered direct emissions associated with a building. GHGs are also emitted during the generation of electricity from fossil fuels; these emissions are considered to be indirect emissions. CalEEmod default parameters were used to estimate electricity and natural gas demand for the Project scenario.

3.5.3 MOBILE SOURCE EMISSIONS

Vehicles

GHG emissions will also result from mobile sources associated with the Project. These mobile source emissions will result from the typical daily operation of motor vehicles by visitors and residents. Trip characteristics available from the report, Legacy Park (Tentative Tract Map No. 36760) Traffic Impact Analysis (Urban Crossroads) 2016 were utilized in this analysis (54). A fleet mix consistent with the Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol was used in this report in order to appropriately represent vehicular trips from a primarily residential development (55).

3.5.4 SOLID WASTE

Residential land uses will result in the generation and disposal of solid waste. A large percentage of this waste will be diverted from landfills by a variety of means, such as reducing the amount of waste generated, recycling, and/or composting. The remainder of the waste not diverted will be disposed of at a landfill. GHG emissions from landfills are associated with the anaerobic breakdown of material. CalEEmod default parameters were used to estimate GHG emissions associated with the disposal of solid waste for the Project scenario.

3.5.5 WATER SUPPLY, TREATMENT AND DISTRIBUTION

Indirect GHG emissions result from the production of electricity used to convey, treat and distribute water and wastewater. The amount of electricity required to convey, treat and distribute water depends on the volume of water as well as the sources of the water. CalEEMod default parameters were used to estimate GHG emissions associated with water supply, treatment and distribution for the Project scenario.

3.6 EMISSIONS SUMMARY

According to the City of Moreno Valley Census, the latest Persons per Household data (2010-2014) is 3.91 (56). The Project proposes to construct 221 single family detached dwelling units. As such, the Project would result in approximately 864 Persons per Household. The annual GHG emissions associated with the operation of the proposed Project are estimated to be 3,992.20 MTCO2e per year. As shown in Table 3-1, the total annual Project efficiency threshold would be 4.62 MTCO2e per year. The Project would not exceed the Project efficiency threshold of 4.8 MTCO2e per year and therefore would result in a less than significant impact with respect to the Project efficiency threshold.

TABLE 3-1: TOTAL PROJECT GREENHOUSE GAS EMISSIONS (ANNUAL)

Emission Source	Emissions (metric tons per year)			
	CO_2	CH_4	N_2O	Total CO_2E
Annual construction-related emissions amortized over 30 years	37.06	4.16E-03	0.00	37.16
Area	56.79	4.63E-03	9.70E-04	57.20
Energy	888.47	4.00E-02	1.00E-02	523.66
Mobile Source	3,157.07	1.60E-01	0	3,161.18
Waste	52.60	3.11	0.00	130.31
Water Usage	67.33	0.47	1.00E-02	82.69
Total CO_2E (All Sources)	**3,992.20**			
Total Service Population (Persons Per Household)	**864**			
Total CO2E (All Sources/ Service Population))	**4.62**			
Threshold (Persons Per Household	**4.8**			
Significant?	**NO**			

Source: CalEEMod™ model output, See Appendix 3.1 for detailed model outputs.
Note: Totals obtained from CalEEMod™ and may not total 100% due to rounding. Table results include scientific notation. *e* is used to represent *times ten raised to the power of* (which would be written as x 10^{b}") and is followed by the value of the exponent

Attachment: Greenhouse Gas Analysis (2444 : Legacy Park Project)

4 CONCLUSION

The City of Moreno Valley has not adopted its own numeric threshold of significance for determining impacts with respect to GHG emissions. The SCAQMD has convened aWorking Group. Based on the last Working Group meeting (Meeting No. 15) held in September 2010, SCAQMD is proposing to adopt a tiered approach for evaluating GHG emissions for development projects where SCAQMD is not the lead agency. SCAQMD had proposed a Project level efficiency significance threshold, in which a 2020 statewide population and employment for land use sectors was divided by 2020 statewide SP, amounting to a 4.8 MTCO2e per service population threshold (1). The City will utilize the Project level efficiency significance threshold approach recommended in the SCAQMD's Interim Thresholds document for commercial, residential, and mixed use projects.

Thus, and based on guidance from the SCAQMD, if a residential project would emit GHGs less than 4.8 MTCO2e per service population, the project is not considered a substantial GHG emitter and the GHG impact is less than significant. On the other hand, if a residential project would emit GHGs in excess of 4.8 MTCO2e per service population, then the project could be considered a substantial GHG emitter, requiring additional analysis and potential mitigation.

As shown in Table 4-1, the proposed project would result in approximately 4.62 MTCO2e per service population and would not exceed the threshold of 4.8 MTCO2e per service population. Therefore, project-related emissions would not have a significant direct or indirect impact on GHG and climate change.

TABLE 4-1: TOTAL PROJECT GREENHOUSE GAS EMISSIONS (ANNUAL)

Emission Source	Emissions (metric tons per year)			
	CO_2	CH_4	N_2O	Total CO_2E
Annual construction-related emissions amortized over 30 years	37.06	4.16E-03	0.00	37.16
Area	56.79	4.63E-03	9.70E-04	57.20
Energy	888.47	4.00E-02	1.00E-02	523.66
Mobile Source	3,157.07	1.60E-01	0	3,161.18
Waste	52.60	3.11	0.00	130.31
Water Usage	67.33	0.47	1.00E-02	82.69
Total CO_2E (All Sources)	**3,992.20**			
Total Service Population (Persons Per Household)	**864**			
Total CO2E (All Sources/ Service Population))	**4.62**			
Threshold (Persons Per Household	**4.8**			
Significant?	**NO**			

The Project would not conflict with the City of Moreno Valley Energy Efficiency and Climate Action Strategy

The Project is consistent with and supports the CAS, which is the applicable plan, policy or regulation adopted for the purpose of reducing greenhouse gases. Project consistency with the CAS is detailed in Section 2.10.

CONSTRUCTION AND OPERATIONAL-SOURCE MITIGATION MEASURES

No significant impacts were identified, therefore, no mitigation measures are required.

5 REFERENCES

1. *Greenhouse Gas CEQA Significance Threshold Stakeholder Working Group Meeting #15.* **South Coast Air Quality Management District.** Diamond Bar : s.n., 2010.

2. **South Coast Air Quality Management District.** RULE 1186. PM10 Emissions From Paved and Unpaved Roads, and Livestock Operations. [Online] http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1186-1-less-polluting-sweepers.pdf?sfvrsn=4.

3. —. *Localized Significance Thresholds Methodology.* s.l. : South Coast Air Quality Managment District, 2003.

4. **Air Resources Board.** Clean Car Standards - Pavley, Assembly Bill 1493. [Online] September 24, 2009. [Cited: November 13, 2013.] http://www.arb.ca.gov/cc/ccms/ccms.htm.

5. **Building Standards Commission.** California Building Standards Code (Title 24, California Code of Regulations). [Online] [Cited: 13 2013, November.] http://www.bsc.ca.gov/codes.aspx.

6. **California Energy Commission.** California Code of Regulations, TITLE 20, Division 2. [Online] September 3, 2013. [Cited: November 13, 2013.] http://www.energy.ca.gov/reports/title20/index.html.

7. **South Coast Air Quality Management District.** RULE 1113. Architectural Coatings. [Online] http://www.aqmd.gov/rules/reg/reg11/r1113.pdf.

8. **Environmental Protection Agency.** Monitor Values Report. [Online] [Cited: September 17, 2014.] http://www.epa.gov/airdata/ad_rep_mon.html.

9. **California Energy Commission.** SB 1368 Emission Performance Standards. [Online] September 29, 2006. [Cited: November 13, 2013.] http://www.energy.ca.gov/emission_standards/.

10. **California Environmental Quality Act.** Checklist. [Online] [Cited: September 17, 2014.] http://ceres.ca.gov/ceqa/guidelines/Appendix_G.html.

11. **United Nations.** Flexible GHG Data Queries. [Online] [Cited: November 13, 2013.] http://unfccc.int/ghg_data/ghg_data_unfccc/time_series_annex_i/items/3841.php.

12. **U.S. Energy Information Administration.** [Online] http://www.eia.gov/.

13. **Environmental Protection Agency.** Inventory of U.S. Greenhouse Gas Emissions and Sinks. [Online] April 12, 2013. http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2013-Main-Text.pdf.

14. **Air Resources Board.** Reducing Climate Change Emissions From Motor Vehicles. [Online] [Cited: November 13, 2013.] http://www.arb.ca.gov/cc/factsheets/ccfactsheet.pdf.

15. **World Resources Institute.** Climate Analysis Indicator Tool (CAIT). [Online] [Cited: 13 2013, November.] http://cait.wri.org.

16. *The Carbon Cycle and Climate Change.* **Bennington, Bret J.** 1, s.l. : Brooks/Cole. ISBN 1 3: 978-0-495-73855-8.

17. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report.* **International Panel on Climate Change.** 4, 2007.

18. *Occupational Safety and Health Guideline for Nitrous Oxide.* **U.S. Department of Labor.**

19. **Environmental Protection Agency.** Overview of Greenhouse Gases. [Online] [Cited: November 13, 2013.] http://www.epa.gov/highgwp/scientific.html.

20. **American Lung Association.** Climate Change. [Online] 2013. [Cited: November 13, 2013.] http://www.lung.org/associations/states/california/advocacy/climate-change/.
21. **The National Institute for Occupational Safety and Health.** [Online] [Cited: November 13, 2013.] http://www.cdc.gov/niosh/.
22. **Occupational Health and Safety Administration.** [Online] [Cited: November 13, 2013.] https://www.osha.gov/.
23. **Hardin, Mary and Kahn, Ralph.** Aerosols & Climate Change. *Earth Observatory.* [Online] http://earthobservatory.nasa.gov/Features/Aerosols/.
24. **President Obama.** *Climate Action PLan.* 2014.
25. **The White House.** Climate Change and President Obama's Action Plan. [Online] 2014. [Cited: April 6, 2015.] https://www.whitehouse.gov/climate-change.
26. **European Commission.** Climate Action- Paris Agreement. [Online] http://ec.europa.eu/clima/policies/international/negotiations/future/index_en.htm.
27. **United Nations Framework Convention on Climate Change (UNFCCC).** Historic Paris Agreement on Climate Change. [Online]
28. **United Nations Framework Convention on Climate Change.** The Paris Agreement. [Online] 2016. http://unfccc.int/paris_agreement/items/9485.php.
29. **Environmental Protection Agency.** Air Pollution and the Clean Air Act. [Online] [Cited: November 13, 2013.] http://www.epa.gov/air/caa/.
30. **Building Standards Commission.** California Building Standards Code (Title 24, California Code of Regulations). [Online] [Cited: 17 2014, September.] http://www.bsc.ca.gov/codes.aspx.
31. —. CALGreen. [Online] 2010. [Cited: September 17, 2014.] http://www.bsc.ca.gov/home/calgreen.aspx.
32. **Air Resources Board.** Clean Car Standards - Pavley, Assembly Bill 1493. [Online] September 24, 2009. [Cited: September 17, 2014.] http://www.arb.ca.gov/cc/ccms/ccms.htm.
33. **Environmental Protection Agency.** State and Local Climate and Energy Program. [Online] [Cited: September 17, 2014.] http://www.epa.gov/statelocalclimate/state/tracking/individual/ca.html.
34. **Air Resources Board.** Assembly Bill 32: Global Warming Solutions Act. [Online] 2006. [Cited: September 17, 2014.] http://www.arb.ca.gov/cc/ab32/ab32.htm.
35. —. Status of Scoping Plan Recommended Measures. [Online] July 25, 2011. [Cited: September 23, 2014.] http://www.arb.ca.gov/cc/scopingplan/status_of_scoping_plan_measures.pdf.
36. —. Final Supplement to the AB 32 Scoping Plan Functional Equivalent Document. [Online] August 19, 2011. [Cited: September 23, 2014.] http://www.arb.ca.gov/cc/scopingplan/document/final_supplement_to_sp_fed.pdf.
37. —. Climate Change Scoping Plan First Update, Discussion Draft for Public Review and Comment. [Online] May 22, 2014. [Cited: September 23, 2014.] http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf.
38. **State of California.** Senate Bill No. 97. [Online] [Cited: September 17, 2014.] http://opr.ca.gov/docs/SB_97_bill_20070824_chaptered.pdf.
39. —. California Climate Change Executive Orders. [Online] http://www.climatechange.ca.gov/state/executive_orders.html.

40. **Office of Governor Edmund G. Brown Jr.** Governor Brown Estalbished Most Ambitious Greenhouse Gas Reduction Target in North America. [Online] April 29, 2015. https://www.gov.ca.gov/news.php?id=18938.
41. **California Legislative Information.** Senate Bill No. 32. [Online] September 8, 2016. https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB32.
42. **Policy Matters Journal: A Student Publication from the Goldman School of Public Policy.** New California Emissions Targets Spell Next Step in the State's Fight against Climate Change. [Online] September 1, 2016. http://www.policymattersjournal.org/sb32.html.
43. **State of California.** Senate Bill No. 1078. [Online] http://www.energy.ca.gov/portfolio/documents/documents/SB1078.PDF.
44. —. EXECUTIVE ORDER S-14-08. [Online] [Cited: September 17, 2014.] http://gov.ca.gov/news.php?id=11072.
45. **Air Resources Board.** Sustainable Communities. [Online] 2008. [Cited: September 17, 2014.] http://www.arb.ca.gov/cc/sb375/sb375.htm.
46. **Southern California Association of Governments.** Final 2016 RTP/SCS. [Online] April 7, 2016. http://scagrtpscs.net/Pages/FINAL2016RTPSCS.aspx.
47. **U.S Department of Transporation: Federal Highway Administration.** Conformity Determination for SCAG 2016 RTP/SCS. *Southern California Association of Governments.* [Online] June 1, 2016. http://scagrtpscs.net/Documents/2016/notices/FHMW-FTA_2016RTPSCSConformityDetermination_2016-0601.pdf.
48. **California Air Resources Board .** Preliminary Draft Staff Proposal. [Online] October 24, 2008. [Cited: November 13, 2013.] http://www.arb.ca.gov/cc/localgov/ceqa/meetings/102708/prelimdraftproposal102408.pdf.
49. **South Coast Air Quality Management District.** Greenhouse Gases (GHG) CEQA Significance Thresholds. [Online] [Cited: November 13, 2013.] http://www.aqmd.gov/ceqa/handbook/GHG/GHG.html.
50. **California Environmental Quality Act.** Addressing Analysis and Mitigation of Greenhouse Gas . [Online] [Cited: Noveber 13, 2013.] http://ceres.ca.gov/ceqa/docs/Final_Statement_of_Reasons.pdf.
51. **California Air Pollution Control Officers Association (CAPCOA).** California Emissions Estimator Model (CalEEMod). [Online] September 2016. www.caleemod.com.
52. **Urban Crossroads, Inc.** *Legacy Park (Tentative Tract Map No. 36760) Air Quality Impact Analysis Report.* Irvine : s.n., 2016.
53. **South Coast Air Quality Management District.** *Greenhouse Gas CEQA Significance Threshold Stakeholder Working Group #13.* [Powerpoint] Diamond Bar : s.n., 2009.
54. **Urban Crossroads, Inc.** *Legacy Park (Tentative Tract Map No. 36760) Traffic Impact Analysis.* Irvine : s.n., 2016.
55. **California Department of Transportation.** *Transportation Project-Level Carbon Monoxed Protocol.* 1997. UCD-ITS-RR-92-21.
56. **United States Census.** Moreno Valley Census. [Online] http://www.census.gov/quickfacts/table/POP010210/0649270#flag-js-X.

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6 CERTIFICATION

The contents of this greenhouse gas study report represent an accurate depiction of the greenhouse gas impacts associated with the proposed Legacy Park (Tentative Tract Map No. 36760). The information contained in this greenhouse gas report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 336-5987.

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EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May, 2010

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University of California, Irvine • June, 2006

PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Planned Communities and Urban Infill – Urban Land Institute • June, 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April, 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August, 2007
AB2588 Regulatory Standards – Trinity Consultants • November, 2006
Air Dispersion Modeling – Lakes Environmental • June, 2006

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APPENDIX 3.1:

CALEEMOD EMISSIONS MODEL OUTPUTS

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Legacy Park (Tentative Tract Map No. 36760)

Riverside-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	12.00	Acre	12.00	522,720.00	0
Single Family Housing	221.00	Dwelling Unit	40.90	512,278.00	632

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.4 **Precipitation Freq (Days)** 28

Climate Zone 10 **Operational Year** 2021

Utility Company Southern California Edison

CO2 Intensity (lb/MWhr) 479.9 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44.

Land Use - Based on site plan dated September 19, 2016; Total lot acreage: 52.9; Average home size: 2,318 s.f

Construction Phase - Based on past project experience and a 2021 opening year

Off-road Equipment - Based on 8 hour workday

Off-road Equipment - Based on 8 hour workday

Off-road Equipment - Based on past project experience

Off-road Equipment -

Grading -

Construction Off-road Equipment Mitigation -

Vehicle Trips -

Woodstoves - Rule 445- Gas stoves only

Energy Use - .

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstructionPhase	NumDays	75.00	650.00
tblConstructionPhase	NumDays	1,110.00	650.00
tblConstructionPhase	NumDays	110.00	75.00
tblConstructionPhase	NumDays	75.00	55.00
tblConstructionPhase	PhaseEndDate	11/23/2022	12/24/2021
tblConstructionPhase	PhaseEndDate	3/11/2020	9/25/2020
tblConstructionPhase	PhaseEndDate	9/13/2017	1/12/2018
tblConstructionPhase	PhaseEndDate	5/27/2020	3/30/2018
tblConstructionPhase	PhaseStartDate	5/28/2020	6/29/2019
tblConstructionPhase	PhaseStartDate	9/14/2017	3/31/2018
tblConstructionPhase	PhaseStartDate	6/1/2017	10/1/2017
tblConstructionPhase	PhaseStartDate	3/12/2020	1/13/2018

tblFireplaces	NumberGas	187.85	221.00
tblFireplaces	NumberNoFireplace	22.10	0.00
tblFireplaces	NumberWood	11.05	0.00
tblLandUse	BuildingSpaceSquareFeet	397,800.00	512,278.00
tblLandUse	LandUseSquareFeet	397,800.00	512,278.00
tblLandUse	LotAcreage	71.75	40.90
tblOffRoadEquipment	HorsePower	402.00	189.00
tblOffRoadEquipment	LoadFactor	0.38	0.50
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblProjectCharacteristics	CO2IntensityFactor	702.44	479.9
tblProjectCharacteristics	OperationalYear	2018	2021
tblWoodstoves	NumberCatalytic	11.05	0.00
tblWoodstoves	NumberNoncatalytic	11.05	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.2139	2.4482	1.3914	2.3600e-003	0.3335	0.1101	0.4436	0.1371	0.1013	0.2384	0.0000	218.9203	218.9203	0.0650	0.0000	220.5457
2018	0.5706	4.7207	3.9672	9.8200e-003	0.7206	0.2111	0.9317	0.2414	0.1976	0.4390	0.0000	897.5871	897.5871	0.1222	0.0000	900.6431
2019	0.9531	4.9217	4.5096	0.0122	0.5623	0.2068	0.7690	0.1514	0.1950	0.3464	0.0000	1,111.7441	1,111.7441	0.1248	0.0000	1,114.8645
2020	1.1339	3.4991	3.5302	9.7400e-003	0.4700	0.1433	0.6133	0.1263	0.1358	0.2622	0.0000	880.3406	880.3406	0.0923	0.0000	882.6476
2021	0.7301	0.2828	0.5520	1.2600e-003	0.0844	0.0166	0.1010	0.0224	0.0165	0.0389	0.0000	111.8389	111.8389	4.5800e-003	0.0000	111.9534
Maximum	**1.1339**	**4.9217**	**4.5096**	**0.0122**	**0.7206**	**0.2111**	**0.9317**	**0.2414**	**0.1976**	**0.4390**	**0.0000**	**1,111.7441**	**1,111.7441**	**0.1248**	**0.0000**	**1,114.8645**

Attachment: Greenhouse Gas Analysis (2444 : Legacy Park Project)

2.1 Overall Construction

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.2139	2.4482	1.3914	2.3600e-003	0.1351	0.1101	0.2452	0.0548	0.1013	0.1561	0.0000	218.9200	218.9200	0.0650	0.0000	220.5454
2018	0.5706	4.7207	3.9672	9.8200e-003	0.5222	0.2111	0.7333	0.1591	0.1976	0.3567	0.0000	897.5867	897.5867	0.1222	0.0000	900.6426
2019	0.9531	4.9217	4.5096	0.0122	0.5623	0.2068	0.7690	0.1514	0.1950	0.3464	0.0000	1,111.7437	1,111.7437	0.1248	0.0000	1,114.8641
2020	1.1339	3.4990	3.5302	9.7400e-003	0.4700	0.1433	0.6133	0.1263	0.1358	0.2622	0.0000	880.3403	880.3403	0.0923	0.0000	882.6473
2021	0.7301	0.2828	0.5520	1.2600e-003	0.0844	0.0166	0.1010	0.0224	0.0165	0.0389	0.0000	111.8389	111.8389	4.5800e-003	0.0000	111.9534
Maximum	**1.1339**	**4.9217**	**4.5096**	**0.0122**	**0.5623**	**0.2111**	**0.7690**	**0.1591**	**0.1976**	**0.3567**	**0.0000**	**1,111.7437**	**1,111.7437**	**0.1248**	**0.0000**	**1,114.8641**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**18.28**	**0.00**	**13.88**	**24.25**	**0.00**	**12.42**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
2	**9-1-2017**	**11-30-2017**	1.7846	1.7846
3	**12-1-2017**	**2-28-2018**	1.5457	1.5457
4	**3-1-2018**	**5-31-2018**	1.2021	1.2021
5	**6-1-2018**	**8-31-2018**	1.4677	1.4677
6	**9-1-2018**	**11-30-2018**	1.4519	1.4519
7	**12-1-2018**	**2-28-2019**	1.3508	1.3508

8	**3-1-2019**	**5-31-2019**	1.3353	1.3353
9	**6-1-2019**	**8-31-2019**	1.5296	1.5296
10	**9-1-2019**	**11-30-2019**	1.5966	1.5966
11	**12-1-2019**	**2-29-2020**	1.5084	1.5084
12	**3-1-2020**	**5-31-2020**	1.4799	1.4799
13	**6-1-2020**	**8-31-2020**	1.4803	1.4803
14	**9-1-2020**	**11-30-2020**	0.5958	0.5958
15	**12-1-2020**	**2-28-2021**	0.2580	0.2580
16	**3-1-2021**	**5-31-2021**	0.2605	0.2605
17	**6-1-2021**	**8-31-2021**	0.2605	0.2605
18	**9-1-2021**	**9-30-2021**	0.0850	0.0850
		Highest	1.7846	1.7846

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	2.1270	0.0722	2.3037	4.1000e-004		0.0163	0.0163		0.0163	0.0163	0.0000	56.7935	56.7935	4.6300e-003	9.7000e-004	57.1991
Energy	0.0442	0.3781	0.1609	2.4100e-003		0.0306	0.0306		0.0306	0.0306	0.0000	888.4663	888.4663	0.0356	0.0137	893.4279
Mobile	0.6530	5.6138	8.2201	0.0360	2.7241	0.0264	2.7504	0.7299	0.0248	0.7546	0.0000	3,332.0814	3,332.0814	0.1692	0.0000	3,336.3102
Waste						0.0000	0.0000		0.0000	0.0000	52.5990	0.0000	52.5990	3.1085	0.0000	130.3118
Water						0.0000	0.0000		0.0000	0.0000	4.5682	62.7661	67.3343	0.4730	0.0119	82.6942
Total	**2.8243**	**6.0641**	**10.6847**	**0.0388**	**2.7241**	**0.0732**	**2.7973**	**0.7299**	**0.0716**	**0.8015**	**57.1672**	**4,340.1073**	**4,397.2744**	**3.7909**	**0.0265**	**4,499.9432**

2.2 Overall Operational

Mitigated Operational

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Area	2.1270	0.0722	2.3037	4.1000e-004		0.0163	0.0163		0.0163	0.0163	0.0000	56.7935	56.7935	4.6300e-003	9.7000e-004	57.1991
Energy	0.0442	0.3781	0.1609	2.4100e-003		0.0306	0.0306		0.0306	0.0306	0.0000	888.4663	888.4663	0.0356	0.0137	893.4279
Mobile	0.6530	5.6138	8.2201	0.0360	2.7241	0.0264	2.7504	0.7299	0.0248	0.7546	0.0000	3,332.0814	3,332.0814	0.1692	0.0000	3,336.3102
Waste						0.0000	0.0000		0.0000	0.0000	52.5990	0.0000	52.5990	3.1085	0.0000	130.3118
Water						0.0000	0.0000		0.0000	0.0000	4.5682	62.7661	67.3343	0.4730	0.0119	82.6942
Total	**2.8243**	**6.0641**	**10.6847**	**0.0388**	**2.7241**	**0.0732**	**2.7973**	**0.7299**	**0.0716**	**0.8015**	**57.1672**	**4,340.1073**	**4,397.2744**	**3.7909**	**0.0265**	**4,499.9432**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	10/1/2017	1/12/2018	5	75	
2	Paving	Paving	1/13/2018	3/30/2018	5	55	
3	Building Construction	Building Construction	3/31/2018	9/25/2020	5	650	
4	Architectural Coating	Architectural Coating	6/29/2019	12/24/2021	5	650	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 187.5

Acres of Paving: 12

Residential Indoor: 1,037,363; Residential Outdoor: 345,788; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 31,363 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Off-Highway Trucks	1	8.00	189	0.50
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Architectural Coating	Air Compressors	1	8.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	9	23.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	299.00	109.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	60.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3253	0.0000	0.3253	0.1349	0.0000	0.1349	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2094	2.4446	1.3554	2.2800e-003		0.1101	0.1101		0.1013	0.1013	0.0000	211.3836	211.3836	0.0648	0.0000	213.0028
Total	**0.2094**	**2.4446**	**1.3554**	**2.2800e-003**	**0.3253**	**0.1101**	**0.4353**	**0.1349**	**0.1013**	**0.2362**	**0.0000**	**211.3836**	**211.3836**	**0.0648**	**0.0000**	**213.0028**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.5100e-003	3.5100e-003	0.0360	8.0000e-005	8.2200e-003	5.0000e-005	8.2700e-003	2.1800e-003	5.0000e-005	2.2300e-003	0.0000	7.5366	7.5366	2.5000e-004	0.0000	7.5428
Total	**4.5100e-003**	**3.5100e-003**	**0.0360**	**8.0000e-005**	**8.2200e-003**	**5.0000e-005**	**8.2700e-003**	**2.1800e-003**	**5.0000e-005**	**2.2300e-003**	**0.0000**	**7.5366**	**7.5366**	**2.5000e-004**	**0.0000**	**7.5428**

3.2 Grading - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1269	0.0000	0.1269	0.0526	0.0000	0.0526	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2094	2.4446	1.3554	2.2800e-003		0.1101	0.1101		0.1013	0.1013	0.0000	211.3834	211.3834	0.0648	0.0000	213.0026
Total	**0.2094**	**2.4446**	**1.3554**	**2.2800e-003**	**0.1269**	**0.1101**	**0.2369**	**0.0526**	**0.1013**	**0.1539**	**0.0000**	**211.3834**	**211.3834**	**0.0648**	**0.0000**	**213.0026**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.5100e-003	3.5100e-003	0.0360	8.0000e-005	8.2200e-003	5.0000e-005	8.2700e-003	2.1800e-003	5.0000e-005	2.2300e-003	0.0000	7.5366	7.5366	2.5000e-004	0.0000	7.5428
Total	**4.5100e-003**	**3.5100e-003**	**0.0360**	**8.0000e-005**	**8.2200e-003**	**5.0000e-005**	**8.2700e-003**	**2.1800e-003**	**5.0000e-005**	**2.2300e-003**	**0.0000**	**7.5366**	**7.5366**	**2.5000e-004**	**0.0000**	**7.5428**

3.2 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3253	0.0000	0.3253	0.1349	0.0000	0.1349	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0283	0.3264	0.1883	3.5000e-004		0.0144	0.0144		0.0132	0.0132	0.0000	32.0108	32.0108	9.9700e-003	0.0000	32.2599
Total	**0.0283**	**0.3264**	**0.1883**	**3.5000e-004**	**0.3253**	**0.0144**	**0.3396**	**0.1349**	**0.0132**	**0.1481**	**0.0000**	**32.0108**	**32.0108**	**9.9700e-003**	**0.0000**	**32.2599**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.2000e-004	4.7000e-004	4.8700e-003	1.0000e-005	1.2600e-003	1.0000e-005	1.2700e-003	3.4000e-004	1.0000e-005	3.4000e-004	0.0000	1.1265	1.1265	3.0000e-005	0.0000	1.1273
Total	**6.2000e-004**	**4.7000e-004**	**4.8700e-003**	**1.0000e-005**	**1.2600e-003**	**1.0000e-005**	**1.2700e-003**	**3.4000e-004**	**1.0000e-005**	**3.4000e-004**	**0.0000**	**1.1265**	**1.1265**	**3.0000e-005**	**0.0000**	**1.1273**

3.2 Grading - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1269	0.0000	0.1269	0.0526	0.0000	0.0526	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0283	0.3264	0.1883	3.5000e-004		0.0144	0.0144		0.0132	0.0132	0.0000	32.0107	32.0107	9.9700e-003	0.0000	32.2599
Total	**0.0283**	**0.3264**	**0.1883**	**3.5000e-004**	**0.1269**	**0.0144**	**0.1412**	**0.0526**	**0.0132**	**0.0658**	**0.0000**	**32.0107**	**32.0107**	**9.9700e-003**	**0.0000**	**32.2599**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.2000e-004	4.7000e-004	4.8700e-003	1.0000e-005	1.2600e-003	1.0000e-005	1.2700e-003	3.4000e-004	1.0000e-005	3.4000e-004	0.0000	1.1265	1.1265	3.0000e-005	0.0000	1.1273
Total	**6.2000e-004**	**4.7000e-004**	**4.8700e-003**	**1.0000e-005**	**1.2600e-003**	**1.0000e-005**	**1.2700e-003**	**3.4000e-004**	**1.0000e-005**	**3.4000e-004**	**0.0000**	**1.1265**	**1.1265**	**3.0000e-005**	**0.0000**	**1.1273**

3.3 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0452	0.4818	0.4069	6.3000e-004		0.0263	0.0263		0.0242	0.0242	0.0000	57.2320	57.2320	0.0178	0.0000	57.6774
Paving	0.0157					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0609**	**0.4818**	**0.4069**	**6.3000e-004**		**0.0263**	**0.0263**		**0.0242**	**0.0242**	**0.0000**	**57.2320**	**57.2320**	**0.0178**	**0.0000**	**57.6774**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.2400e-003	1.6900e-003	0.0175	4.0000e-005	4.5300e-003	3.0000e-005	4.5600e-003	1.2000e-003	3.0000e-005	1.2300e-003	0.0000	4.0406	4.0406	1.2000e-004	0.0000	4.0436
Total	**2.2400e-003**	**1.6900e-003**	**0.0175**	**4.0000e-005**	**4.5300e-003**	**3.0000e-005**	**4.5600e-003**	**1.2000e-003**	**3.0000e-005**	**1.2300e-003**	**0.0000**	**4.0406**	**4.0406**	**1.2000e-004**	**0.0000**	**4.0436**

3.3 Paving - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0452	0.4818	0.4069	6.3000e-004		0.0263	0.0263		0.0242	0.0242	0.0000	57.2319	57.2319	0.0178	0.0000	57.6773
Paving	0.0157					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0609**	**0.4818**	**0.4069**	**6.3000e-004**		**0.0263**	**0.0263**		**0.0242**	**0.0242**	**0.0000**	**57.2319**	**57.2319**	**0.0178**	**0.0000**	**57.6773**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.2400e-003	1.6900e-003	0.0175	4.0000e-005	4.5300e-003	3.0000e-005	4.5600e-003	1.2000e-003	3.0000e-005	1.2300e-003	0.0000	4.0406	4.0406	1.2000e-004	0.0000	4.0436
Total	**2.2400e-003**	**1.6900e-003**	**0.0175**	**4.0000e-005**	**4.5300e-003**	**3.0000e-005**	**4.5600e-003**	**1.2000e-003**	**3.0000e-005**	**1.2300e-003**	**0.0000**	**4.0406**	**4.0406**	**1.2000e-004**	**0.0000**	**4.0436**

Attachment: Greenhouse Gas Analysis (2444 : Legacy Park Project)

3.4 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2794	2.4724	1.8397	2.8200e-003		0.1575	0.1575		0.1478	0.1478	0.0000	249.8917	249.8917	0.0623	0.0000	251.4503
Total	**0.2794**	**2.4724**	**1.8397**	**2.8200e-003**		**0.1575**	**0.1575**		**0.1478**	**0.1478**	**0.0000**	**249.8917**	**249.8917**	**0.0623**	**0.0000**	**251.4503**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0400	1.3177	0.2693	2.7900e-003	0.0675	0.0109	0.0784	0.0195	0.0105	0.0299	0.0000	266.2621	266.2621	0.0234	0.0000	266.8472
Worker	0.1591	0.1202	1.2408	3.1800e-003	0.3221	2.0500e-003	0.3241	0.0855	1.8900e-003	0.0874	0.0000	287.0234	287.0234	8.5600e-003	0.0000	287.2374
Total	**0.1991**	**1.4379**	**1.5101**	**5.9700e-003**	**0.3895**	**0.0130**	**0.4025**	**0.1050**	**0.0124**	**0.1173**	**0.0000**	**553.2856**	**553.2856**	**0.0320**	**0.0000**	**554.0846**

Attachment: Greenhouse Gas Analysis (2444 : Legacy Park Project)

3.4 Building Construction - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2794	2.4724	1.8397	2.8200e-003		0.1575	0.1575		0.1478	0.1478	0.0000	249.8914	249.8914	0.0623	0.0000	251.4500
Total	**0.2794**	**2.4724**	**1.8397**	**2.8200e-003**		**0.1575**	**0.1575**		**0.1478**	**0.1478**	**0.0000**	**249.8914**	**249.8914**	**0.0623**	**0.0000**	**251.4500**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0400	1.3177	0.2693	2.7900e-003	0.0675	0.0109	0.0784	0.0195	0.0105	0.0299	0.0000	266.2621	266.2621	0.0234	0.0000	266.8472
Worker	0.1591	0.1202	1.2408	3.1800e-003	0.3221	2.0500e-003	0.3241	0.0855	1.8900e-003	0.0874	0.0000	287.0234	287.0234	8.5600e-003	0.0000	287.2374
Total	**0.1991**	**1.4379**	**1.5101**	**5.9700e-003**	**0.3895**	**0.0130**	**0.4025**	**0.1050**	**0.0124**	**0.1173**	**0.0000**	**553.2856**	**553.2856**	**0.0320**	**0.0000**	**554.0846**

Attachment: Greenhouse Gas Analysis (2444 : Legacy Park Project)

3.4 Building Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3278	2.9632	2.3900	3.7600e-003		0.1801	0.1801		0.1691	0.1691	0.0000	328.9174	328.9174	0.0817	0.0000	330.9609
Total	**0.3278**	**2.9632**	**2.3900**	**3.7600e-003**		**0.1801**	**0.1801**		**0.1691**	**0.1691**	**0.0000**	**328.9174**	**328.9174**	**0.0817**	**0.0000**	**330.9609**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0482	1.6416	0.3268	3.6800e-003	0.0899	0.0124	0.1022	0.0259	0.0118	0.0378	0.0000	352.2212	352.2212	0.0300	0.0000	352.9716
Worker	0.1938	0.1412	1.4806	4.1000e-003	0.4289	2.6900e-003	0.4316	0.1139	2.4800e-003	0.1164	0.0000	370.5323	370.5323	0.0101	0.0000	370.7858
Total	**0.2420**	**1.7827**	**1.8073**	**7.7800e-003**	**0.5187**	**0.0151**	**0.5338**	**0.1398**	**0.0143**	**0.1541**	**0.0000**	**722.7536**	**722.7536**	**0.0402**	**0.0000**	**723.7573**

3.4 Building Construction - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3278	2.9632	2.3900	3.7600e-003		0.1801	0.1801		0.1691	0.1691	0.0000	328.9171	328.9171	0.0817	0.0000	330.9605
Total	**0.3278**	**2.9632**	**2.3900**	**3.7600e-003**		**0.1801**	**0.1801**		**0.1691**	**0.1691**	**0.0000**	**328.9171**	**328.9171**	**0.0817**	**0.0000**	**330.9605**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0482	1.6416	0.3268	3.6800e-003	0.0899	0.0124	0.1022	0.0259	0.0118	0.0378	0.0000	352.2212	352.2212	0.0300	0.0000	352.9716
Worker	0.1938	0.1412	1.4806	4.1000e-003	0.4289	2.6900e-003	0.4316	0.1139	2.4800e-003	0.1164	0.0000	370.5323	370.5323	0.0101	0.0000	370.7858
Total	**0.2420**	**1.7827**	**1.8073**	**7.7800e-003**	**0.5187**	**0.0151**	**0.5338**	**0.1398**	**0.0143**	**0.1541**	**0.0000**	**722.7536**	**722.7536**	**0.0402**	**0.0000**	**723.7573**

Attachment: Greenhouse Gas Analysis (2444 : Legacy Park Project)

3.4 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2176	1.9927	1.7339	2.7800e-003		0.1153	0.1153		0.1083	0.1083	0.0000	239.4923	239.4923	0.0597	0.0000	240.9847
Total	**0.2176**	**1.9927**	**1.7339**	**2.7800e-003**		**0.1153**	**0.1153**		**0.1083**	**0.1083**	**0.0000**	**239.4923**	**239.4923**	**0.0597**	**0.0000**	**240.9847**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0299	1.0940	0.2140	2.7000e-003	0.0664	6.1900e-003	0.0726	0.0192	5.9200e-003	0.0251	0.0000	258.6370	258.6370	0.0207	0.0000	259.1538
Worker	0.1326	0.0929	0.9921	2.9400e-003	0.3171	1.9500e-003	0.3191	0.0842	1.8000e-003	0.0860	0.0000	265.3346	265.3346	6.6400e-003	0.0000	265.5007
Total	**0.1625**	**1.1870**	**1.2062**	**5.6400e-003**	**0.3836**	**8.1400e-003**	**0.3917**	**0.1034**	**7.7200e-003**	**0.1111**	**0.0000**	**523.9716**	**523.9716**	**0.0273**	**0.0000**	**524.6545**

Attachment: Greenhouse Gas Analysis (2444 : Legacy Park Project)

3.4 Building Construction - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2176	1.9927	1.7339	2.7800e-003		0.1153	0.1153		0.1083	0.1083	0.0000	239.4920	239.4920	0.0597	0.0000	240.9844
Total	**0.2176**	**1.9927**	**1.7339**	**2.7800e-003**		**0.1153**	**0.1153**		**0.1083**	**0.1083**	**0.0000**	**239.4920**	**239.4920**	**0.0597**	**0.0000**	**240.9844**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0299	1.0940	0.2140	2.7000e-003	0.0664	6.1900e-003	0.0726	0.0192	5.9200e-003	0.0251	0.0000	258.6370	258.6370	0.0207	0.0000	259.1538
Worker	0.1326	0.0929	0.9921	2.9400e-003	0.3171	1.9500e-003	0.3191	0.0842	1.8000e-003	0.0860	0.0000	265.3346	265.3346	6.6400e-003	0.0000	265.5007
Total	**0.1625**	**1.1870**	**1.2062**	**5.6400e-003**	**0.3836**	**8.1400e-003**	**0.3917**	**0.1034**	**7.7200e-003**	**0.1111**	**0.0000**	**523.9716**	**523.9716**	**0.0273**	**0.0000**	**524.6545**

3.5 Architectural Coating - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.3402					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0235	0.1615	0.1620	2.6000e-004		0.0113	0.0113		0.0113	0.0113	0.0000	22.4686	22.4686	1.9000e-003	0.0000	22.5161
Total	**0.3637**	**0.1615**	**0.1620**	**2.6000e-004**		**0.0113**	**0.0113**		**0.0113**	**0.0113**	**0.0000**	**22.4686**	**22.4686**	**1.9000e-003**	**0.0000**	**22.5161**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0197	0.0143	0.1503	4.2000e-004	0.0435	2.7000e-004	0.0438	0.0116	2.5000e-004	0.0118	0.0000	37.6045	37.6045	1.0300e-003	0.0000	37.6302
Total	**0.0197**	**0.0143**	**0.1503**	**4.2000e-004**	**0.0435**	**2.7000e-004**	**0.0438**	**0.0116**	**2.5000e-004**	**0.0118**	**0.0000**	**37.6045**	**37.6045**	**1.0300e-003**	**0.0000**	**37.6302**

3.5 Architectural Coating - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.3402					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0235	0.1615	0.1620	2.6000e-004		0.0113	0.0113		0.0113	0.0113	0.0000	22.4686	22.4686	1.9000e-003	0.0000	22.5161
Total	**0.3637**	**0.1615**	**0.1620**	**2.6000e-004**		**0.0113**	**0.0113**		**0.0113**	**0.0113**	**0.0000**	**22.4686**	**22.4686**	**1.9000e-003**	**0.0000**	**22.5161**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0197	0.0143	0.1503	4.2000e-004	0.0435	2.7000e-004	0.0438	0.0116	2.5000e-004	0.0118	0.0000	37.6045	37.6045	1.0300e-003	0.0000	37.6302
Total	**0.0197**	**0.0143**	**0.1503**	**4.2000e-004**	**0.0435**	**2.7000e-004**	**0.0438**	**0.0116**	**2.5000e-004**	**0.0118**	**0.0000**	**37.6045**	**37.6045**	**1.0300e-003**	**0.0000**	**37.6302**

3.5 Architectural Coating - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.6753					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0423	0.2941	0.3199	5.2000e-004		0.0194	0.0194		0.0194	0.0194	0.0000	44.5968	44.5968	3.4500e-003	0.0000	44.6832
Total	**0.7176**	**0.2941**	**0.3199**	**5.2000e-004**		**0.0194**	**0.0194**		**0.0194**	**0.0194**	**0.0000**	**44.5968**	**44.5968**	**3.4500e-003**	**0.0000**	**44.6832**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0361	0.0253	0.2703	8.0000e-004	0.0864	5.3000e-004	0.0869	0.0229	4.9000e-004	0.0234	0.0000	72.2800	72.2800	1.8100e-003	0.0000	72.3252
Total	**0.0361**	**0.0253**	**0.2703**	**8.0000e-004**	**0.0864**	**5.3000e-004**	**0.0869**	**0.0229**	**4.9000e-004**	**0.0234**	**0.0000**	**72.2800**	**72.2800**	**1.8100e-003**	**0.0000**	**72.3252**

3.5 Architectural Coating - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.6753					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0423	0.2941	0.3199	5.2000e-004		0.0194	0.0194		0.0194	0.0194	0.0000	44.5968	44.5968	3.4500e-003	0.0000	44.6831
Total	**0.7176**	**0.2941**	**0.3199**	**5.2000e-004**		**0.0194**	**0.0194**		**0.0194**	**0.0194**	**0.0000**	**44.5968**	**44.5968**	**3.4500e-003**	**0.0000**	**44.6831**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0361	0.0253	0.2703	8.0000e-004	0.0864	5.3000e-004	0.0869	0.0229	4.9000e-004	0.0234	0.0000	72.2800	72.2800	1.8100e-003	0.0000	72.3252
Total	**0.0361**	**0.0253**	**0.2703**	**8.0000e-004**	**0.0864**	**5.3000e-004**	**0.0869**	**0.0229**	**4.9000e-004**	**0.0234**	**0.0000**	**72.2800**	**72.2800**	**1.8100e-003**	**0.0000**	**72.3252**

3.5 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.6599					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0374	0.2606	0.3102	5.1000e-004		0.0161	0.0161		0.0161	0.0161	0.0000	43.5755	43.5755	2.9900e-003	0.0000	43.6503
Total	**0.6972**	**0.2606**	**0.3102**	**5.1000e-004**		**0.0161**	**0.0161**		**0.0161**	**0.0161**	**0.0000**	**43.5755**	**43.5755**	**2.9900e-003**	**0.0000**	**43.6503**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0329	0.0222	0.2418	7.5000e-004	0.0844	5.1000e-004	0.0849	0.0224	4.7000e-004	0.0229	0.0000	68.2634	68.2634	1.5900e-003	0.0000	68.3032
Total	**0.0329**	**0.0222**	**0.2418**	**7.5000e-004**	**0.0844**	**5.1000e-004**	**0.0849**	**0.0224**	**4.7000e-004**	**0.0229**	**0.0000**	**68.2634**	**68.2634**	**1.5900e-003**	**0.0000**	**68.3032**

3.5 Architectural Coating - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.6599					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0374	0.2606	0.3102	5.1000e-004		0.0161	0.0161		0.0161	0.0161	0.0000	43.5755	43.5755	2.9900e-003	0.0000	43.6502
Total	**0.6972**	**0.2606**	**0.3102**	**5.1000e-004**		**0.0161**	**0.0161**		**0.0161**	**0.0161**	**0.0000**	**43.5755**	**43.5755**	**2.9900e-003**	**0.0000**	**43.6502**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0329	0.0222	0.2418	7.5000e-004	0.0844	5.1000e-004	0.0849	0.0224	4.7000e-004	0.0229	0.0000	68.2634	68.2634	1.5900e-003	0.0000	68.3032
Total	**0.0329**	**0.0222**	**0.2418**	**7.5000e-004**	**0.0844**	**5.1000e-004**	**0.0849**	**0.0224**	**4.7000e-004**	**0.0229**	**0.0000**	**68.2634**	**68.2634**	**1.5900e-003**	**0.0000**	**68.3032**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.6530	5.6138	8.2201	0.0360	2.7241	0.0264	2.7504	0.7299	0.0248	0.7546	0.0000	3,332.081 4	3,332.081 4	0.1692	0.0000	3,336.310 2
Unmitigated	0.6530	5.6138	8.2201	0.0360	2.7241	0.0264	2.7504	0.7299	0.0248	0.7546	0.0000	3,332.081 4	3,332.081 4	0.1692	0.0000	3,336.310 2

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	2,103.92	2,190.11	1905.02	7,134,393	7,134,393
Total	2,103.92	2,190.11	1,905.02	7,134,393	7,134,393

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

4.4 Fleet Mix

Attachment: Greenhouse Gas Analysis (2444 : Legacy Park Project)

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Asphalt Surfaces	0.542116	0.037578	0.185203	0.118503	0.016241	0.005141	0.017392	0.068695	0.001383	0.001183	0.004582	0.000945	0.001038
Single Family Housing	0.542116	0.037578	0.185203	0.118503	0.016241	0.005141	0.017392	0.068695	0.001383	0.001183	0.004582	0.000945	0.001038

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	450.6197	450.6197	0.0272	5.6300e-003	452.9794
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	450.6197	450.6197	0.0272	5.6300e-003	452.9794
NaturalGas Mitigated	0.0442	0.3781	0.1609	2.4100e-003		0.0306	0.0306		0.0306	0.0306	0.0000	437.8466	437.8466	8.3900e-003	8.0300e-003	440.4485
NaturalGas Unmitigated	0.0442	0.3781	0.1609	2.4100e-003		0.0306	0.0306		0.0306	0.0306	0.0000	437.8466	437.8466	8.3900e-003	8.0300e-003	440.4485

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	8.20493e+006	0.0442	0.3781	0.1609	2.4100e-003		0.0306	0.0306		0.0306	0.0306	0.0000	437.8466	437.8466	8.3900e-003	8.0300e-003	440.4485
Total		**0.0442**	**0.3781**	**0.1609**	**2.4100e-003**		**0.0306**	**0.0306**		**0.0306**	**0.0306**	**0.0000**	**437.8466**	**437.8466**	**8.3900e-003**	**8.0300e-003**	**440.4485**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	8.20493e+006	0.0442	0.3781	0.1609	2.4100e-003		0.0306	0.0306		0.0306	0.0306	0.0000	437.8466	437.8466	8.3900e-003	8.0300e-003	440.4485
Total		**0.0442**	**0.3781**	**0.1609**	**2.4100e-003**		**0.0306**	**0.0306**		**0.0306**	**0.0306**	**0.0000**	**437.8466**	**437.8466**	**8.3900e-003**	**8.0300e-003**	**440.4485**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	2.07011e +006	450.6197	0.0272	5.6300e-003	452.9794
Total		**450.6197**	**0.0272**	**5.6300e-003**	**452.9794**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	2.07011e +006	450.6197	0.0272	5.6300e-003	452.9794
Total		**450.6197**	**0.0272**	**5.6300e-003**	**452.9794**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	2.1270	0.0722	2.3037	4.1000e-004		0.0163	0.0163		0.0163	0.0163	0.0000	56.7935	56.7935	4.6300e-003	9.7000e-004	57.1991
Unmitigated	2.1270	0.0722	2.3037	4.1000e-004		0.0163	0.0163		0.0163	0.0163	0.0000	56.7935	56.7935	4.6300e-003	9.7000e-004	57.1991

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1675					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.8849					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	5.3600e-003	0.0458	0.0195	2.9000e-004		3.7000e-003	3.7000e-003		3.7000e-003	3.7000e-003	0.0000	53.0703	53.0703	1.0200e-003	9.7000e-004	53.3857
Landscaping	0.0692	0.0264	2.2842	1.2000e-004		0.0126	0.0126		0.0126	0.0126	0.0000	3.7232	3.7232	3.6100e-003	0.0000	3.8134
Total	**2.1270**	**0.0722**	**2.3037**	**4.1000e-004**		**0.0163**	**0.0163**		**0.0163**	**0.0163**	**0.0000**	**56.7935**	**56.7935**	**4.6300e-003**	**9.7000e-004**	**57.1991**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1675					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.8849					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	5.3600e-003	0.0458	0.0195	2.9000e-004		3.7000e-003	3.7000e-003		3.7000e-003	3.7000e-003	0.0000	53.0703	53.0703	1.0200e-003	9.7000e-004	53.3857
Landscaping	0.0692	0.0264	2.2842	1.2000e-004		0.0126	0.0126		0.0126	0.0126	0.0000	3.7232	3.7232	3.6100e-003	0.0000	3.8134
Total	**2.1270**	**0.0722**	**2.3037**	**4.1000e-004**		**0.0163**	**0.0163**		**0.0163**	**0.0163**	**0.0000**	**56.7935**	**56.7935**	**4.6300e-003**	**9.7000e-004**	**57.1991**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	67.3343	0.4730	0.0119	82.6942
Unmitigated	67.3343	0.4730	0.0119	82.6942

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	14.399 / 9.07766	67.3343	0.4730	0.0119	82.6942
Total		**67.3343**	**0.4730**	**0.0119**	**82.6942**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	14.399 / 9.07766	67.3343	0.4730	0.0119	82.6942
Total		**67.3343**	**0.4730**	**0.0119**	**82.6942**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	52.5990	3.1085	0.0000	130.3118
Unmitigated	52.5990	3.1085	0.0000	130.3118

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	259.12	52.5990	3.1085	0.0000	130.3118
Total		**52.5990**	**3.1085**	**0.0000**	**130.3118**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	259.12	52.5990	3.1085	0.0000	130.3118
Total		**52.5990**	**3.1085**	**0.0000**	**130.3118**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

PRELIMINARY HYDROLOGIC AND HYDRAULIC ANALYSIS
FOR
LEGACY PARK
TR. 36760

IN THE CITY OF MORENO VALLEY, CALIFORNIA

June 19, 2015
Revised: July 22, 2016
Revised: September 21, 2016

Prepared For:

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REC JOB NUMBER: 16464B

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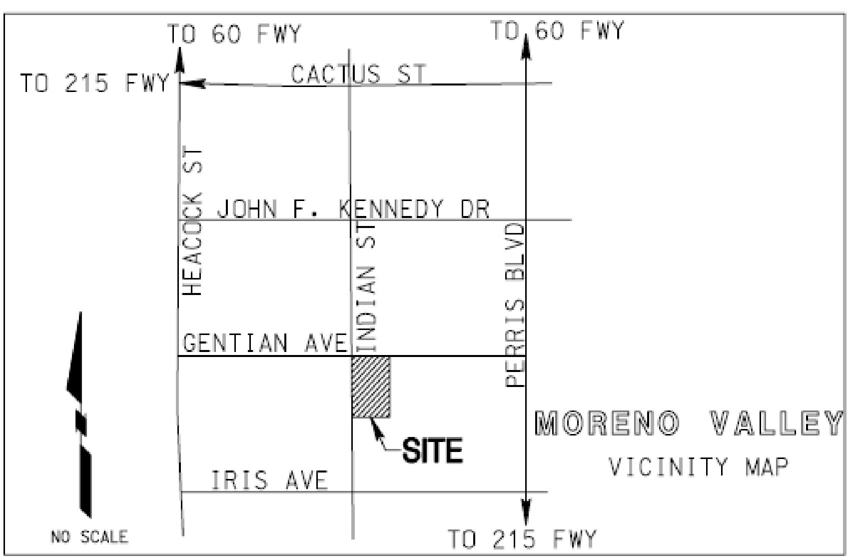
Introduction

This study presents the hydrologic and hydraulic analysis of the Legacy Park Tract 36760. The project site is located at the southeast corner of Indian Street and Gentian Avenue in the City of Moreno Valley, California. The site is approximately 48.5 acres and is located in the Perris Valley Hydrologic Subarea of the Santa Ana Watershed. The site drains to two separate basins in both the southwestern and southeastern corners. Tract 36370 proposes 221 single-family residential lots. The two onsite basins will be designed as bioretention basins, and will serve to treat the water for water quality. The basins are also attenuating flows, but this volume fits entirely within the water quality volume, therefore they are acting as water quality and not detention basins. The water exiting the west basin will tie into an existing storm drain system, and the water from the east basin will outlet into a proposed storm drain system to the east.

The site is surrounded by existing residential development to the West and proposed residential development to the North. To the East of the site there is an easement for the California DWR Aqueduct, with commercial development bordering it. To the South of the site is March Middle School which is designated as public use.

The vicinity map below shows the location of the project site.



2.0 Methodology

The hydrologic and hydraulic criteria used for the design of the storm drain systems are outlined in the Riverside County Flood Control Hydrology Manual. The 10-year storm shall be contained within the roadway from curb to curb. The 100-year storm shall be contained within the roadway right of way limits. To meet these requirements the 100-year storm event is contained within the roadway from curb to curb. All habitable dwellings shall be free of inundation during the 100-year storm.

<u>HYDROLOGIC ANALYSIS</u>

The Rational Method program from Advanced Engineering Software (AES) was used to perform the hydrologic analysis. The analysis represents the watershed as a link-node model. The existing and proposed conditions drainage basin maps with drainage basin boundaries and nodes are provided in Attachment 2 & 3, entitled Rational Method Hydrology Maps. The analysis can perform up to 15 hydrologic processes. These processes are assigned code numbers, which appear in the printed results. The code numbers and their meanings are as follows:

Hydrologic Process Code	Subarea Hydrologic Processes
1.	CONFLUENCE analysis at node
2.	INITIAL subarea analysis
3.	PIPEFLOW travel time (COMPUTER-Estimated pipe size)
4.	PIPEFLOW travel time (USER-Specified pipe size)
5.	TRAPEZOIDAL channel travel time
6.	STREET-FLOW analysis
7.	USER-SPECIFIED information at node
8.	ADDITION of subarea runoff to mainline
9.	V-GUTTER flow through subarea
10.	COPY Mainstream data onto a memory bank
11.	CONFLUENCE a memory BANK with the Main-Stream memory
12.	CLEAR a memory BANK
13.	CLEAR the Mainstream memory
14.	COPY a memory Bank onto the Main-Stream Memory
15.	HYDROLOGIC data BANK storage functions

ROUTING

The hydrology portion of this report, as shown on the attached hydrology map, is for hydrologic “Routing” purposes only. Peak flow-rates are routed through the system. At each confluence, flow-rates are adjusted to take into account their different times of concentration. The storm drains may require minor size and elevation changes upon completing the hydraulic portion of the calculations. Refer to the tentative tract map for proposed invert elevations and pipe sizes.

3.0 Rational Method Hydrology

3.1 Pre-Project Condition

The pre-project rational method was analyzed for the entire project site. The flows from the pre-project site split to the west and the east. Approximately 23.6 acres drain west while 25.4 acres drain east.

In the existing western portion of Tract 36760, water sheet flows to the southwest corner of the site. The water then flows south along the existing curb and gutter, and enters an existing catch basin on the eastern portion of Indian Street. The catch basin drains to the existing Riverside County Flood Control and Water Conservation District Master Drainage Line D-1. Line D-1 is a 36” RCP located South of Santiago Drive on the western portion of Indian Street. Along the eastern portion of the existing site water will sheet flow to the southeast and drain east along Santiago Drive before discharging into the Perris Valley Channel downstream of the site.

The results from the west side of the site show that a Q_{100} of 23.3 cfs currently enters into Line D-1. The results from the east side of the site show a Q_{100} of 27.2 cfs. Both the east and west flows eventually converge in the Perris Valley Channel which is an MS4 storm drain facility. Please see Attachment 2 for calculations and backup plans.

3.2 Post-Project Condition

In the post-project condition the majority of the flows from the eastern and western portion of the site flow to the basin at the southwest corner adjacent to Indian Avenue and Santiago Drive. The flows from the remaining eastern portion will drain to the basin in the southeastern corner of the site. Since both of these flows will ultimately outlet into the Perris Valley channel, this remains consistent with the pre-project condition.

The western basin will pick up flows from the western and northeastern portions of the site, including the proposed park along the southern boundary. The western portion drains in a general southwestern pattern. Water from the northeast lots will drain through Street M before being picked up in a set of storm drain catch basins. Water from Street L will also be picked up in catch basins near the intersection of street L and Street D. The storm drain will drain southwest through Street D, where other flows from Streets B, D, K and portions of I and N will be picked up in catch basins just before entering into the Basin at the end of Street D cul-de-sac. At this point, flows from the southern areas (Street G, a portion of Street N, and the park) will confluence with the storm drain flows at Node 134.0 to outlet into the basin. Water from Streets A, C, H, and J flows south/west, draining to the end of the Street C cul-de-sac. The 100 year peak flow into the western basin is 74.3 cfs. Once in the basin, flows will outlet west to the connection into Line D-1 on Indian Street. The existing storm drain is capable of receiving 21.9 cfs. This project site will add the full 21.9 cfs into the storm drain. Any remaining flows will be detained by the basin. Please see the Tract 36760 Pre and Post Rational Method Hydrology maps and calculations located in Attachment 3.

The eastern basin will pick up flows from the southeastern portions of the site. The water will drain southeast through the site to the basin located at the southeast corner. The high points on Streets L and G delineate the drainage boundary for the eastern portions. Water from Street L will drain south and then east to join Street G surface flows before being picked up in a set of catch basins. Water from Street E will split to drain to both street L and Street M. Street M drains south, joining with Street F, and eventually to the catch basin located on Street G. A portion of Street L (south of Street G) drains north to join flows from the southern half of Street G as well as Street P, which enter a catch basin on Street G. These flows are conveyed through storm drain to enter the eastern basin at Node 210.0. The most southerly portion of Street L drains south towards Santiago Drive. Flows from this portion of Street L and Santiago Drive (east) are picked up by catch basins and outlet into the basin at Nodes 218.0 and 221.0. The east end of Street G drains to the east and flows are picked up by a catch basin at the Street G cul-de-sac, which are also conveyed through storm drain to outlet to the basin at Node 215.0. From the confluence off all the flows draining to the southeast basin, the 100 year peak flow is 24.6 cfs. Flows from the basin will outlet into the proposed Line M-2 storm drain, which will then drain to the Perris Valley Channel. The proposed storm drain Line M-2 will receive 10.0 cfs from the project site, while the remaining flows will be detained by the basin. Please see the Tract 36760 Pre and Post Rational Method Hydrology maps and calculations located in Attachment 3.

4.0 Synthetic Unit Hydrograph

Due to the outlet of flows into the existing and proposed storm drain facilities, the 1-hour, 3-hour, 6-hour, and 24-hour storm events were analyzed for the 2-year, 10-year, and 100-year storms in order to obtain the required detention volume for the basins. For the analysis of the mitigation for the required storm events, the synthetic unit hydrograph (SUH) was used in accordance with the RCFC&WCD hydrology manual. All SUH results for the pre-project condition can be found in Attachment 4 and the post-project conditions can be found in Attachment 5.

All flows drain according to the previously explained flow patterns. The pre-project and post-project conditions were analyzed for all storm events for comparison between the separate areas.

For the western basin only the 10-year 1-hour and the 100-year 1-hour storm events produced flows in excess of the 21.9 cfs outlet. Therefore these two storm events were the only events to be analyzed for detention sizing. The 100-year1-hour storm event generated the largest storage volume needed to detain the post-project condition down to the allowable outlet of 21.9 cfs. The required detention volume was 0.75 ac-ft. The western basin was sized to allow for 2 feet of freeboard within the basin.

For the eastern basin only the 100-year 1-hour storm event produced flows in excess of the 10.0 cfs outlet. Therefore this storm event was the only event to be analyzed for detention sizing. The required detention volume was 0.11 ac-ft. The eastern basin was sized to allow for 2 feet of freeboard within the basin.

For water quality requirements, it was found that 1.19 ac-ft of storage volume is required for the western basin and 0.42 ac-ft of storage volume is required for the eastern basin. According to the Riverside County Flood Control and Water Conservation District LID Manual, the bioretention facility will consist of a layer of soil media (24" for the east basin, 36" for the west basin) at a porosity of 30% and a 12" layer of gravel with a porosity of 40%. Since the water quality storage volume exceeds the required detention volume, the basins will be designed solely as water quality features and not detention basins. Therefore the necessary basin capacities, governed by the water quality volume are 1.2 ac-ft for the western basin and 0.4 ac-ft for the eastern basin.

In the final hydrology analysis, the basin will not be designed to retain the total storage without an adequate outlet to maintain the required 48-hour drawdown time. All outlet sizing, including emergency overflows for the 100-year 1-hour storm event bypass, will be done in the final analysis for the project site.

5.0 Hydraulics

As indicated above, hydrologic process No. 6 analyzes street flow (using Manning's Equation), and calculates the depth of flow in the gutter. The storm drain systems will be designed to intercept the 100-year street flows into catch basins before the depth in the street reaches the top of curb or splits over the street crown. Therefore, the 10-year storm water surface will never exceed the top of curb. Per the City of Moreno Valley Plan

Check Manual page 45, the design HGL should be 6” below the local depression lip of inlets.

6.0 Conclusion

The supporting hydrologic and hydraulic calculations are provided in the following sections to substantiate the design of the proposed storm drain facilities. The hydrology rational method calculations for pre and post project conditions onsite hydrology routing are shown in attachments 2 and 3 respectively. The Synthetic Unit Hydrograph calculations are located in attachment 4 of this report.

Attachment 1

Attachment 2

Attachment 3

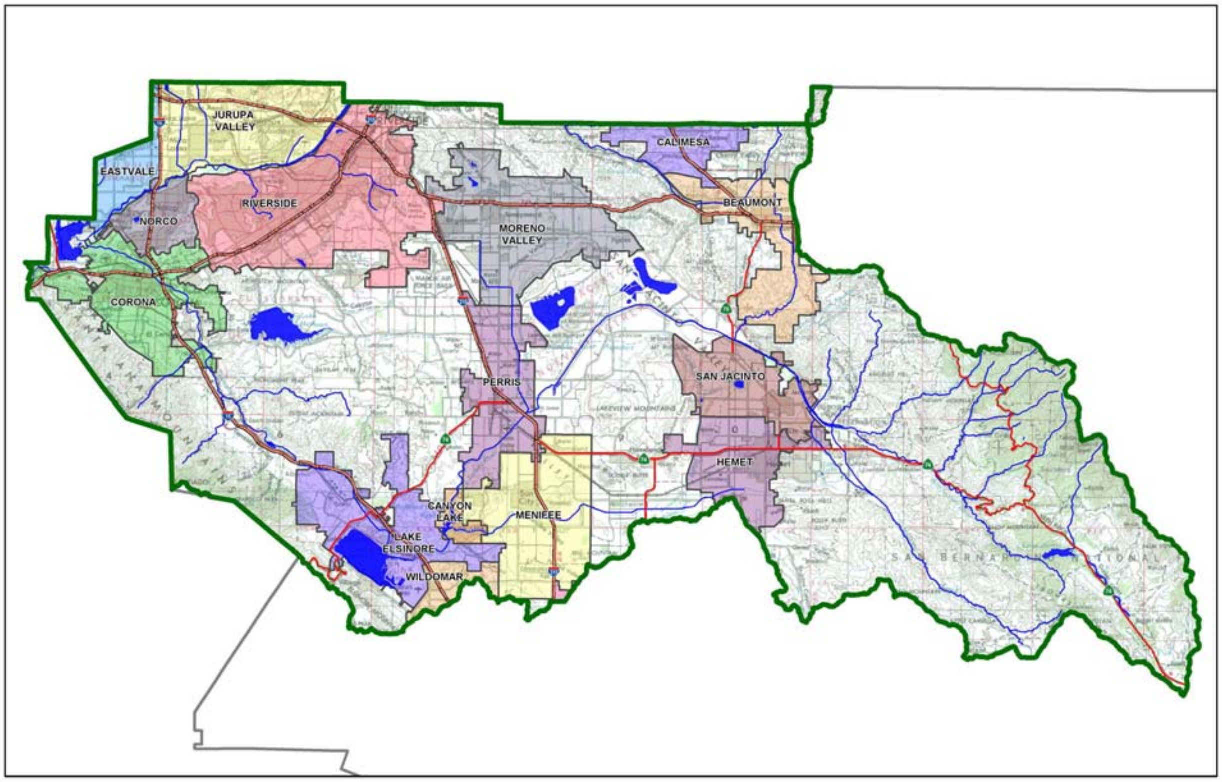
Attachment 4

Project Specific Water Quality Management Plan

Project Title: Legacy Park

Development No: Tract 36760

Design Review/Case No: PA 14-0053



☒ **Preliminary**
☐ **Final**

Original Date Prepared: June 18, 2015

Revision Date(s): July 20, 2016; October 19, 2016; January 12, 2017

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**

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Riverside, California 92507
(951) 782-0707
Contact: Richard O'Neill

OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for MPLC Legacy 75 Partners, LLP by Rick Engineering Company for the Legacy Park project.

This WQMP is intended to comply with the requirements of City of Moreno Valley for Ordinance 827 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under Moreno Valley Water Quality Ordinance (Municipal Code Section 8.10).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

[signature]	1-4-17
Owner's Signature	Date
R. Luce	Authorized Signer
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature	Date
Richard O'Neill	Associate
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT **CIVIL CODE § 1189**

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California)
County of Orange)

On January 4, 2017 before me, Angelita O. Mason, Notary Public,
Date *Here Insert Name and Title of the Officer*

personally appeared Randall C. Luce
Name(s) of Signer(s)

who proved to me on the basis of satisfactory evidence to be the person~~(s)~~ whose name~~(s)~~ is/~~are~~ subscribed to the within instrument and acknowledged to me that he/~~she~~/~~they~~ executed the same in his/~~her~~/~~their~~ authorized capacity~~(ies)~~, and that by his/~~her~~/~~their~~ signature~~(s)~~ on the instrument the person~~(s)~~, or the entity upon behalf of which the person~~(s)~~ acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

ANGELITA O. MASON
COMM. #2056933
Notary Public - California
Orange County
My Comm. Expires Mar. 4, 2018
NRO1

Signature Angelita O. Mason
Signature of Notary Public

Place Notary Seal Above

OPTIONAL

Though this section is optional, completing this information can deter alteration of the document or fraudulent reattachment of this form to an unintended document.

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☐ Other: ____
Signer Is Representing: ____

Signer's Name: ____
☐ Corporate Officer — Title(s): ____
☐ Partner — ☐ Limited ☐ General
☐ Individual ☐ Attorney in Fact
☐ Trustee ☐ Guardian or Conservator
☐ Other: ____
Signer Is Representing: ____

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Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Residential
Planning Area:	None
Community Name:	
Development Name:	Legacy Park
PROJECT LOCATION	
Latitude & Longitude (DMS): 33°53'37"N, 117°13'54"W	
Project Watershed and Sub-Watershed: Santa Ana River Watershed San Jacinto HU, Perris HA, Perris Valley HSA	
APN(s): 485-220-023, 485-220-032, 485-220-040	
Map Book and Page No.: MB 8/23	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Residential: Max 5 du/ac
Proposed or Potential SIC Code(s)	None
Area of Impervious Project Footprint (SF)	1,397,321
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	1,397,321
Does the project consist of offsite road improvements?	☒ Y ☐ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the project limits (SF)	None
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	N/A
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	N/A
What is the Water Quality Design Storm Depth for the project?	0.65

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Perris North	N/A	MUN, AGR, IND, PROC	N/A
San Jacinto River Reach 4	N/A	AGR*, WILD*, GWR*, MUN*, REC1*, REC2*, WARM*	N/A
San Jacinto River Reach 3	N/A	AGR*, GWR*, MUN**, REC1*, REC2*, WARM*, WILD*	N/A
San Jacinto River Reach 2 & Canyon Lake	Nutrients, pathogens	AGR, GWR, WILD, MUN, REC1, REC2, WARM	N/A
San Jacinto River Reach 1	N/A	AGR*, GWR*, MUN*, REC1*, REC2*, WARM*, WILD*	N/A
Lake Elsinore	Nutrients, organic enrichment/low DO, PCBs, sediment toxicity, unknown toxicity.	MUN**, REC1, REC2, WARM, WILD	N/A

*Intermittent Beneficial Use
**Exempted from MUN

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)* Grading, Building and Encroachment Permits will be required.	☒ Y	☐ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

Yes, the existing site drainage pattern splits flows, with the majority of the site draining to the southwest corner before entering the street and flowing to an existing storm drain. A portion on the east side of the site drains to the southeast corner. The proposed development will drain through the streets into proposed storm drains, then into our proposed water quality and bioretention basins at the southwest and southeast corners of the site. The proposed drainage split is similar to that of the existing condition. The water in the basins will drain through proposed storm drain and tie into the existing storm drain southwest and southeast of the project site.

Did you identify and protect existing vegetation? If so, how? If not, why?

Any existing vegetation will be removed when the mass grading occurs.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

The natural infiltration capacity is 0.45 in/hr (see Appendix 3), therefore infiltration is not feasible onsite.

Did you identify and minimize impervious area? If so, how? If not, why?

Yes, the sidewalk and street design will adhere to city standards for appropriate widths required.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Yes, runoff from this site will disperse to landscaped areas when possible. The project will disperse the remainder of the runoff to the bioretention basin.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
D-100 Impervious	Concrete or Asphalt	320,442	Type D – Area that drains to BMP
D-100 Roofs	Roofs	727,285	Type D – Area that drains to BMP
D-100 Landscape	Ornamental Landscaping	571,926	Type D – Area that drains to BMP
D-200 Impervious	Concrete or Asphalt	118,702	Type D – Area that drains to BMP
D-200 Roofs	Roofs	230,892	Type D – Area that drains to BMP
D-200 Landscape	Ornamental Landscaping	193,462	Type D – Area that drains to BMP

[1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
n/a			

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				Type 'C' DMAs that are draining to the Self-Retaining Area		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]
n/a						

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet) [A]	Post-project surface type	Runoff factor [B]	Product [C] = [A] x [B]	DMA name /ID	Area (square feet) [D]	Ratio [C]/[D]
n/a							

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
D-100 Impervious	D-100 Bioretention Basin
D-100 Roofs	D-100 Bioretention Basin
D-100 Landscape	D-100 Bioretention Basin
D-200 Impervious	D-200 Bioretention Basin
D-200 Roofs	D-200 Bioretention Basin
D-200 Landscape	D-200 Bioretention Basin

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site. If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?	X	
If Yes, list affected DMAs: D-100 and D-200 (Infiltration rate = 0.45 inches/hour)		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		X
Describe here:		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

☐ Reclaimed water will be used for the non-potable water demands for the project.

☐Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☐The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If neither of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: 0.41 acres*

*This area does not include: homeowner maintained landscaping/slopes within the private lots or parkway. The homeowner will be required to maintain landscaping/slope off of each individual meter. The basins, which will be maintained by the City of Moreno Valley, are also not included.

Type of Landscaping (Conservation Design or Active Turf): Conservation design

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 32.1 acres

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: 1.05

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: 33.7 acres

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
33.7 acres	0.41 acres

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: 660

Project Type: Residential

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 32.1 acres

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-1 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: 108

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: 3,467

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	Projected number of toilet users (Step 1)
3,467	660

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

n/a

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: Projected Average Daily Use (gpd)

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: Insert Area (Acres)

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-3 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-3: Enter Value

Step 4: Multiply the unit value obtained from Step 4 by the total of impervious areas from Step 3 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: Minimum use required (gpd)

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
Minimum use required (gpd)	Projected Average Daily Use (gpd)

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment, unless a site-specific analysis has been completed that demonstrates technical infeasibility as noted in D.3 below.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
D-100 Impervious	☐	☐	☒	☐	☐
D-100 Roofs	☐	☐	☒	☐	☐
D-100 Landscape	☐	☐	☒	☐	☐
D-200 Impervious	☐	☐	☒	☐	☐
D-200 Roofs	☐	☐	☒	☐	☐
D-200 Landscape	☐	☐	☒	☐	☐

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Bioretention Basin D-100*		
	[A]		[B]	[C]	[A] x [C]			
D-100 Impervious	*320,442*	*AC Pavement*	*1.0*	*0.89*	*285,834.3*	*Design Storm Depth (in)*	*Design Capture Volume, **V_{BMP}** (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D-100 Roofs	*727,285*	*Roofs*	*1.0*	*0.89*	*648,738.2*			
D-100 Landscape	*571,926*	*Ornamental Landscaping*	*0.1*	*0.11*	*63,173.8*			
	1,619,653				997,746.3.	0.65	54,044.6	**54,045**

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Bioretention Basin D-200*		
	[A]		[B]	[C]	[A] x [C]			
D-200 Impervious	*118,702*	*AC Pavement*	*1.0*	*0.89*	*105,882.2*	*Design Storm Depth (in)*	*Design Capture Volume, **V_{BMP}** (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D-200 Roofs	*230,892*	*Roofs*	*1.0*	*0.89*	*205,955.7*			
D-200 Landscape	*193,462*	*Ornamental Landscaping*	*0.1*	*0.11*	*21.369.4*			
	543,056				333,207.3	0.65	18,048.7	**18,049**

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☒ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☐ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft²)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft²)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft²)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☒	☐	☒	☒	☐	☒	☐	☐

P = Potential
N = Not Potential
(1) A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected
(2) A potential Pollutant if the project includes uncovered parking areas; otherwise not expected
(3) A potential Pollutant is land use involving animal waste
(4) Specifically petroleum hydrocarbons
(5) Specifically solvents
(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
n/a	
Total Credit Percentage[1]	

[1]Cannot Exceed 50%
[2]Obtain corresponding data from Table 3-8 in the WQMP Guidance Document

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff Factor		***Enter BMP Name / Identifier Here***		
	[A]		[B]	[C]	[A] x [C]				
n/a						*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12
[H] is from the Total Credit Percentage as Calculated from Table E.2 above
[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
Bioretention Basin	Nutrients	70%
Bioretention Basin	Bacteria, T.O.C	90%
Bioretention Basin	Pesticides	>80%
Bioretention Basin	Sediments	>80%

[1] *Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.*

[2] *Cross Reference Table E.1 above to populate this column.*

[3] *As documented in a Co-Permittee Approved Study and provided in Appendix 6.*

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	n/a	n/a	n/a
Volume (Cubic Feet)	n/a	n/a	n/a

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

Does the project qualify for this HCOC Exemption? ☒ Y ☐ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

Lake Elsinore

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources***: Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit***: Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative***: Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-Site Storm Drain Inlets	Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.995.1200 to verify.	Maintain and periodically repaint or replace inlet markings. Provide stormwater pollution prevention information to new site owners, leases, or operators. See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to

		store or deposit materials so as to create a potential discharge to storm drains.”
Landscape/Outdoor Pesticide Use	All final landscape plans will accomplish the following: Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. Consider using pest-resistant plants, especially adjacent to hardscape. To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions	Maintain landscaping using minimum or no pesticides. See applicable operational BMPs in “What you should know for…..Landscape and Gardening” at http://rcflood.org/stormwater/Downloads/LandscapeGardenBrochure.pdf Provide IPM information to new owners, lessees and operators
Miscellaneous Drain or Wash Water or Other Sources	Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
D-100 Impervious	320,442 sf draining to D-100 Bioretention Basin	Tentative Map Sheet 1
D-100 Roofs	727,285 sf draining to D-100 Bioretention Basin	Tentative Map Sheet 1
D-100 Landscaping	571,926 sf draining to D-100 Bioretention Basin	Tentative Map Sheet 1
D-200 Impervious	118,702 sf draining to D-200 Bioretention Basin	Tentative Map Sheet 1
D-200 Roofs	230,892 sf draining to D-200 Bioretention Basin	Tentative Map Sheet 1
D-200 Landscaping	193,462 sf draining to D-200 Bioretention Basin	Tentative Map Sheet 1

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: Home Owner's Association

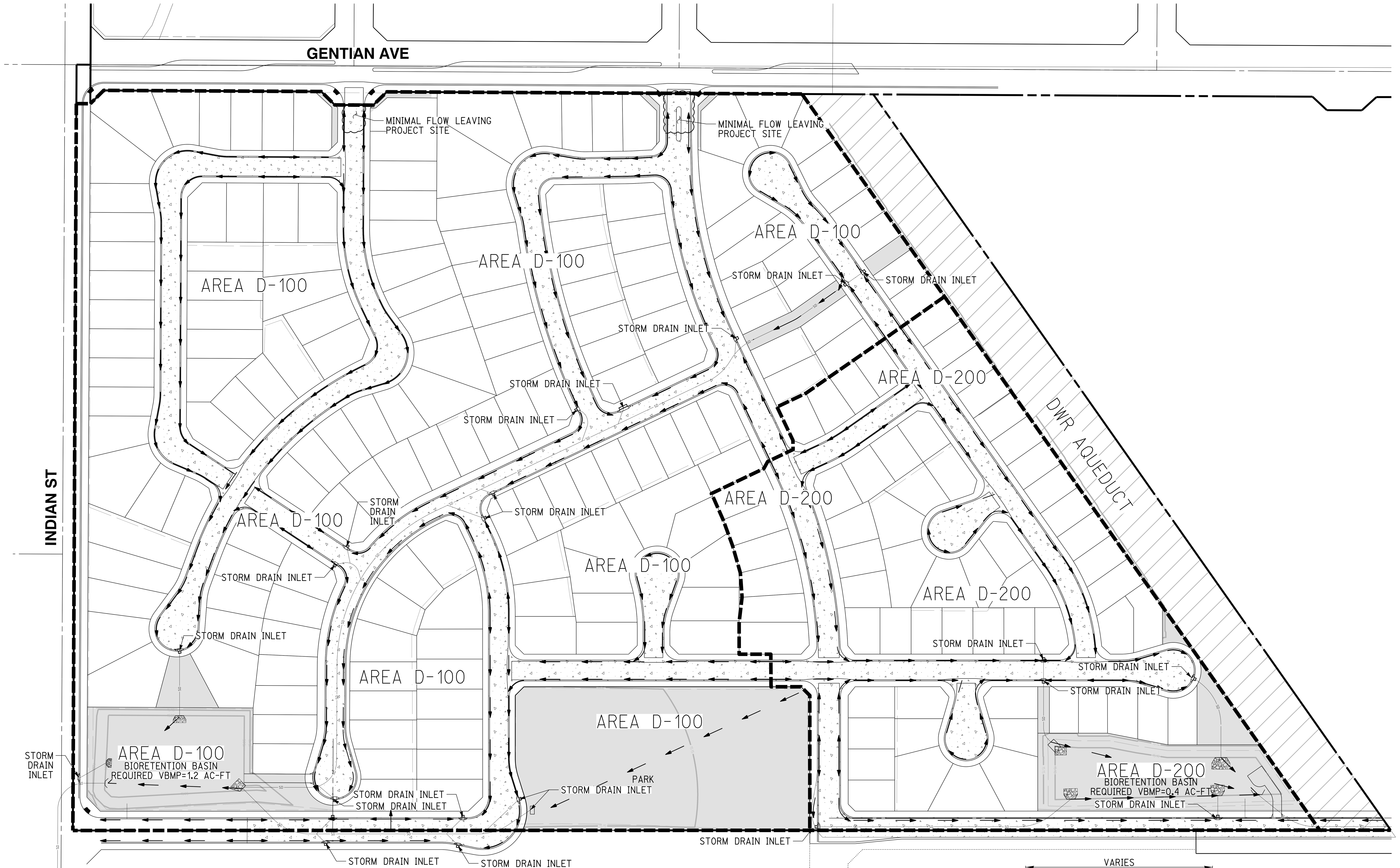
Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

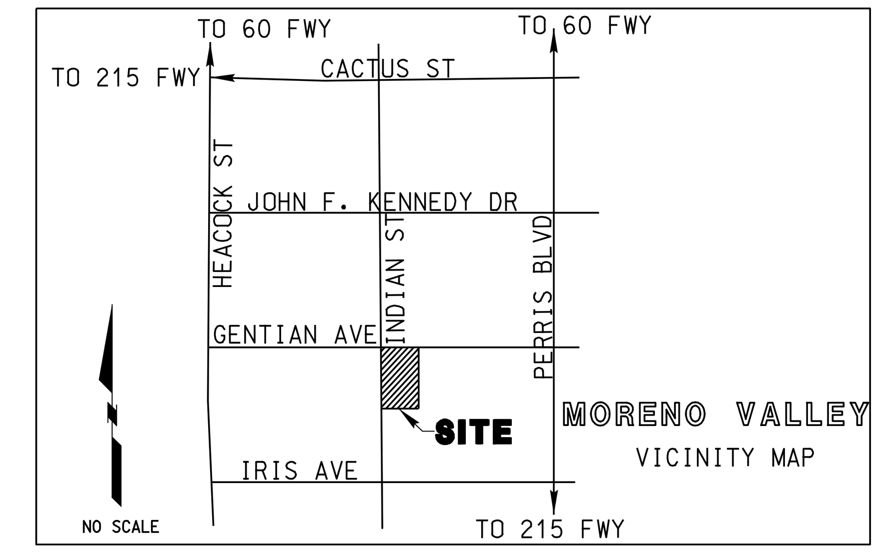
☐ Y ☒ N

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map





OWNER/APPLICANT

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ENGINEER

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PHONE: (951) 782-0707
FAX: (951) 782-0723
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GENERAL NOTES

1. PROPOSED BMPs: BIORETENTION BASINS
2. EXISTING LAND USE: SUBURBAN RESIDENTIAL
3. PROPOSED LAND USE: SUBURBAN RESIDENTIAL

LEGEND

PROJECT BOUNDARY
DRAINAGE BOUNDARY
DIRECTION OF FLOW
SD PROPOSED SD
LANDSCAPE/PLANTED AREA
PAVED AREA
AREA NOT DRAINING TO BMPS

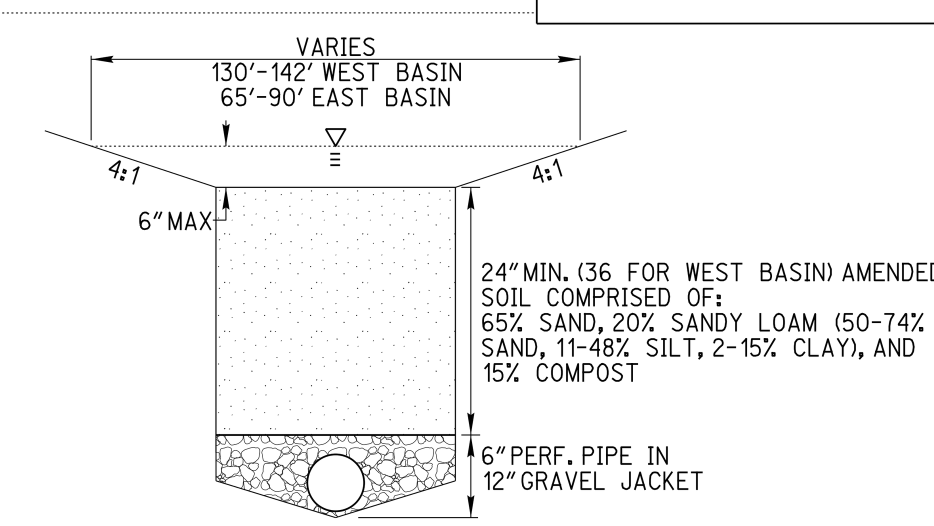
TOTAL AREA DRAINING TO BMP'S

AREA DRAINING TO D-100 BASIN
1. PERVIOUS LANDSCAPING: 13.1 AC
2. IMPERVIOUS ROOFS: 16.7 AC
3. IMPERVIOUS ASPHALT AND CONCRETE: 7.4 AC

AREA DRAINING TO D-200 BASIN
1. PERVIOUS LANDSCAPING: 4.5 AC
2. IMPERVIOUS ROOFS: 5.3 AC
3. IMPERVIOUS ASPHALT AND CONCRETE: 2.7 AC

WATER QUALITY MANAGEMENT PLAN NOTES:

1. POST-CONSTRUCTION BMPs ARE DISCUSSED IN MORE DETAIL WITHIN THIS WATER QUALITY MANAGEMENT PLAN.
2. THE CONSTRUCTION SITE PERIMETER IS A SCHEMATIC AND NOT INTENDED TO EXPAND THE LIMITS OF WORK AS DELINEATED MORE PRECISELY ON OTHER CONTRACT DOCUMENTS.
3. FOR INFORMATION ON PROPOSED LANDSCAPED AND PAVED AREAS, REFER TO SECTION 1, PROJECT DESCRIPTION AND THE TEXT.
4. THE MPLC LEGACY 75 PARTNERS, LLC. WILL INSTALL STENCILS ON EVERY STORM DRAIN INLET. THE MPLC LEGACY 75 PARTNERS, LLC. WILL CONTACT THE CITY OF MORENO VALLEY PRIOR TO COMPLETING CONSTRUCTION OF THE INLETS TO DETERMINE THE MOST CURRENT STENCILING REQUIREMENTS AND INCOPORATE THOSE REQUIREMENTS AT THE INLETS.



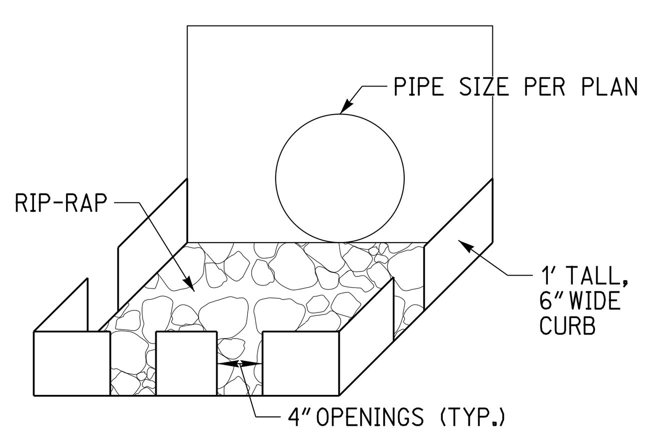
TYPICAL BIORETENTION BASIN SECTION
N.T.S.

NOTE: UNDERDRAIN LAYOUT WILL BE SHOWN IN THE FINAL WQMP AND WILL CONFIGURE TO REQUIREMENTS OUTLINED IN THE LID HANDBOOK.

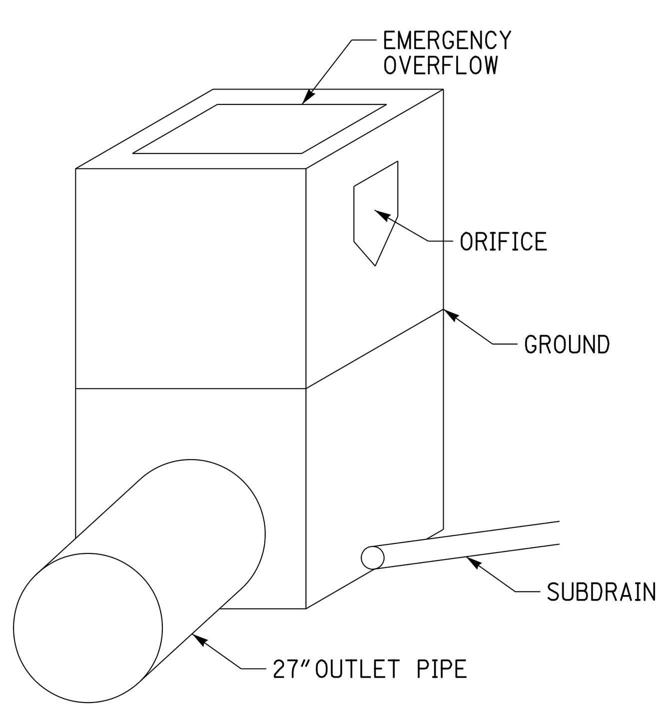
SCALE: 1" = 100'
100 0 100 200

NOT FOR CONSTRUCTION
FOR WQMP EXHIBIT ONLY

TYPICAL STORM DRAIN INLET SIGNAGE
PER CASQA BMP STANDARD SD-13
N.T.S.



TYPICAL BASIN INLET DETAIL
N.T.S.



TYPICAL BASIN OUTLET DETAIL
N.T.S.

NOTE: INLET/OUTLET DETAILS WILL BE FINALIZED IN THE FINAL WQMP REPORT.

WQMP EXHIBIT:

THIS PLAN PRESENTS THE RECOMMENDATIONS OF RICK ENGINEERING COMPANY FOR THE TITLE PROJECT BASED ON COMPLETED PHASES OF CONSTRUCTION. STORM WATER POLLUTION PREVENTION IS THE RESPONSIBILITY OF THE PROPERTY OWNER OR THEIR DELEGATED RESPONSIBLE PARTY. THE RECOMMENDATIONS PRESENTED ON THIS PLAN SHOULD BE CONSTANTLY REVIEWED AND AMENDED AS APPROPRIATE BY THE PROPERTY OWNER OR THEIR DELEGATED RESPONSIBLE PARTY AS SITE CONDITIONS CHANGE.

DATE	BY	REVISIONS

WATER QUALITY MANAGEMENT PLAN
SITE PLAN EXHIBIT
TRACT 36760
APN'S 485-220-023, 485-220-032

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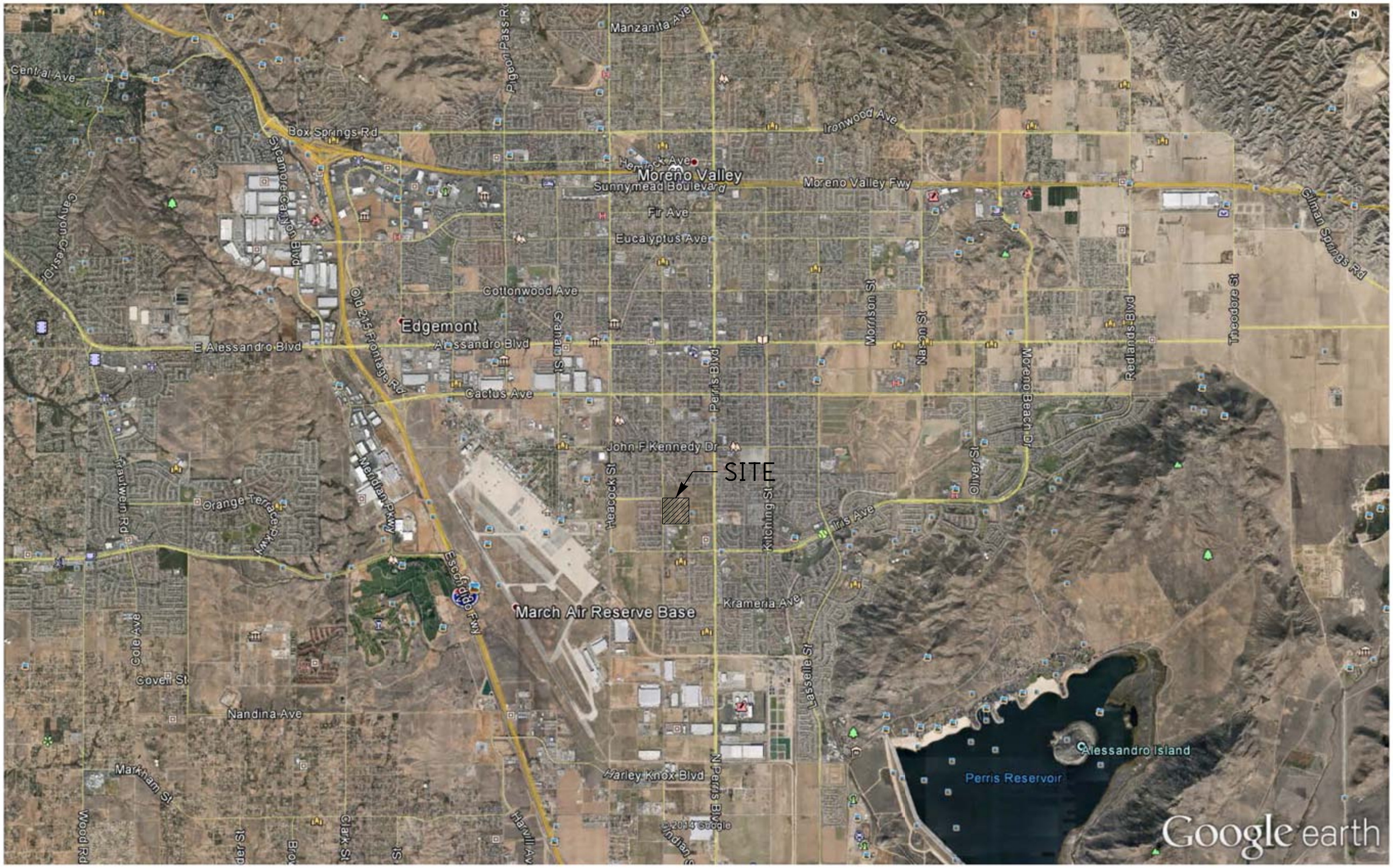
(FAX)951.782.0723
rickengineering.com
Riverside · San Diego - Orange - San Luis Obispo - Bakersfield - Sacramento - Phoenix - Tucson

SHEET NO.
1
OF 1 SHEETS

G:\16464\16464B\Civil\16464BWQMP02.dgn
PLOT DATE: 27-DEC-2016 JN 16464B



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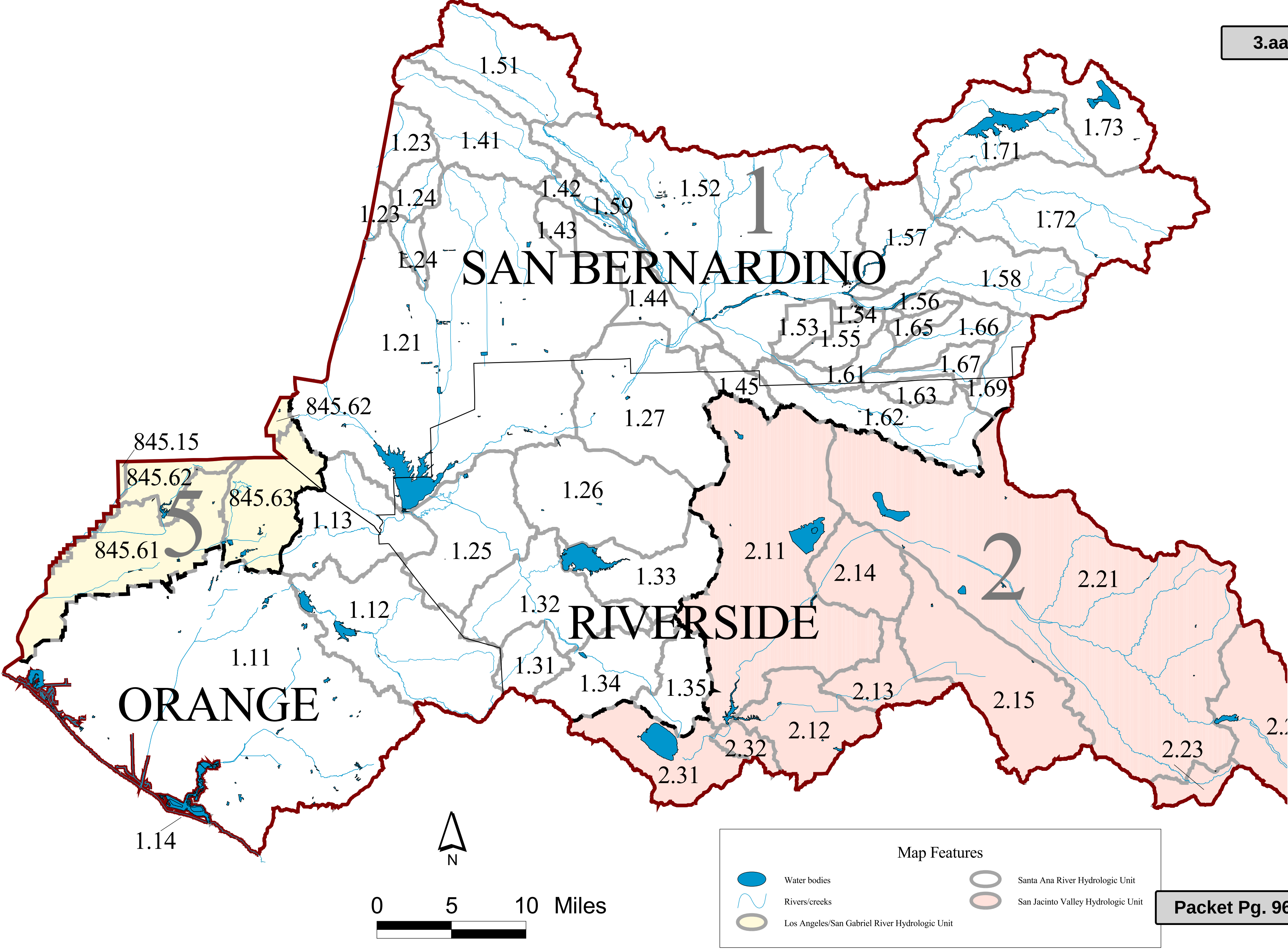
San Diego - Orange - San Luis Obispo - Bakersfield - Sacramento - Phoenix - Tucson

LEGACY PARK DEVELOPMENT
APN'S: 485-220-023,
485-220-032, 485-220-040
LOCATION MAP

G:\16464\16464B\Civil\16464BWQMP01.dgn

PLOT DATE: 19-OCT-2016

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)



1.51
1.23
1.41
1.42
1.59
1.52
1
1.24
1.23
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1.72
1.71
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SAN BERNARDINO
1.58
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1.61
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845.62
845.63
5
1.26
1.13
845.61
1.25
2.11
2.14
2
2.21
1.33
1.32
1.12
RIVERSIDE
1.11
1.31
1.34
1.35
2.13
2.15
ORANGE
2.12
2.32
2.23
2.31
1.14
N
0
5
10
Miles
Map Features
Water bodies
Rivers/creeks
Los Angeles/San Gabriel River Hydrologic Unit
Santa Ana River Hydrologic Unit
San Jacinto Valley Hydrologic Unit

Index to map of the Santa Ana Hydrologic Basin Planning Area (SA), 1986

Abbreviations Used:

HA – Hydrologic Area
HSA - Hydrologic Subarea

801.0	SANTA ANA RIVER HYDROLOGIC UNIT
801.10	Lower Santa Ana River HA
801.11	East Coastal Plain HSA
801.12	Santiago HSA
801.13	Santa Ana Narrows HSA
801.14	(not included in Basin Plan)
801.20	Middle Santa Ana River HA Split
801.21	Chino HSA Split
481.21	Chino HSA Split
481.22	Harrison HSA
801.23	Claremont Heights HSA Split
481.23	Claremont Heights HSA Split
801.24	Cucamonga HSA
801.25	Temescal HSA
801.26	Arlington HSA
801.27	Riverside HSA
801.30	Lake Mathews HSA
801.31	Coldwater HSA
801.32	Bedford HSAS
801.33	Cajalco HSA
801.34	Lee Lake HSA
801.35	Terra Cotta HSA
801.40	Colton- Rialto HA
801.41	Upper Lytle HSA
801.42	Lower Lytle HSA
801.43	Rialto HSA
801.44	Colton HSA
801.50	Upper Santa Ana River HA
801.51	Cajon HSA
801.52	Bunker Hill HSA
801.53	Redlands HSA
801.54	Mentone HSA
801.55	Reservoir HSA
801.56	Crafton HSA

Index to map of the Santa Ana Hydrologic Basin Planning Area

801.57		Santa Ana Canyon HSA
801.58		Mill Creek HSA
801.59		Sycamore HAS
801.60	San Timoteo HA	
801.61		Yucaipa HSA
801.62		Beaumont HSA
801.63		Cherry Valley HSA
801.64		Chicken Hill HSA
801.65		Gateway HSA
801.66		Oak Glen HSA
801.67		South Mesa HSA
801.68		Triple Falls Creek HSA
801.69		Noble Creek HAS
801.70	San Bernardino Mountain HA	
801.71		Bear Valley HSA
801.72		Seven Oaks HSA
801.73		Baldwin HSA
802.0	SAN JACINTO VALLEY HYDROLOGIC UNIT	
802.10	Perris HA	
802.11		Perris Valley HSA
802.12		Menifee HSA
802.13		Winchester HSA
802.14		Lakeview HSA
802.15		Hemet HAS
802.20	San Jacinto HA	
802.21		Gilman Hot Springs HSA
802.22		Hemet Lake HSA
802.23		Bautista HAS
802.30	Elsinore Valley HA	
802.31		Elsinore HSA
802.32		Railroad HSA
805.0	LOS ANGELES-SAN GABRIEL RIVER HYDROLOGIC UNIT	
805.10	Coastal Plain of Los Angeles County HA split	
845.15		Central HSA Split
845.60	Anaheim HA Split	
845.61		Anaheim HSA Split
845.62		La Habra HSA Split
845.63		Yorba Linda HSA Split

Index to map of the Santa Ana Hydrologic Basin Planning Area
Page 3 of 3

Notes:

1. The .pdf version of the map that this index accompanies was prepared from an August 1986 revision of a map entitled, “Santa Ana Hydrologic Basin Planning Area (SA),” State of California Regional Water Quality Control Board, Santa Ana Region (8), that was included in the Water Quality Control Plan for the Santa Ana River Basin – Region 8, 1994.

2. The naming conventions used in this index are the same as used by the Department of Water Resources in their Bulletin 130 series. Bulletin 130 was last published in May 1988, for the 1982-85 water year. The numbering system used on the accompanying map is an adaptation of the numbering system used in Bulletin 130.

3. The boundary between Regional Water Quality Control Boards 4 and 8 is specified in California Water Code Section 13200 as coinciding with the southeasterly boundary of Los Angeles County from the Pacific Ocean to San Antonio Peak. Therefore, the boundary between these two regions is not a hydrologic boundary, but a political one. Consequently, some, or parts of some, of the hydrologic subunits shown in the Santa Ana River watershed are within the jurisdiction of the RWQCB 4, and some, or parts of some, hydrologic units are in the San Gabriel River watershed of RWQCB 4, but are legally in Region 8.

4. Parts of the southwestern boundary shown for HSA 801.11 East Coastal Plain do not conform exactly to the boundary shown for this area in the Calwater hydrologic mapping project Version 2.2. This lack of conformity affects the area of Laguna Hills, but is insignificant at the scale of this map.

5. The boundary of Region 8 at southwestern tip of HSA 802.24 Bautista shown has been modified as a result of the construction of Diamond Valley Reservoir. This modification affects the area of Goodhart Canyon, but is insignificant at the scale of this map.

Appendix 2: Construction Plans

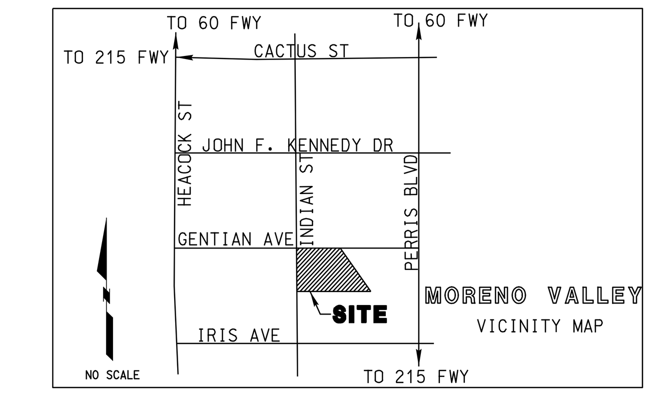
Grading and Drainage Plans

IN THE CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

TENTATIVE TRACT 36760
PLANNED UNIT DEVELOPMENT

APN'S: 485-220-023, 485-220-032, 485-220-040

MARCH 8, 2016; REVISED: SEPTEMBER 19, 2016



UTILITY PURVEYORS

SEWER AND WATER: EASTERN MUNICIPAL WATER DISTRICT
2270 TRUMBLE ROAD
PERRIS, CA 92570
(951) 928-3777

GAS: SOUTHERN CALIFORNIA GAS COMPANY
(800) 427-2200

ELECTRIC: MORENO VALLEY ELECTRIC UTILITY
14331 FREDERICK STREET, SUITE 2
MORENO VALLEY, CA 92553
(877) 811-8700

TELEPHONE: VERIZON
(800) 483-400

CABLE TV: TIME WARNER
1500 AUTO CENTER DRIVE
ONTARIO, CA 91761

STORM DRAIN: RIVERSIDE COUNTY FLOOD CONTROL DISTRICT
1995 MARKET STREET
RIVERSIDE, CA 92501
(951) 955-1200
CITY OF MORENO VALLEY
14177 FREDERICK STREET
MORENO VALLEY, CA 92553

TRASH: WASTE MANAGEMENT OF INLAND VALLEY
17700 INDIAN AVENUE
MORENO VALLEY, CA 92551
(800) 423-9986

LEGEND

TRACT MAP BOUNDARY
CENTERLINE
RIGHT-OF-WAY/ LOT LINE
PROPOSED CURB
EXISTING EASEMENT
EXISTING SPOT ELEVATION ... X 1514.7
ACCESS GATE
BLOCK WALL
TUBULAR STEEL FENCE
PROPOSED STORM DRAIN ... SD
PROPOSED WATERLINE ... W
PROPOSED SEWER/MANHOLE ... S
TOP OF SLOPE
TOE OF SLOPE
DIRECTION OF FLOW
CENTERLINE RADIUS ... R= 50'
POINT OF INTERSECTION ... PI
FINISHED SURFACE ... FS
GRADE BREAK ... GB
STREET GRADE ... 2%
LAST LOT NUMBER ... 220
CURB RAMP
DECORATIVE CONCRETE

OWNER/APPLICANT

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FAX: (951) 782-0723
EMAIL: RONEILL@RICKENGINEERING.COM

GENERAL NOTES

1. EXISTING ZONING: R5, R30
2. EXISTING LAND USE: SUBURBAN RESIDENTIAL
3. EXISTING SURROUNDING LAND USE: PUBLIC FACILITIES, RESIDENTIAL,COMMERCIAL
4. PROPOSED ZONING: R5
5. PROPOSED LAND USE: SUBURBAN RESIDENTIAL
6. PROJECT ACREAGE: 52.9 AC. GROSS, 48.7 AC. NET
7. THOMAS BROS. MAP: 2009 SAN BERNARDINO/RIVERSIDE COUNTIES, PAGE 747, F-1 AND F-2
8. THIS IS NOT A GATED COMMUNITY
9. SCHOOL DISTRICT: VAL VERDE UNIFIED
10. AERIAL TOPOGRAPHY COMPILED AND PREPARED BY RICK ENGINEERING COMPANY ON 03/10/2011 AT 1' CONTOUR INTERVAL ACCURACY
11. AVERAGE RESIDENTIAL LOT SIZE: SEE TABULATION TABLE
12. FEMA FLOOD ZONE "X": NO AREAS OF FLOOD HAZARD, INUNDATION OR OVERFLOW WITHIN THE RESIDENTIAL LOTS OF THIS TENTATIVE TRACT MAP BOUNDARY
13. THERE ARE NO ADJACENT STRUCTURES OR PROPERTY IMPROVEMENTS WITHIN 50' OF THE PROJECT BOUNDARY
14. THERE ARE NO KNOWN EXISTING BUILDINGS OR STRUCTURES ABOVE GROUND WITHIN THE SUBDIVISION
15. THERE ARE NO KNOWN EXISTING WELLS, IRRIGATION LINES, CESSPOOLS, SEPTIC TANKS, SEWAGE LEACH FIELDS, SEWERS, CULVERTS, STORM DRAINS, OR UNDERGROUND STRUCTURES WITHIN THE SUBDIVISION
16. THERE ARE NO KNOWN PREVIOUSLY FILLED AREAS, INCLUDING LIQUID AND SOLID WASTE DISPOSAL SITES, WITHIN THE SUBDIVISION
17. THERE ARE NO EXISTING WATERCOURSES OR FLOOD CONTROL CHANNELS WITHIN THE PROJECT SITE
18. THERE ARE NO KNOWN EXISTING TREES OR ROCKS ON SITE
19. WATER QUALITY MEASURES ARE DESCRIBED IN PRELIMINARY WATER QUALITY MANAGEMENT PLAN.
20. WATER QUALITY BASINS AND PROPOSED PARK SITE TO BE MAINTAINED BY THE HOA OR PUBLIC ENTITY.
21. TRAFFIC SIGNAL INTERCONNECT WILL BE PROVIDED AT GENTIAN AVE.
22. PROJECT SITE IS IN HCOC EXEMPT AREA. OUTLET FROM BASINS WILL NOT MATCH PRE-PROJECT FLOWS, BUT WILL BE SIZED TO STORM DRAIN SYSTEM CAPACITIES.
23. APPLICANT RESERVES THE RIGHT TO RECORD THE FINAL MAP IN PHASES.

LEGAL DESCRIPTION

LOTS 18 AND 23 IN BLOCK 3 OF RIVERSIDE ALFALFA ACRES, AS SHOWN BY MAP ON FILE IN BOOK 8, PAGE 21 OF MAPS, RIVERSIDE COUNTY RECORDS.

EXCEPTING THEREFROM ANY PORTION LYING WITHIN TRACT NO. 22180-2 AS PER MAP RECORDED IN BOOK 207 OF MAPS, PAGES 97 THROUGH 103, INCLUSIVE, RIVERSIDE COUNTY RECORDS.

ALSO EXCEPTING THEREFROM ANY PORTION LYING WITHIN TRACT NO. 22180-3
AS PER MAP RECORDED IN BOOK 208, OF MAPS, PAGES 1 THROUGH 6, INCLUSIVE,
RIVERSIDE COUNTY RECORDS.

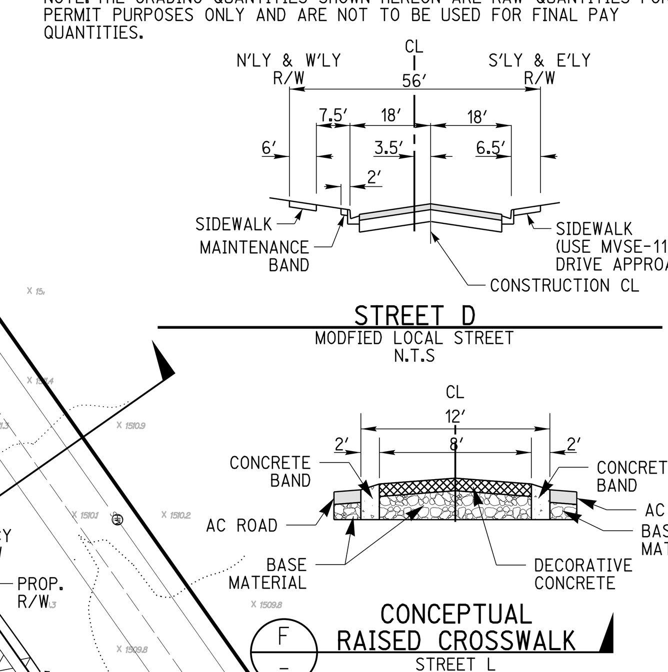
EASEMENTS

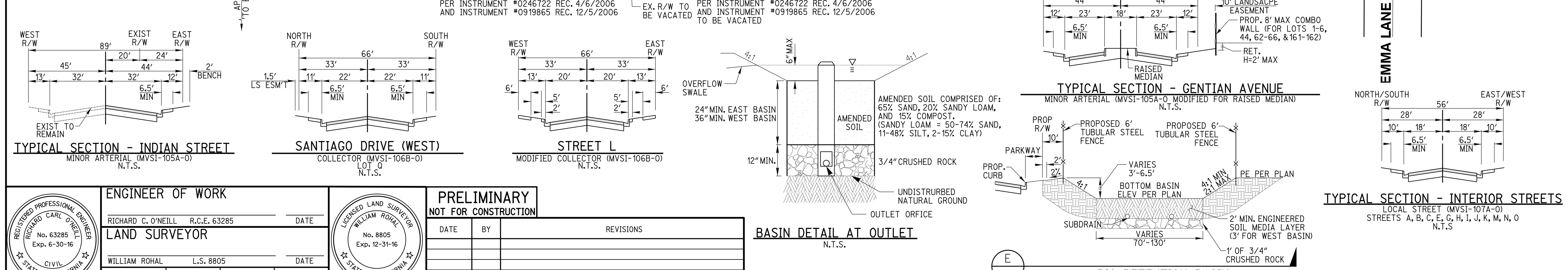
1. 100' CALIFORNIA DWR AQUEDUCT EASEMENT
2. 30' EMWD SEWER EASEMENT
3. PUBLIC UTILITY EASMENT 4' ON EACH SIDE OF LOT LINE REC 04/19.1977 # 67179
4. 6' PUBLIC UTLITY EASEMENT REC 04/19/1977
5. EASEMENT FOR ROADWAY PUBLIC UTILITY AND DRAINAGE, 04/06/2006 #0246722, 12/15/2006 #0919865

ESTIMATED GRADING QUANTITIES

ESTIMATED EXCAVATION: 108,000 C.Y.
ESTIMATED EMBANKMENT: 108,000 C.Y.

NOTE: THE GRADING QUANTITIES SHOWN HEREON ARE RAW QUANTITIES FOR PERMIT PURPOSES ONLY AND ARE NOT TO BE USED FOR FINAL PAY QUANTITIES.

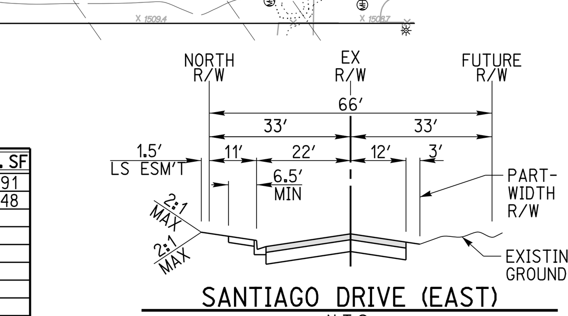




LAND USE

	LAND USE	LOT NO.	MAINTAINED BY	# OF LOTS	AREA	LOT SIZE	DENSITY	MIN. SF	AVG. SF
50x100 NEIGHBORHOOD	RESIDENTIAL	1-145		145	34.6 AC	50'x100'	4.2 DU/AC	5,000	6,291
50x80 NEIGHBORHOOD	RESIDENTIAL	146-221		76	18.3 AC	50'x80'	4.2 DU/AC	4,000	4,848
OPEN SPACE	BASIN	AA	HOA		1.32 AC				
OPEN SPACE	SD ESM'T/COMMON AREA	BB	HOA		6,426 SF				
OPEN SPACE	PARK	CC	CITY		2.83 AC				
OPEN SPACE	BASIN	DD	HOA		1.19 SF				
OPEN SPACE	SD ESM'T/COMMON AREA	EE	HOA		1,600 SF				
OPEN SPACE	COMMON AREA	FF	HOA		8,008 SF				
OPEN SPACE	COMMON AREA	GG	HOA		1,558 SF				
OPEN SPACE	AQUEDUCT/TRAIL	HH	CITY		3.46 AC				
OPEN SPACE	PASEO	II	HOA		2,400 SF				
OPEN SPACE	PASEO	JJ	HOA		5,688 SF				
OPEN SPACE	COMMON AREA	KK	HOA		704 SF				
OPEN SPACE	COMMON AREA	LL	HOA		669 SF				
OPEN SPACE	COMMON AREA	MM	HOA		1,037 SF				
OPEN SPACE	COMMON AREA	NN	HOA		931 SF				
INDIAN STREET	ROAD	S	CITY		0.73 AC				
SANTIAGO DR (WEST)	ROAD	Q	CITY		0.56 AC				
SANTIAGO DR (EAST)	ROAD	R	CITY		0.73 AC				
ONSITE ROADS					12.0 AC				
NET					48.8 AC				
GROSS					52.9 AC		4.2 DU/AC		5,801

NOTE: ALL DENSITY CALCULATIONS ARE BASED ON GROSS ACREAGE.



ENGINEER OF WORK
RICHARD C. O'NEILL R.C.E. 63285 DATE
LAND SURVEYOR
WILLIAM ROHAL L.S. 8805 DATE
DRAWN BY: ELB | DESIGNED BY: ELB | CHECKED BY: NCS | APPROVED BY:

PRELIMINARY
NOT FOR CONSTRUCTION

DATE	BY	REVISIONS

TTM 36760 (PUD)
PA14-0052, PA14-0053
MARCH 8, 2016
REVISED: OCTOBER 20, 2016

RICK ENGINEERING COMPANY
1770 IOWA AVENUE - SUITE 100
RIVERSIDE, CA 92507
951.782.0707
(FAX)951.782.0723
rickengineering.com
Riverside
San Diego - Orange - San Luis Obispo - Bakersfield - Sacramento - Phoenix - Tucson

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Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

Leighton and Associates, Inc.
A LEIGHTON GROUP COMPANY

September 14, 2016

Project No. 11427.001

MISSION PACIFIC LAND COMPANY
4100 Newport Place, Suite 480
Newport Beach, California 92660

Attention: Mr. Jason Keller, P.E.

Subject: Results of Onsite Percolation Testing
Proposed Storm Water Quality Basin, TTM 36760
Moreno Valley, California

References: Riverside County Flood Control District, Design Handbook for Low Impact Development Best Management Practices, dated September 2011.

Rick Engineering Company, 2016, Tentative Tract 36760, Planned Unit Development, dated March 8, 2016, revised July 26, 2016, 60-scale, 1 sheet.

In accordance with your request and authorization, Leighton and Associates, Inc. (Leighton) is pleased to present this percolation testing report for the proposed storm water basin located within Tract 36760. The proposed residential development (APNs 485-220-023, -032, -040) is located southeast of the intersection of Indian Street and Gentian Avenue in the City of Moreno Valley, California (See Figure 1, Site Location Map).

PURPOSE AND SCOPE OF WORK

The purpose of our testing was to determine general infiltration rates of onsite soils, depth to bedrock and/or groundwater with respect to one proposed storm water quality basin location as depicted on the referenced plan. Services provided for this study consisted of the following:

- Drilling, sampling and logging of 1 exploratory deep boring in the area of the proposed storm water basin;
- Field testing of percolation tests in accordance with the procedures outlined in the above referenced County Design Handbook; and

- Compilation of this report that presents the results of our percolation/infiltration testing and laboratory test results.

SITE DESCRIPTION

The overall site consists of approximately 53 acres of vacant relatively flat land. Based on the referenced basin plan (Rick Engineering), the proposed storm water quality basin will be located in the general area depicted on Figure 2. We understand that the planned basin will have a maximum depth of 0.5 to 2.5 feet BGS.

SUBSURFACE INVESTIGATION

Our field investigation consisted of excavating 1 deep exploratory boring up to 21.5 feet deep and 5 percolation test holes (3 feet deep) on September 9, 2016. The boring and test holes were excavated utilizing a truck mounted CME 75 drill rig equipped with an 8-inch hollow-stem auger. The exploratory borings were continuously logged to a depth of deeper than 10 feet below bottom of the proposed basin. A geologist from our office logged and observed all excavations. The locations of the exploratory boring and percolation test holes are shown on Figure 2. The logs of the exploratory boring and percolation test holes are included in Appendix A.

SOILS AND GROUNDWATER CONDITIONS

Based on the results of this study, the site is underlain by younger alluvial soil. The encountered younger alluvium is classified as loose to medium dense, silty sand (SM) with varying amounts of gravel. Groundwater was not encountered to the depth explored of 21.5 feet.

PERCOLATION TEST RESULTS

Percolation tests were performed at the corresponding depths shown in table below. The percolation tests were performed in accordance with the procedures of Section 2.3 of the County Design Handbook referenced above. Results reported below are the most conservative reading in minutes per inch drop and converted to inches per hour per the Porchet method. Field test data are included in Appendix A.

Summary of Percolation/Infiltration Test Results

Test Hole #	Ex. Ground Surface Elev. (ft)	Depth BGS (ft)	Percolation Rate (min/in)	Infiltration Rate (in/hr)	Soil Description/Notes
P-1	1511.5	3	10.0	0.56	Silty Sand (SM) Younger Alluvium
P-2	1512.0	3	6.7	0.85	Silty Sand (SM) Younger Alluvium
P-3	1511.5	3	6.7	0.85	Silty Sand (SM) Younger Alluvium
P-4	1510.5	3	8.6	0.69	Silty Sand (SM) Younger Alluvium
P-5	1510.5	3	6.7	0.85	Silty Sand (SM) Younger Alluvium

CONCLUSIONS AND RECOMMENDATIONS

For preliminary design purposes, an infiltration rate of 0.56 in/hr may be used for the southeast basin.

LIMITATIONS

The above findings and recommendations are based on a general interpretation of soils conditions between test locations, utilizing contemporary engineering principles and practice. We make no other warranty, either expressed or implied. Please notify the engineer in the event conditions are encountered that are not reflected in this report.

If you have any question, please do not hesitate to contact this office. We appreciate this opportunity to be of service.

Respectfully submitted,
LEIGHTON AND ASSOCIATES, INC.

PROFESSIONAL ENGINEER KENNETH EDWIN COX 2793 GEOTECHNICAL STATE OF CALIFORNIA

REGISTERED GEOLOGIST ROBERT F. RIHA No. 1921 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

Kenneth E. Cox, GE 2793
Senior Project Engineer

Robert F. Riha, CEG 1921
Vice President / Senior Principal Geologist

Attachments: Figure 1 – Site Location Map
Figure 2 – Percolation Test Locations
Appendix A – Perc Data Test Sheets & Log of Exploratory Borings

Distribution: (1) addressee (PDF copy via email)

Project: 11427.001	Eng/Geol: KC/RFR
Scale: 1 " = 2,000 '	Date: September 2016

Base Map: ESRI ArcGIS Online 2016
Thematic Information: Leighton
Author: Leighton Geomatics (mmurphy)

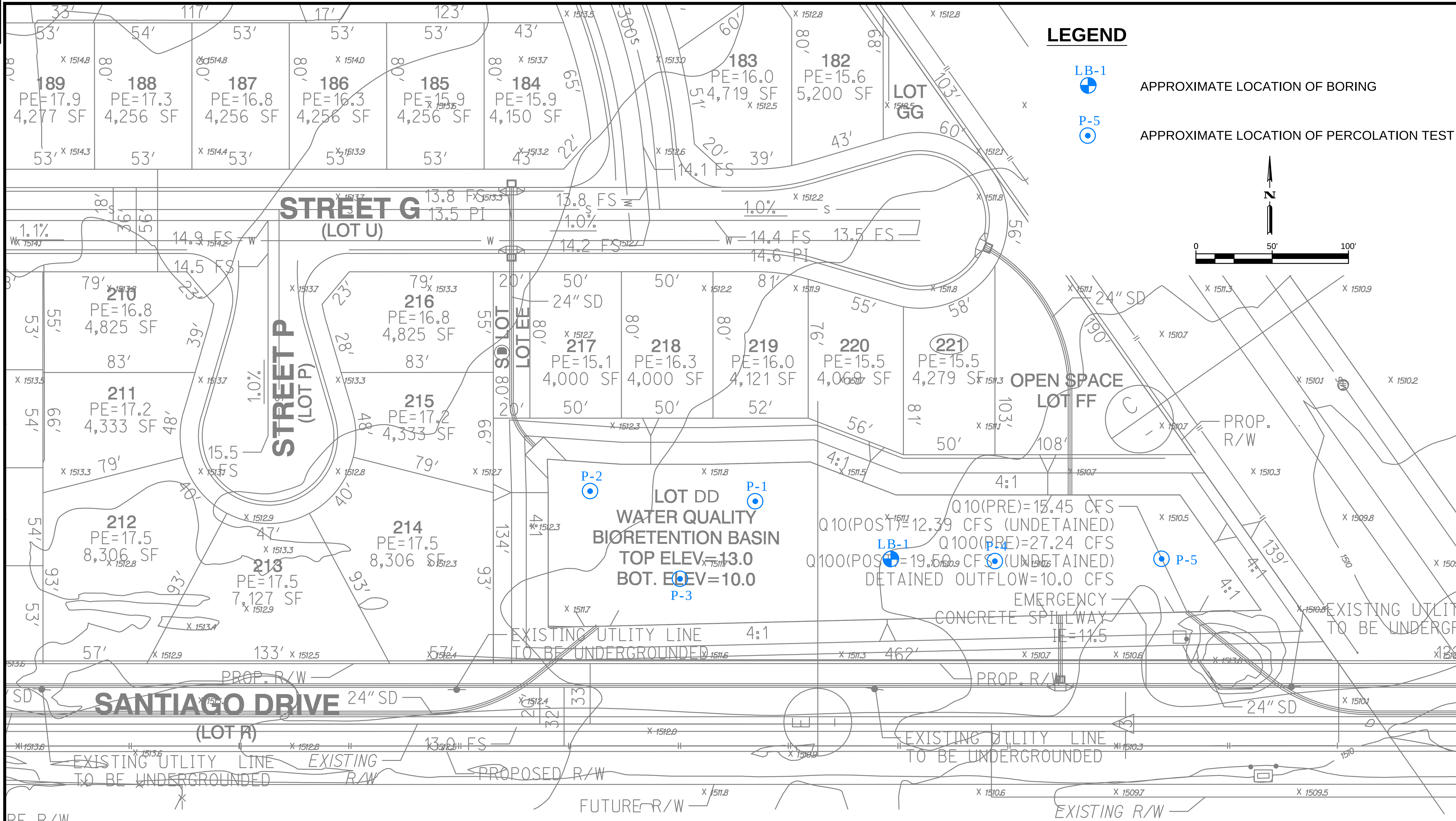
SITE LOCATION MAP

Residential Development, Tentative Tract Map 36760
APNs: 485-220-023, 485-220-032, 485-220-040
Moreno Valley, California

Figure 1

Leighton

Map Saved as V:\Drafting\11427\001\Maps\11427-001_F01_SLM_2016-08-29.mxd on 8/29/2016 9:02:07 AM



Proj: 11427.001	Geo/Eng: KEC/RFR
Scale: 1"=50'	Date: September 2016
Reference:	

BORING/PERCOLATION TEST LOCATION MAP

Residential Development, Tentative Tract Map 36760
APN's 485-220-023, 485-220-032, 485-220-040
Moreno Valley, California

Figure-2

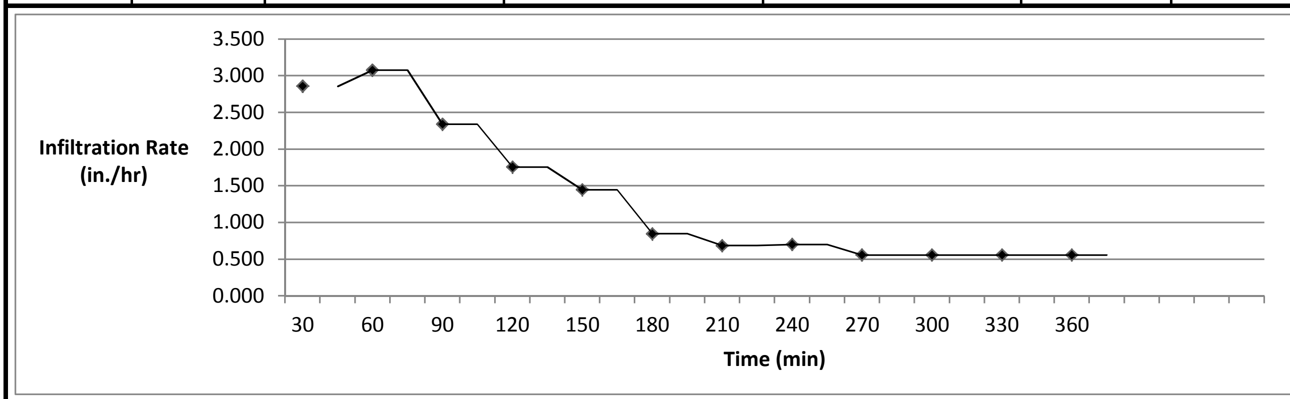
Leighton

APPENDIX A

Percolation Data Sheets & Log of Exploratory Borings

Test Hole Number:	P-1	Project	TTM 36760 Perc	
Date Excavated:	9/9/2016	Project Number	11427.001	
Tested by:	JTD	Date Tested	9/12/2016	
Soil Unit:	Alluvium (Qal)	Depth of Test Hole (in.)	36	
USCS Soil Type:	Brown Silty SAND	Diameter (in.)	8	Cloudy ~70 °

Time	Δt (min)	Initial Water Depth (inches)	Final Water Depth (inches)	Change In Water Level (inches)	Infiltration/Percolation Rate	
					inches/hour*	minute/inch
9:28:00 9:38:00	10.00	14.50	19.50	5.00	2.857	2.000
9:38:00 9:48:00	10.00	16.00	21.00	5.00	3.077	2.000
9:48:00 9:58:00	10.00	15.50	19.50	4.00	2.341	2.500
9:58:00 10:08:00	10.00	16.00	19.00	3.00	1.756	3.333
10:08:00 10:18:00	10.00	16.00	18.50	2.50	1.446	4.000
10:18:00 10:28:00	10.00	16.00	17.50	1.50	0.847	6.667
10:28:00 10:38:00	10.00	15.50	16.75	1.25	0.686	8.000
10:38:00 10:48:00	10.00	16.00	17.25	1.25	0.702	8.000
10:48:00 10:58:00	10.00	16.00	17.00	1.00	0.558	10.000
10:58:00 11:08:00	10.00	16.00	17.00	1.00	0.558	10.000
11:08:00 11:18:00	10.00	16.00	17.00	1.00	0.558	10.000
11:18:00 11:28:00	10.00	16.00	17.00	1.00	0.558	10.000

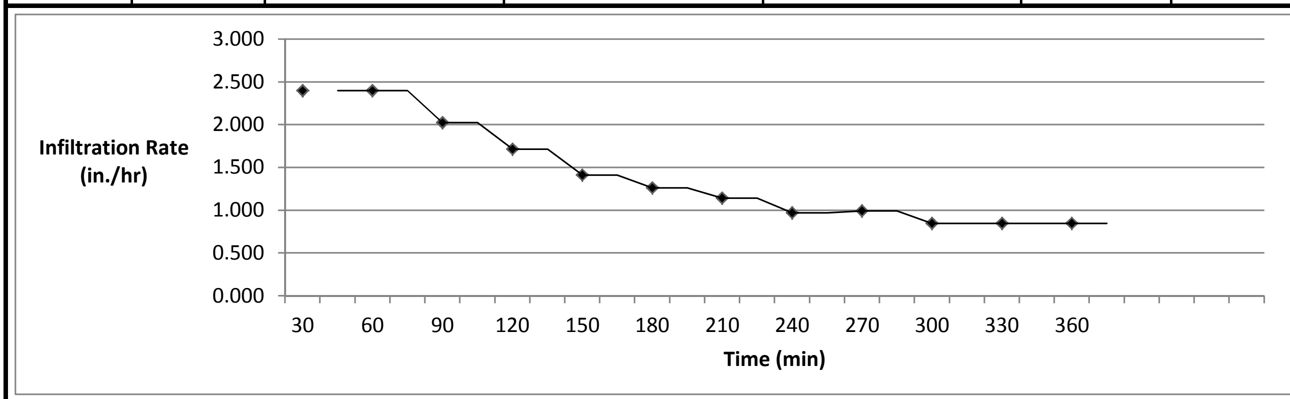


* Based on Prochet Method

Percolation Test Data **P-1**	***Project Number:*** 11427.001 ***Project Name:*** *TTM 36760* ***Date:*** Sep-16	Leighton

Test Hole Number:	P-2	Project	TTM 36760 Perc	
Date Excavated:	9/9/2016	Project Number	11427.001	
Tested by:	JTD	Date Tested	9/12/2016	
Soil Unit:	Alluvium (Qal)	Depth of Test Hole (in.)	36	
USCS Soil Type:	Brown Silty SAND	Diameter (in.)	8	Cloudy ~70 °

Time	Δt (min)	Initial Water Depth (inches)	Final Water Depth (inches)	Change In Water Level (inches)	Infiltration/Percolation Rate	
					inches/hour*	minute/inch
9:29:00 9:39:00	10.00	16.00	20.00	4.00	2.400	2.500
9:39:00 9:49:00	10.00	16.00	20.00	4.00	2.400	2.500
9:49:00 9:59:00	10.00	15.50	19.00	3.50	2.024	2.857
9:59:00 10:09:00	10.00	15.50	18.50	3.00	1.714	3.333
10:09:00 10:19:00	10.00	15.50	18.00	2.50	1.412	4.000
10:19:00 10:29:00	10.00	15.50	17.75	2.25	1.263	4.444
10:29:00 10:39:00	10.00	16.00	18.00	2.00	1.143	5.000
10:39:00 10:49:00	10.00	15.50	17.25	1.75	0.971	5.714
10:49:00 10:59:00	10.00	16.00	17.75	1.75	0.994	5.714
10:59:00 11:09:00	10.00	16.00	17.50	1.50	0.847	6.667
11:09:00 11:19:00	10.00	16.00	17.50	1.50	0.847	6.667
11:19:00 11:29:00	10.00	16.00	17.50	1.50	0.847	6.667



* Based on Prochet Method

Percolation Test Data

P-2

Project Number: 11427.001

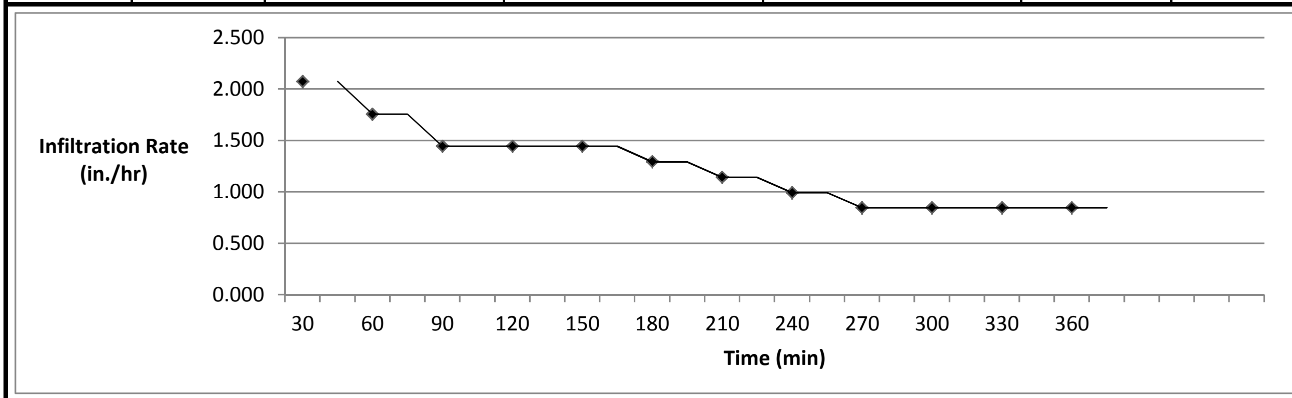
Project Name: *TTM 36760*

Date: Sep-16

Leighton

Test Hole Number:	P-3	Project	TTM 36760 Perc	
Date Excavated:	9/9/2016	Project Number	11427.001	
Tested by:	JTD	Date Tested	9/12/2016	
Soil Unit:	Alluvium (Qal)	Depth of Test Hole (in.)	36	
USCS Soil Type:	Brown Silty SAND	Diameter (in.)	8	Cloudy ~70 °

Time	Δt (min)	Initial Water Depth (inches)	Final Water Depth (inches)	Change In Water Level (inches)	Infiltration/Percolation Rate inches/hour*	Infiltration/Percolation Rate minute/inch
9:30:00 – 9:40:00	10.00	16.00	19.50	3.50	2.074	2.857
9:40:00 – 9:50:00	10.00	16.00	19.00	3.00	1.756	3.333
9:50:00 – 10:00:00	10.00	16.00	18.50	2.50	1.446	4.000
10:00:00 – 10:10:00	10.00	16.00	18.50	2.50	1.446	4.000
10:10:00 – 10:20:00	10.00	16.00	18.50	2.50	1.446	4.000
10:20:00 – 10:30:00	10.00	16.00	18.25	2.25	1.293	4.444
10:30:00 – 10:40:00	10.00	16.00	18.00	2.00	1.143	5.000
10:40:00 – 10:50:00	10.00	16.00	17.75	1.75	0.994	5.714
10:50:00 – 11:00:00	10.00	16.00	17.50	1.50	0.847	6.667
11:00:00 – 11:10:00	10.00	16.00	17.50	1.50	0.847	6.667
11:10:00 – 11:20:00	10.00	16.00	17.50	1.50	0.847	6.667
11:20:00 – 11:30:00	10.00	16.00	17.50	1.50	0.847	6.667



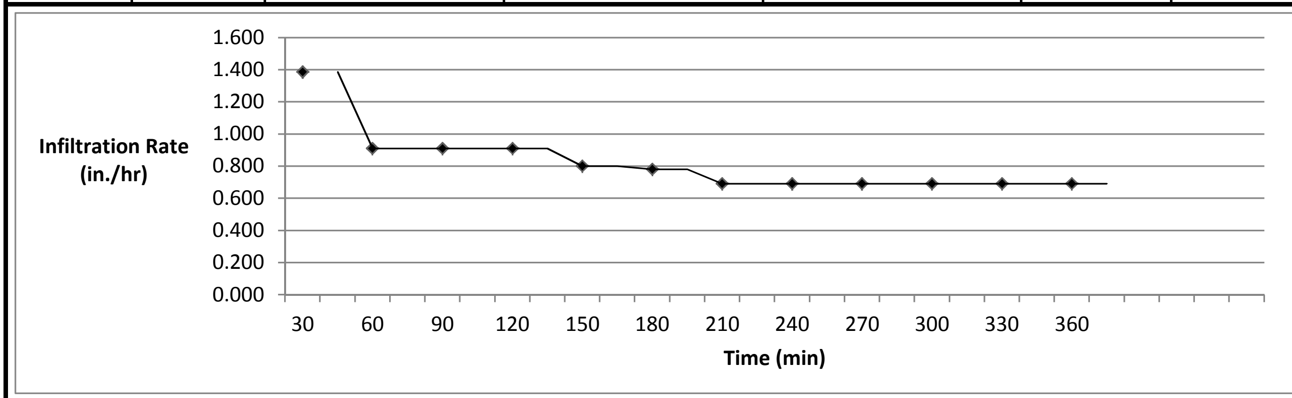
* Based on Prochet Method

Percolation Test Data		
P-3	***Project Number:*** 11427.001	Leighton
	Project Name: *TTM 36760*	
	Date: Sep-16	

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

Test Hole Number:	P-4	Project	TTM 36760 Perc	
Date Excavated:	9/9/2016	Project Number	11427.001	
Tested by:	JTD	Date Tested	9/12/2016	
Soil Unit:	Alluvium (Qal)	Depth of Test Hole (in.)	36	
USCS Soil Type:	Brown Silty SAND	Diameter (in.)	8	Cloudy ~70 °

Time	Δt (min)	Initial Water Depth (inches)	Final Water Depth (inches)	Change In Water Level (inches)	Infiltration/Percolation Rate inches/hour*	Infiltration/Percolation Rate minute/inch
6:59:00 7:09:00	30.00	16.00	22.50	6.50	1.387	4.615
7:09:00 7:19:00	30.00	16.00	20.50	4.50	0.911	6.667
7:19:00 7:29:00	30.00	16.00	20.50	4.50	0.911	6.667
7:29:00 7:39:00	30.00	16.00	20.50	4.50	0.911	6.667
7:39:00 7:49:00	30.00	16.00	20.00	4.00	0.800	7.500
7:49:00 7:59:00	30.00	15.50	19.50	4.00	0.780	7.500
7:59:00 8:09:00	30.00	16.00	19.50	3.50	0.691	8.571
8:09:00 8:19:00	30.00	16.00	19.50	3.50	0.691	8.571
8:19:00 8:29:00	30.00	16.00	19.50	3.50	0.691	8.571
8:29:00 8:39:00	30.00	16.00	19.50	3.50	0.691	8.571
8:39:00 8:49:00	30.00	16.00	19.50	3.50	0.691	8.571
8:49:00 8:59:00	30.00	16.00	19.50	3.50	0.691	8.571



* Based on Prochet Method

Percolation Test Data

P-4

Project Number: 11427.001

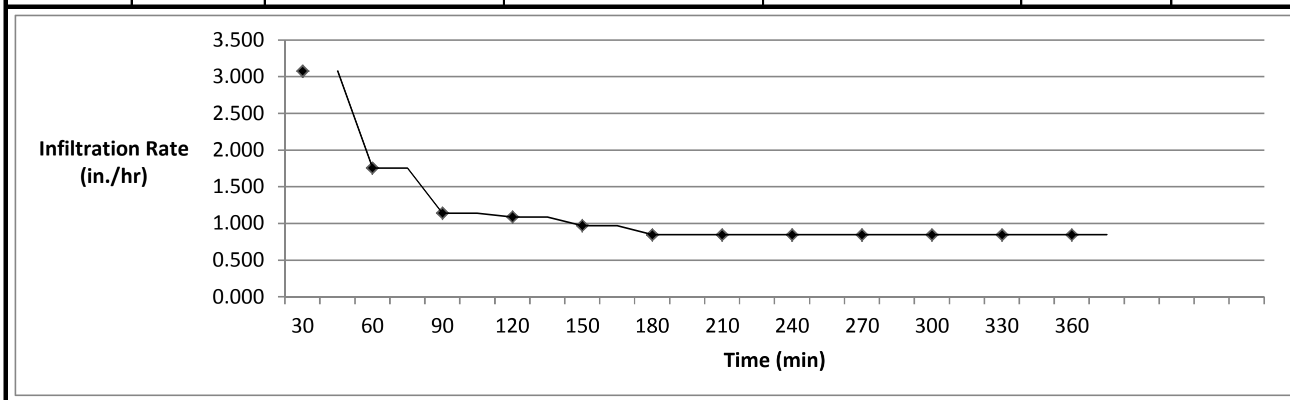
Project Name: *TTM 36760*

Date: Sep-16

Leighton

Test Hole Number:	**P-5**	**Project**	**TTM 36760 Perc**	
Date Excavated:	**9/9/2016**	**Project Number**	**11427.001**	
Tested by:	**JTD**	**Date Tested**	**9/12/2016**	
Soil Unit:	**Alluvium (Qal)**	**Depth of Test Hole (in.)**	**36**	
USCS Soil Type:	**Brown Silty SAND**	**Diameter (in.)**	**8**	**Cloudy ~70 °**

Time	Δt (min)	Initial Water Depth (inches)	Final Water Depth (inches)	Change In Water Level (inches)	Infiltration/Percolation Rate	
					inches/hour*	minute/inch
7:00:00 7:10:00	10.00	16.00	21.00	5.00	3.077	2.000
7:10:00 7:20:00	10.00	16.00	19.00	3.00	1.756	3.333
7:20:00 7:30:00	10.00	16.00	18.00	2.00	1.143	5.000
7:30:00 7:40:00	10.00	15.00	17.00	2.00	1.091	5.000
7:40:00 7:50:00	10.00	15.50	17.25	1.75	0.971	5.714
7:50:00 8:00:00	10.00	16.00	17.50	1.50	0.847	6.667
8:00:00 8:10:00	10.00	16.00	17.50	1.50	0.847	6.667
8:10:00 8:20:00	10.00	16.00	17.50	1.50	0.847	6.667
8:20:00 8:30:00	10.00	16.00	17.50	1.50	0.847	6.667
8:30:00 8:40:00	10.00	16.00	17.50	1.50	0.847	6.667
8:40:00 8:50:00	10.00	16.00	17.50	1.50	0.847	6.667
8:50:00 9:00:00	10.00	16.00	17.50	1.50	0.847	6.667



* Based on Prochet Method

Percolation Test Data **P-5**	***Project Number:*** 11427.001 ***Project Name:*** *TTM 36760* ***Date:*** Sep-16	Leighton

GEOTECHNICAL BORING LOG LB-1

Project No.	11427.001	**Date Drilled**	9-9-16
Project	TTM 36760 Perc	**Logged By**	JTD
Drilling Co.	2-R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1511'
Location	See Boring Location Map	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
	0							SM	**Quaternary Alluvium (Qal)**; SILTY SAND, brown, dry to moist, fine to coarse grained sand	
									becomes dark yellowish brown, moist	
	5			S-1	12 11 11				becomes, medium dense, moist	
									becomes SILTY SAND with GRAVEL	
	10			S-2	5 6 8				becomes SILTY SAND, dark grayish brown	
	15			S-3	6 8 13					
	20			S-4	5 7 7				becomes SILTY SAND with gravel, brown, fine to coarse grained sand with fine gravel	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG P-1

Project No.	11427.001	**Date Drilled**	9-9-16
Project	TTM 36760 Perc	**Logged By**	JTD
Drilling Co.	2-R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1511.5'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0							SM	**Quaternary Alluvium (Qal)**; SILTY SAND with GRAVEL, brown, dry to moist, fine to coarse grained sand with fine gravel	
				S-1	6 8 8				becomes SILTY SAND, medium dense	
	5								Drilled to 3' Sampled to 3' Groundwater not encountered Backfilled with cuttings	
	10									
	15									
	20									
	25									
	30									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG P-2

Project No.	11427.001	**Date Drilled**	9-9-16
Project	TTM 36760 Perc	**Logged By**	JTD
Drilling Co.	2-R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1512'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0							SM	**Quaternary Alluvium (Qal)**; SILTY SAND with GRAVEL, brown, dry to moist, fine to coarse grained sand with fine gravel	
				S-1	7 7 7				becomes SILTY SAND, medium dense	
	5								Drilled to 3' Sampled to 3' Groundwater not encountered Backfilled with cuttings	
	10									
	15									
	20									
	25									
	30									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG P-3

Project No.	11427.001	**Date Drilled**	9-9-16
Project	TTM 36760 Perc	**Logged By**	JTD
Drilling Co.	2-R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1511.5'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0							SM	**Quaternary Alluvium (Qal)**; SILTY SAND with GRAVEL, brown, dry to moist, fine to coarse grained sand with fine gravel	
				S-1	6 6 3				becomes SILTY SAND, loose, dark brown, moist, fine to coarse grained sand	
	5								Drilled to 3' Sampled to 3' Groundwater not encountered Backfilled with cuttings	
	10									
	15									
	20									
	25									
	30									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG P-4

Project No.	11427.001	**Date Drilled**	9-9-16
Project	TTM 36760 Perc	**Logged By**	JTD
Drilling Co.	2-R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1510.5'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0							SM	**Quaternary Alluvium (Qal)**; SILTY SAND with GRAVEL, brown, dry to moist, fine to coarse grained sand with fine gravel	
				S-1	8 8 9				becomes SILTY SAND, medium dense, fine to coarse grained sand	
	5								Drilled to 3' Sampled to 3' Groundwater not encountered Backfilled with cuttings	
	10									
	15									
	20									
	25									
	30									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG P-5

Project No.	11427.001	**Date Drilled**	9-9-16
Project	TTM 36760 Perc	**Logged By**	JTD
Drilling Co.	2-R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1510.5'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
	0							SM	**Quaternary Alluvium (Qal)**; SILTY SAND with GRAVEL, brown, dry to moist, fine to coarse grained sand with gravel to 1"	
				S-1	5 4 4				becomes SILTY SAND, loose, very fine to medium grained sand	
	5								Drilled to 3' Sampled to 3' Groundwater not encountered Backfilled with cuttings	
	10									
	15									
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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PRELIMINARY GEOTECHNICAL INVESTIGATION, PROPOSED 104-ACRE RESIDENTIAL DEVELOPMENT, NORTHWEST OF PERRIS BOULEVARD AND IRIS AVENUE, CITY OF MORENO VALLEY, CALIFORNIA

Prepared for:

YOUNG HOMES
10370 Trademark Street
Rancho Cucamonga, California 91730

Project No. 021164-001

June 9, 2004

Leighton and Associates, Inc.
A LEIGHTON GROUP COMPANY

Leighton and Associates, Inc.
A LEIGHTON GROUP COMPANY

June 9, 2004

Project No. 021164-001

To: Young Homes
10370 Trademark Street
Rancho Cucamonga, California 91730

Attention: Mr. Thomas Owen

Subject: Preliminary Geotechnical Investigation, Proposed 104-Acre Residential Development, Northwest of Perris Boulevard and Iris Avenue, City of Moreno Valley, California

In response to your request, Leighton and Associates, Inc. has conducted a preliminary geotechnical investigation of the proposed residential development to be located northwest of Perris Boulevard and Iris Avenue in the City of Moreno Valley, California. The purpose of our investigation has been to explore the subsurface conditions at the site, to evaluate the general soil characteristics, and to provide preliminary geotechnical recommendations for the design and construction of the proposed improvements.

Based upon our investigation, the proposed development is feasible from a geotechnical viewpoint, provided our recommendations are incorporated in the design and construction of the project. The following report presents our geotechnical findings, conclusions, and preliminary recommendations. Additional geotechnical investigation and analysis may be necessary, based on the actual development plans for submittal with the project grading plans.

10532 Acacia Street, Suite B-6 ▪ Rancho Cucamonga, CA 91730
909.484.2205 ▪ Fax 909.484.2170 ▪ www.leightongeo.com

We appreciate the opportunity to work with you on this project. If you have any questions, or if we can be of further service, please call us at your convenience.

Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.

REGISTERED PROFESSIONAL ENGINEER
JASON D. HERTZBERG
No. 61778
Exp. 6-30-05
CIVIL
STATE OF CALIFORNIA

Jason Hertzberg, RCE 61778
Project Engineer

Philip A. Buchiarelli, CEG 1715
Senior Associate Geologist

David C. Smith, RCE 46222
Vice President/Principal Engineer

DAG/JDH/PB/DCS/rsh

Distribution: (4) Addressee

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Leighton

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Appendices

LIST OF ILLUSTRATIONS

1.0 INTRODUCTION

1.1 Site Location and Project Description

The site is located northwest of Perris Boulevard and Iris Avenue in the City of Moreno Valley, California (see Figure 1, Site Location Map). The project area is bounded on the east by Perris Boulevard and the Home Depot shopping center, on the south by Iris Avenue, on the west by Indian Street and an elementary school, and on the north by vacant land. March Air Reserve Base is approximately one mile west. The East Branch California Aqueduct crosses the eastern portion of the site. The approximately 104-acre flat site is irregular in shape and is currently vacant. Vegetation consists of seasonal grasses, brush, and several scattered small trees.

Based on our review of historic aerial photographs, the site was used for agricultural purposes within the period of at least 1953 to 1980, and was otherwise vacant.

It is our understanding that the intended use of the site is a residential development. Although grading and construction plans are not yet available, we anticipate that minor cuts and fills will be required to attain the desired finish grades. We anticipate the one- and two-story single-family residences will be constructed. A parcel map provided by you was used as the base map for our Geotechnical Map, Figure 2 (rear of text).

1.2 Purpose of Investigation

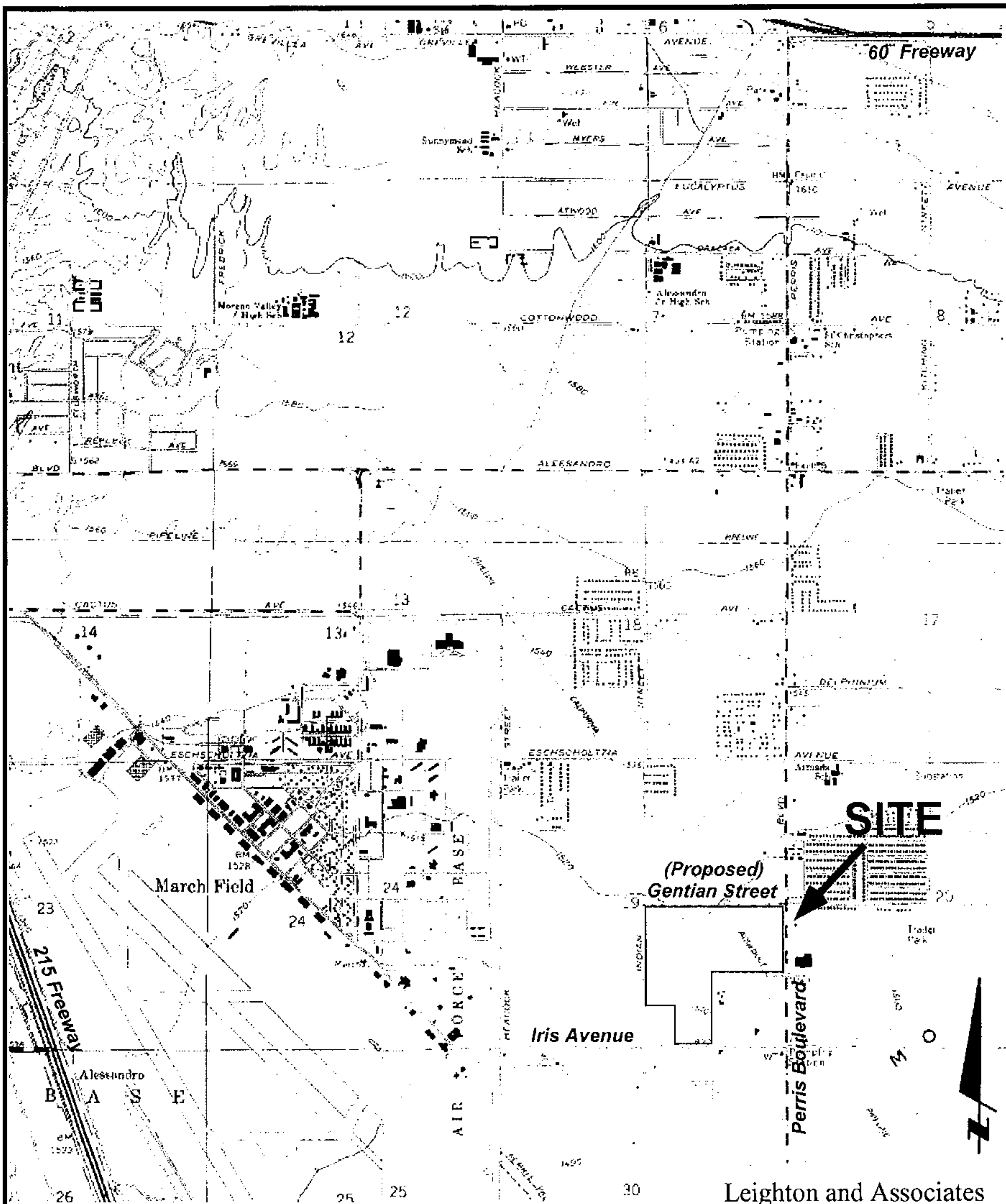
The purpose of this study has been to evaluate the general geotechnical conditions at the site, to identify significant geotechnical or geologic issues that would impact site development, and to provide preliminary geotechnical recommendations for design and construction.

1.3 Scope of Investigation

The scope of our investigation has included the following tasks:

- Background Review - A background review of readily available, relevant, in-house geotechnical literature, and aerial photographs was performed.

- Pre-field Investigation Activities - Coordinated with Underground Service Alert (USA) to have existing underground utilities located and marked prior to our subsurface investigation.



PROPOSED 104-ACRE RESIDENTIAL DEVELOPMENT NORTHWEST OF PERRIS BOULEVARD AND IRIS AVENUE, City of Moreno Valley, California	**SITE LOCATION MAP**	PROJECT NO. 021164-001 DATE June, 2004 Figure 1

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

- Field Investigation - Our field investigation consisted of the excavation of borings and test pits as follows:

  Borings
  Eight hollow-stem auger borings were excavated, logged and sampled at representative locations within the site. One boring was excavated to a depth of 51.5 feet and seven borings were excavated to depths of 21.5 feet below the existing ground surface. Each boring was logged by a member of our technical staff. Relatively undisturbed soil samples were obtained at selected intervals within the borings using Standard Penetration Testing and a California Ring Sampler. Logs of the geotechnical borings are presented in Appendix B. Approximate boring locations are shown on the accompanying Geotechnical Map, Figure 2.

  Test Pits
  Eight backhoe test pits were excavated and logged at representative locations within the site to a maximum depth of 5.5 feet below the existing ground surface. Each test pit was logged by a member of our technical staff. Bulk soil samples were obtained from the test pits. Logs of the test pits are presented in Appendix C. Approximate test pit locations are shown on the accompanying Geotechnical Map, Figure 2.

- Laboratory Tests - Laboratory tests were conducted on selected relatively undisturbed and bulk soil samples obtained during our field investigation. The laboratory testing program was designed to evaluate the engineering characteristics of the onsite soil. Results of the laboratory testing are presented in Appendix D. The laboratory tests conducted during this investigation include:

  - In situ moisture content and dry density.
  - Sieve analysis for grain size distribution.
  - Consolidation and hydrocollapse characteristics.
  - Expansion Index.
  - Maximum dry density and optimum moisture content.
  - R-value for pavement recommendations.

- Water-soluble sulfate concentration in the soil for cement type recommendations.

- Resistivity, chloride content and pH to evaluate corrosion potential.

- Engineering Analysis - The data obtained from our background review and field exploration was evaluated and analyzed in order to provide the conclusions and preliminary recommendations in the following sections.

- Report Preparation - The results of our geotechnical investigation have been summarized in this report, presenting our findings, conclusions and preliminary recommendations.

2.0 FINDINGS

2.1 Site Geology

The site is located in the Perris block of the Peninsular Ranges Geomorphic Province of southern California. The Perris block is a structural block bounded on the north by the San Jacinto Fault Zone (located 8 kilometers northeast of the site) and on the south by the Elsinore Fault Zone (located 29 kilometers southwest of the site). These faults have experienced significant activity in the recent geologic past. These and other northwest-trending right lateral strike slip faults dominate the structure of the Peninsular Ranges. Cretaceous igneous rocks of the Southern California Batholith underlie the Peninsular Ranges in this area. Locally, the site vicinity is underlain by older alluvial soil deposits of clay, silt, sand and gravel (SCGS, 1982; Morton, 1978). Bedrock outcrops of quartz diorite are present approximately ¾ mile east of the site.

2.2 Subsurface Soil Conditions

Based upon our review of pertinent geotechnical literature, and our subsurface exploration, the site is underlain by alluvial soil deposits. The soil encountered during our subsurface exploration in the upper 15 feet generally consisted of loose to medium dense silty sand to gravelly sand and soft to stiff sandy silt. Below a depth of 15 feet, the soil generally consisted of stiff to very stiff sandy silt to clay. These soils were typically characterized as slightly moist to very moist to the depths excavated. Moisture contents in the upper 10 feet ranged from 2 to 10 percent.

2.3 Groundwater

Groundwater was not encountered in any of our borings performed during this investigation to a depth of 51.5 feet. Based on our review of regional groundwater data, groundwater is expected to be on the order of 120 to 140 feet below the ground surface in the site vicinity (CDWR, 2000). However, relatively shallow perched ground water may occur locally (WMWD, 2003).

2.4 Faulting and Seismicity

The two principal seismic considerations for most sites in southern California are surface rupture along active fault traces and damage to structures due to seismically-induced ground shaking. An active fault is one that has moved in the Holocene (last 11,000 years). The closest mapped active fault that could affect the site is the San Jacinto (San

Jacinto Valley) fault, located approximately 9 kilometers northeast of the site. The San Jacinto fault is capable of producing a maximum moment magnitude of 6.9 and an average slip rate of 12 millimeter per year (CDMG, 1998). Other known regional active faults that could affect the site include the San Jacinto (San Bernardino), San Andreas, Elsinore, Chino-Central Avenue and Cucamonga faults.

No traces of active or potentially active faults have been observed to cross the project site. The site is not within an Alquist-Priolo Earthquake Fault Zone (CDMG, 2000). The potential for fault ground rupture at the site is considered very low.

Peak Horizontal Ground Accelerations (PHGA) for the site were estimated using a deterministic seismic hazard analysis, based on currently available earthquake and fault information. The analysis computes the site PHGA that could be expected to result from an earthquake on a specific fault using the estimated maximum magnitude earthquake event. PHGA's were estimated using the EQFAULT computer program (Blake, 2000), based on the attenuation relationship by Sadigh et al. (1997). Based on the analysis, the San Jacinto (San Jacinto Valley) Fault Zone is potentially capable of producing the greatest PHGA at the site, due to its proximity, fault type, and its maximum earthquake magnitude of 6.9 (M_W). It is estimated that such an earthquake on this fault near the site could produce seismic shaking with a PHGA of 0.32g.

The PHGA was also estimated using a probabilistic seismic hazard analsyis. The computer program FRISKSP (Blake, 2000) was used for the analysis. Attenuation relationships used in the computer analysis were developed by Abrahamson and Silva (1997) for soil, Campbell (1997 and 2000) for alluvium, and Sadigh et al. (1997) for deep soil deposits. The analysis indicated an average value of 0.59g for peak horizontal ground acceleration (PHGA) with a 10 percent probability of exceedance in 50 years. The predominant magnitude is approximately 6.8 (Mw) at a distance on the order of 10 kilometers.

2.5 Secondary Seismic Hazards

Liquefaction Potential

Liquefaction is the loss of soil strength or stiffness due to a buildup of excess pore-water pressure during strong ground shaking. Liquefaction is associated primarily with loose (low density), granular, saturated soil. Effects of severe liquefaction can include sand boils, excessive settlement, bearing capacity failures, and lateral spreading.

The Generalized Liquefaction Map for Riverside County (2003) indicates the site is located in an area of shallow groundwater with sediments considered highly susceptible to liquefaction. Our exploratory borings indicate that moderately dense soil underlies the site. In addition, regional groundwater data indicates that shallow groundwater conditions do not exist locally, nor have they existed historically. Based on these findings, the potential for liquefaction appears to be low.

Seismically Induced Settlement

During a strong seismic event, seismically induced settlement can occur within loose to moderately dense, dry or saturated granular soil. Settlement caused by ground shaking can be nonuniformly distributed, resulting in differential settlement. We have performed analyses to estimate seismically-induced settlement using the simplified method set forth by Tokimatsu and Seed (1987).

Based on this preliminary study, the potential total settlement resulting from seismic loading is estimated to be approximately 1½ inches. Differential settlement resulting from seismic loading is generally assumed to be one-half of the total seismically induced settlement over a distance of 40 feet. Seismic settlement is not considered a geotechnical constraint to the project.

2.6 Compressible and Collapsible Soil

Based on our investigation, the upper 5 to 15 feet of older alluvium is generally considered to be slightly to moderately compressible. Partial removal and recompaction of this material will be necessary to reduce the potential for excessive total and differential settlement of the proposed structures.

Hydrocollapse potential refers to the potential settlement of a soil under existing stresses upon being wetted. Representative samples of the upper 5 to 20 feet of the subsurface soil were tested for hydrocollapse potential. Test results indicate that the near-surface soil onsite has a negligible to minor hydrocollapse potential (1 percent or less).

2.7 Expansive Soils

Representative samples of the subsurface soil were tested for expansion potential. Test results indicate an Expansion Index of 0 to 5. Based on these results and the relatively granular nature of the near-surface soil, the onsite soil generally has a very low expansion potential.

2.8 Sulfate Content

Water-soluble sulfates in soil can react adversely with concrete. However, concrete in contact with soil containing sulfate concentrations of less than 0.10 percent are considered to have negligible sulfate exposure (UBC, 1997 edition, Chapter 19).

Near-surface soil samples were tested during this investigation for soluble sulfate content. The results of these tests indicated sulfate contents of less than 0.01 percent by weight, indicating negligible sulfate exposure. As such, the soils exposed at pad grade are not expected to pose a significant potential for sulfate reaction with concrete.

2.9 Resistivity, Chloride and pH

Soil corrosivity to ferrous metals can be estimated by the soil's pH level, electrical resistivity, and chloride content. In general, soil having a minimum resistivity less than 2,000 ohm-cm is considered corrosive. Soil with a chloride content of 500 ppm or more is considered corrosive to ferrous metals.

As a screening for potentially corrosive soil, representative soil samples were tested during this investigation to determine minimum resistivity, chloride content, and pH level. The tests indicated a chloride content of 42 ppm, a pH value of approximately 7.0, and a minimum resistivity of 7,000 ohm-cm. Based on the test results, the onsite soil is considered mildly corrosive to buried ferrous metals.

3.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon this study, the proposed improvements are feasible from a geotechnical standpoint. The recommendations presented below are preliminary. Additional geotechnical investigation and analysis may be necessary, based on the actual development plans for submittal with the project grading plans.

3.1 General Earthwork and Grading

All grading should be performed in accordance with the General Earthwork and Grading Specifications presented in Appendix D, unless specifically revised or amended below or by future recommendations based on final development plans.

Site Preparation

Prior to construction, the site should be cleared of vegetation, trash, and debris. Trees should be removed and grubbed out, and the excavations should be backfilled with compacted fill. Any underground obstructions onsite should be removed. The resulting cavities should be properly backfilled and compacted. Efforts should be made to locate any existing utility lines. Those lines should be removed or rerouted if they interfere with the proposed construction, and the resulting cavities should be properly backfilled and compacted. In addition, any uncontrolled artificial fill, if encountered, should be removed.

Overexcavation and Recompaction

To reduce the potential for adverse differential settlement of the proposed structures, the underlying subgrade soil should be prepared in such a manner that a uniform response to the applied loads is achieved. The soil underneath conventional shallow footings should be overexcavated and recompacted to a minimum depth of 3 feet below the bottom of the proposed foundations for residential structures or 3 feet below the existing grade, whichever is deeper. The overexcavation and recompaction should extend a minimum lateral distance of 5 feet from the footings. Local conditions may require that deeper overexcavation be performed; such areas should be evaluated by Leighton and Associates during grading.

Areas outside the overexcavation limits of buildings planned for asphalt or concrete pavement, flatwork, site walls, and retaining walls (less than 6 feet in height), and areas to receive fill should be overexcavated to a minimum depth of 12 inches below the existing ground surface or 12 inches below the proposed finish subgrade, whichever is deeper.

After completion of the overexcavation, and prior to fill placement, the exposed surfaces should be scarified to a minimum depth of 6 inches, moisture-conditioned to or slightly above optimum moisture content, and recompacted to a minimum 90 percent relative compaction.

Fill Placement and Compaction

The onsite soil is suitable for use as compacted structural fill, provided it is free of debris, and oversized material (greater than 8 inches in largest dimension). Any soil to be placed as fill, whether onsite or imported material, should be accepted by Leighton and Associates.

All fill soil should be placed in thin, loose lifts, moisture-conditioned, as necessary, to near optimum moisture content, and compacted to a minimum 90 percent relative compaction as determined by ASTM Test Method D1557. Aggregate base should be compacted to a minimum of 95 percent relative compaction.

Shrinkage and Subsidence

The change in volume of excavated and recompacted soil varies according to soil type and location. This volume change is represented as a percentage increase (bulking) or decrease (shrinkage) in volume of fill after removal and recompaction. Subsidence occurs as natural ground is moisture-conditioned and densified to receive fill. Field and laboratory data used in our calculations included laboratory-measured maximum dry densities for soil types encountered at the subject site and the measured in-place densities of soils encountered. We estimate the following earth volume changes will occur during grading:

Shrinkage	Approximately 15 percent
Subsidence	Approximately 0.15 foot

The level of fill compaction, variations in the dry density of the existing soils and other factors influence the amount of volume change. Some adjustments to earthwork volume should be anticipated during grading of the site.

3.2 Foundations

Based on our preliminary investigation and our experience in the region, conventional shallow or post-tensioned foundations may be used to support the loads of one- to two-story, frame-type structures. Overexcavation and recompaction of the footing subgrade soil should be performed as detailed in Section 3.1.

Conventional Shallow Foundations

Based on our preliminary investigation, the footings for 2-story structures should have an embedment depth of 18 inches, with a minimum width of 24 and 15 inches for isolated and continuous footings, respectively. The footings for 1-story residential structures should have an embedment depth of 12 inches, with a minimum width of 24 and 12 inches for isolated and continuous footings, respectively.

An allowable bearing capacity of 2,000 psf may be used for preliminary design, based on the minimum embedment depth and width. The allowable bearing value may be increased by 300 psf per foot increase in depth or width to a maximum allowable bearing pressure of 3,500 psf. The allowable bearing pressure is for the total dead load and frequently applied live loads.

The soil resistance available to withstand lateral loads on a shallow foundation is a function of the frictional resistance along the base of the footing and the passive resistance that may develop as the face of the structure tends to move into the soil. The frictional resistance between the base of the foundation and the subgrade soil may be computed using a coefficient of friction of 0.35. The passive resistance may be computed using an equivalent fluid pressure of 350 pounds per cubic foot (pcf), assuming there is constant contact between the footing and undisturbed soil.

The allowable bearing pressure and coefficient of friction values may be increased by one third when considering loads of short duration, such as those imposed by wind and seismic forces.

Footing reinforcement should be designed by the structural engineer.

The recommended allowable bearing capacity is generally based on a total allowable, post construction settlement of 1 inch. Differential settlement is estimated at ½ inch over a horizontal distance of 30 feet. Since settlement is a function of footing size and contact bearing pressure, differential settlement can be expected between adjacent columns or walls where a large differential loading condition exists. These settlement estimates should be reevaluated by Leighton and Associates when foundation plans for the proposed structures become available.

Post-Tensioned Foundations

As an alternative to conventional spread footings, post-tension foundation systems can be used. Post-tension slab foundations should be designed by the project structural engineer. The following table provides post-tension slab design information for soil with a low expansion potential. Post-tension slabs should be designed in accordance with Section 1816 of the current edition of the UBC.

Post-Tension Foundation Design Recommendations		
Very Low Expansion		
Edge Moisture Variation Distance, e_m	Center Lift	5.5 feet
	Edge Lift	3.0 feet
Differential Swell, Y_m	Center Lift	1.0 inch
	Edge Lift	0.4 inch
Modulus of subgrade Reaction		120 pci

Exterior footings (thickened edges) should have a minimum depth of 12 inches below the lowest adjacent soil grade and a minimum width of 12 inches. These footings may be designed for a maximum allowable bearing pressure of 2,000 pounds per square foot. The allowable bearing capacity may be increased by one-third for short-term loading.

These recommendations are based on preliminary data. Additional testing of the soil present near finish grade will be conducted to confirm the final foundation design information. Local agencies, the structural engineer or the Uniform Building Code may have requirements that are more stringent.

3.3 Slab-On-Grade

Concrete slabs subjected to special loads should be designed by the structural engineer. Where conventional light floor loading conditions exist, the following minimum recommendations, which are based on a very low soil expansion potential, should be used:

- A minimum slab thickness of 4 inches (nominal). Reinforcement steel should be design by the structural engineer, but as a minimum should be No. 3 rebar placed at 24 inches on center. Reinforcement should be supported on "chairs" to position the reinforcement within the middle third of the slab thickness.

- A moisture barrier consisting of 6-mil Visqueen (or equivalent) placed below slabs where moisture-sensitive floor coverings or equipment is planned. The moisture barrier should be covered with a minimum of 2 inches of sand.

- The subgrade soil should be moisture conditioned to at least optimum moisture content to a minimum depth of 12 inches prior to placing the moisture barrier, steel or concrete.

The use of reinforcement or post-tensioned cables in slabs and foundations can generally reduce the potential for concrete cracking. However, minor cracking of the concrete as it cures, due to drying and shrinkage, is normal and should be expected. However, cracking is often aggravated by a high water/cement ratio, high concrete temperature at the time of placement, small nominal aggregate size, and rapid moisture loss due to hot, dry, and/or windy weather conditions during placement and curing. Cracking due to temperature and moisture fluctuations can also be expected. The use of low slump concrete can reduce the potential for shrinkage cracking.

Moisture barriers can retard, but not eliminate moisture vapor movement from the underlying soils up through the slab. Floor covering manufacturers should be consulted for specific recommendations.

3.4 Seismic Design Parameters

Seismic parameters presented in this report should be considered during project design. In order to reduce the effects of ground shaking produced by regional seismic events, seismic design should be performed in accordance with the most recent edition of the Uniform Building Code (UBC). The following data should be considered for the seismic analysis of the subject site:

Seismic Design Parameters	
Seismic Source	San Jacinto (San Jacinto Valley) Fault
Distance	Approximately 9 km
Seismic Source Type (UBC, Table 16-U):	B
Seismic Zone Factor, Z (UBC, Table 16-I):	0.4
Soil Profile Type (UBC, 16-J):	S_D
Near-Source Factor N_a (UBC, Table 16-S):	1.0
Source Factor N_v (UBC, Table 16-T):	1.04

3.5 Retaining Walls

We recommend that retaining walls be backfilled with onsite, very low expansive soil and constructed with a backdrain in accordance with the recommendations provided on Figure 3 (rear of text). Using expansive soil as retaining wall backfill will result in higher lateral earth pressures exerted on the wall. Based on these recommendations, the following parameters may be used for the design of conventional retaining walls up to 6 feet tall:

Static Equivalent Fluid Weight (pcf)	
Conditions	Level
Active	35
At-Rest	55
Passive	350 (Maximum of 3,500 psf)

The above values do not contain an appreciable factor of safety, so the structural engineer should apply the applicable factors of safety and/or load factors during design.

Cantilever walls that are designed to yield at least 0.001H, where H is equal to the wall height, may be designed using the active condition. Rigid walls and walls braced at the top should be designed using the at-rest condition.

Passive pressure is used to compute soil resistance to lateral structural movement. In addition, for sliding resistance, a frictional resistance coefficient of 0.35 may be used at the concrete and soil interface. The lateral passive resistance should be taken into account only if it is ensured that the soil providing passive resistance, embedded against the foundation elements, will remain intact with time.

In addition to the above lateral forces due to retained earth, surcharge due to improvements, such as an adjacent structure or traffic loading, should be considered in the design of the retaining wall. Loads applied within a 1:1 projection from the surcharging structure on the stem of the wall should be considered in the design.

A soil unit weight of 120 pcf may be assumed for calculating the actual weight of the soil over the wall footing.

Retaining wall footings should have a minimum width of 12 inches and a minimum embedment of 12 inches below the lowest adjacent grade. An allowable bearing capacity of 2,000 psf may be used for retaining wall footing design, based on the minimum footing width and depth. This bearing value may be increased by 300 psf per foot increase in width or depth to a maximum allowable bearing pressure of 3,500 psf.

3.6 Pavement Design

A representative soil sample tested during this investigation had an R-value of 61. Based on the design procedures outlined in the current Caltrans Highway Design Manual, preliminary flexible pavement section recommendations are presented in the following table for the Traffic Indices indicated. Final pavement design should be based on the Traffic Index determined by the project civil engineer and R-value testing provided near the completion of street grading. These pavement sections meet the City of Moreno Valley's current minimum pavement requirements.

AC PAVEMENT SECTION THICKNESS		
Traffic Index	Asphaltic Concrete (AC) Thickness (feet)	Class 2 Aggregate Base (AB) Thickness (feet)
6 or less	0.30	.040
7	0.35	0.40

If the pavement is to be constructed prior to construction of the structures, we recommend that the full depth of the pavement section be placed in order to support heavy construction traffic.

All pavement construction should be performed in accordance with the Standard Specifications for Public Works Construction. Field inspection and periodic testing, as needed during placement of the base course materials, should be undertaken to ensure that the requirements of the standard specifications are fulfilled. Prior to placement of aggregate base, the subgrade soil should be processed to a minimum depth of 6 inches, moisture-conditioned, as necessary, and recompacted to a minimum of 90 percent relative compaction. Aggregate base should be moisture conditioned, as necessary, and compacted to a minimum of 95 percent relative compaction.

3.7 Temporary Excavations

All temporary excavations, including utility trenches, retaining wall excavations, etc. should be performed in accordance with project plans, specifications and all OSHA requirements.

No surcharge loads should be permitted within a horizontal distance equal to the height of cut or 5 feet, whichever is greater from the top of the slope, unless the cut is shored appropriately. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of any adjacent existing structure should be properly shored to maintain support of the structure.

Typical cantilever shoring should be designed based on the active fluid pressure presented in the retaining wall section. If excavations are braced at the top and at specific design intervals, the active pressure may then be approximated by a rectangular soil pressure distribution with the pressure per foot of width equal to 22H, where H is equal to the depth of the excavation being shored.

During construction, the soil conditions should be regularly evaluated to verify that conditions are as anticipated. The contractor should be responsible for providing the "competent person" required by OSHA standards to evaluate soil conditions. Close coordination between the competent person and the geotechnical engineer should be maintained to facilitate construction while providing safe excavations.

3.8 Trench Backfill

Utility-type trenches onsite can be backfilled with the onsite material, provided it is free of debris, significant organic material and oversized material. Prior to backfilling the trench, pipes should be bedded and shaded in a granular material that has a sand equivalent of 30 or greater. The sand should extend 12 inches above the top of the pipe. The bedding/shading sand should be densified in-place by jetting. The native backfill should be placed in loose layers, moisture conditioned, as necessary, and mechanically compacted using a minimum standard of 90 percent relative compaction.

3.9 Surface Drainage

Surface drainage should be designed to be directed away from foundations and toward approved drainage devices. Irrigation of landscaping should be controlled to maintain, as much as possible, a consistent moisture content sufficient to provide healthy plant growth without overwatering.

3.10 Cement Type and Corrosion Protection

Based on the results of laboratory testing, concrete structures in contact with the onsite soil will have negligible exposure to water-soluble sulfates in the soil. Common Type II cement may be used for concrete construction onsite and the concrete should be designed in accordance with Table 19-A-4 of the Uniform Building Code.

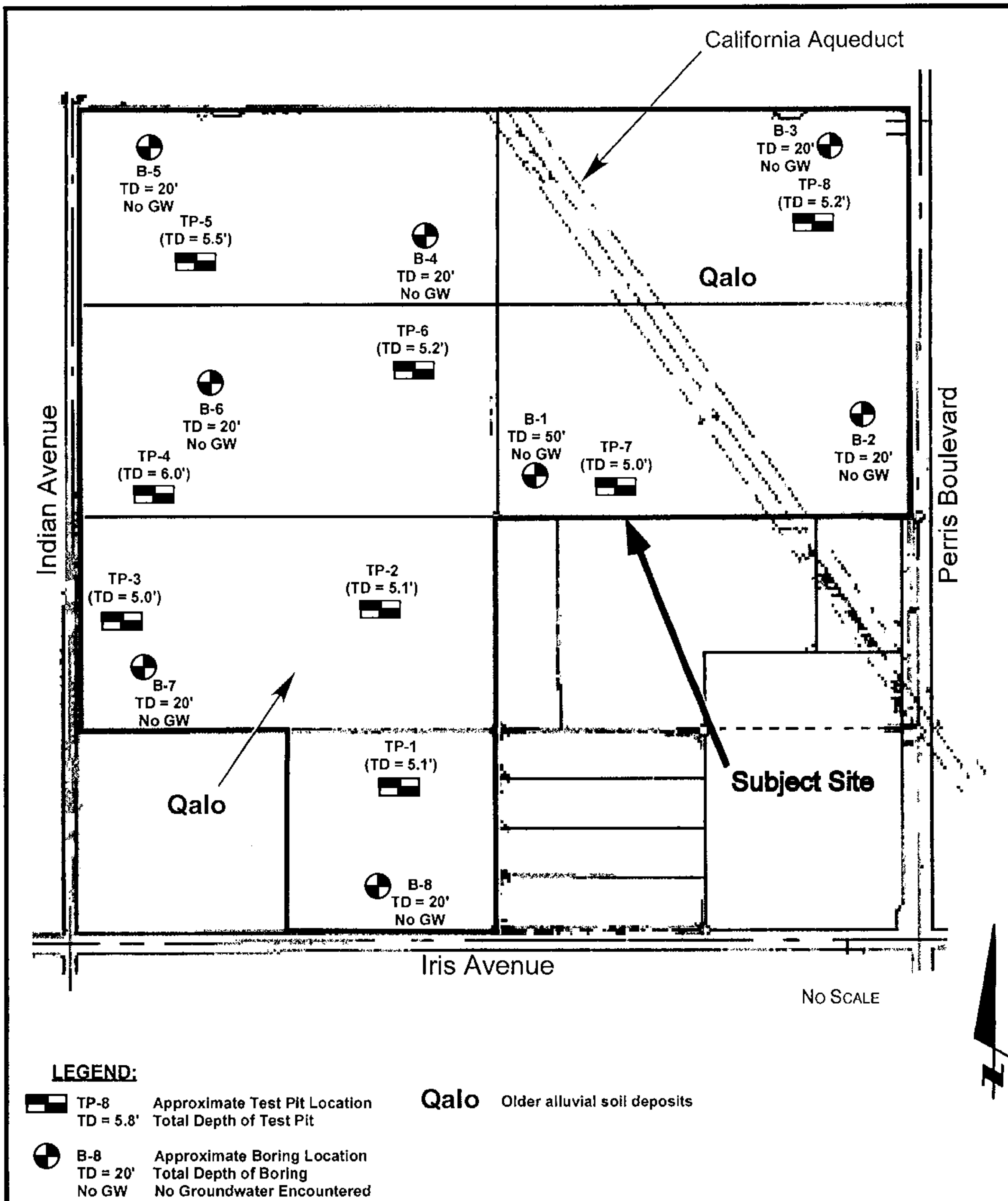
Based on our laboratory testing, the onsite soil is considered mildly corrosive to ferrous metals. The corrosion information presented in this report should be provided to your underground utility subcontractors.

3.11 Additional Geotechnical Investigation and Services

The preliminary geotechnical recommendations presented in this report are based on subsurfacc conditions as interpreted from limited subsurface explorations and limited laboratory testing. Our preliminary geotechnical recommendations provided in this report are based on information available at the time the report was prepared and may change as plans are developed. Additional geotechnical investigation and analysis may be required based on final development plans. Leighton and Associates should review the site and grading plans when available and comment further on the geotechnical aspects of the project. Geotechnical observation and testing should be conducted during excavation and all phases of grading operations. The conclusions and preliminary recommendations presented herein should be reviewed and verified by Leighton and Associates during construction and revised accordingly if geotechnical conditions encountered vary from our preliminary findings and interpretations. Geotechnical observation and testing should be provided:

- After completion of site clearing.
- During overexcavation of compressible soil.
- During compaction of all fill materials.

- After excavation of all footings and prior to placement of concrete.
- During utility trench backfilling and compaction.
- During pavement subgrade and base preparation.
- When any unusual conditions are encountered.



Proposed 104-Acre Residential Development Northwest of Perris Boulevard and Iris Avenue, City of Moreno Valley, California	**Geotechnical Map**	Project No. 021164-001 Date June, 2004 Figure 2

APPENDIX A

References

Abrahamson, N. A. and Silva, W. J., 1997, Empirical Response Spectral Attenuation Relations for Shallow Crustal Earthquakes: Seismological Research Letters, Volume 68, No. 1, pp. 94-127.

Blake, T. F., 2000, FRISKSP, A Computer Program for the Probabilistic Estimation of Peak Acceleration and Uniform Hazard Spectra Using 3-D Faults as Earthquake Sources, Version 4.00, User's Manual.

California Division of Mines and Geology (CDMG), 1998, *Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada,* to be used with the 1997 Uniform Building Code, International Conference of Building Officials, February 1998.

________, 2000, CD-ROM containing digital images of Official Maps of Alquist-Priolo Earthquake Fault Zones that affect the Southern Region, DMG CD 2000-003 2000.

California Department of Water Resources (CDWR), 2000, Water Data Library (WDL) home page, http://well.water.ca.gov/.

Campbell, K. W., 1997, Empirical Near-Source Attenuation Relationships for Horizontal and Vertical Components of Peak Ground Acceleration, Peak Ground Velocity, and Pseudo-Absolute Acceleration Response Spectra: Seismological Research Letters, Volume 68, No. 1, pp. 154-179.

______, 2000, Erratum, Empirical Near-Source Attenuation Relationships for Horizontal and Vertical Components of Peak Ground Acceleration, Peak Ground Velocity, and Pseudo-Absolute Acceleration Response Spectra: Seismological Research Letters, Volume 71, No. 3, pp. 352-354.

Hart, E. W. and Bryant, W. A., 1999, Fault Rupture Hazard Zones in California, Aquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps: California Division of Mines and Geology Special Publications 42, 38p.

International Conference of Building Officials (ICBO), 1997, Uniform Building Code, Volume II - Structural Engineering Design Provisions.

Petersen, M. D., Bryant, W. A., Cramer, C. H., Cao, T., Reichle, M. S., Frankel, A. D., Lienkaemper, J. J., McCrory, P. A., and Schwartz, D. P., 1996, Probabilistic Seismic Hazard Assessment for the State of California: California Division of Mines and Geology Open-File Report 96-08; U.S. Geological Survey Open File-Report 96-706.

Petersen, M. D. and Wesnousky, S. G., 1994, Fault Slip Rates and Earthquake Histories for Active Faults in Southern California: Seismological Society of America Bulletin, Volume 84, No. 5, pp. 1608-1649.

Public Works Standard, Inc., 2002, Greenbook, Standard Specifications for Public Works Construction: BNI Building News, Anaheim, California, 471 p.

Sadigh, K., Chang, C. Y., Egan, J. A., Makdisi, F., and Young R. R., 1997, "Attenuation Relations for Shallow Crustal Earthquakes Based on California Strong Motion Data" *Seismological Research Letters*, Vol 68, No. 1, January/February, pp. 180-189.

San Bernardino County Planning Department, 1994, San Bernardino County Official Land Use Plan, General Plan, Geologic Hazard Overlay,

Tokimatsu, K., Seed, H. B., 1987, "Evaluation of Settlements in Sands Due to Earthquake Shaking," *Journal of the Geotechnical Engineering*, American Society of Civil Engineers, Vol. 113, No. 8, pp. 861-878.

Western Municipal Water District / San Bernardino Valley Municipal Water District, 2003, Cooperative Well Measuring Program, Fall 2003.

Aerial Photographs Reviewed

Date	Flight	Frame	Agency
10/16/1959	R 10165 9	33 and 34	RCFCD
5/24/1974	RCFC 74	234	RCFCD
2/7/1984	RCFC 83	1341	RCFCD

GEOTECHNICAL BORING LOG B-1

Date 3-31-04 | Sheet 1 of 2
Project Young Homes Moreno Valley | Project No. 021164-001
Drilling Co. Redman Drilling | Type of Rig Hollow Stem Auger
Hole Diameter 8 inches | Drive Weight 140 pounds Automatic Hammer | Drop 30"
Elevation Top of Hole ' | Location See Boring Location Map

Logged By RSB
Sampled By RSB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION
	0								**ALLUVIUM (Qal)**
				R-1	5	116.2	10.8	ML	2': TOP: Sandy SILT, yellow brown, slightly moist, soft, fine to medium sand, trace gravel up to 1/16" diameter BOTTOM: Sandy SILT, dark brown, very moist, soft, fine to coarse sand, trace gravel up to 1/16" diameter
	5			R-2	7			SM	5': Silty SAND, dark brown, very moist, loose, fine to coarse sand, trace gravel up to 1/8" diameter
	10			R-3	15	105.7	1.8	SW	10': Gravelly SAND, well graded, light yellow brown, moist to very moist, loose, fine to coarse sand, trace gravel up to 1/4" diameter
	15			R-4	22	124.2	11.2	ML	15': Sandy SILT/Clayey SILT, dark brown, very moist, stiff, fine to medium sand, trace gravel up to 1/8" diameter
	20			S-1	13			CL	20': Sandy CLAY/Silty CLAY, dark brown, very moist, medium stiff to stiff, fine to medium sand
	25			S-2	11			CL	25': Silty CLAY, dark brown, very moist, medium stiff, trace fine sand
	30								

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG B-1

Date 3-31-04 | Sheet 2 of 2
Project Young Homes Moreno Valley | Project No. 021164-001
Drilling Co. Redman Drilling | Type of Rig Hollow Stem Auger
Hole Diameter 8 inches | Drive Weight 140 pounds Automatic Hammer | Drop 30"
Elevation Top of Hole ' | Location See Boring Location Map

Logged By RSB
Sampled By RSB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION
	30			S-3	13			SM ML	30': TOP: Silty SAND, yellow brown, very moist, loose, fine sand BOTTOM: Sandy SILT, yellow brown, very moist, medium stiff to stiff, fine to medium sand, trace gravel up to 1/8" diameter
	35			S-4	12			ML CL	35': TOP: Sandy SILT, yellow brown, very moist, medium stiff, fine to medium sand, trace gravel up to 1/16" diameter BOTTOM: Sandy CLAy/Silty CLAY, dark brown, very moist, medium stiff, fine to medium sand, trace gravel up to 1/16" diameter
	40			S-5	14			ML	40': Sandy SILT, yellow brown, very moist, stiff, fine to medium sand, trace gravel up to 1/16" diameter
	45			S-6	27			SM ML	45': TOP: Silty SAND, yellow brown, moist, medium dense, fine to coarse sand, some gravel up to 1/4" diameter BOTTOM: Sandy SILT, yellow brown, moist, very stiff, fine to medium sand, trace gravel up to 1/8" diameter
	50			S-2	19			ML	50': TOP: Sandy SILT, yellow brown, very moist, stiff, fine to medium sand, trace gravel up to 1/8" diameter BOTTOM: SILT, dark yellow brown, very moist, stiff, some fine
	55								Total Depth 50 feet No Groundwater encountered No Bedrock encountered Boring Backfilled with Native Soil
	60								

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

GEOTECHNICAL BORING LOG B-2

Date 3-31-04 | Sheet 1 of 1
Project Young Homes Moreno Valley | Project No. 021164-001
Drilling Co. Redman Drilling | Type of Rig Hollow Stem Auger
Hole Diameter 8 inches | Drive Weight 140 pounds Automatic Hammer | Drop 30"
Elevation Top of Hole ' | Location See Boring Location Map

Logged By RSB
Sampled By RSB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION
	0								**ALLUVIUM (Qal)**
				R-1	8	117.6	5.4	SM ML	2': TOP: Silty SAND, light yellow brown, slightly moist, loose, fine to medium sand, trace gravel up to 1/4" diameter, rootlets BOTTOM: Sandy SILT, dark brown, very moist, medium stiff, fine to coarse sand, trace gravel up to 1/4" diameter
	5			R-2	11			ML SM	5': TOP: Sandy SILT, dark brown, very moist, medium stiff, fine to medium sand, trace gravel up to 1/4" diameter BOTTOM: Silty SAND, dark yellow brown, very moist, loose, fine to coarse sand, trace gravel up to 1/4" diameter
				R-3	14	105.3	1.4	SW	7': Gravelly SAND, well graded, light yellow brown, moist to very moist, loose, fine to coarse sand, gravel up to 1" diameter
	10			R-4	21	124.7	8.4	SW SM	10': TOP: Gravelly SAND, well graded, light yellow brown, moist to very moist, medium dense, fine to coarse sand, gravel up to 1/2" diameter BOTTOM: Silty SAND, dark brown, very moist, medium dense, fine to coarse sand, trace gravel up to 1/4" diameter
	15			R-5	35	127.5	10.3	ML CL	15': TOP: Sandy SILT, dark brown, very moist, very stiff, fine to medium sand, trace gravel up to 1/8" diameter BOTTOM: Silty CLAY/Sandy CLAY, dark brown, very moist, very stiff, some fine sand, trace gravel up to 1/8" diameter
	20			R-6	25			SM	20': Silty SAND, yellow brown, very moist, medium dense, fine to coarse sand, gravel up to 1/4" diameter
									Total Depth 20 feet No Groundwater encountered No Bedrock encountered Boring Backfilled with Native Soil
	25								
	30								

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

GEOTECHNICAL BORING LOG B-3

Date 3-31-04 Sheet 1 of 1
Project Young Homes Moreno Valley Project No. 021164-001
Drilling Co. Redman Drilling Type of Rig Hollow Stem Auger
Hole Diameter 8 inches Drive Weight 140 pounds Automatic Hammer Drop 30"
Elevation Top of Hole ' Location See Boring Location Map

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION Logged By RSB Sampled By RSB
	0								**ALLUVIUM (Qal)**
				R-1	18	107.9	4.2	ML	2': Sandy SILT, dark yellow brown, slightly moist, stiff, fine to medium sand, trace gravel up to 1/8" diameter, porosity 3%, rootlets
	5			R-2	12			SM	5': Silty SAND, yellow brown, slightly moist to moist, loose, fine to medium sand, trace gravel up to 1/4" diameter
	10			R-3	17			CL	10': Sandy CLAY/Silty CLAY, dark brown, very moist, stiff, some fine sand, trace gravel up to 1/8" diameter
	15			S-1	17			ML	15': Sandy SILT, dark brown, moist to very moist, stiff, fine to medium sand
	20			S-2	8			SM	20': Silty SAND, yellow brown, very moist, loose, fine to coarse sand, some gravel up to 1/4" diameter
									Total Depth 20 feet No Groundwater encountered No Bedrock encountered Boring Backfilled with Native Soil
	25								
	30								

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

GEOTECHNICAL BORING LOG B-4

Date 3-31-04 **Sheet** 1 **of** 1
Project Young Homes Moreno Valley **Project No.** 021164-001
Drilling Co. Redman Drilling **Type of Rig** Hollow Stem Auger
Hole Diameter 8 inches **Drive Weight** 140 pounds Automatic Hammer **Drop** 30"
Elevation Top of Hole ' **Location** See Boring Location Map

Logged By RSB
Sampled By RSB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION
	0								**ALLUVIUM (Qal)**
				R-1	15	116.6	2.7	SW	2': Gravelly SAND, well graded, yellow brown, slightly moist to moist, loose, fine to coarse sand, gravel up to 1/4" diameter
	5			R-2	10	103.5	1.1	SW	5': Gravelly SAND, well graded, yellow brown, slightly moist to moist, loose, fine to coarse sand, gravel up to 1/2" diameter
				R-3	16	103.5	1.6	SW	7': Gravelly SAND, well graded, yellow brown, slightly moist, loose, fine to coarse sand, gravel up to 1/2" diameter
	10			R-4	15	102.0	1.9	SW	10': Gravelly SAND, well graded, yellow brown, slightly moist, loose, fine to coarse sand, gravel up to 1/2" diameter
	15			R-5	33			SM	15': Silty SAND, dark brown, very moist, medium dense, fine to coarse sand, trace gravel up to 1/4" diameter
	20			R-6	36			ML CL	20': TOP: Sandy SILT/Clayey SILT, dark brown, very moist to wet, very stiff, fine to medium sand, trace gravel up to 1/4" diameter BOTTOM: Sandy CLAY/Silty CLAY, dark red brown, very moist, very stiff, fine to medium sand, trace gravel up to 1/4" diameter
									Total Depth 20 feet No Groundwater encountered No Bedrock encountered Boring Backfilled with Native Soil
	25								
	30								

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG B-5

Date 3-31-04 | Sheet 1 of 1
Project Young Homes Moreno Valley | Project No. 021164-001
Drilling Co. Redman Drilling | Type of Rig Hollow Stem Auger
Hole Diameter 8 inches | Drive Weight 140 pounds Automatic Hammer | Drop 30"
Elevation Top of Hole ' | Location See Boring Location Map

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION Logged By RSB Sampled By RSB
	0								**ALLUVIUM (Qal)**
				R-1	8	109.5	6.8	ML	2': Sandy SILT, dark brown, very moist, medium stiff, fine to coarse sand, trace gravel up to 1/8" diameter
	5			R-2	10			SM	5': Silty SAND, yellow brown, highly moist, loose, fine to medium sand, trace gravel up to 1/4" diameter
	10			R-3	22			SW	10': SAND, well graded, light brown, very moist, medium dense, fine to coarse sand, gravel up to 1/8" diameter, some fines
	15			S-1	13			SM	15': Silty SAND, dark brown, very moist to wet, loose, fine to medium sand, trace gravel up to 1/8" diameter
	20			S-2	50/3"			CL	20': Sandy CLAY/Silty CLAY, dark brown, very moist, hard, fine to medium sand, some black stain
									Total Depth 20 feet No Groundwater encountered No Bedrock encountered Boring Backfilled with Native Soil
	25								
	30								

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

GEOTECHNICAL BORING LOG B-6

Date	3-31-04	**Sheet**	1 **of** 1
Project	Young Homes Moreno Valley	**Project No.**	021164-001
Drilling Co.	Redman Drilling	**Type of Rig**	Hollow Stem Auger
Hole Diameter	8 inches	**Drive Weight**	140 pounds Automatic Hammer; **Drop** 30"
Elevation Top of Hole	'	**Location**	See Boring Location Map

Logged By RSB
Sampled By RSB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION
	0								**ALLUVIUM (Qal)**
				R-1	12	112.0	4.3	ML	2': Sandy SILT, yellow brown, slightly moist to moist, medium stiff, fine to medium sand, trace gravel up to 1/8" diameter
	5			R-2	22	114.7	1.7	SM	5': Silty SAND, yellow brown, slightly moist to dry, medium dense, fine to coarse sand, with gravel up to 1/4" diameter
				R-3	13			SW	7': Gravelly SAND, well graded, yellow brown, slightly moist to dry, loose, fine to coarse sand, gravel up to 1/4" diameter
	10			R-4	31	117.7	5.3	ML	10': Sandy SILT, dark brown, moist to very moist, very stiff, fine sand
	15			R-5	20			ML SM	15': TOP: Sandy SILT, dark brown, moist to very moist, stiff, fine to medium sand, trace gravel up to 1/8" diameter BOTTOM: Silty SAND, dark brown, very moist, medium dense, fine to medium sand, trace gravel up to 1/8" diameter
	20			R-6	23			SW CL	20': TOP: Gravelly SAND, well graded, dark yellow brown, very moist, medium dense, fine to coarse sand, gravel up to 1/2" diameter BOTTOM: Silty CLAY, olive brown, very moist, stiff, trace fine sand
									Total Depth 20 feet No Groundwater encountered No Bedrock encountered Boring Backfilled with Native Soil
	25								
	30								

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG B-7

Date 3-31-04 — Sheet 1 of 1
Project Young Homes Moreno Valley — Project No. 021164-001
Drilling Co. Redman Drilling — Type of Rig Hollow Stem Auger
Hole Diameter 8 inches — Drive Weight 140 pounds Automatic Hammer — Drop 30"
Elevation Top of Hole ' — Location See Boring Location Map

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION Logged By RSB Sampled By RSB
	0								**ALLUVIUM (Qal)**
				R-1	13	120.7	3.4	SM	2': Silty SAND, dark brown, moist, loose, fine to coarse sand, with gravel up to 1/8" diameter
	5			R-2	11	109.9	1.6	SW	5': Gravelly SAND, well graded, yellow brown, very moist, loose, fine to coarse sand, gravel up to 1/4" diameter, some fines
	10			R-3	19			SW	10': Gravelly SAND, well graded, light yellow brown, slightly moist to moist, medium dense, fine to coarse sand, gravel up to 1/2" diameter
	15			S-1	13			CL	15': CLAY, dark brown, very moist, medium stiff to stiff, some silt, trace fine sand
	20			S-2	17			CL	20': Silty CLAY, dark brown, very moist, stiff, some fine sand
									Total Depth 20 feet No Groundwater encountered No Bedrock encountered Boring Backfilled with Native Soil
	25								
	30								

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG B-8

Date 3-31-04 | **Sheet** 1 **of** 1

Project Young Homes Moreno Valley | **Project No.** 021164-001

Drilling Co. Redman Drilling | **Type of Rig** Hollow Stem Auger

Hole Diameter 8 inches | **Drive Weight** 140 pounds Automatic Hammer | **Drop** 30"

Elevation Top of Hole ' | **Location** See Boring Location Map

Logged By RSB

Sampled By RSB

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION
	0								**ALLUVIUM (Qal)**
				R-1	13	115.7	2.6	SM	2': Silty SAND, yellow brown, slightly moist, loose, fine sand, trace gravel up to 1/8" diameter
	5			R-2	13	114.4	1.6	SW	5': Gravelly SAND, well graded, yellow brown, slightly moist, loose, fine to coarse sand, gravel up to 1/4" diameter, trace fines
				R-3	11			SP	7': SAND, poorly graded, yellow brown, slightly moist to moist, loose, fine to medium sand, trace gravel up to 1/8" diameter, trace fines
	10			R-4	18			SM	10': Silty SAND, dark yellow brown, very moist, medium dense, fine sand, trace gravel up to 1/8" diameter
	15			R-5	20			SW CL	15': TOP: Gravelly SAND, yellow brown, very moist, medium dense, fine to coarse sand, gravel up to 1/8" diameter BOTTOM: Silty CLAY, dark brown, very moist to wet, stiff
	20			R-6	23			CL	20': CLAY, dark brown, very moist to wet, stiff, some fine sand, trace gravel up to 1/16" diameter
									Total Depth 20 feet No Groundwater encountered No Bedrock encountered Boring Backfilled with Native Soil
	25								
	30								

SAMPLE TYPES:

S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
SH SHELBY TUBE

LEIGHTON AND ASSOCIATES, INC.

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

Geotechnical Test Pit Logs

Young Homes / Moreno Valley
Project No. 021164-001

Logged by: MM
Sampled by: MM

Test Pit TP-1

Date: April 2004 Location: See Geotechnical Map

Depth Top (ft)	Depth Bottom (ft)	Soil symbol (USCS)	Description	Geologic Unit	Test Results Sample number	Depth ft	Density (dry)pfc	Moisture %
0	1.1	SM	Silty SAND, light gray brown, dry, dense, fine to medium grain sand, rootlets (tilled)	Afu				
1.1	2.6	SM	Silty SAND, dark brown, slightly moist, medium dense, fine to coarse grain sand, porous to 1% up to 1/8" in diameter, some rootlets	Qal	Bag-1	2.5'		10.1
2.6	5.1	SW	Sand with gravel, light brown, dry to slightly moist, loose, fine to coarse grain sand, gravel up to 1/4", no apparent porosity	Qal		5.1		2.2

Total Depth (ft): 5.1
No ground water encountered.
Test pit backfilled, wheel rolled at surface.

Test Pit TP-2

Date: April 2004 Location: See Geotechnical Map

Depth Top (ft)	Depth Bottom (ft)	Soil symbol (USCS)	Description	Geologic Unit	Test Results Sample number	Depth ft	Density (dry)pfc	Moisture %
0	1.6	SM	Silty SAND, light gray, dry, dense, fine to medium sand, rootlets (tilled)	Afu				
1.6	3.3	SM	Silty SAND, dark olive brown, slightly moist, medium dense, fine to medium grain with some coarse grain sand, porous to < 1% up to 1/8" in diameter, some rootlets	Qal	Bag-1	2		4.5
3.3	4	SP	SAND, dark brown, slightly moist, very dense, medium to coarse grain sand	Qal				
4	5.1	SW	SAND with gravel and some silt, light brown, dry to slightly moist, loose, fine to coarse grain sand, gravel up to 1/4", porous to < 0.5% up to 1/16" in diameter	Qal		5.1		4.1

Total Depth (ft): 5.1
No ground water encountered.
Test pit backfilled, wheel rolled at surface.

Test Pit TP-3

Date: April 2004 Location: See Geotechnical Map

Depth Top (ft)	Depth Bottom (ft)	Soil symbol (USCS)	Description	Geologic Unit	Test Results Sample number	Depth ft	Density (dry)pfc	Moisture %
0	1.3		Fill - weathered alluvium (tilled)	Afu				
1.3	3	SW	SAND with some gravel and thin layers of silt, light to dark brown, slightly moist, dense to medium dense, fine to coarse grain sand with fine gravel, porous to < 1% up to 1/8" in diameter	Qal	Bag-1	2.3		3.6
3	5	SP	SAND, light to dark brown, slightly moist, medium dense to loose, medium to coarse grain sand with some fine gravel, no apparent porosity	Qal		5		3.4

Total Depth (ft): 5.0
No ground water encountered.
Test pit backfilled, wheel rolled at surface.

Geotechnical Test Pit Logs

Young Homes / Moreno Valley
Project No. 021164-001

Logged by: MM
Sampled by: MM

Test Pit TP-4

Date: April 2004 Location: See Geotechnical Map

Depth		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top (ft)	Bottom (ft)				Sample number	Depth ft	Density (dry)pfc	Moisture %
0	1.6		Fill - weathered alluvium (tilled)	Afu				
1.6	6	SM	Silty SAND, light brown, slightly moist, medium dense, fine to coarse grain sand, porous to < 0.5% up to 1/16" in diameter	Qal	Bag-1	2.5		4.1
				Qal		6		5.8

Total Depth (ft): 6.0
No ground water encountered.
Test pit backfilled, wheel rolled at surface.

Test Pit TP-5

Date: April 2004 Location: See Geotechnical Map

Depth		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top (ft)	Bottom (ft)				Sample number	Depth ft	Density (dry)pfc	Moisture %
0	1.4		Fill - weathered alluvium (tilled)	Afu				
1.4	3.2	SM	Silty SAND, light brown, dry to slightly moist, dense to medium dense, fine to coarse grain sand, thin layers of dark silt, porous to < 0.5% up to 1/16" in diameter, rootlets	Qal	Bag-1	2.5		2.6
3.2	5.5	SW	SAND with gravel, light brown, slightly moist, medium dense to loose, fine to coarse grain sand, fine gravel, no apparent porosity	Qal		5.5		3.3

Total Depth (ft): 5.5
No ground water encountered.
Test pit backfilled, wheel rolled at surface.

Test Pit TP-6

Date: April 2004 Location: See Geotechnical Map

Depth		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top (ft)	Bottom (ft)				Sample number	Depth ft	Density (dry)pfc	Moisture %
0	1.8		Fill - weathered alluvium (tilled)	Afu				
1.8	4.1	SM	Silty SAND, dark brown, slightly moist, medium dense, fine to coarse grain sand, porous to < 1% up to 1/8" in diameter, some rootlets	Qal	Bag-1	2.5		6.1
4.1	5.2	SW	SAND with gravel, light brown, dry to slightly moist, loose, fine to coarse grain sand, no apparent porosity	Qal		5.2		3.6

Total Depth (ft): 5.2
No ground water encountered.
Test pit backfilled, wheel rolled at surface.

P:\Leighton Associates\021000-021499\021164-001 Young Homes M.V. Prelim\Test pit logs\testpit logs.xls

Geotechnical Test Pit Logs

Young Homes / Moreno Valley
Project No. 021164-001

Logged by: MM
Sampled by: MM

Test Pit TP-7

Date: April 2004 Location: See Geotechnical Map

Depth		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top (ft)	Bottom (ft)				Sample number	Depth ft	Density (dry)pfc	Moisture %
0	1.5		Fill - weathered alluvium (tilled)	Afu				
1.5	3.3	SM	Silty SAND, dark brown, dry to slightly moist, medium dense, fine to coarse grain sand, porous to <0.5% up to 1/16" in diameter	Qal	Bag-1	3		2.9
3.3	5	SW	Gravelly SAND, light brown, dry to slightly moist, loose, fine to coarse grain sand and fine gravel, no apparent porosity	Qal		5		3.3

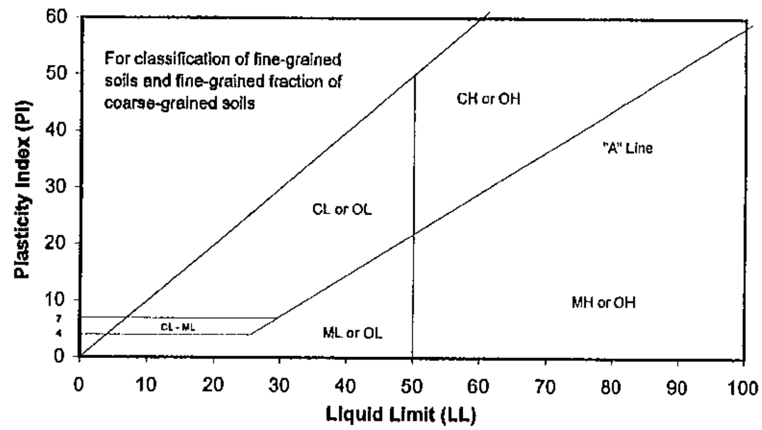
Total Depth (ft): 5.0
No ground water encountered.
Test pit backfilled, wheel rolled at surface.

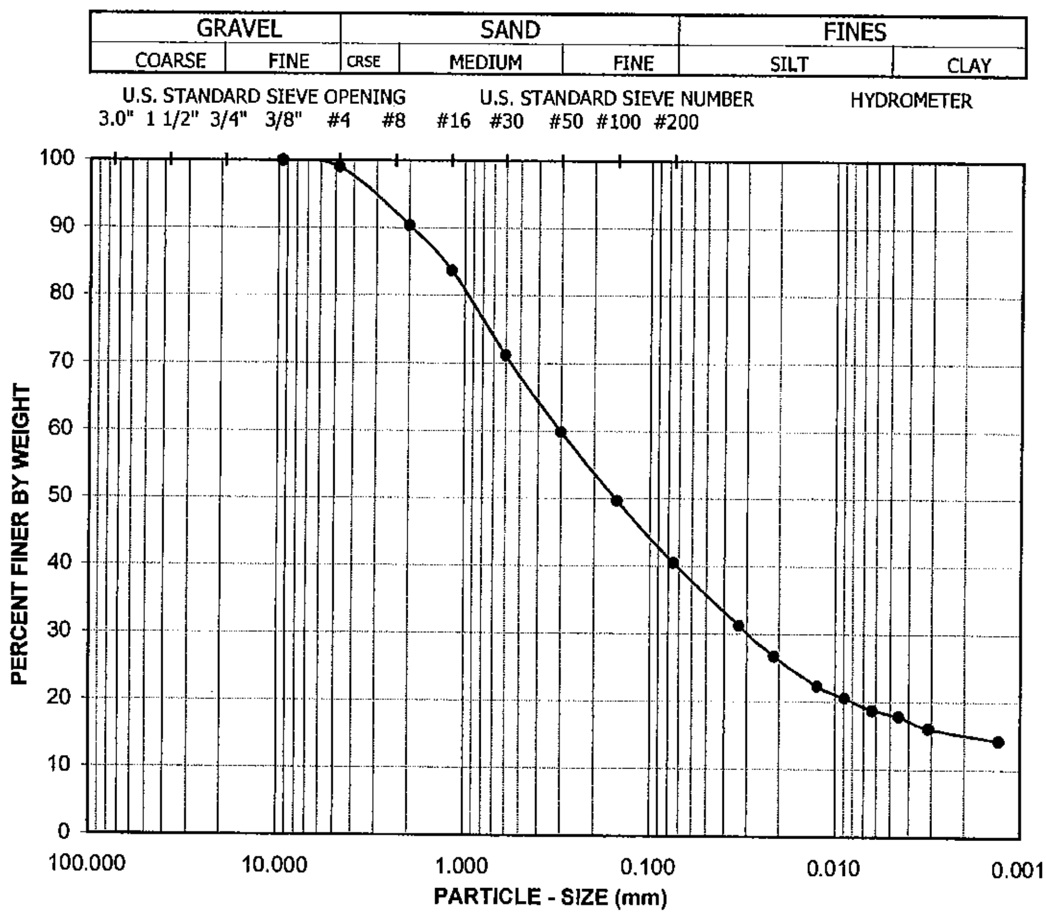
Test Pit TP-8

Date: April 2004 Location: See Geotechnical Map

Depth		Soil symbol (USCS)	Description	Geologic Unit	Test Results			
Top (ft)	Bottom (ft)				Sample number	Depth ft	Density (dry)pfc	Moisture %
0	1.5		Fill - weathered alluvium (tilled)	Afu				
1.5	4.5	SM	Silty SAND with some gravel, light to dark brown, dry to slightly moist, medium dense, fine to coarse grain sand and fine gravel, porous to < 1% up to 1/16" in diameter, some rootlets	Qal	Bag-1	2.3		3.9
4.5	5.2	SW	SAND with some gravel, light brown, dry to slightly moist, medium dense to loose, fine to coarse grain sand and fine gravel, no apparent porosity	Qal		5.2		3.5

Total Depth (ft): 5.2
No ground water encountered.
Test pit backfilled, wheel rolled at surface.





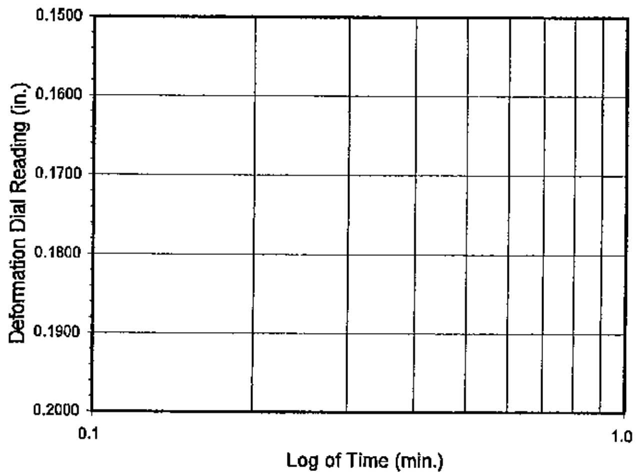
Boring No.:	Sample No.:	Depth (ft.) :	Soil Type	GR:SA:FI	LL,PL,PI
TP-1	Bag-1	2.5	SC-SM	1:58:41	NA,,

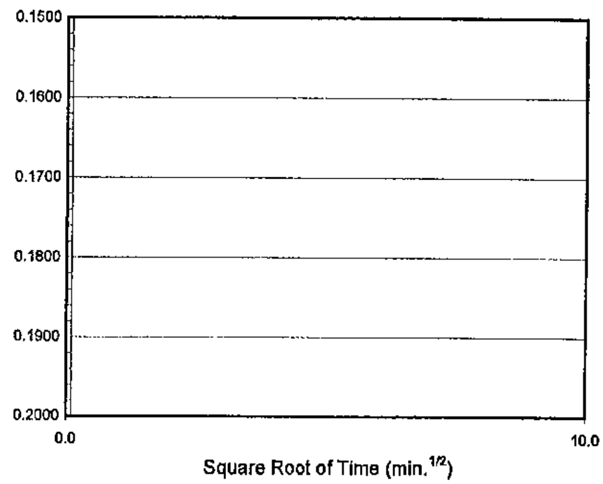
Soil Description: Brown silty, clayey sand (SC-SM)

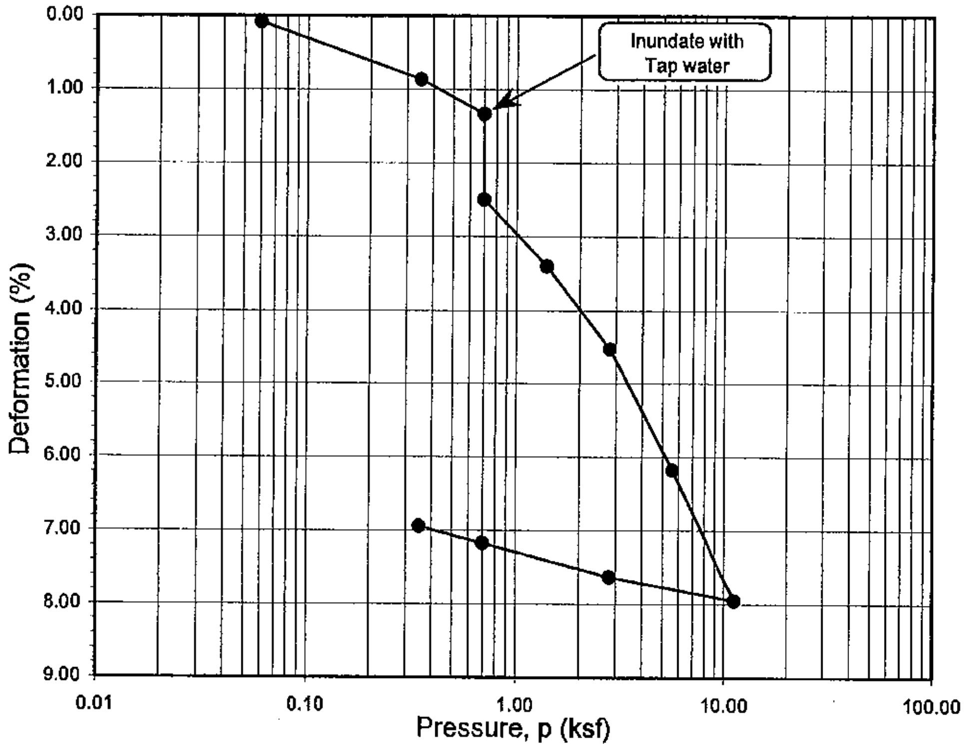
Teratest Labs, Inc. A LEIGHTON GROUP COMPANY	**ATTERBERG LIMITS, PARTICLE - SIZE CURVE** **ASTM D 4318, D 422**	Project No.: 021164-001 Young Homes / MV 05-04

SA & Hyd TP-1 Bag-1 @ 2.5

No Time Readings







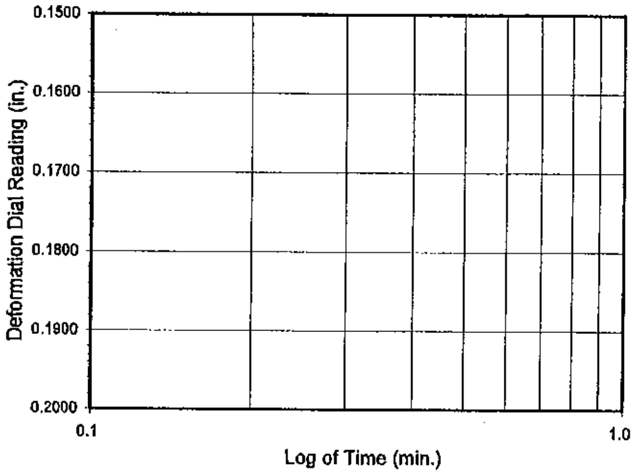
Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
B-3	**R-2**	**5**	**2.4**	**14.3**	**112.7**	**120.6**	**0.495**	**0.391**	**13**	**97**

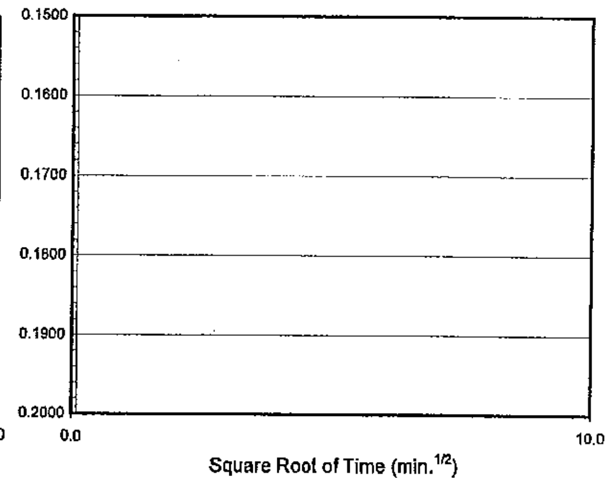
Soil Identification: Brown silty sand (SM)

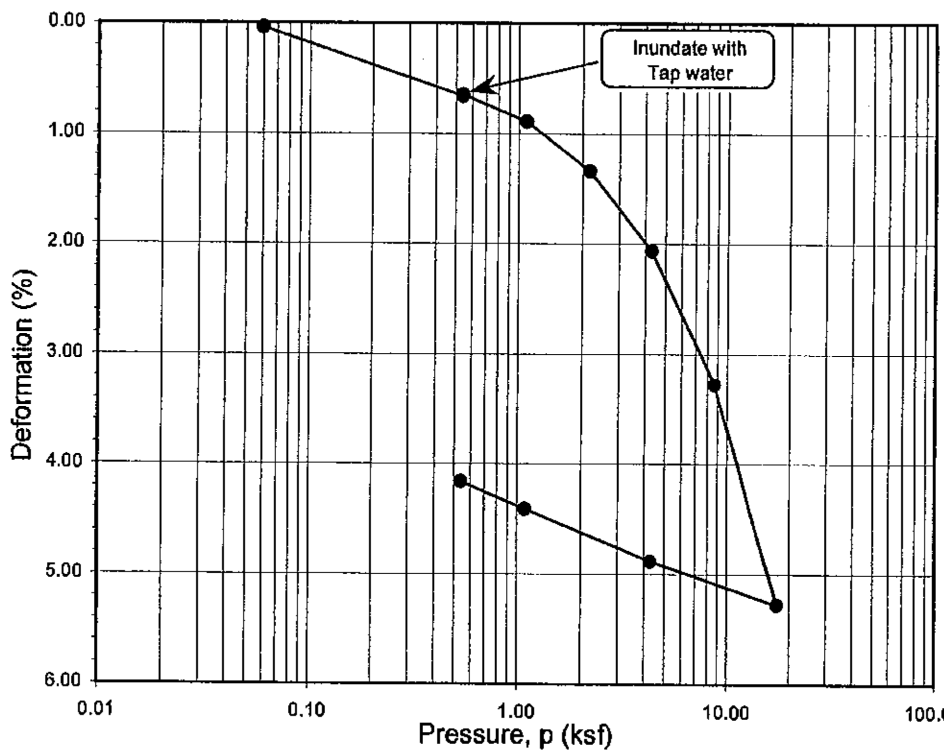
Teratest Labs, Inc. A LEIGHTON GROUP COMPANY	**ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS** **(ASTM D 2435)**	Project No.: 021164-001 Young Homes / MV

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

No Time Readings







Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
B-1	**R-2**	**5**	**8.9**	**12.6**	**118.2**	**122.5**	**0.426**	**0.366**	**57**	**90**

Soil Identification: Brown clayey sand (SC)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
(ASTM D 2435)

Project No.: 021164-001

Young Homes / MV

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name:	Young Homes / MV	Tested By:	FT
Project No.:	021164-001	Checked By:	LF
Boring No.:	B-8	Sample Type:	Drive
Sample No.:	R-4	Depth (ft.)	10.0
Sample Description:	Brown silty sand (SM)		

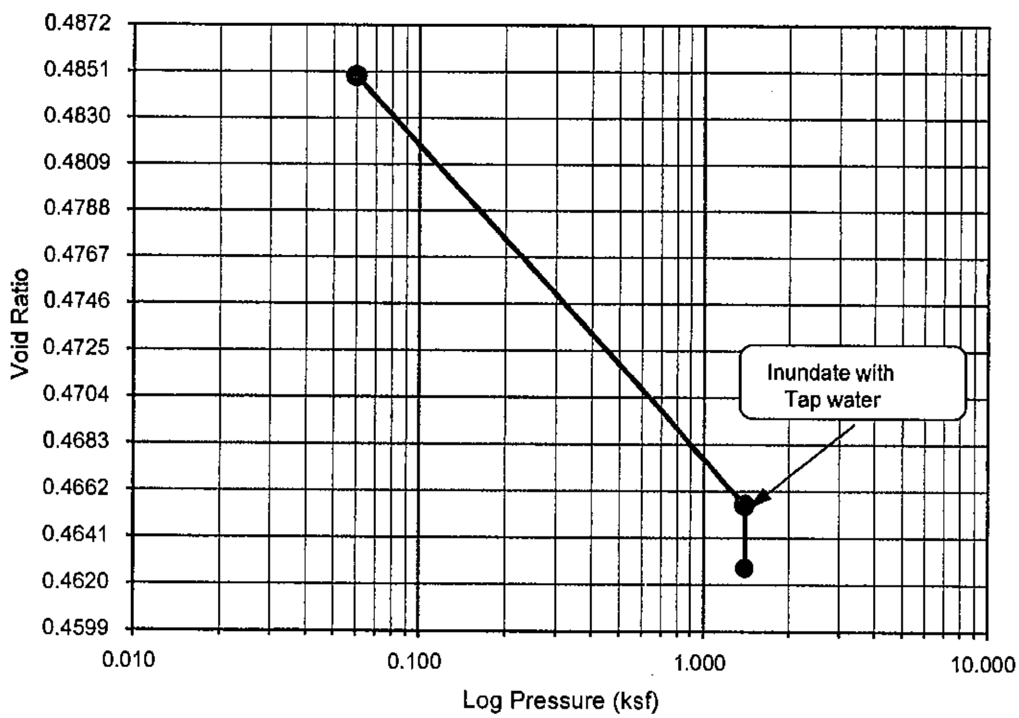
Initial Dry Density (pcf):	113.4
Initial Moisture (%):	5.80
Initial Length (in.):	1.0000
Initial Dial Reading:	0.2563
Diameter(in):	2.416

Final Dry Density (pcf):	113.7
Final Moisture (%) :	17.8
Initial Void ratio:	0.4859
Specific Gravity(assumed):	2.70
Initial Saturation (%)	32.2

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.2570	0.9993	0.00	-0.07	0.4849	-0.07
1.400	0.2700	0.9863	0.00	-1.37	0.4656	-1.37
H2O	0.2719	0.9844	0.00	-1.56	0.4628	-1.56

Percent Swell (+) / Settlement (-) After Inundation = -0.19

Void Ratio - Log Pressure Curve



Collapse B-8 R-4 @ 10

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name:	Young Homes / MV	Tested By:	FT
Project No.:	021164-001	Checked By:	LF
Boring No.:	B-6	Sample Type:	Drive
Sample No.:	R-5	Depth (ft.)	15.0
Sample Description:	Brown silty sand (SM)		

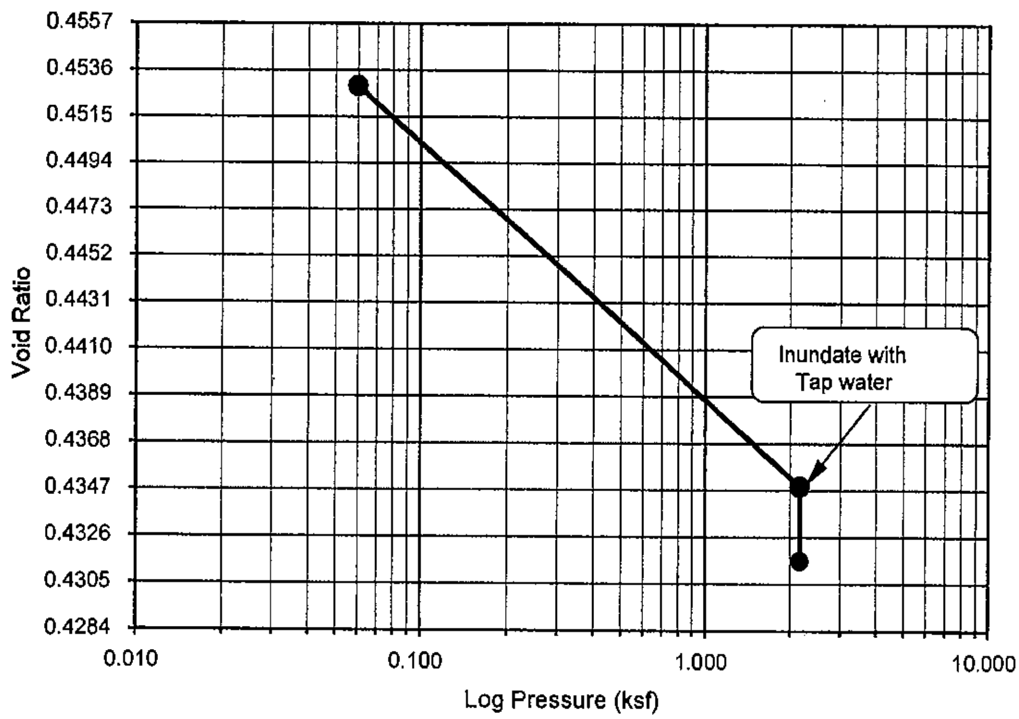
Initial Dry Density (pcf):	116.0
Initial Moisture (%):	6.69
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1000
Diameter(in):	2.416

Final Dry Density (pcf):	117.4
Final Moisture (%) :	16.3
Initial Void ratio:	0.4533
Specific Gravity(assumed):	2.70
Initial Saturation (%)	39.8

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.1003	0.9997	0.00	-0.03	0.4529	-0.03
2.170	0.1127	0.9873	0.00	-1.27	0.4349	-1.27
H2O	0.1150	0.9850	0.00	-1.50	0.4315	-1.50

Percent Swell (+) / Settlement (-) After Inundation = -0.23

Void Ratio - Log Pressure Curve



Collapse B-6 R-5 @ 15

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name:	Young Homes / MV	Tested By:	FT
Project No.:	021164-001	Checked By:	LF
Boring No.:	B-5	Sample Type:	Drive
Sample No.:	R-3	Depth (ft.)	10.0
Sample Description:	Brown silty sand (SM)		

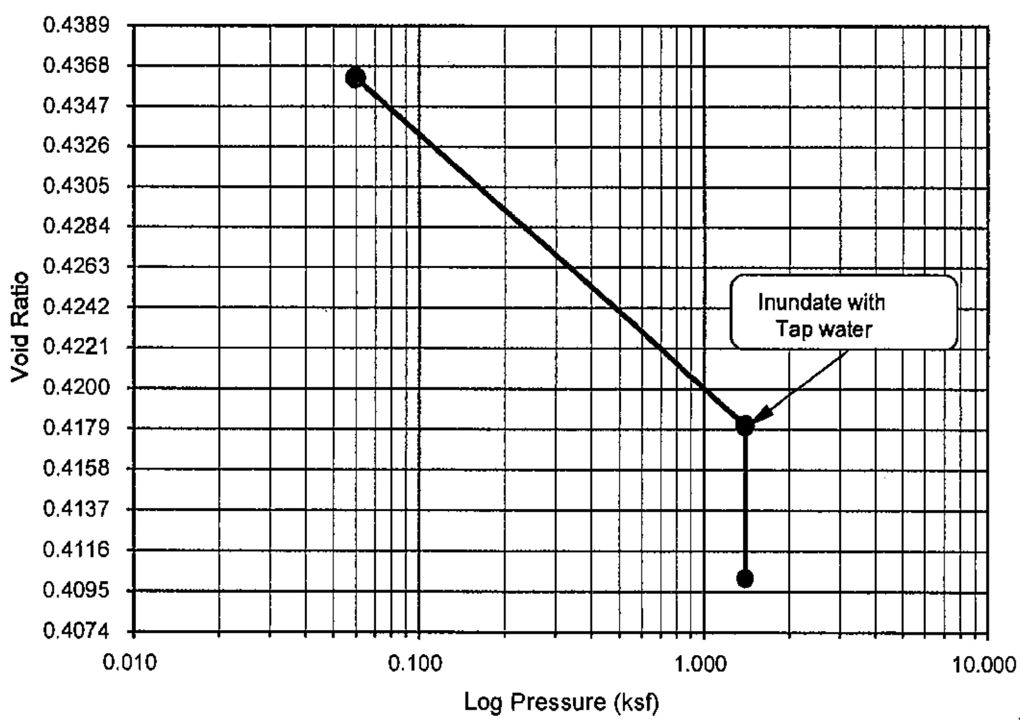
Initial Dry Density (pcf):	117.4
Initial Moisture (%):	1.92
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1000
Diameter(in):	2.416

Final Dry Density (pcf):	118.6
Final Moisture (%) :	14.6
Initial Void ratio:	0.4363
Specific Gravity(assumed):	2.70
Initial Saturation (%)	11.9

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.1001	0.9999	0.00	-0.01	0.4362	-0.01
1.400	0.1127	0.9873	0.00	-1.27	0.4181	-1.27
H2O	0.1182	0.9818	0.00	-1.82	0.4102	-1.82

Percent Swell (+) / Settlement (-) After Inundation = -0.56

Void Ratio - Log Pressure Curve



Collapse B-5 R-3 @ 10

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name:	Young Homes / MV	Tested By:	FT
Project No.:	021164-001	Checked By:	LF
Boring No.:	B-5	Sample Type:	Drive
Sample No.:	R-2	Depth (ft.)	5.0
Sample Description:	Brown silty sand (SM)		

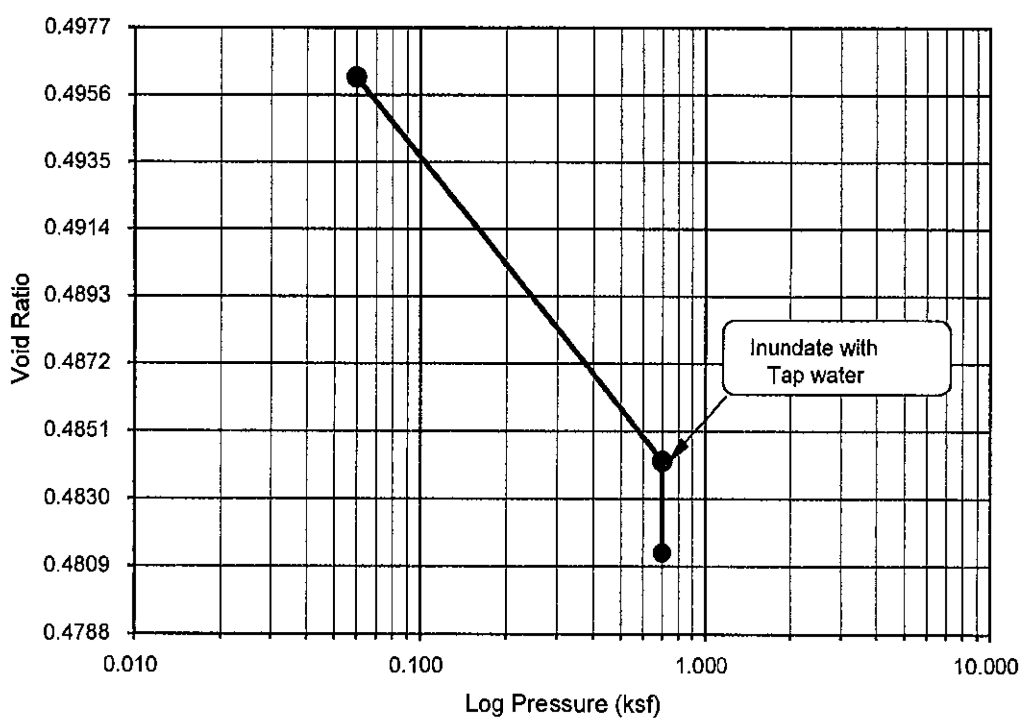
Initial Dry Density (pcf):	112.6
Initial Moisture (%):	4.73
Initial Length (in.):	1.0000
Initial Dial Reading:	0.2300
Diameter(in):	2.416

Final Dry Density (pcf):	112.5
Final Moisture (%) :	17.2
Initial Void ratio:	0.4967
Specific Gravity(assumed):	2.70
Initial Saturation (%)	25.7

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.2304	0.9996	0.00	-0.04	0.4961	-0.04
0.700	0.2384	0.9916	0.00	-0.84	0.4842	-0.84
H2O	0.2403	0.9897	0.00	-1.03	0.4813	-1.03

Percent Swell (+) / Settlement (-) After Inundation = -0.19

Void Ratio - Log Pressure Curve



Collapse B-5 R-2 @ 5

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name:	Young Homes / MV	Tested By:	FT
Project No.:	021164-001	Checked By:	LF
Boring No.:	B-4	Sample Type:	Drive
Sample No.:	R-5	Depth (ft.)	15.0
Sample Description:	Brown clayey sand (SC)		

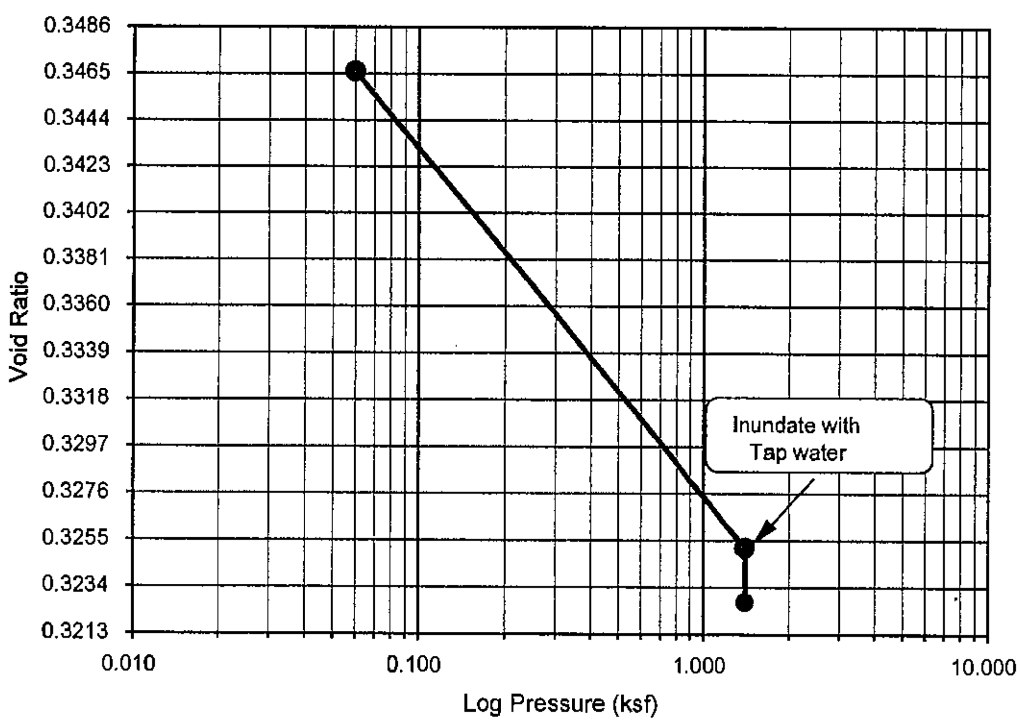
Initial Dry Density (pcf):	125.0
Initial Moisture (%):	7.31
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1590
Diameter(in):	2.416

Final Dry Density (pcf):	126.3
Final Moisture (%) :	10.8
Initial Void ratio:	0.3481
Specific Gravity(assumed):	2.70
Initial Saturation (%)	56.7

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.1601	0.9989	0.00	-0.11	0.3466	-0.11
1.400	0.1760	0.9830	0.00	-1.70	0.3252	-1.70
H2O	0.1778	0.9812	0.00	-1.88	0.3227	-1.88

Percent Swell (+) / Settlement (-) After Inundation = -0.18

Void Ratio - Log Pressure Curve



Collapse B-4 R-5 @ 15

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name:	Young Homes / MV	Tested By:	FT, ESS
Project No.:	021164-001	Checked By:	LF
Boring No.:	B-3	Sample Type:	Drive
Sample No.:	R-3	Depth (ft.)	10.0
Sample Description:	Brown sandy lean clay s(CL)		

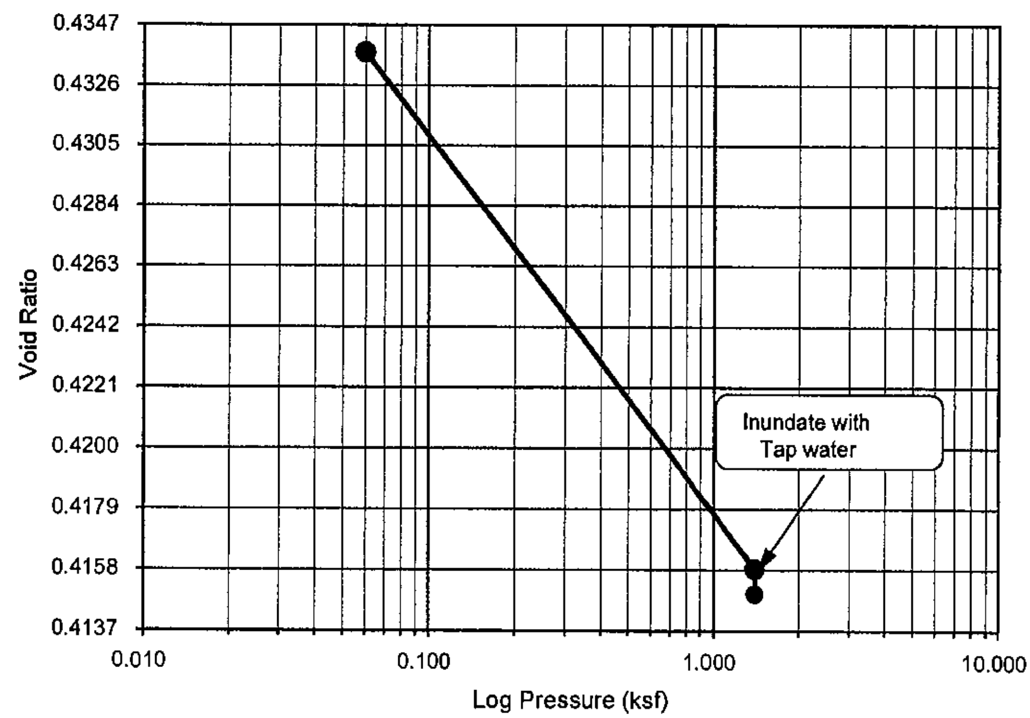
Initial Dry Density (pcf):	117.6
Initial Moisture (%):	11.23
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1441
Diameter(in):	2.416

Final Dry Density (pcf):	118.8
Final Moisture (%) :	15.7
Initial Void ratio:	0.4338
Specific Gravity(assumed):	2.70
Initial Saturation (%)	69.9

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.1441	1.0000	0.00	0.00	0.4338	0.00
1.400	0.1566	0.9875	0.00	-1.25	0.4158	-1.25
H2O	0.1572	0.9869	0.00	-1.31	0.4150	-1.31

Percent Swell (+) / Settlement (-) After Inundation = -0.06

Void Ratio - Log Pressure Curve



Collapse B-3 R-3 @ 10

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name: Young Homes / MV
Project No.: 021164-001
Boring No.: B-2
Sample No.: R-6
Sample Description: Brown silty sand (SM)

Tested By: FT, ESS
Checked By: LF
Sample Type: Drive
Depth (ft.) 20.0

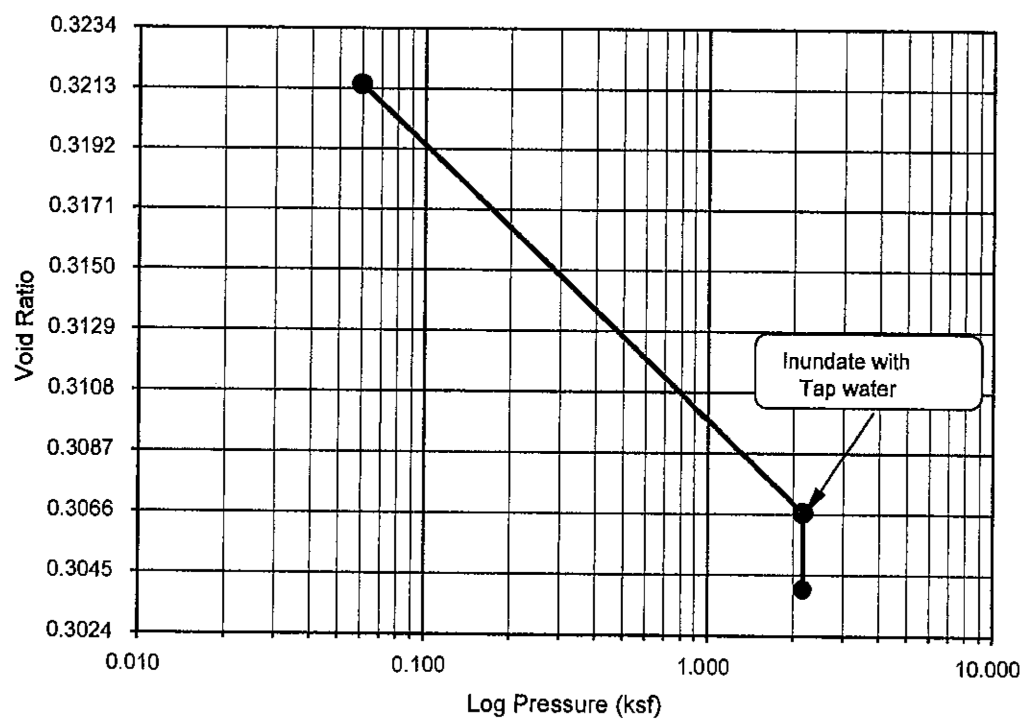
Initial Dry Density (pcf):	127.5
Initial Moisture (%):	5.38
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1000
Diameter(in):	2.416

Final Dry Density (pcf):	127.9
Final Moisture (%) :	11.3
Initial Void ratio:	0.3216
Specific Gravity(assumed):	2.70
Initial Saturation (%)	45.1

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.1001	0.9999	0.00	-0.01	0.3215	-0.01
2.170	0.1113	0.9887	0.00	-1.13	0.3067	-1.13
H2O	0.1133	0.9867	0.00	-1.33	0.3040	-1.33

Percent Swell (+) / Settlement (-) After Inundation = -0.20

Void Ratio - Log Pressure Curve



Collapse B-2 R-6 @ 20

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546)

Project Name: Young Homes / MV
Project No.: 021164-001
Boring No.: B-2
Sample No.: R-2
Sample Description: Brown silty sand (SM)

Tested By: FT, ESS
Checked By: LF
Sample Type: Drive
Depth (ft.) 5.0

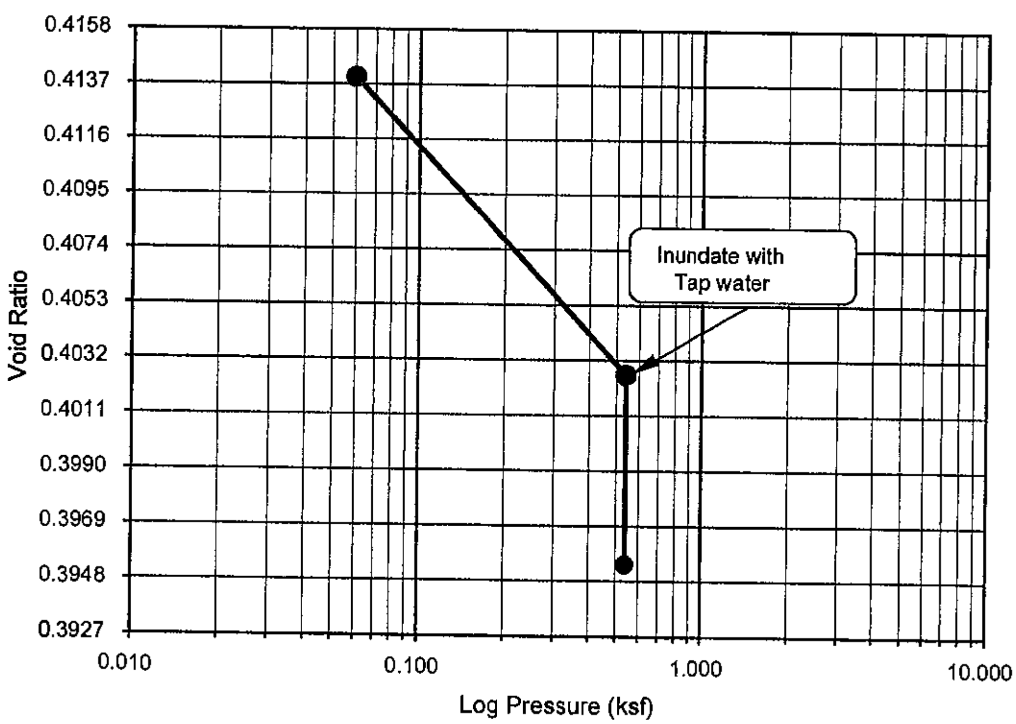
Initial Dry Density (pcf):	119.2
Initial Moisture (%):	3.19
Initial Length (in.):	1.0000
Initial Dial Reading:	0.1093
Diameter(in):	2.416

Final Dry Density (pcf):	119.0
Final Moisture (%) :	13.5
Initial Void ratio:	0.4147
Specific Gravity(assumed):	2.70
Initial Saturation (%)	20.8

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.060	0.1098	0.9995	0.00	-0.05	0.4140	-0.05
0.540	0.1178	0.9915	0.00	-0.85	0.4027	-0.85
H_2O	0.1229	0.9864	0.00	-1.36	0.3954	-1.36

Percent Swell (+) / Settlement (-) After Inundation = -0.51

Void Ratio - Log Pressure Curve



Collapse B-2 R-2 @ 5

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name: Young Homes / MV
Tested By : GB
Project No.: 021164-001
Input By : LF
Boring No.: TP-3
Depth (ft.) 2-3
Sample No. : Bag-1
Soil Identification: Olive brown poorly graded sand (SP)

Preparation Method: [ ] Moist [X] Dry

[X] Mechanical Ram
[ ] Manual Ram

Mold Volume (ft^3) 0.03323

Ram Weight = 10 lb.; Drop = 18 in.

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	3753.6	3855.7	3946.2	3901.9		
Weight of Mold (g)	1771.0	1771.0	1771.0	1771.0		
Net Weight of Soil (g)	1982.6	2084.7	2175.2	2130.9		
Wet Weight of Soil + Cont. (g)	411.70	355.40	374.30	399.80		
Dry Weight of Soil + Cont. (g)	404.20	341.80	353.40	369.80		
Weight of Container (g)	51.80	51.20	52.10	49.30		
Moisture Content (%)	2.13	4.68	6.94	9.36		
Wet Density (pcf)	131.5	138.3	144.3	141.4		
Dry Density (pcf)	128.8	132.1	134.9	129.3		

Maximum Dry Density (pcf) 135.0 **Optimum Moisture Content (%)** 7.0

PROCEDURE USED

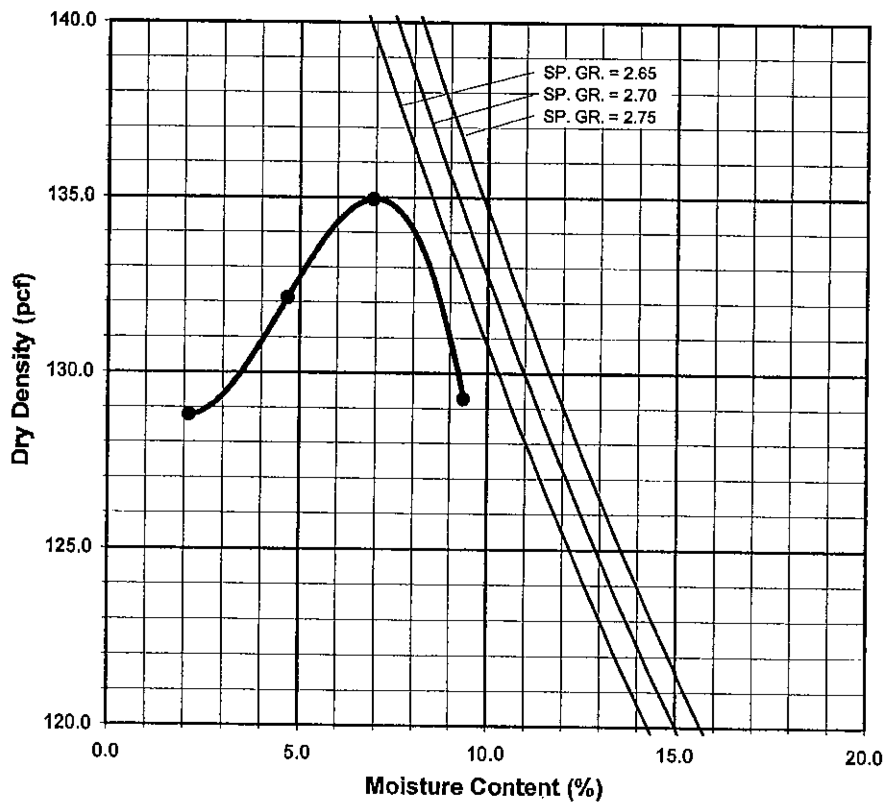
[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:
GR:SA:FI

Atterberg Limits:
LL,PL,PI



MX TP-3 Bag-1

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	Young Homes / MV	Tested By :	GB
Project No.:	021164-001	Input By :	LF
Boring No.:	TP-6	Depth (ft.)	2-5
Sample No. :	Bag-1		
Soil Identification:	Dark reddish brown silty clay (CL-ML)		

Preparation Method: ☐ Moist ☒ Dry

☒ Mechanical Ram ☐ Manual Ram

Mold Volume (ft³) 0.03323

Ram Weight = 10 lb.; Drop = 18 in.

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	3683.6	3842.9	3913.2	3810.1		
Weight of Mold (g)	1771.0	1771.0	1771.0	1771.0		
Net Weight of Soil (g)	1912.6	2071.9	2142.2	2039.1		
Wet Weight of Soil + Cont. (g)	369.90	347.80	312.20	329.70		
Dry Weight of Soil + Cont. (g)	354.20	326.10	287.80	298.20		
Weight of Container (g)	52.00	51.00	52.50	54.00		
Moisture Content (%)	5.20	7.89	10.37	12.90		
Wet Density (pcf)	126.9	137.5	142.1	135.3		
Dry Density (pcf)	120.6	127.4	128.8	119.8		

Maximum Dry Density (pcf) **129.0** **Optimum Moisture Content (%)** **9.5**

PROCEDURE USED

☒ **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

☐ **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

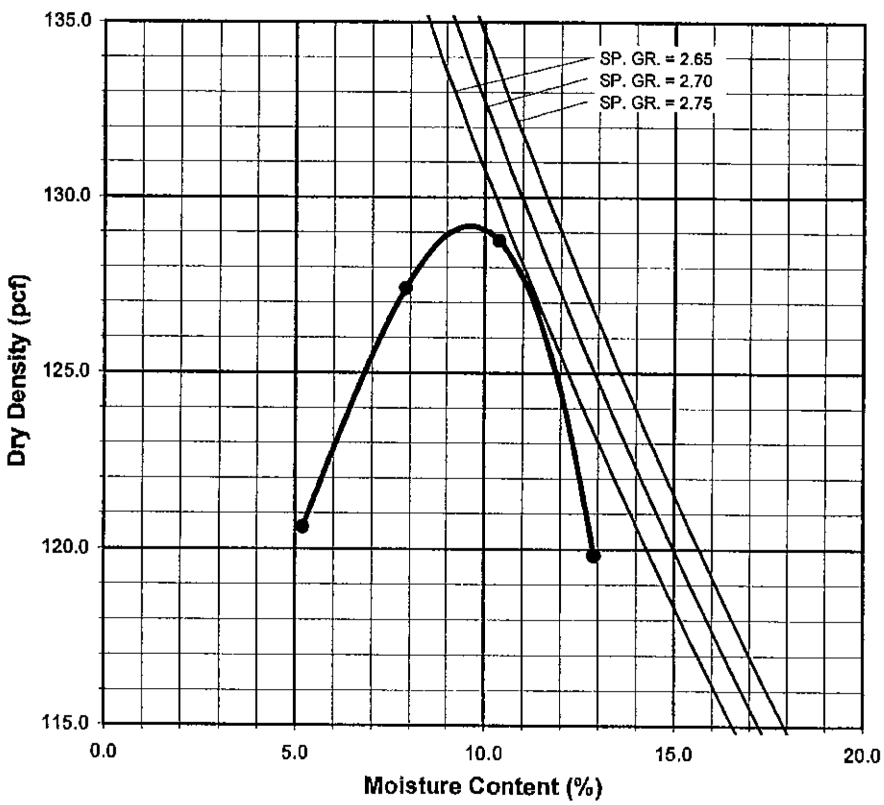
☐ **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI



MX TP-6 Bag-1

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

EXPANSION INDEX of SOILS
ASTM D 4829

Project Name:	Young Homes / MV	Tested By:	GB
Project No. :	021164-001	Checked By:	LF
Boring No.:	TP-1	Depth (ft.)	2-5
Sample No. :	Bag-1		
Soil Identification:	Dark yellowish brown clayey sand (SC)		

Dry Wt. of Soil + Cont.	(g)	1000.00
Wt. of Container No.	(g)	0.00
Dry Wt. of Soil	(g)	1000.00
Weight Soil Retained on #4 Sieve		0.00
Percent Passing # 4		100.00

MOLDED SPECIMEN		Before Test	After Test
Specimen Diameter	(in.)	4.01	4.01
Specimen Height	(in.)	1.0000	1.0043
Wt. Comp. Soil + Mold	(g)	636.10	443.00
Wt. of Mold	(g)	210.80	0.00
Specific Gravity (Assumed)		2.70	2.70
Container No.		O	O
Wet Wt. of Soil + Cont.	(g)	848.50	653.80
Dry Wt. of Soil + Cont.	(g)	787.90	605.70
Wt. of Container	(g)	0.00	210.80
Moisture Content	(%)	7.69	12.18
Wet Density	(pcf)	128.3	133.1
Dry Density	(pcf)	119.1	118.6
Void Ratio		0.415	0.421
Total Porosity		0.293	0.296
Pore Volume	(cc)	60.7	61.6
Degree of Saturation (%) [S meas]		**50.0**	78.1

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
04/21/04	16:02	1.0	0	0.0710
04/21/04	16:12	1.0	10	0.0703
Add Distilled Water to the Specimen				
04/21/04	17:07	1.0	55	0.0742
04/22/04	6:45	1.0	873	0.0753
04/22/04	10:10	1.0	1078	0.0753

Expansion Index (EI_{meas})	= ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	5.0
Expansion Index (EI)$_{60}$	= EI_{meas} - (50 -S_{meas})x((65+EI_{meas}) / (220-S_{meas}))	**5**

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

Terratest Labs, Inc.
A LEIGHTON GROUP COMPANY

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	Young Homes / MV	Tested By:	GB
Project No. :	021164-001	Checked By:	LF
Boring No.:	TP-5	Depth (ft.)	2-5
Sample No. :	Bag-1		
Soil Identification:	Dark yellowish brown poorly graded sand (SP)		

Dry Wt. of Soil + Cont.	(g)	1000.00
Wt. of Container No.	(g)	0.00
Dry Wt. of Soil	(g)	1000.00
Weight Soil Retained on #4 Sieve		0.00
Percent Passing # 4		100.00

MOLDED SPECIMEN		Before Test	After Test
Specimen Diameter	(in.)	4.01	4.01
Specimen Height	(in.)	1.0000	1.0004
Wt. Comp. Soil + Mold	(g)	629.40	449.10
Wt. of Mold	(g)	190.80	0.00
Specific Gravity (Assumed)		2.70	2.70
Container No.		O	O
Wet Wt. of Soil + Cont.	(g)	854.10	639.90
Dry Wt. of Soil + Cont.	(g)	794.50	598.80
Wt. of Container	(g)	0.00	190.80
Moisture Content	(%)	7.50	10.07
Wet Density	(pcf)	132.3	135.4
Dry Density	(pcf)	123.1	123.0
Void Ratio		0.370	0.370
Total Porosity		0.270	0.270
Pore Volume	(cc)	55.9	56.0
Degree of Saturation (%) [S meas]		**54.8**	73.4

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
04/21/04	16:29	1.0	0	0.0508
04/21/04	16:39	1.0	10	0.0507
Add Distilled Water to the Specimen				
04/21/04	17:06	1.0	27	0.0509
04/22/04	6:47	1.0	848	0.0512
04/22/04	10:02	1.0	1043	0.0512

Expansion Index (EI_{meas})	=	((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	0.5
Expansion Index (EI)$_{50}$	=	$EI_{meas} - (50 - S_{meas}) \times ((65 + EI_{meas}) / (220 - S_{meas}))$	**2**

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

EXPANSION INDEX of SOILS
ASTM D 4829

Project Name: Young Homes / MV
Project No. : 021164-001
Boring No.: TP-8
Sample No. : Bag-1
Soil Identification: Dark yellowish brown silty sand (SM)

Tested By: GB
Checked By: LF
Depth (ft.) 2-3

Dry Wt. of Soil + Cont.	(g)	1000.00
Wt. of Container No.	(g)	0.00
Dry Wt. of Soil	(g)	1000.00
Weight Soil Retained on #4 Sieve		0.00
Percent Passing # 4		100.00

MOLDED SPECIMEN		Before Test	After Test
Specimen Diameter	(in.)	4.01	4.01
Specimen Height	(in.)	1.0000	1.0000
Wt. Comp. Soil + Mold	(g)	620.80	440.00
Wt. of Mold	(g)	201.80	0.00
Specific Gravity (Assumed)		2.70	2.70
Container No.		O	O
Wet Wt. of Soil + Cont.	(g)	862.40	641.80
Dry Wt. of Soil + Cont.	(g)	804.50	592.70
Wt. of Container	(g)	0.00	201.80
Moisture Content	(%)	7.20	12.56
Wet Density	(pcf)	126.4	132.7
Dry Density	(pcf)	117.9	117.9
Void Ratio		0.430	0.430
Total Porosity		0.301	0.301
Pore Volume	(cc)	62.2	62.2
Degree of Saturation (%) [S_{meas}]		**45.2**	78.9

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
04/21/04	16:55	1.0	0	0.1090
04/21/04	17:05	1.0	10	0.1087
Add Distilled Water to the Specimen				
04/21/04	17:10	1.0	5	0.1087
04/22/04	6:44	1.0	819	0.1090
04/22/04	10:15	1.0	1030	0.1090

Expansion Index (EI_{meas})	= ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	0.3
Expansion Index (EI)$_{50}$	= EI_{meas} - (50 - S_{meas})x((65+EI_{meas}) / (220-S_{meas}))	**0**

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

Leighton Consulting, Inc.
A LEIGHTON GROUP COMPANY

R-VALUE TEST RESULTS

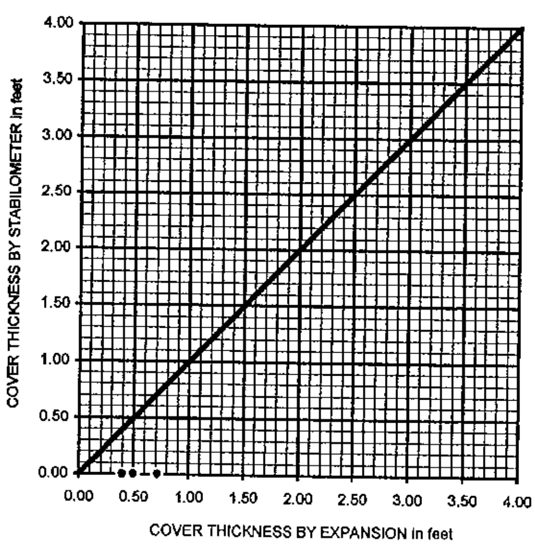
PROJECT NAME: Young Homes / MV
SAMPLE NUMBER: Bag 1
SAMPLE DESCRIPTION: Si. Sa.

PROJECT NUMBER: 021164-001
SAMPLE LOCATION: TP-8 2-3'
TECHNICIAN: SCF

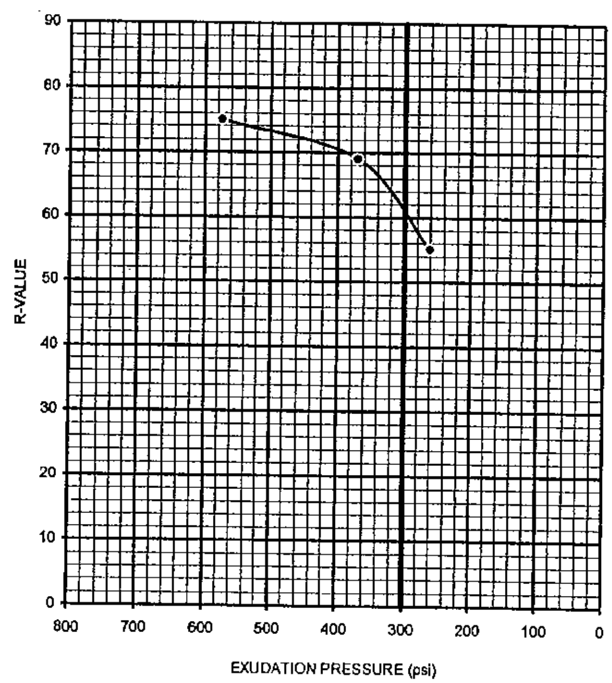
TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	9.5	9.9	10.3
HEIGHT OF SAMPLE, Inches	2.44	2.57	2.53
DRY DENSITY, pcf	126.6	125.6	127.4
COMPACTOR AIR PRESSURE, psf	200	150	100
EXUDATION PRESSURE, psf	574	369	261
EXPANSION, Inches x 10exp-4	0	0	0
STABILITY Ph 2,000 lbs (160 psi)	25	30	43
TURNS DISPLACEMENT	4.58	4.98	5.56
R-VALUE UNCORRECTED	75	69	55
R-VALUE CORRECTED	75	69	55

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	0.40	0.50	0.72
EXPANSION PRESSURE THICKNESS, ft.	0.00	0.00	0.00

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION: 100
R-VALUE BY EXUDATION: 61
EQUILIBRIUM R-VALUE: 61

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

TESTS for SULFATE CONTENT CHLORIDE CONTENT and pH of SOILS

Project Name: Young Homes / MV
Project No. : 021164-001
Tested By : VJ
Data Input By: LF

Boring No.	TP-1	TP-8		
Sample No.	Bag-1	Bag-1		
Sample Depth (ft)	2-5	2-3		
Soil Identification:	SC	SM		
Wet Weight of Soil + Container (g)	222.36	193.02		
Dry Weight of Soil + Container (g)	215.40	187.60		
Weight of Container (g)	74.75	38.66		
Moisture Content (%)	4.95	3.64		
Weight of Soaked Soil (g)	100.24	100.39		

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	14	15		
Crucible No.	19	20		
Furnace Temperature (°C)	830	830		
Time In / Time Out	7:45 / 8:30	7:45 / 8:30		
Duration of Combustion (min)	45	45		
Wt. of Crucible + Residue (g)	20.9062	21.2107		
Wt. of Crucible (g)	20.9043	21.2096		
Wt. of Residue (g) (A)	0.0019	0.0011		
PPM of Sulfate (A) x 41150	78.18	45.27		
PPM of Sulfate, Dry Weight Basis	**82**	**47**		

CHLORIDE CONTENT, DOT California Test 422

ml of Chloride Soln. For Titration (B)	30	30		
ml of AgNO3 Soln. Used in Titration (C)	0.6	0.6		
PPM of Chloride (C -0.2) * 100 * 30 / B	40	40		
PPM of Chloride, Dry Wt. Basis	**42**	**42**		

pH TEST, DOT California Test 532/643

pH Value	**7.02**	**7.07**		
Temperature °C	20.7	20.6		

Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

SOIL RESISTIVITY TEST

DOT CA TEST 532 / 643

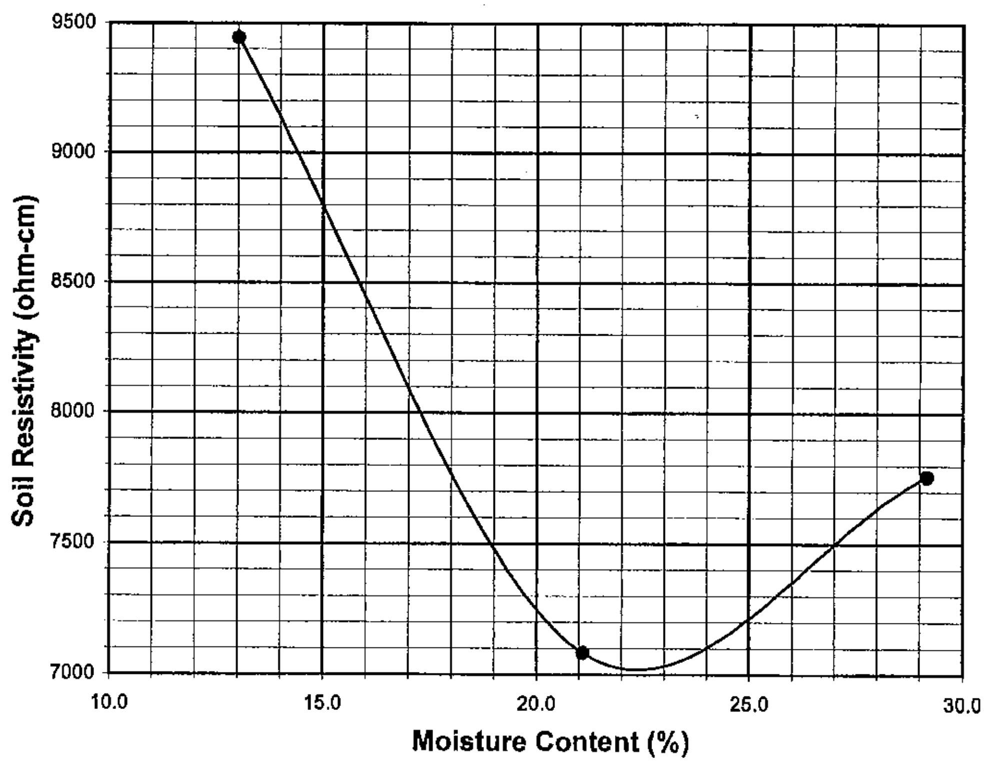
Project Name: Young Homes / MV
Project No. : 021164-001
Boring No.: TP-1
Sample No. : Bag-1
Soil Identification: SC

Tested By : VJ
Data Input By: LF
Depth (ft.) : 2-5

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	100	13.02	1400	9444
2	200	21.09	1050	7083
3	300	29.17	1150	7758
4				
5				

Moisture Content (%) (MCi)	4.95
Wet Wt. of Soil + Cont. (g)	222.36
Dry Wt. of Soil + Cont. (g)	215.40
Wt. of Container (g)	74.75
Container No.	
Initial Soil Wt. (g) (Wt)	1300.00
Box Constant	6.746
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 532 / 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 532 / 643	
7020	**22.3**	**82**	**42**	**7.02**	**20.7**



Teratest Labs, Inc.
A LEIGHTON GROUP COMPANY

SOIL RESISTIVITY TEST

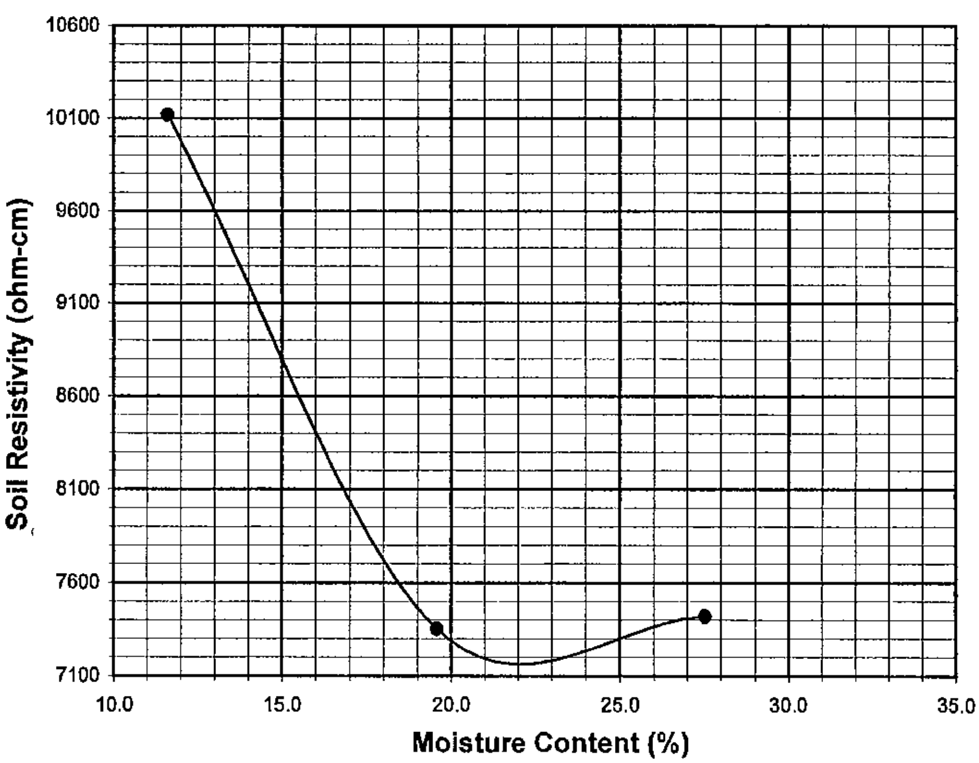
DOT CA TEST 532 / 643

Project Name:	Young Homes / MV	Tested By :	VJ
Project No. :	021164-001	Data Input By:	LF
Boring No.:	TP-8	Depth (ft.) :	2-3
Sample No. :	Bag-1		
Soil Identification:	SM		

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	100	11.61	1500	10119
2	200	19.58	1090	7353
3	300	27.56	1100	7421
4				
5				

Moisture Content (%) (MCi)	3.64
Wet Wt. of Soil + Cont. (g)	193.02
Dry Wt. of Soil + Cont. (g)	187.60
Wt. of Container (g)	38.66
Container No.	
Initial Soil Wt. (g) (Wt)	1300.00
Box Constant	6.746
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 532 / 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 532 / 643	
7170	**22.0**	**47**	**42**	**7.07**	**20.6**



Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

APPENDIX E

LEIGHTON AND ASSOCIATES, INC.

GENERAL EARTHWORK AND GRADING SPECIFICATIONS FOR ROUGH GRADING

Table of Contents

1.0 General

1.1 Intent: These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 The Geotechnical Consultant of Record: Prior to commencement of work, the owner shall employ the Geotechnical Consultant of Record (Geotechnical Consultant). The Geotechnical Consultants shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include natural ground after it has been cleared for receiving fill but before fill is placed, bottoms of all "remedial removal" areas, all key bottoms, and benches made on sloping ground to receive fill.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to determine the attained level of compaction. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

1.3 <u>The Earthwork Contractor</u>: The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The

Contractor shall be solely responsible for performing the grading in accordance with the plans and specifications.

The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "spreads" of work and the estimated quantities of daily earthwork contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified.

2.0 <u>Preparation of Areas to be Filled</u>

2.1 <u>Clearing and Grubbing</u>: Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 5 percent of organic matter. Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

2.2 Processing: Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

2.3 Overexcavation: In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be overexcavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.4 Benching: Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.

2.5 Evaluation/Acceptance of Fill Areas: All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

3.0 Fill Material

3.1 General: Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

3.2 Oversize: Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 8 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 Import: If importing of fill material is required for grading, proposed import material shall meet the requirements of Section 3.1. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

4.1 Fill Layers: Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 Fill Moisture Conditioning: Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557-91).

4.3 Compaction of Fill: After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557-91). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

4.4 Compaction of Fill Slopes: In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557-91.

4.5 Compaction Testing: Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 Frequency of Compaction Testing: Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than 5 feet apart from potential test locations shall be provided.

5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 Excavation

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 Trench Backfills

7.1 Safety: The Contractor shall follow all OHSA and Cal/OSHA requirements for safety of trench excavations.

7.2 Bedding and Backfill: All bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1 foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum of 90 percent of maximum from 1 foot above the top of the conduit to the surface.

The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

7.3 Lift Thickness: Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

7.4 Observation and Testing: The jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

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May 9, 2014

Project No. 14541-11A

Mr. Jason Keller
MISSION PACIFIC LAND COMPANY
3649 Mission Inn Avenue
1st Floor Rotunda
Riverside, CA 92501

Subject: **Interpretive Report for Infiltration System Design, Proposed Residential Development, Located at the Northeast Corner of Indian Avenue and Santiago Street City of Moreno Valley, Riverside County, California**

Earth-Strata, Inc. is pleased to present this interpretive report for the proposed development, located at the northeast corner of Indian Avenue and Santiago Street in the City of Moreno Valley, Riverside County, California. The purpose of our study was to determine the infiltration rates and physical characteristics of the subsurface earth materials within the proposed development. We have provided guidelines for the design of onsite detention basins, where applicable. This study is intended to provide onsite infiltration rates for the earth materials at the approximate depth near the proposed porous pavement areas.

PROPERTY DESCRIPTION

The subject property is located at northwest corner of Indian Avenue and Santiago Street in the City of Moreno Valley, Riverside County, California (see Figure 1). The subject property consists of a developed parcel of land with relatively flat terrain. The subject property is underlain by undocumented fill and alluivium (Qal).

PROPOSED CONSTRUCTION

Based on information provided by you, the proposed development will consist of single family residences which include interior driveways, utilities and hardscape.

SUBSURFACE EXPLORATION AND INFILTRATION TESTING

SUBSURFACE EXPLORATION

Subsurface exploration of the subject site consisted of 2 exploratory excavations to a depth of 6 feet, conducted on May 7, 2014. The exploratory holes were excavated to evaluate insitu permeability rates for the soil below the porous pavement. The approximate location of the exploratory excavations are shown on the attached Infiltration Location Map, Plate 1.

EARTH MATERIALS

A general description of the earth materials observed on site is provided below.

- Quaternary Alluvium (map symbol Qal): Quaternary alluvium was encountered to a maximum depth explored. These alluvial deposits consist predominately of interlayered brown to gray brown, fine to coarse grained silty sand. These deposits were generally noted to be in a slightly moist to moist, loose to medium dense state.

GROUNDWATER

Groundwater was not observed within the exploratory excavations.

INFILTRATION TESTING

The continuous presoak test method was utilized to perform a total of two (2) infiltration tests on May 7, 2014 to evaluate near surface infiltratiion rates in order to estimate the amount of storm water runoff that can percolate into the onsite bio swale retention basins. The infiltration tests were performed in general accordance with the requirements of insitu infiltration testing.

The infiltration tests were performed within 8 inch holes, 6 feet deep. The locations of the infiltration test holes are indicated on the attached Infiltration Location Map, Plate 1. The infiltration test holes were located by property boundary measurement on the site plan and by using geographic features. For the continuous presoak testing method, the pipe was filled with water and allowed to stand.

After the presoak, testing was performed by adjusting the water level. The drop in water level was measured from a fixed initial reference point for more reliable readings, with measurements having an accuracy of 1/8-inch. After each measurement, the water level was brought up to the original test level. Infiltration test data recorded in the field is summarized in the following table and is included within Appendix A.

INFILTRATION TEST SUMMARY

TEST NUMBER	INFILTRATION HOLE DEPTH (ft.)	INFILTRATION RATE (cm/sec)	DESCRIPTION
P-1	6	5	Silty SAND
P-2	6	3	Silty SAND

The infiltration test rates ranged from 3 to 5 minutes per inch (mpi).

CONCLUSIONS AND RECOMMENDATIONS

Based on the data presented in this report and the recommendations set forth herein, it is the opinion of Earth-Strata that the retention basin can be designed for a infiltration rate of 5 mpi.

The following equation was used in order to convert the infiltration rate to infiltration rate.

$$I_t = \frac{\Delta H\ (60)\ r}{\Delta t\ \ (r + 2H_{avg})}$$

The design infiltration rate of 5 mpi is equalvent to 0.45 inch/hour.

GRADING PLAN REVIEW AND CONSTRUCTION SERVICES

This report has been prepared for the exclusive use of **Mr. Jason Keller** and their authorized representative. It likely does not contain sufficient information for other parties or other uses. Earth-Strata should be engaged to review the final design plans and specifications prior to construction. This is to verify that the recommendations contained in this report have been properly incorporated into the project plans and specifications. Should Earth-Strata not be accorded the opportunity to review the project plans and specifications, we are not responsibility for misinterpretation of our recommendations.

Earth-Strata should be retained to provide observations during construction to validate this report. In order to allow for design changes in the event that the subsurface conditions differ from those anticipated prior to construction.

Earth-Strata should review any changes in the project and modify and approve in writing the conclusions and recommendations of this report. This report and the drawings contained within are intended for design input purposes only and are not intended to act as construction drawings or specifications. In the event that conditions encountered during grading or construction operations appear to be different than those indicated in this report, this office should be notified immediately, as revisions may be required.

REPORT LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists, practicing at the time and location this report was prepared. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

Earth materials vary in type, strength, and other geotechnical properties between points of observation and exploration. Groundwater and moisture conditions can also vary due to natural processes or the works of man on this or adjacent properties. As a result, we do not and cannot have complete knowledge of the subsurface conditions beneath the subject property. No practical study can completely eliminate uncertainty with regard to the anticipated geotechnical conditions in connection with a subject property. The conclusions and recommendations within this report are based upon the findings at the points of observation and are subject to confirmation by Earth-Strata during construction. This report is considered valid for a period of one year from the time the report was issued.

This report was prepared with the understanding that it is the responsibility of the owner or their representative, to ensure that the conclusions and recommendations contained herein are brought to the attention of the other project consultants and are incorporated into the plans and specifications. The owners' contractor should properly implement the conclusions and recommendations during grading and construction, and notify the owner if they consider any of the recommendations presented herein to be unsafe or unsuitable.

Respectfully submitted,

EARTH-STRATA, INC.

Stephen M. Poole

REGISTERED PROFESSIONAL ENGINEER
STEPHEN MICHAEL POOLE
No. 40219
Exp.
CIVIL
STATE OF CALIFORNIA

Stephen M. Poole, PE 40219
President
Principal Engineer

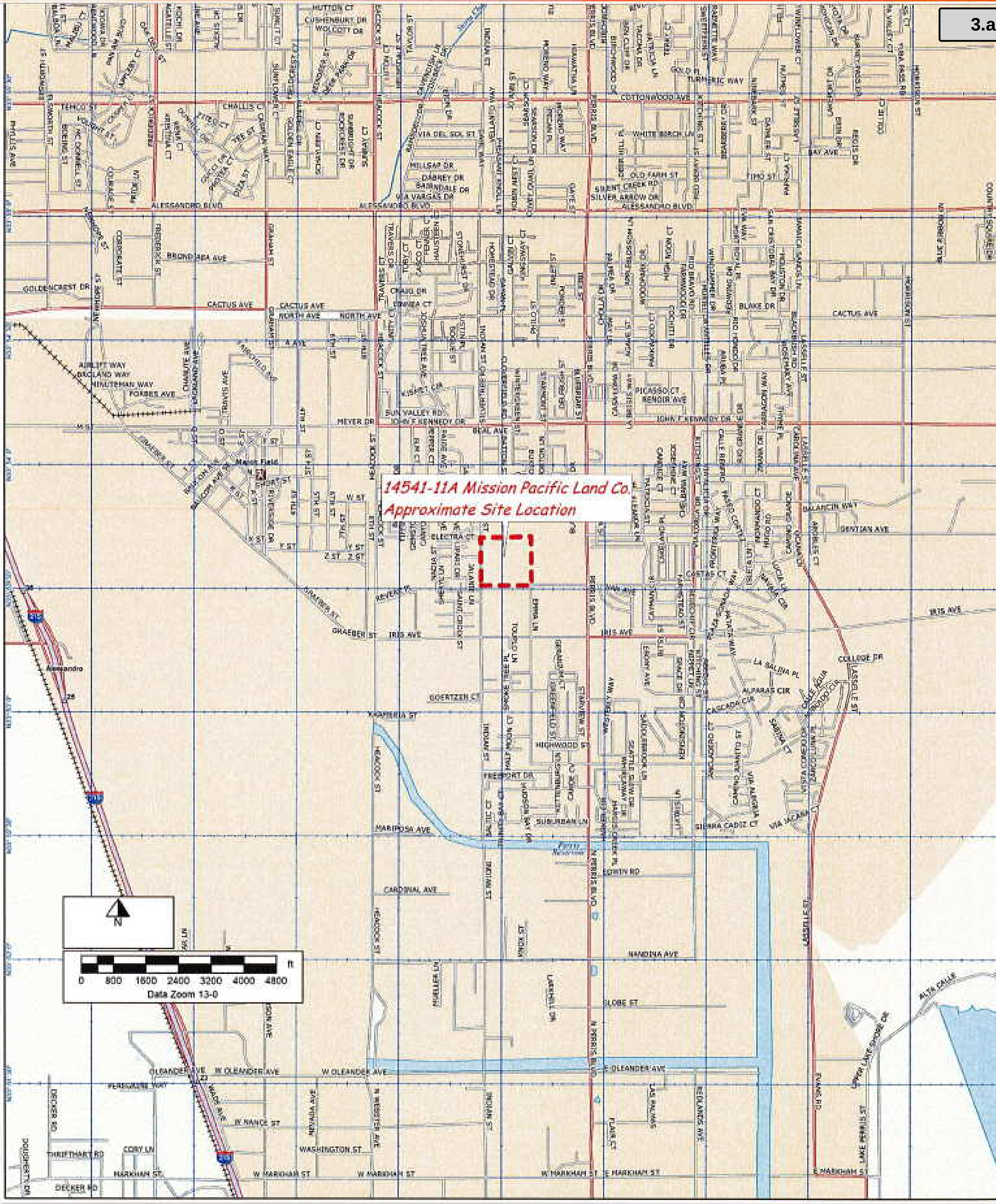
SMP/ca

Distribution: (2) Addressee

Attachments: Figure 1 – Vicinity Map *(Rear of Text)*
Appendix A – Exploratory Logs *(Rear of Text)*
Appendix B – Infiltration Test Sheets *(Rear of Text)*
Plate 1 – Infiltration Location Map *(Rear of Text)*

FIGURE 1

VICINITY MAP



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	VICINITY MAP	SEE BAR SCALE	
		MAY 2014	FIGURE 1

Attachment: Preliminary Water Quality Management Plan (2444 : Legacy Park Project)

APPENDIX A

EXPLORATORY LOGS

Geotechnical Boring Log B-1

Date: May 6, 2014	Project Name: Moreno Valley — Page: 1 of 1
Project Number: 14541-11A	Logged By: SMP
Drilling Company: Drilling It	Type of Rig: CME 45B
Drive Weight (lbs): 140	Drop (in): 30 — Hole Diameter (in): 8
Top of Hole Elevation (ft):	Hole Location: See Geotechnical Map

Depth (ft)	Blow Count Per Foot	Sample Number	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0					SM	**Quarternary Alluvium (Qal):**
						Silty **SAND**, Brown to Gray Brown, fine to coarse grained, slightly moist
						to moist, loose to medium dense
5						
10						
15						
20						
25						
30						

42217 Rio Nedo Rd., Suite A-104, Temecula CA 92590

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APPENDIX B

INFILTRATION TEST SHEETS

Job No.: 14541-11A
Job Name: Moreno Valley, Indian Avenue
Test Hole Number: P-1
Soil Classification: Silty SAND
Test Hole Depth (ft): 6

Tested By: TJ
Test Hole Diameter (inches): 8
Date Excavated: 5/6/2014
Date Tested: 5/7/2014
Time Interval of Presoak: 0
Amount of Water Used / Comments: 0

Date / Time
Start: 5/7/14 11:42
Stop: 5/7/14 13:43

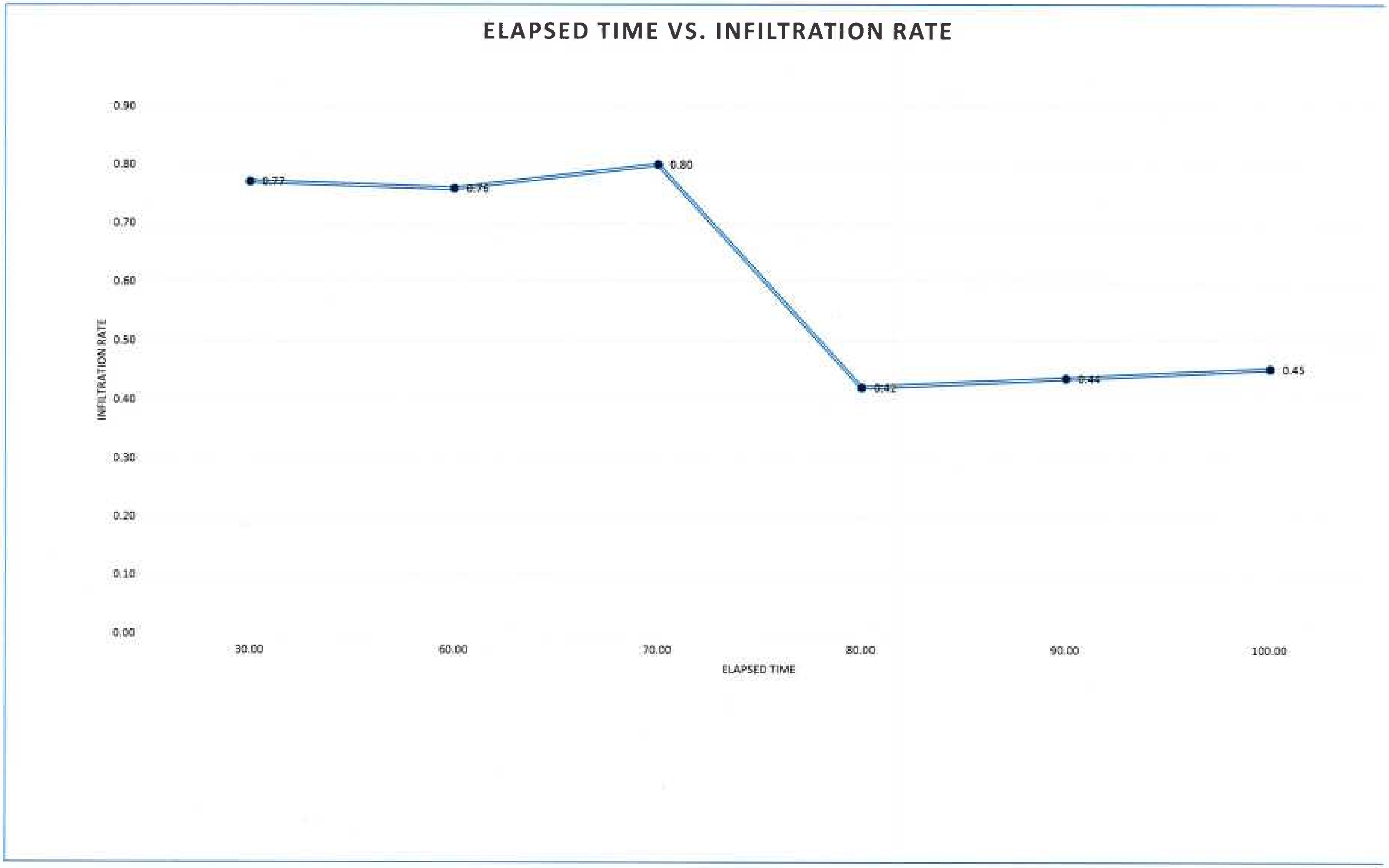
"It" is the tested infiltration rate.
Time interval, Δt — Initial Depth to Water, D_0
Final Depth to Water, D_f — Total Depth of Test Hole, D_T
2Test Hole Radius, r
The conversion equation is used:
"Havg" is the average head height over the time interval.

$$It = \frac{\Delta H \, 60 \, r}{\Delta t(r+2Havg)}$$

Time	Time Interval (min.)	Initial Water Level (Inches)	Final Water Level (Inches)	Water Level Drop (Inches)	Percolation Rate (Min./Inch)	Total Depth of Percolation Hole
11:42–12:12	30	28.5	36.5	8.00	4	72.00
12:12–12:42	30	36.5	43	6.50	5	72.00
12:42–12:52	10	43	45	2.00	5	72.00
12:52–13:02	10	45	46	1.00	10	72.00
13:02–13:12	10	46	47	1.00	10	72.00
13:12–13:22	10	47	48	1.00	10	72.00
13:23–13:33	10	28	33	5.00	2	72.00
13:33–13:43	10	33	35	2.00	5	72.00

Time Interval Δt	Initial Water H_0	Final Water H_f	Total Depth of Test Hole D_t	Raduis of Perc Hole r	ΔH	H Avg	$\Delta H \, 60 \, r / (\Delta t (r+2Havg))$ It	ELAPSED TIME Δt
30.00	43.50	35.50	72.00	4.00	8.00	39.50	0.77	30.00
30.00	35.50	29.00	72.00	4.00	6.50	32.25	0.76	60.00
10.00	29.00	27.00	72.00	4.00	2.00	28.00	0.80	70.00
10.00	27.00	26.00	72.00	4.00	1.00	26.50	0.42	80.00
10.00	26.00	25.00	72.00	4.00	1.00	25.50	0.44	90.00
10.00	25.00	24.00	72.00	4.00	1.00	24.50	0.45	100.00
10.00	44.00	39.00	72.00	4.00	5.00	41.50	1.38	110.00
10.00	39.00	37.00	72.00	4.00	2.00	38.00	0.60	120.00

Job No.: 14541-11A
Job Name: Moreno Valley, Indian Avenue
Test Hole Number: P-1



Job No.: 14541-11A
Job Name: Moreno Valley, Indian Avenue
Test Hole Number: P-2
Soil Classification: Silty SAND
Test Hole Depth (ft): 6

Tested By: TJ
Test Hole Diameter (inches): 8
Date Excavated: 5/6/2014
Date Tested: 5/7/2014

Time Interval of Presoak: 0
Amount of Water Used / Comments: 0

Date / Time
Start: 5/7/14 11:40
Stop: 5/7/14 13:42

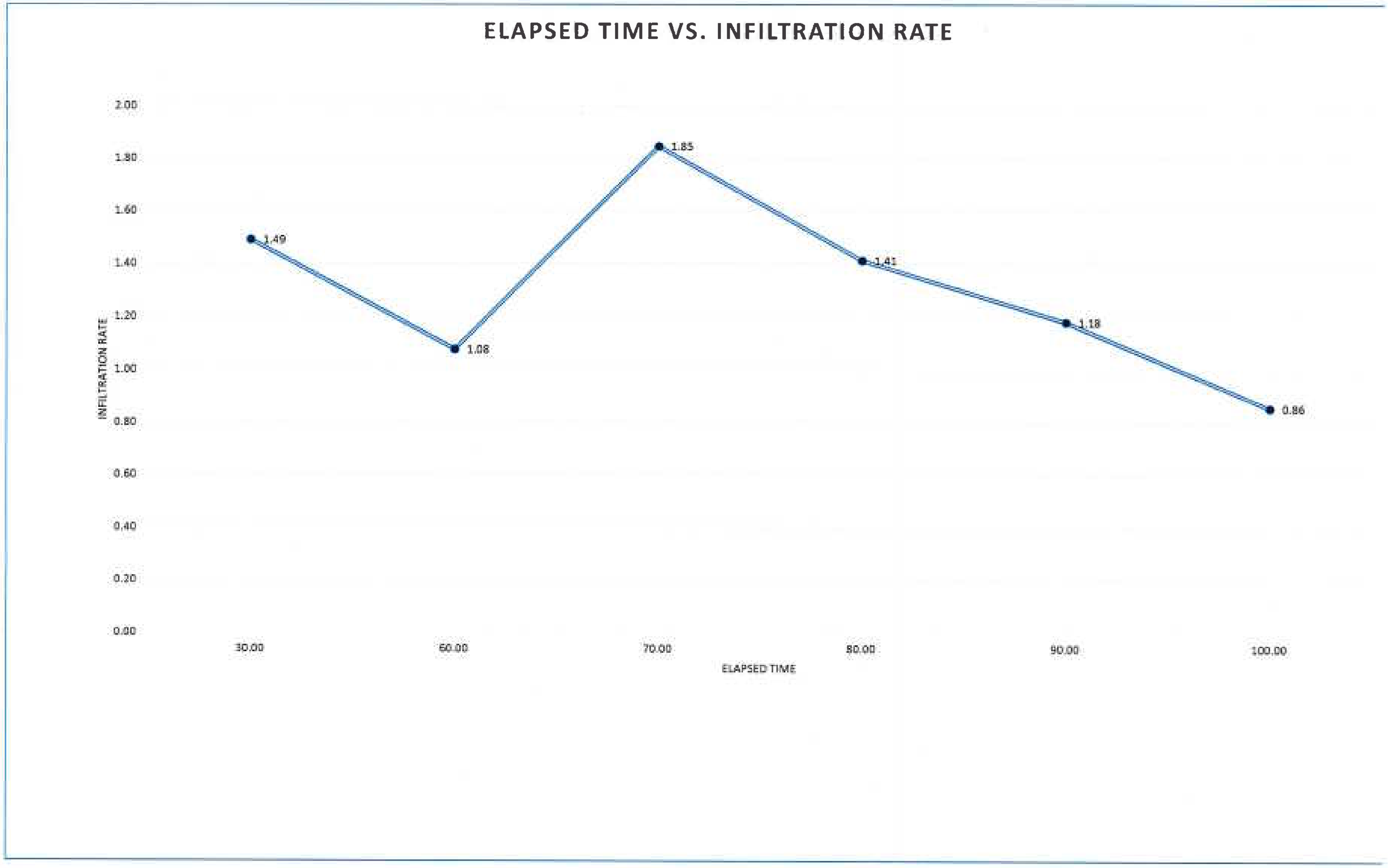
"It" is the tested infiltration rate.
Time interval, Δt
Initial Depth to Water, D_0
Final Depth to Water, D_f
Total Depth of Test Hole, D_T
2Test Hole Radius, r
The conversion equation is used:
"Havg" is the average head height over the time interval.

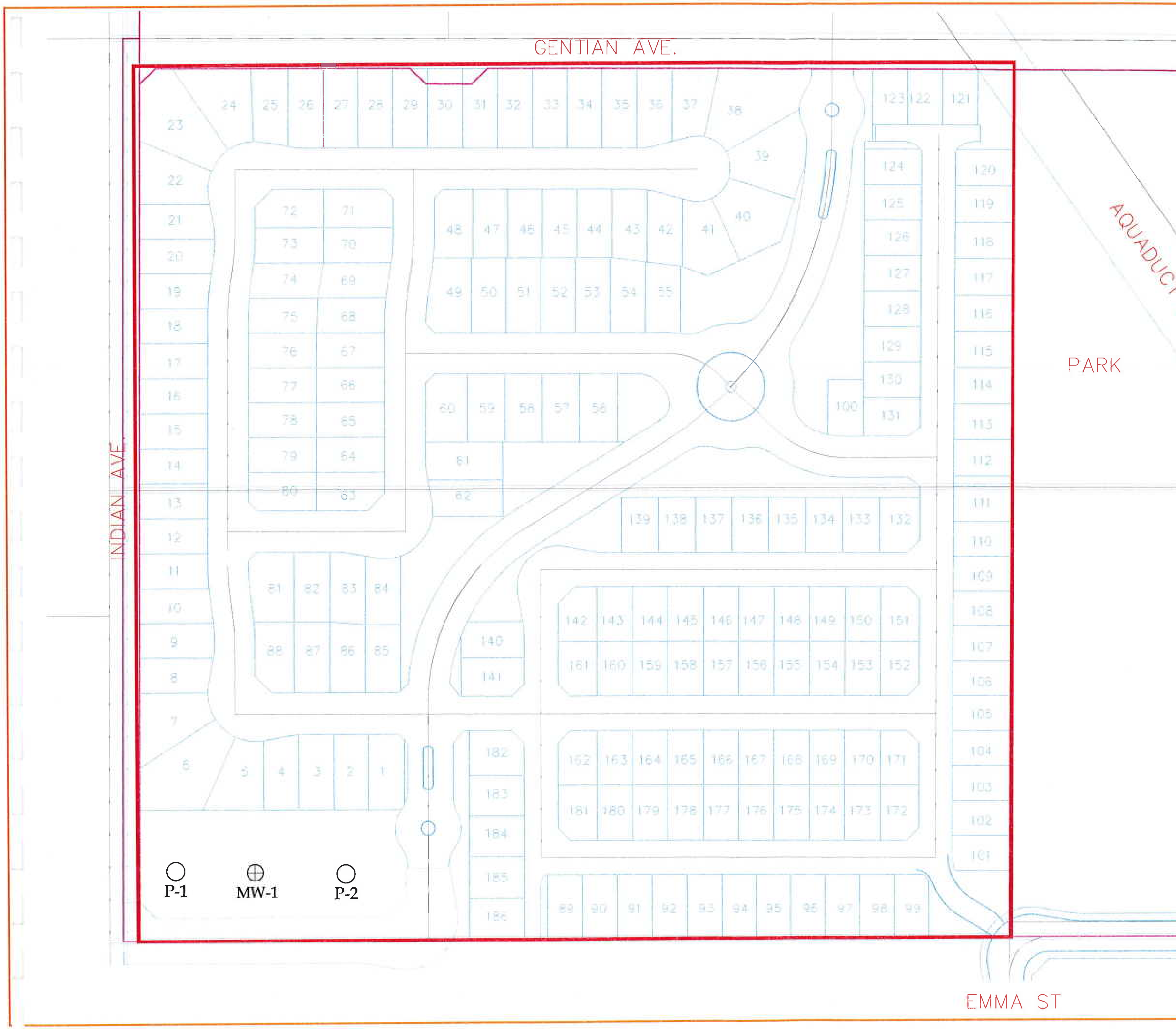
$$It = \frac{\Delta H\ 60\ r}{\Delta t(r+2Havg)}$$

Time	Time Interval (min.)	Initial Water Level (inches)	Final Water Level (inches)	Water Level Drop (inches)	Percolation Rate (Min./Inch)	Total Depth of Percolation Hole
11:40 12:10	30	31	44.5	13.50	3	72.00
12:10 12:40	30	44.5	51.5	7.00	5	72.00
12:41 12:51	10	32	38	6.00	2	72.00
12:51 13:01	10	38	42	4.00	3	72.00
13:01 13:11	10	42	45	3.00	4	72.00
13:11 13:21	10	45	47	2.00	5	72.00
13:22 13:32	10	36	39	3.00	4	72.00
13:32 13:42	10	39	42	3.00	4	72.00

Time Interval Δt	Initial Water H_0	Final Water H_f	Total Depth of Test Hole D_T	Radius of Perc Hole r	ΔH	H Avg	ΔH 60 r/(Δt (r+2Havg)) It	ELAPSED TIME Δt
30.00	41.00	27.50	72.00	4.00	13.50	34.25	1.49	30.00
30.00	27.50	20.50	72.00	4.00	7.00	24.00	1.08	60.00
10.00	40.00	34.00	72.00	4.00	6.00	37.00	1.85	70.00
10.00	34.00	30.00	72.00	4.00	4.00	32.00	1.41	80.00
10.00	30.00	27.00	72.00	4.00	3.00	28.50	1.18	90.00
10.00	27.00	25.00	72.00	4.00	2.00	26.00	0.86	100.00
10.00	36.00	33.00	72.00	4.00	3.00	34.50	0.99	110.00
10.00	33.00	30.00	72.00	4.00	3.00	31.50	1.07	120.00

Job No.: 14541-11A
Job Name: Moreno Valley, Indian Avenue
Test Hole Number: P-2





LEGEND

Locations are Approximate

Symbols

- Limits of Report

P-2 - Percolation Test Location

MW-1 - Percolation Monitoring Well Location

NORTH

PERCOLATION MAP

LOCATED EAST OF INDIAN AVE., SOUTH OF GENETIAN AVE.
CITY OF MORENO VALLEY
RIVERSIDE COUNTY, CALIFONIA

PROJECT	MISSION VALLEY LAND COMPANY		
CLIENT	MR. JASON KELLER		
PROJECT NO.	14541-11A		
DATE	MAY 2014		
SCALE	1:40		
DWG XREFS			
REVISION			
DRAWN BY	CS	PLATE	1 OF 1

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Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

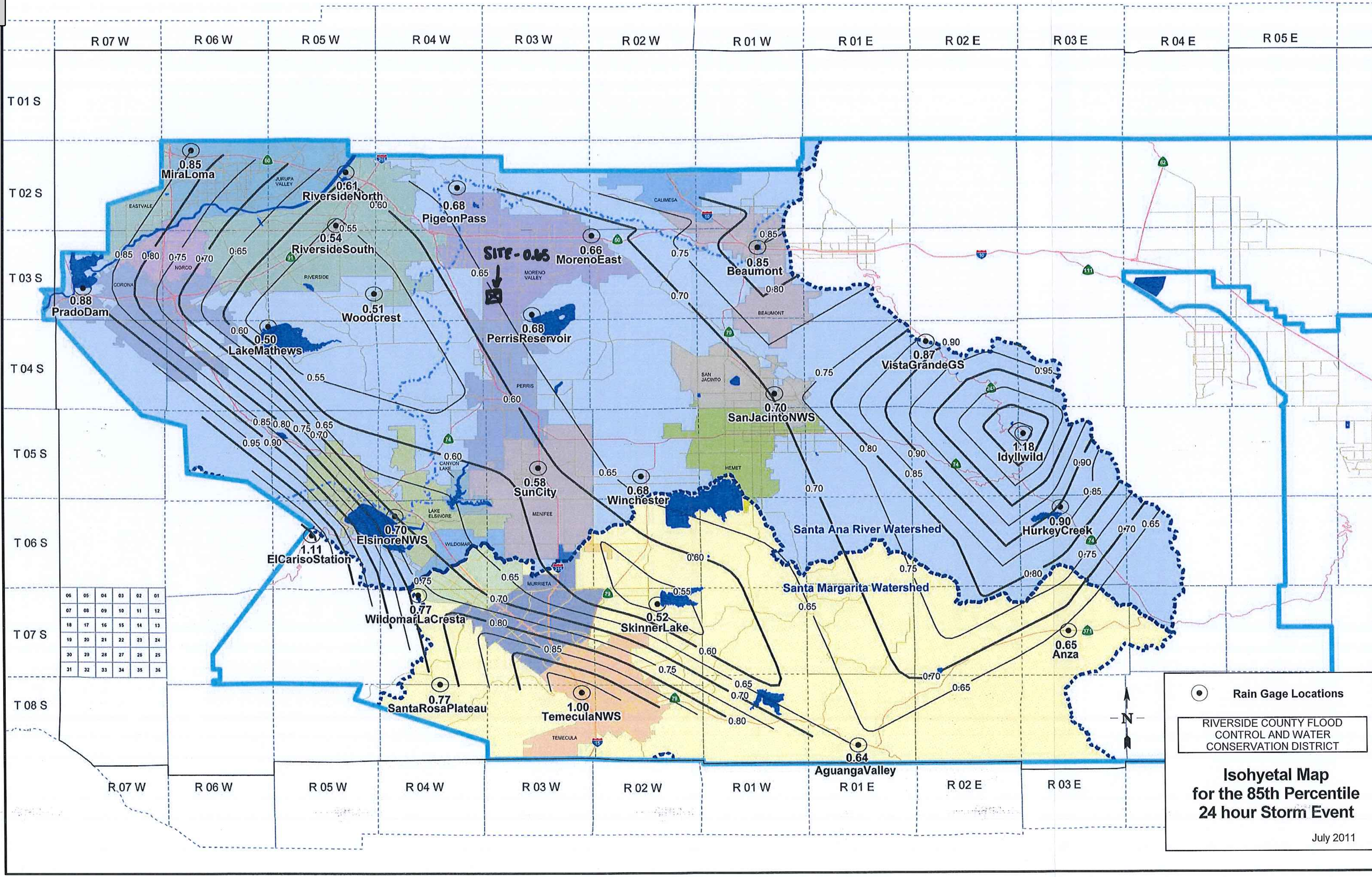
Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

(NOT APPLICABLE)

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation


R 07 W
R 06 W
R 05 W
R 04 W
R 03 W
R 02 W
R 01 W
R 01 E
R 02 E
R 03 E
R 04 E
R 05 E
T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S
0.85 MiraLoma
0.61 RiversideNorth
0.68 PigeonPass
0.54 RiversideSouth
SITE - 0.65
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.68 PerrisReservoir
0.50 LakeMathews
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.90 HurkeyCreek
0.70 ElsinoreNWS
1.11 ElCarisoStation
Santa Ana River Watershed
Santa Margarita Watershed
0.52 SkinnerLake
0.77 WildomarLaCresta
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley
N
Rain Gage Locations
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Isohyetal Map for the 85th Percentile 24 hour Storm Event
July 2011

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: REC — Date: 6/8/2015
Designed by: TMG — Case No:
Company Project Number/Name: 16464B Legacy Park

BMP Identification

BMP NAME / ID: Area 100 West

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.65 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D-100	*320442*	*Concrete or Asphalt*	*1*	*0.89*	*285834.3*			
D-100	*727285*	*Roofs*	*1*	*0.89*	*648738.2*			
D-100	*571926*	*Ornamental Landscaping*	*0.1*	*0.11*	*63173.8*			
	1619653	***Total***			**997746.3**	**0.65**	***54044.6***	***54,045***

Notes:

The design capture volume is stored in the sub-surface media and gravel layers, with excess water not exceeding a maximum of 6" ponded depth (see attached calculation sheet titled "Ponded Depth Calc"). The actual basin volume exceeds the proposed Vbmp for hydrology detetention requirements.

Bioretention Facility - Design Procedure	BMP ID	Legend:	Required Entries
	D-100		Calculated Cells

Company Name:	REC	Date:	6/18/2015
Designed by:	ROG	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T= 36.2 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP}= 54,045 ft^3

Type of Bioretention Facility Design

- [x] Side slopes required (parallel to parking spaces or adjacent to walkways)
- [ ] No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 3.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 130.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.79 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$ — A_M = 30,115 ft^2

Proposed Surface Area — A= 31,934 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation: Natural Grasses

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries
Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name REC
Date 6/8/2015
Designed by TMG
Case No
Company Project Number/Name 16464B Legacy Park

BMP Identification

BMP NAME / ID Area 200 East

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth,
from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.65 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D-200	*118702*	*Concrete or Asphalt*	*1*	*0.89*	*105882.2*			
D-200	*230892*	*Roofs*	*1*	*0.89*	*205955.7*			
D-200	*193462*	*Ornamental Landscaping*	*0.1*	*0.11*	*21369.4*			
	543056	***Total***			333207.3	0.65	***18048.7***	***18,049***

Notes:

The design capture volume is stored in the sub-surface media and gravel layers, with excess water not exceeding a maximum of 6" ponded depth (see attached calculation sheet titled "Ponded Depth Calc"). The actual basin volume exceeds the proposed Vbmp for hydrology detetention requirements.

Bioretention Facility - Design Procedure	BMP ID	Legend:	Required Entries
	D-200		Calculated Cells

Company Name: REC — Date: 6/18/2015

Designed by: ROG — County/City Case No.:

Design Volume

Enter the area tributary to this feature — A_T= 12.5 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP}= 18,049 ft^3

Type of Bioretention Facility Design

- (●) Side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 2.0 ft

Top Width of Bioretention Facility, excluding curb — w_T = 74.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.49 ft

Minimum Surface Area, A_m

$$A_M (ft^2) = \frac{V_{BMP} (ft^3)}{d_E (ft)}$$

A_M = 12,110 ft^2

Proposed Surface Area — A= 27,885 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0 %

6" Check Dam Spacing — 0 feet

Describe Vegetation: Natural Grasses

Notes:

WEST BASIN #100

DESIGN CAPTURE VOLUME (VBMP) ≈ 54,045 ft^3 = 1.2 AC-FT

SUB-SURFACE STORAGE:

- BOTTOM OF BASIN SURFACE AREA = 31,934 ft^2
- 36" SOIL MEDIA LAYER @ 30% POROSITY
- 12" GRAVEL LAYER @ 40% POROSITY

VOLUME IN (12") GRAVEL LAYER = (1 FT × 31,934 ft^2) × 0.4 = 12,774 ft^3

VOLUME IN (36") SOIL MEDIA = (3 FT × 31,934 ft^2) × 0.3 = 28,741 ft^3

SUM OF SUB-SURFACE STORAGE VOLUME = 41,515 ft^3

REMAINING VOLUME = 54,045 ft^3 − 41,515 ft^3 = 12,530 ft^3

BASIN VOLUME @ 6" ABOVE BASIN BOTTOM = 15,882 ft^3

∴ PONDED DEPTH < 6"

EAST BASIN #200

DESIGN CAPTURE VOLUME = 18,049 ft^3 = 0.4 AC-FT

SUB-SURFACE STORAGE:

- BOTTOM OF BASIN SURFACE AREA = 27,885 ft^2
- 24" SOIL MEDIA @ 30% POROSITY
- 12" GRAVEL LAYER @ 40% POROSITY

VOLUME IN (12") GRAVEL LAYER = (1 FT × 27,885 ft^2) × 0.4 = 11,154 ft^3

VOLUME IN (24") SOIL MEDIA = (2 FT × 27,885 ft^2) × 0.3 = 16,731 ft^3

SUM OF SUB-SURFACE STORAGE VOLUME = 27,885 ft^3

∴ PONDED DEPTH < 6"

TOPS 35500

APPENDIX E
BMP POLLUTANT REMOVAL EFFECTIVENESS

BMP Pollutant Removal Effectiveness [1]

Pollutant of Concern	Harvest and Use [8]	Infiltration BMPs [3]	Bioretention	Extended Detention Basins [2]	Sand Filter Basin [7]
Sediment	H	H	H	M	H
Nutrient	H	H	[5]	M [4]	L [6]
Trash	H	H	H	H	H
Metal	H	H	H	M	M
Bacteria	H	H	H	M	M
Oil & Grease	H	H	H	M	H
Organic Compounds	H	H	H	M	H
Pesticides	H	H	H	U	U

<u>Abbreviations:</u>

L: Low removal efficiency M: Medium removal efficiency H: High removal efficiency U: Unknown

<u>Notes:</u>

(1) Periodic performance assessment and updating of this table may be performed based on updated information from studies from the District, CASQA, Caltrans or others. These effectiveness ratings are based on the specific BMP designs incorporated into this manual.

(2) Effectiveness based upon total 72-hour drawdown time.

(3) Includes infiltration basins, infiltration trenches, and permeable pavements.

(4) Medium for soil types A & B only. Low for soil types C & D.

(5) Removal rating is dependent on the soil media depth. L=Min. 18” deep, M= Min. 24” deep, H=Max. 30"-36" deep.

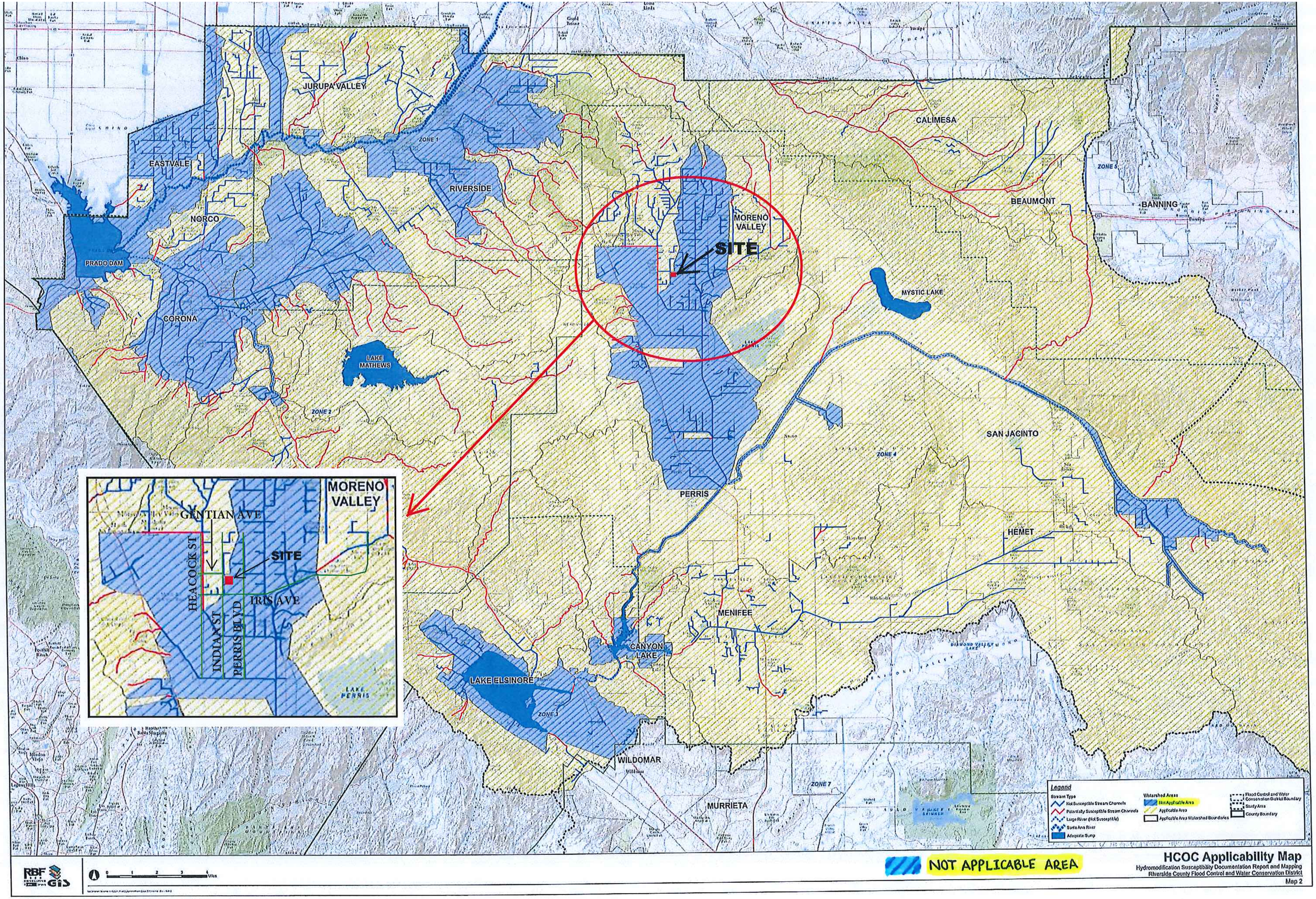
(6) Medium where sand filter layer is increased to 36”.

(7) Considered to be a Treatment Control BMP. See the WQMP to determine if this BMP can be used.

(8) Cisterns, when associated with an adequate and reliable (year-round) demand for non-potable use of captured storm water (see the applicable WQMP for any specific requirements), have a High effectiveness at removing all pollutants from stormwater runoff. If there is inadequate demand to reliably drain the cistern through a non-potable use throughout the year, pollutant removal effectiveness will be Low.

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern


JURUPA VALLEY
EASTVALE
NORCO
PRADO DAM
CORONA
RIVERSIDE
LAKE MATHEWS
ZONE 1
ZONE 2
ZONE 3
ZONE 4
ZONE 5
ZONE 7
MORENO VALLEY
SITE
MYSTIC LAKE
CALIMESA
BEAUMONT
BANNING
PERRIS
SAN JACINTO
HEMET
MENIFEE
CANYON LAKE
LAKE ELSINORE
WILDOMAR
MURRIETA
GENTIAN AVE
HEACOCK ST
INDIAN ST
PERRIS BLVD
IRIS AVE
LAKE PERRIS
NOT APPLICABLE AREA
HCOC Applicability Map
Hydromodification Susceptibility Documentation Report and Mapping
Riverside County Flood Control and Water Conservation District
Map 2

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included in WQMP Table and Narrative
☒ A. On-site storm drain inlets	☒ On-site storm drain inlets	☒ Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	☒ Maintain and periodically repaint or replace inlet markings. ☒ Provide stormwater pollution prevention information to new site owners, lessees, or operators. ☒ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ☒Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."
☐ B. Interior floor drains and elevator shaft sump pumps		☐ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	☐ Inspect and maintain blockages and overflow.
☐ C. Interior parking garages		☐ State that parking garage floor drains will be plumbed to the sanitary sewer.	☐ Inspect and maintain blockages and overflow.

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included in WQMP Table and Narrative
☐ D1. Need for future indoor & structural pest control		☐ Note building design features that discourage entry of pests.	☐ Provide Integrated Pest Management information to owners, lessees, and operators.
☒ D2. Landscape/ Outdoor Pesticide Use	☒ Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. ☒ Show self-retaining landscape areas, if any. ☒ Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)	State that final landscape plans will accomplish all of the following. ☐ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ☒ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. ☒ Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. ☒ Consider using pest-resistant plants, especially adjacent to hardscape. ☒ To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	☒ Maintain landscaping using minimum or no pesticides. ☒ See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at http://rcflood.org/stormwater/Downloads/ LandscapeGardenBrochure.pdf ☒ Provide IPM information to new owners, lessees and operators.

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included in WQMP Table and Narrative
☐ E. Pools, spas, ponds, decorative fountains, and other water features.	☐ Show location of water feature and sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)	☐ If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	☐ See applicable operational BMPs in "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
☐ F. Food service	☐ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ☐ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	☐ Describe the location and features of the designated cleaning area. ☐ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	☐ See the brochure, "The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ Provide this brochure to new site owners, lessees, and operators.
☐ G. Refuse areas	☐ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ☐ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. ☐ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	☐ State how site refuse will be handled and provide supporting detail to what is shown on plans. ☐ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	State how the following will be implemented: ☐ Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included in WQMP Table and Narrative
☐ H. Industrial processes.	☐ Show process area	☐ If industrial processes are to be located on site, state: “All process activities to be performed indoors. No processes to drain to exterior or to storm drain system.”	☐ See Fact Sheet SC-10, “Non-Stormwater Discharges” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com See the brochure “Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities” at http://rcflood.org/stormwater/

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included in WQMP Table and Narrative
☐ I. Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	☐ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. ☐ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ☐ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with therequirements of Hazardous Materials Programs for: • Hazardous Waste Generation • Hazardous Materials Release Response and Inventory • California Accidental Release (CalARP) • Aboveground Storage Tank • Uniform Fire Code Article 80 Section 103(b) & (c) 1991 • Underground Storage Tank www.cchealth.org/groups/haz mat /	☐ See the Fact Sheets SC-31, “Outdoor Liquid Container Storage” and SC-33, “Outdoor Storage of Raw Materials ” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included in WQMP Table and Narrative
☐ J. Vehicle and Equipment Cleaning	☐ Show on drawings as appropriate: (1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. (2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shutoff to discourage such use). (3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.	☐ If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.	Describe operational measures to implement the following (if applicable): ☐ Wash water from vehicle and equipment washing operations shall not be discharged to the storm drain system. Refer to “Outdoor Cleaning Activities and Professional Mobile Service Providers” for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ☐ Car dealerships and similar may rinse cars with water only.

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included in WQMP Table and Narrative
☐ K. Vehicle/Equipment Repair and Maintenance	☐ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater. ☐ Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas. ☐ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	☐ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ☐ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ☐ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the Stormwater Control Plan, note that all of the following restrictions apply to use the site: ☐ No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains. ☐ No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. ☐ No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment. Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included in WQMP Table and Narrative
☐ L. Fuel Dispensing Areas	☐ Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. ☐ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area1.] The canopy [or cover] shall not drain onto the fueling area.		☐ The property owner shall dry sweep the fueling area routinely. ☐ See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

[6] The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included in WQMP Table and Narrative
☐ M. Loading Docks	☐ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. ☐ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ☐ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		☐ Move loaded and unloaded items indoors as soon as possible. ☐ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included in WQMP Table and Narrative
☐ N. Fire Sprinkler Test Water		☐ Provide a mean to drain fire sprinkler test water to the sanitary sewer.	☐ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
O. Miscellaneous Drain or Wash Water or Other Sources ☐ Boiler drain lines ☐ Condensate drain lines ☐ Rooftop equipment ☐ Drainage sumps ☒ Roofing, gutters, and trim. ☐ Other sources		☐ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. ☐ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ☐ Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ☐ Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. ☒ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. ☐ Include controls for other sources as specified by local reviewer.	

1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Shown on WQMP Drawings	3 Permanent Controls—Listed in WQMP Table and Narrative	4 Operational BMPs—Included in WQMP Table and Narrative
☐ P. Plazas, sidewalks, and parking lots.			☐ Sweep plazas, sidewalks and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

Operation and Maintenance Responsibility for Treatment Control BMPs

BMP	Operation and Maintenance Activities	BMP Start Date	Frequency	Indications for Maintenance	Parties Responsible For Maintenance and Funding
Landscaping and Irrigation	Inspect landscaping and irrigation systems and repair/replace if needed.	At the completion of project	The landscaping and irrigation systems shall be monitored monthly.	The landscaping areas should be maintained if areas are eroding away. Irrigation systems should be checked for irregular flows to the landscaped areas when ponding or dry soil occurs.	MPLC Legacy 75 Partners, LLP 4100 Newport Place, Suite 400 Newport, California 92660
Bioretention Basin	Maintain vegetation as needed and remove debris and litter from the basin. Inspect hydraulic and structural facilities, check erosion, and verify infiltration.	At the completion of project	The basin shall be monitored before annual storm seasons and following rainfall events. Mulch replacement prior to start of wet season. An in-depth inspection should occur annually, within 72 hours after a significant rainfall. Perform biannual health evaluation of trees/shrubs.	Vegetation should be maintained if it has eroded. If any debris or litter is seen it should be removed. Odor, insects, and overgrowth indicate the need for repair. The inlet should be examined for blockage, embankment, and damage to the structural integrity. The basin should be aerated if significant ponding of more than 72 hours occurs.	Home Owner's Association
Activity Restrictions	Any activity that may affect surrounding areas or the downstream receiving waters (such as car washes or leaving trash bin lids open) is strictly prohibited.	At the completion of project	Trash areas shall be checked before and after a major storm event, as well as on a monthly basis to reduce debris.	Not applicable	MPLC Legacy 75 Partners, LLP 4100 Newport Place, Suite 400 Newport, California 92660
Education Program	Educational materials are included in this WQMP Attachment D. The property owner shall distribute additional copies of handouts to the homeowners.	When new homeowners move in	The educational material provided shall be included in homeowner information packets and reviewed quarterly.	Not applicable	MPLC Legacy 75 Partners, LLP 4100 Newport Place, Suite 400 Newport, California 92660

BMP	Operation and Maintenance Activities	BMP Start Date	Frequency	Indications for Maintenance	Parties Responsible For Maintenance and Funding
Street Sweeping	A street sweeper shall clean the privately maintained streets and parking areas to reduce debris.	At the completion of project	A street sweeper shall clean the privately maintained streets and parking areas monthly and before any known storm event.	Not applicable	MPLC Legacy 75 Partners, LLP 4100 Newport Place, Suite 400 Newport, California 92660

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

3.5 Bioretention Facility

Type of BMP	LID – Bioretention
Treatment Mechanisms	Infiltration, Evapotranspiration, Evaporation, Biofiltration
Maximum Drainage Area	This BMP is intended to be integrated into a project's landscaped area in a distributed manner. Typically, contributing drainage areas to Bioretention Facilities range from less than 1 acre to a maximum of around 10 acres.
Other Names	Rain Garden, Bioretention Cell, Bioretention Basin, Biofiltration Basin, Landscaped Filter Basin, Porous Landscape Detention

Description

Bioretention Facilities are shallow, vegetated basins underlain by an engineered soil media. Healthy plant and biological activity in the root zone maintain and renew the macro-pore space in the soil and maximize plant uptake of pollutants and runoff. This keeps the Best Management Practice (BMP) from becoming clogged and allows more of the soil column to function as both a sponge (retaining water) and a highly effective and self-maintaining biofilter. In most cases, the bottom of a Bioretention Facility is unlined, which also provides an opportunity for infiltration to the extent the underlying onsite soil can accommodate. When the infiltration rate of the underlying soil is exceeded, fully biotreated flows are discharged via underdrains. Bioretention Facilities therefore will inherently achieve the maximum feasible level of infiltration and evapotranspiration and achieve the minimum feasible (but highly biotreated) discharge to the storm drain system.

Siting Considerations

These facilities work best when they are designed in a relatively level area. Unlike other BMPs, Bioretention Facilities can be used in smaller landscaped spaces on the site, such as:

- ✓ Parking islands
- ✓ Medians
- ✓ Site entrances

Landscaped areas on the site (such as may otherwise be required through minimum landscaping ordinances), can often be designed as Bioretention Facilities. This can be accomplished by:

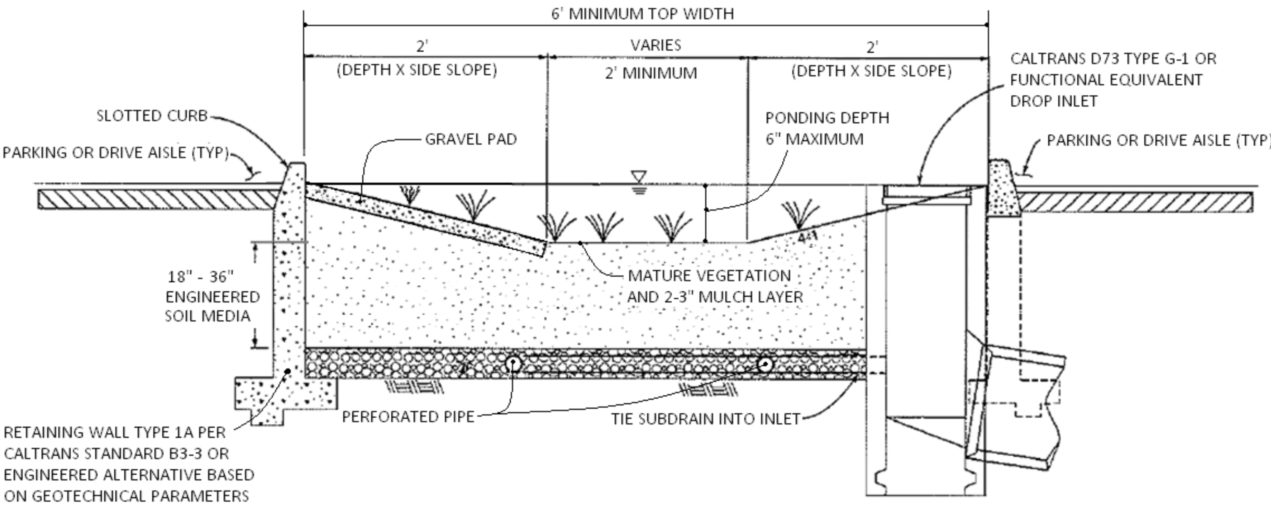
- *Depressing* landscaped areas below adjacent impervious surfaces, rather than elevating those areas
- Grading the site to direct runoff from those impervious surfaces *into* the Bioretention Facility, rather than away from the landscaping
- Sizing and designing the depressed landscaped area as a Bioretention Facility as described in this Fact Sheet

Bioretention Facilities should however not be used downstream of areas where large amounts of sediment can clog the system. Placing a Bioretention Facility at the toe of a steep slope should also be avoided due to the potential for clogging the engineered soil media with erosion from the slope, as well as the potential for damaging the vegetation.

Design and Sizing Criteria

The recommended cross section necessary for a Bioretention Facility includes:

- Vegetated area
- 18' minimum depth of engineered soil media
- 12' minimum gravel layer depth with 6' perforated pipes (added flow control features such as orifice plates may be required to mitigate for HCOC conditions)



While the 18-inch minimum engineered soil media depth can be used in some cases, it is recommended to use 24 inches or a preferred 36 inches to provide an adequate root zone for the chosen plant palate. Such a design also provides for improved removal effectiveness for nutrients. The recommended ponding depth inside of a Bioretention Facility is 6 inches; measured from the flat bottom surface to the top of the water surface as shown in Figure 1.

Because this BMP is filled with an engineered soil media, pore space in the soil and gravel layer is assumed to provide storage volume. However, several considerations must be noted:

- Surcharge storage above the soil surface (6 inches) is important to assure that design flows do not bypass the BMP when runoff exceeds the soil's absorption rate.
- In cases where the Bioretention Facility contains engineered soil media deeper than 36 inches, the pore space within the engineered soil media can only be counted to the 36-inch depth.
- A maximum of 30 percent pore space can be used for the soil media whereas a maximum of 40 percent pore space can be use for the gravel layer.

Figure 1: Standard Layout for a Bioretention Facility

BIORETENTION FACILITY BMP FACT SHEET

Engineered Soil Media Requirements

The engineered soil media shall be comprised of 85 percent mineral component and 15 percent organic component, by volume, drum mixed prior to placement. The mineral component shall be a Class A sandy loam topsoil that meets the range specified in Table 1 below. The organic component shall be nitrogen stabilized compost[1], such that nitrogen does not leach from the media.

Table 1: Mineral Component Range Requirements

Percent Range	Component
70-80	Sand
15-20	Silt
5-10	Clay

The trip ticket, or certificate of compliance, shall be made available to the inspector to prove the engineered mix meets this specification.

Vegetation Requirements

Vegetative cover is important to minimize erosion and ensure that treatment occurs in the Bioretention Facility. The area should be designed for at least 70 percent mature coverage throughout the Bioretention Facility. To prevent the BMP from being used as walkways, Bioretention Facilities shall be planted with a combination of small trees, densely planted shrubs, and natural grasses. Grasses shall be native or ornamental; preferably ones that do not need to be mowed. The application of fertilizers and pesticides should be minimal. To maintain oxygen levels for the vegetation and promote biodegradation, it is important that vegetation not be completely submerged for any extended period of time. Therefore, a maximum of 6 inches of ponded water shall be used in the design to ensure that plants within the Bioretention Facility remain healthy.

A 2 to 3-inch layer of standard shredded aged hardwood mulch shall be placed as the top layer inside the Bioretention Facility. The 6-inch ponding depth shown in Figure 1 above shall be measured from the top surface of the 2 to 3-inch mulch layer.

Curb Cuts

To allow water to flow into the Bioretention Facility, 1-foot-wide (minimum) curb cuts should be placed approximately every 10 feet around the perimeter of the Bioretention Facility. Figure 2 shows a curb cut in a Bioretention Facility. Curb cut flow lines must be at or above the V_{BMP} water surface level.

[1] For more information on compost, visit the US Composting Council website at: http://compostingcouncil.org/

BIORETENTION FACILITY BMP FACT SHEET

Figure 2: Curb Cut located in a Bioretention Facility

To reduce erosion, a gravel pad shall be placed at each inlet point to the Bioretention Facility. The gravel should be 1- to 1.5-inch diameter in size. The gravel should overlap the curb cut opening a minimum of 6 inches. The gravel pad inside the Bioretention Facility should be flush with the finished surface at the curb cut and extend to the bottom of the slope.

In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet. See Figure 3.

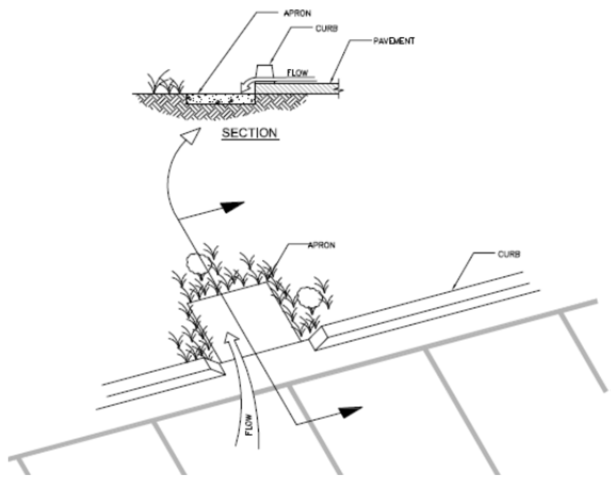


Figure 3: Apron located in a Bioretention Facility

Terracing the Landscaped Filter Basin

It is recommended that Bioretention Facilities be level. In the event the facility site slopes and lacks proper design, water would fill the lowest point of the BMP and then discharge from the basin without being treated. To ensure that the water will be held within the Bioretention Facility on sloped sites, the BMP must be terraced with nonporous check dams to provide the required storage and treatment capacity.

The terraced version of this BMP shall be used on non-flat sites with no more than a 3 percent slope. The surcharge depth cannot exceed 0.5 feet, and side slopes shall not exceed 4:1. Table 2 below shows the spacing of the check dams, and slopes shall be rounded up (i.e., 2.5 percent slope shall use 10' spacing for check dams).

Table 2: Check Dam Spacing

6" Check Dam Spacing	
Slope	**Spacing**
1%	*25'*
2%	*15'*
3%	*10'*

BIORETENTION FACILITY BMP FACT SHEET

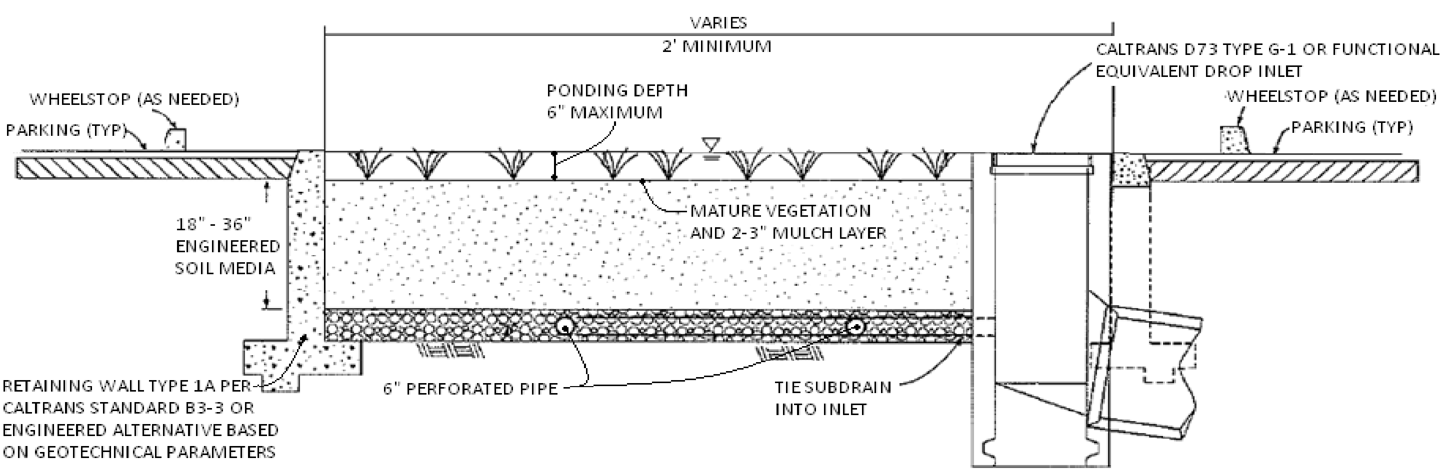
Roof Runoff
Roof downspouts may be directed towards Bioretention Facilities. However, the downspouts must discharge onto a concrete splash block to protect the Bioretention Facility from erosion.

Retaining Walls
It is recommended that Retaining Wall Type 1A, per Caltrans Standard B3-3 or equivalent, be constructed around the entire perimeter of the Bioretention Facility. This practice will protect the sides of the Bioretention Facility from collapsing during construction and maintenance or from high service loads adjacent to the BMP. Where such service loads would not exist adjacent to the BMP, an engineered alternative may be used if signed by a licensed civil engineer.

Side Slope Requirements

Bioretention Facilities Requiring Side Slopes
The design should assure that the Bioretention Facility does not present a tripping hazard. Bioretention Facilities proposed near pedestrian areas, such as areas parallel to parking spaces or along a walkway, must have a gentle slope to the bottom of the facility. Side slopes inside of a Bioretention Facility shall be 4:1. A typical cross section for the Bioretention Facility is shown in Figure 1.

Bioretention Facilities Not Requiring Side Slopes
Where cars park perpendicular to the Bioretention Facility, side slopes are not required. A 6-inch maximum drop may be used, and the Bioretention Facility must be planted with trees and shrubs to prevent pedestrian access. In this case, a curb is not placed around the Bioretention Facility,
but wheel stops shall be used to prevent vehicles from entering the Bioretention Facility, as shown in Figure 4.



BIORETENTION FACILITY BMP FACT SHEET

Planter Boxes

Bioretention Facilities can also be placed above ground as planter boxes. Planter boxes must have a minimum width of 2 feet, a maximum surcharge depth of 6 inches, and no side slopes are necessary. Planter boxes must be constructed so as to ensure that the top surface of the engineered soil media will remain level. This option may be constructed of concrete, brick, stone or other stable materials that will not warp or bend. Chemically treated wood or galvanized steel, which has the ability to contaminate stormwater, should not be used. Planter boxes must be lined with an impermeable liner on all sides, including the bottom. Due to the impermeable liner, the inside bottom of the planter box shall be designed and constructed with a cross fall, directing treated flows within the subdrain layer toward the point where subdrain exits the planter box, and subdrains shall be oriented with drain holes oriented down. These provisions will help avoid excessive stagnant water within the gravel underdrain layer. Similar to the in-ground Bioretention Facility versions, this BMP benefits from healthy plants and biological activity in the root zone. Planter boxes should be planted with appropriately selected vegetation.

Figure 5: Planter Box
Source: LA Team Effort

Overflow

An overflow route is needed in the Bioretention Facility design to bypass stored runoff from storm events larger than V_{BMP} or in the event of facility or subdrain clogging. Overflow systems must connect to an acceptable discharge point, such as a downstream conveyance system as shown in Figure 1 and Figure 4. The inlet to the overflow structure shall be elevated inside the Bioretention Facility to be flush with the ponding surface for the design capture volume (V_{BMP}) as shown in Figure 4. This will allow the design capture volume to be fully treated by the Bioretention Facility, and for larger events to safely be conveyed to downstream systems. The overflow inlet shall **<u>not</u>** be located in the entrance of a Bioretention Facility, as shown in Figure 6.

Underdrain Gravel and Pipes

An underdrain gravel layer and pipes shall be provided in accordance with Appendix B – Underdrains.

Figure 6: Incorrect Placement of an Overflow Inlet.

Inspection and Maintenance Schedule

The Bioretention Facility area shall be inspected for erosion, dead vegetation, soggy soils, or standing water. The use of fertilizers and pesticides on the plants inside the Bioretention Facility should be minimized.

Schedule	Activity
Ongoing	• Keep adjacent landscape areas maintained. Remove clippings from landscape maintenance activities. • Remove trash and debris • Replace damaged grass and/or plants • Replace surface mulch layer as needed to maintain a 2-3 inch soil cover.
After storm events	• Inspect areas for ponding
Annually	• Inspect/clean inlets and outlets

Bioretention Facility Design Procedure

1) Enter the area tributary, A_T, to the Bioretention Facility.

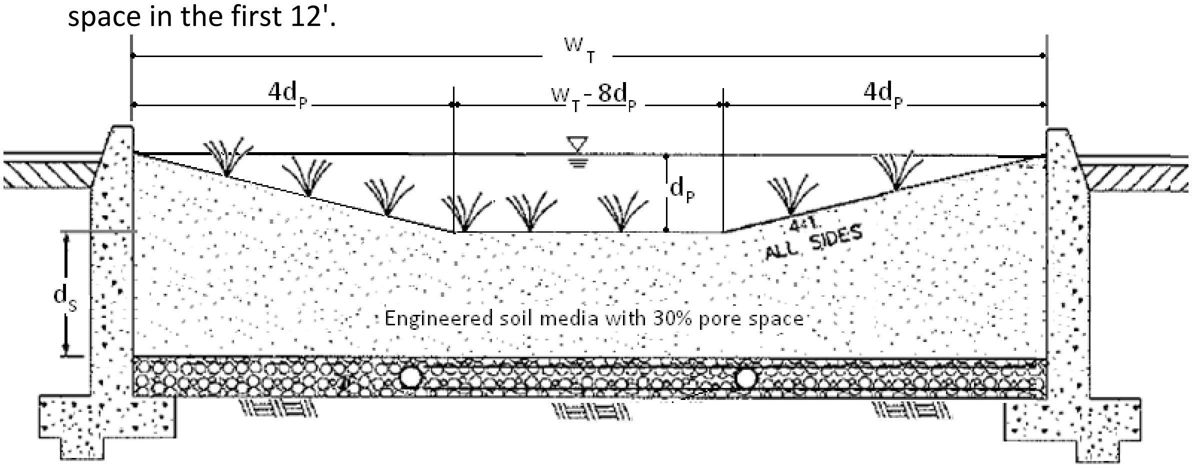
2) Enter the Design Volume, $V_{BMP,}$ determined from Section 2.1 of this Handbook.

3) Select the type of design used. There are two types of Bioretention Facility designs: the standard design used for most project sites that include side slopes, and the modified design used when the BMP is located perpendicular to the parking spaces or with planter boxes that do not use side slopes.

4) Enter the depth of the engineered soil media, d_S. The minimum depth for the engineered soil media can be 18' in limited cases, but it is recommended to use 24' or a preferred 36' to provide an adequate root zone for the chosen plant palette. Engineered soil media deeper than 36' will only get credit for the pore space in the first 36'.

5) Enter the top width of the Bioretention Facility.

6) Calculate the total effective depth, d_E, within the Bioretention Facility. The maximum allowable pore space of the soil media is 30% while the maximum allowable pore space for the gravel layer is 40%. Gravel layer deeper than 12' will only get credit for the pore space in the first 12'.



a. For the design with side slopes the following equation shall be used to determine the total effective depth. Where, d_P is the depth of ponding within the basin.

$$d_E(\mathrm{ft}) = \frac{0.3 \times \left[\left(w_T(\mathrm{ft}) \times d_S(\mathrm{ft})\right) + 4\left(d_P(\mathrm{ft})\right)^2\right] + 0.4 \times 1(\mathrm{ft}) + d_P(\mathrm{ft})\left[4d_P(\mathrm{ft}) + \left(w_T(\mathrm{ft}) - 8d_P(\mathrm{ft})\right)\right]}{w_T(\mathrm{ft})}$$

This above equation can be simplified if the maximum ponding depth of 0.5’ is used. The equation below is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\mathrm{ft}) = (0.3 \times d_S(\mathrm{ft}) + 0.4 \text{ x } 1(\mathrm{ft})) - \left(\frac{0.7\ (\mathrm{ft}^2)}{w_T(\mathrm{ft})}\right) + 0.5(\mathrm{ft})$$

b. For the design without side slopes the following equation shall be used to determine the total effective depth:

$$d_E(ft) = d_P(ft) + [(0.3) \times d_S(ft) + (0.4) \times 1(ft)]$$

The equation below, using the maximum ponding depth of 0.5', is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(ft) = 0.5\ (ft) + [(0.3) \times d_S(ft) + (0.4) \times 1(ft)]$$

7) Calculate the minimum surface area, A_M, required for the Bioretention Facility. This does not include the curb surrounding the Bioretention Facility or side slopes.

$$A_M(ft^2) = \frac{V_{BMP}(ft^3)}{d_E\ (ft)}$$

8) Enter the proposed surface area. This area shall not be less than the minimum required surface area.

9) Verify that side slopes are no steeper than 4:1 in the standard design, and are not required in the modified design.

10) Provide the diameter, minimum 6 inches, of the perforated underdrain used in the Bioretention Facility. See Appendix B for specific information regarding perforated pipes.

11) Provide the slope of the site around the Bioretention Facility, if used. The maximum slope is 3 percent for a standard design.

12) Provide the check dam spacing, if the site around the Bioretention Facility is sloped.

13) Describe the vegetation used within the Bioretention Facility.

References Used to Develop this Fact Sheet

Anderson, Dale V. "Landscaped Filter Basin Soil Requirements." Riverside, May 2010.

California Department of Transportation. CalTrans Standard Plans. 15 September 2005. May 2010 <http://www.dot.ca.gov/hq/esc/oe/project_plans/HTM/stdplns-met-new99.htm>.

Camp Dresser and McKee Inc.; Larry Walker Associates. California Stormwater Best Management Practice Handbook for New Development and Redevelopment. California Stormwater Quality Association (CASQA), 2004.

Contra Costa Clean Water Program. Stormwater Quality Requirements for Development Applications. 3rd Edition. Contra Costa, 2006.

County of Los Angeles Public Works. Stormwater Best Management Practice Design and Maintenance Manual. Los Angeles, 2009.

Kim, Hunho, Eric A. Seagren and Allen P. Davis. "Engineered Bioretention for Removal of Nitrate from Stormwater Runoff." Water Environment Research 75.4 (2003): 355-366.

LA Team Effort. LA Team Effort: FREE Planter Boxes for Businesses. 2 November 2009. May 2010 <http://lateameffort.blogspot.com/2009/11/free-planter-boxes-for-businesses-est.html>.

Montgomery County Maryland Department of Permitting Services Water Resources Section. Biofiltration (BF). Montgomery County, 2005.

Program, Ventura Countywide Stormwater Quality Management. Technical Guidance Manual for Stormwater Quality Control Measures. Ventura, 2002.

United States Environmental Protection Agency. Storm Water Technology Fact Sheet Bioretention. Washington D.C, 1999.

Urban Drainage and Flood Control District. Urban Storm Drainage Criteria Manual Volume 3 - Best Management Practices. Vol. 3. Denver, 2008. 3 vols.

Urbonas, Ben R. Stormwater Sand Filter Sizing and Design: A Unit Operations Approach. Denver: Urban Drainage and Flood Control District, 2002.

Bioretention

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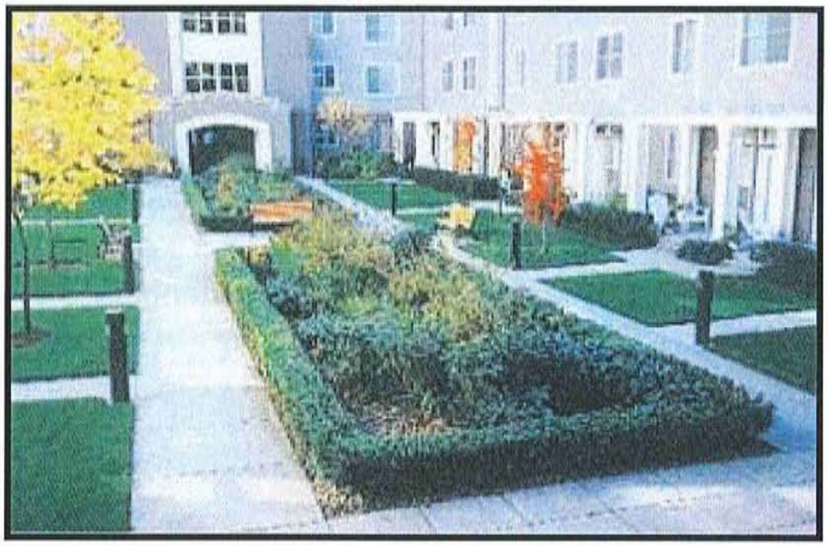

Design Considerations

- Soil for Infiltration
- Tributary Area
- Slope
- Aesthetics
- Environmental Side-effects

Description

The bioretention best management practice (BMP) functions as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. These facilities normally consist of a grass buffer strip, sand bed, ponding area, organic layer or mulch layer, planting soil, and plants. The runoff's velocity is reduced by passing over or through buffer strip and subsequently distributed evenly along a ponding area. Exfiltration of the stored water in the bioretention area planting soil into the underlying soils occurs over a period of days.

California Experience

None documented. Bioretention has been used as a stormwater BMP since 1992. In addition to Prince George's County, MD and Alexandria, VA, bioretention has been used successfully at urban and suburban areas in Montgomery County, MD; Baltimore County, MD; Chesterfield County, VA; Prince William County, VA; Smith Mountain Lake State Park, VA; and Cary, NC.

Advantages

- Bioretention provides stormwater treatment that enhances the quality of downstream water bodies by temporarily storing runoff in the BMP and releasing it over a period of four days to the receiving water (EPA, 1999).

- The vegetation provides shade and wind breaks, absorbs noise, and improves an area's landscape.

Limitations

- The bioretention BMP is not recommended for areas with slopes greater than 20% or where mature tree removal would

Targeted Constituents

☑	Sediment	■
☑	Nutrients	▲
☑	Trash	■
☑	Metals	■
☑	Bacteria	■
☑	Oil and Grease	■
☑	Organics	■

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

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be required since clogging may result, particularly if the BMP receives runoff with high sediment loads (EPA, 1999).

- Bioretention is not a suitable BMP at locations where the water table is within 6 feet of the ground surface and where the surrounding soil stratum is unstable.
- By design, bioretention BMPs have the potential to create very attractive habitats for mosquitoes and other vectors because of highly organic, often heavily vegetated areas mixed with shallow water.
- In cold climates the soil may freeze, preventing runoff from infiltrating into the planting soil.

Design and Sizing Guidelines

- The bioretention area should be sized to capture the design storm runoff.
- In areas where the native soil permeability is less than 0.5 in/hr an underdrain should be provided.
- Recommended minimum dimensions are 15 feet by 40 feet, although the preferred width is 25 feet. Excavated depth should be 4 feet.
- Area should drain completely within 72 hours.
- Approximately 1 tree or shrub per 50 ft^2 of bioretention area should be included.
- Cover area with about 3 inches of mulch.

Construction/Inspection Considerations

Bioretention area should not be established until contributing watershed is stabilized.

Performance

Bioretention removes stormwater pollutants through physical and biological processes, including adsorption, filtration, plant uptake, microbial activity, decomposition, sedimentation and volatilization (EPA, 1999). Adsorption is the process whereby particulate pollutants attach to soil (e.g., clay) or vegetation surfaces. Adequate contact time between the surface and pollutant must be provided for in the design of the system for this removal process to occur. Thus, the infiltration rate of the soils must not exceed those specified in the design criteria or pollutant removal may decrease. Pollutants removed by adsorption include metals, phosphorus, and hydrocarbons. Filtration occurs as runoff passes through the bioretention area media, such as the sand bed, ground cover, and planting soil.

Common particulates removed from stormwater include particulate organic matter, phosphorus, and suspended solids. Biological processes that occur in wetlands result in pollutant uptake by plants and microorganisms in the soil. Plant growth is sustained by the uptake of nutrients from the soils, with woody plants locking up these nutrients through the seasons. Microbial activity within the soil also contributes to the removal of nitrogen and organic matter. Nitrogen is removed by nitrifying and denitrifying bacteria, while aerobic bacteria are responsible for the decomposition of the organic matter. Microbial processes require oxygen and can result in depleted oxygen levels if the bioretention area is not adequately aerated. Sedimentation occurs in the swale or ponding area as the velocity slows and solids fall out of suspension.

The removal effectiveness of bioretention has been studied during field and laboratory studies conducted by the University of Maryland (Davis et al, 1998). During these experiments, synthetic stormwater runoff was pumped through several laboratory and field bioretention areas to simulate typical storm events in Prince George's County, MD. Removal rates for heavy metals and nutrients are shown in Table 1.

Table 1 Laboratory and Estimated Bioretention Davis et al. (1998); PGDER (1993)

Pollutant	Removal Rate
Total Phosphorus	70-83%
Metals (Cu, Zn, Pb)	93-98%
TKN	68-80%
Total Suspended Solids	90%
Organics	90%
Bacteria	90%

Results for both the laboratory and field experiments were similar for each of the pollutants analyzed. Doubling or halving the influent pollutant levels had little effect on the effluent pollutants concentrations (Davis et al, 1998).

The microbial activity and plant uptake occurring in the bioretention area will likely result in higher removal rates than those determined for infiltration BMPs.

Siting Criteria

Bioretention BMPs are generally used to treat stormwater from impervious surfaces at commercial, residential, and industrial areas (EPA, 1999). Implementation of bioretention for stormwater management is ideal for median strips, parking lot islands, and swales. Moreover, the runoff in these areas can be designed to either divert directly into the bioretention area or convey into the bioretention area by a curb and gutter collection system.

The best location for bioretention areas is upland from inlets that receive sheet flow from graded areas and at areas that will be excavated (EPA, 1999). In order to maximize treatment effectiveness, the site must be graded in such a way that minimizes erosive conditions as sheet flow is conveyed to the treatment area. Locations where a bioretention area can be readily incorporated into the site plan without further environmental damage are preferred. Furthermore, to effectively minimize sediment loading in the treatment area, bioretention only should be used in stabilized drainage areas.

Additional Design Guidelines

The layout of the bioretention area is determined after site constraints such as location of utilities, underlying soils, existing vegetation, and drainage are considered (EPA, 1999). Sites with loamy sand soils are especially appropriate for bioretention because the excavated soil can be backfilled and used as the planting soil, thus eliminating the cost of importing planting soil.

The use of bioretention may not be feasible given an unstable surrounding soil stratum, soils with clay content greater than 25 percent, a site with slopes greater than 20 percent, and/or a site with mature trees that would be removed during construction of the BMP.

Bioretention can be designed to be off-line or on-line of the existing drainage system (EPA, 1999). The drainage area for a bioretention area should be between 0.1 and 0.4 hectares (0.25 and 1.0 acres). Larger drainage areas may require multiple bioretention areas. Furthermore, the maximum drainage area for a bioretention area is determined by the expected rainfall intensity and runoff rate. Stabilized areas may erode when velocities are greater than 5 feet per second (1.5 meter per second). The designer should determine the potential for erosive conditions at the site.

The size of the bioretention area, which is a function of the drainage area and the runoff generated from the area is sized to capture the water quality volume.

The recommended minimum dimensions of the bioretention area are 15 feet (4.6 meters) wide by 40 feet (12.2 meters) long, where the minimum width allows enough space for a dense, randomly-distributed area of trees and shrubs to become established. Thus replicating a natural forest and creating a microclimate, thereby enabling the bioretention area to tolerate the effects of heat stress, acid rain, runoff pollutants, and insect and disease infestations which landscaped areas in urban settings typically are unable to tolerate. The preferred width is 25 feet (7.6 meters), with a length of twice the width. Essentially, any facilities wider than 20 feet (6.1 meters) should be twice as long as they are wide, which promotes the distribution of flow and decreases the chances of concentrated flow.

In order to provide adequate storage and prevent water from standing for excessive periods of time the ponding depth of the bioretention area should not exceed 6 inches (15 centimeters). Water should not be left to stand for more than 72 hours. A restriction on the type of plants that can be used may be necessary due to some plants' water intolerance. Furthermore, if water is left standing for longer than 72 hours mosquitoes and other insects may start to breed.

The appropriate planting soil should be backfilled into the excavated bioretention area. Planting soils should be sandy loam, loamy sand, or loam texture with a clay content ranging from 10 to 25 percent.

Generally the soil should have infiltration rates greater than 0.5 inches (1.25 centimeters) per hour, which is typical of sandy loams, loamy sands, or loams. The pH of the soil should range between 5.5 and 6.5, where pollutants such as organic nitrogen and phosphorus can be adsorbed by the soil and microbial activity can flourish. Additional requirements for the planting soil include a 1.5 to 3 percent organic content and a maximum 500 ppm concentration of soluble salts.

Soil tests should be performed for every 500 cubic yards (382 cubic meters) of planting soil, with the exception of pH and organic content tests, which are required only once per bioretention area (EPA, 1999). Planting soil should be 4 inches (10.1 centimeters) deeper than the bottom of the largest root ball and 4 feet (1.2 meters) altogether. This depth will provide adequate soil for the plants' root systems to become established, prevent plant damage due to severe wind, and provide adequate moisture capacity. Most sites will require excavation in order to obtain the recommended depth.

Planting soil depths of greater than 4 feet (1.2 meters) may require additional construction practices such as shoring measures (EPA, 1999). Planting soil should be placed in 18 inches or greater lifts and lightly compacted until the desired depth is reached. Since high canopy trees may be destroyed during maintenance the bioretention area should be vegetated to resemble a terrestrial forest community ecosystem that is dominated by understory trees. Three species each of both trees and shrubs are recommended to be planted at a rate of 2500 trees and shrubs per hectare (1000 per acre). For instance, a 15 foot (4.6 meter) by 40 foot (12.2 meter) bioretention area (600 square feet or 55.75 square meters) would require 14 trees and shrubs. The shrub-to-tree ratio should be 2:1 to 3:1.

Trees and shrubs should be planted when conditions are favorable. Vegetation should be watered at the end of each day for fourteen days following its planting. Plant species tolerant of pollutant loads and varying wet and dry conditions should be used in the bioretention area.

The designer should assess aesthetics, site layout, and maintenance requirements when selecting plant species. Adjacent non-native invasive species should be identified and the designer should take measures, such as providing a soil breach to eliminate the threat of these species invading the bioretention area. Regional landscaping manuals should be consulted to ensure that the planting of the bioretention area meets the landscaping requirements established by the local authorities. The designers should evaluate the best placement of vegetation within the bioretention area. Plants should be placed at irregular intervals to replicate a natural forest. Trees should be placed on the perimeter of the area to provide shade and shelter from the wind. Trees and shrubs can be sheltered from damaging flows if they are placed away from the path of the incoming runoff. In cold climates, species that are more tolerant to cold winds, such as evergreens, should be placed in windier areas of the site.

Following placement of the trees and shrubs, the ground cover and/or mulch should be established. Ground cover such as grasses or legumes can be planted at the beginning of the growing season. Mulch should be placed immediately after trees and shrubs are planted. Two to 3 inches (5 to 7.6 cm) of commercially-available fine shredded hardwood mulch or shredded hardwood chips should be applied to the bioretention area to protect from erosion.

Maintenance

The primary maintenance requirement for bioretention areas is that of inspection and repair or replacement of the treatment area's components. Generally, this involves nothing more than the routine periodic maintenance that is required of any landscaped area. Plants that are appropriate for the site, climatic, and watering conditions should be selected for use in the bioretention cell. Appropriately selected plants will aide in reducing fertilizer, pesticide, water, and overall maintenance requirements. Bioretention system components should blend over time through plant and root growth, organic decomposition, and the development of a natural soil horizon. These biologic and physical processes over time will lengthen the facility's life span and reduce the need for extensive maintenance.

Routine maintenance should include a biannual health evaluation of the trees and shrubs and subsequent removal of any dead or diseased vegetation (EPA, 1999). Diseased vegetation should be treated as needed using preventative and low-toxic measures to the extent possible. BMPs have the potential to create very attractive habitats for mosquitoes and other vectors because of highly organic, often heavily vegetated areas mixed with shallow water. Routine inspections for areas of standing water within the BMP and corrective measures to restore proper infiltration rates are necessary to prevent creating mosquito and other vector habitat. In addition, bioretention BMPs are susceptible to invasion by aggressive plant species such as cattails, which increase the chances of water standing and subsequent vector production if not routinely maintained.

In order to maintain the treatment area's appearance it may be necessary to prune and weed. Furthermore, mulch replacement is suggested when erosion is evident or when the site begins to look unattractive. Specifically, the entire area may require mulch replacement every two to three years, although spot mulching may be sufficient when there are random void areas. Mulch replacement should be done prior to the start of the wet season.

New Jersey's Department of Environmental Protection states in their bioretention systems standards that accumulated sediment and debris removal (especially at the inflow point) will normally be the primary maintenance function. Other potential tasks include replacement of dead vegetation, soil pH regulation, erosion repair at inflow points, mulch replenishment, unclogging the underdrain, and repairing overflow structures. There is also the possibility that the cation exchange capacity of the soils in the cell will be significantly reduced over time. Depending on pollutant loads, soils may need to be replaced within 5-10 years of construction (LID, 2000).

Cost

Construction Cost

Construction cost estimates for a bioretention area are slightly greater than those for the required landscaping for a new development (EPA, 1999). A general rule of thumb (Coffman, 1999) is that residential bioretention areas average about $3 to $4 per square foot, depending on soil conditions and the density and types of plants used. Commercial, industrial and institutional site costs can range between $10 to $40 per square foot, based on the need for control structures, curbing, storm drains and underdrains.

Retrofitting a site typically costs more, averaging $6,500 per bioretention area. The higher costs are attributed to the demolition of existing concrete, asphalt, and existing structures and the replacement of fill material with planting soil. The costs of retrofitting a commercial site in Maryland, Kettering Development, with 15 bioretention areas were estimated at $111,600.

In any bioretention area design, the cost of plants varies substantially and can account for a significant portion of the expenditures. While these cost estimates are slightly greater than those of typical landscaping treatment (due to the increased number of plantings, additional soil excavation, backfill material, use of underdrains etc.), those landscaping expenses that would be required regardless of the bioretention installation should be subtracted when determining the net cost.

Perhaps of most importance, however, the cost savings compared to the use of traditional structural stormwater conveyance systems makes bioretention areas quite attractive financially. For example, the use of bioretention can decrease the cost required for constructing stormwater conveyance systems at a site. A medical office building in Maryland was able to reduce the amount of storm drain pipe that was needed from 800 to 230 feet - a cost savings of $24,000 (PGDER, 1993). And a new residential development spent a total of approximately $100,000 using bioretention cells on each lot instead of nearly $400,000 for the traditional stormwater ponds that were originally planned (Rappahanock,). Also, in residential areas, stormwater management controls become a part of each property owner's landscape, reducing the public burden to maintain large centralized facilities.

Maintenance Cost

The operation and maintenance costs for a bioretention facility will be comparable to those of typical landscaping required for a site. Costs beyond the normal landscaping fees will include the cost for testing the soils and may include costs for a sand bed and planting soil.

References and Sources of Additional Information

Coffman, L.S., R. Goo and R. Frederick, 1999: Low impact development: an innovative alternative approach to stormwater management. Proceedings of the 26th Annual Water Resources Planning and Management Conference ASCE, June 6-9, Tempe, Arizona.

Davis, A.P., Shokouhian, M., Sharma, H. and Minami, C., "Laboratory Study of Biological Retention (Bioretention) for Urban Stormwater Management," *Water Environ. Res.*, 73(1), 5-14 (2001).

Davis, A.P., Shokouhian, M., Sharma, H., Minami, C., and Winogradoff, D. "Water Quality Improvement through Bioretention: Lead, Copper, and Zinc," *Water Environ. Res.*, accepted for publication, August 2002.

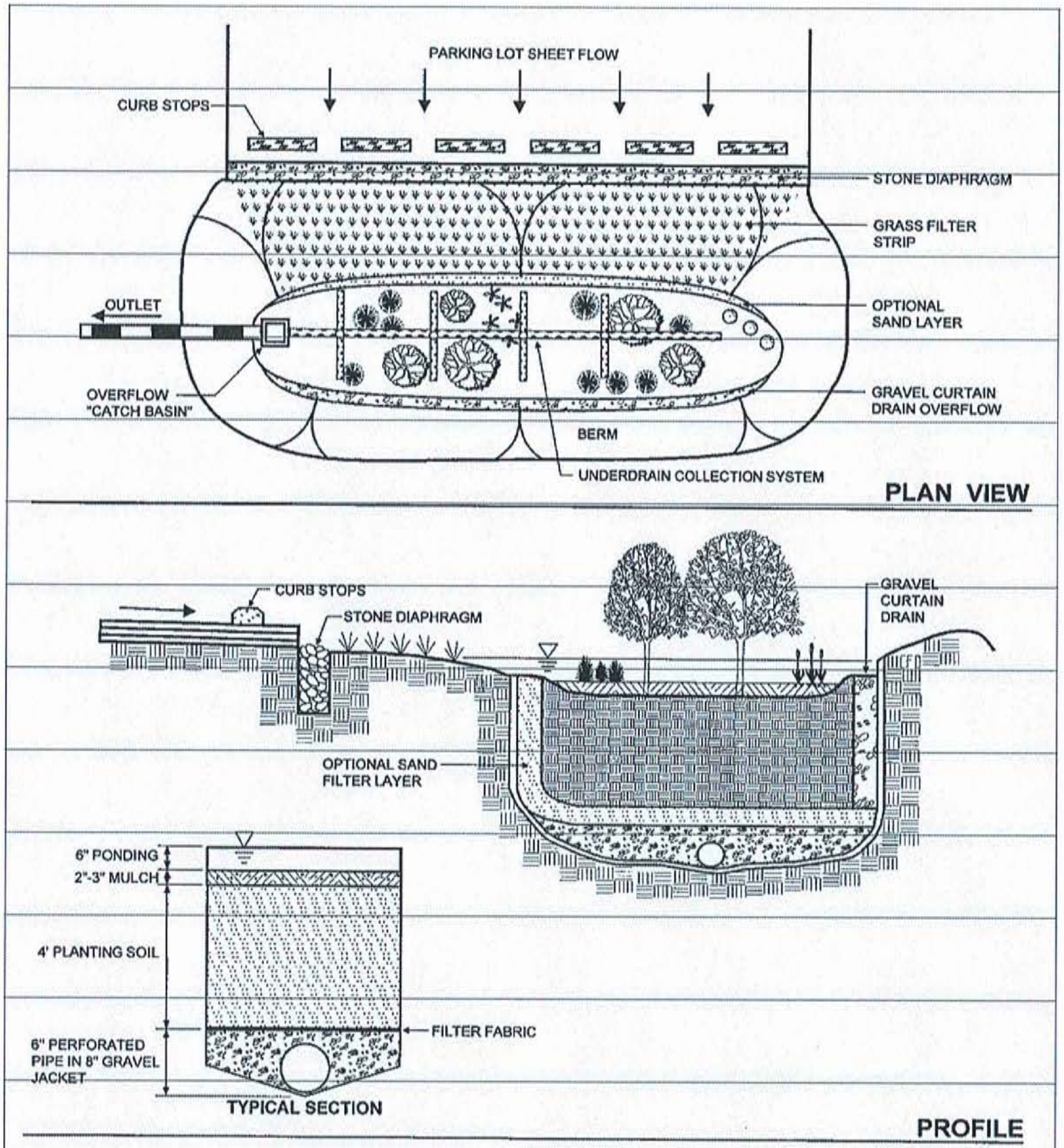
Kim, H., Seagren, E.A., and Davis, A.P., "Engineered Bioretention for Removal of Nitrate from Stormwater Runoff," *WEFTEC 2000 Conference Proceedings on CDROM Research Symposium, Nitrogen Removal*, Session 19, Anaheim CA, October 2000.

Hsieh, C.-h. and Davis, A.P. "Engineering Bioretention for Treatment of Urban Stormwater Runoff," *Watersheds 2002, Proceedings on CDROM Research Symposium*, Session 15, Ft. Lauderdale, FL, Feb. 2002.

Prince George's County Department of Environmental Resources (PGDER), 1993. Design Manual for Use of *Bioretention in Stormwater Management*. Division of Environmental Management, Watershed Protection Branch. Landover, MD.

U.S. EPA Office of Water, 1999. Stormwater Technology Fact Sheet: Bioretention. EPA 832-F-99-012.

Weinstein, N. Davis, A.P. and Veeramachaneni, R. "Low Impact Development (LID) Stormwater Management Approach for the Control of Diffuse Pollution from Urban Roadways," *5th International Conference Diffuse/Nonpoint Pollution and Watershed Management Proceedings*, C.S. Melching and Emre Alp, Eds. 2001 International Water Association



Schematic of a Bioretention Facility (MDE, 2000)

Roof Runoff Controls SD-11

Rain Garden

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Various roof runoff controls are available to address stormwater that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches: cisterns or rain barrels; dry wells or infiltration trenches; pop-up emitters, and foundation planting. The first three approaches require the roof runoff to be contained in a gutter and downspout system. Foundation planting provides a vegetated strip under the drip line of the roof.

Approach

Design of individual lots for single-family homes as well as lots for higher density residential and commercial structures should consider site design provisions for containing and infiltrating roof runoff or directing roof runoff to vegetative swales or buffer areas. Retained water can be reused for watering gardens, lawns, and trees. Benefits to the environment include reduced demand for potable water used for irrigation, improved stormwater quality, increased groundwater recharge, decreased runoff volume and peak flows, and decreased flooding potential.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain

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barrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least 2 rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load. Several types of rain barrels are commercially available. Consideration must be given to selecting rain barrels that are vector proof and childproof. In addition, some barrels are designed with a bypass valve that filters out grit and other contaminants and routes overflow to a soak-away pit or rain garden.

If the cistern has an operable valve, the valve can be closed to store stormwater for irrigation or infiltration between storms. This system requires continual monitoring by the resident or grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering stormwater runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say ¼ to ½ inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent, small storms.

Dry wells and Infiltration Trenches

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance.

In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Infiltration trenches function in a similar manner and would be particularly effective for larger roof areas. An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. These are described under Treatment Controls.

Pop-up Drainage Emitter

Roof downspouts can be directed to an underground pipe that daylights some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

Foundation Planting

Landscape planting can be provided around the base to allow increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Supplemental Information

Examples

- City of Ottawa's Water Links Surface –Water Quality Protection Program
- City of Toronto Downspout Disconnection Program
- City of Boston, MA, Rain Barrel Demonstration Program

Other Resources

Hager, Marty Catherine, Stormwater, "Low-Impact Development", January/February 2003. www.stormh2o.com

Low Impact Urban Design Tools, Low Impact Development Design Center, Beltsville, MD. www.lid-stormwater.net

Start at the Source, Bay Area Stormwater Management Agencies Association, 1999 Edition

Efficient Irrigation SD-12

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

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SD-12 Efficient Irrigation

- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

URBAN CROSSROADS

Legacy Park (Tentative Tract Map No. 36760)

TRAFFIC IMPACT ANALYSIS

CITY OF MORENO VALLEY

REGISTERED PROFESSIONAL ENGINEER
CHARLENE HWANG SO
No. TR2414
Exp. 6/30/2017
TRAFFIC
STATE OF CALIFORNIA

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SEPTEMBER 13, 2016

09188-06 TIA Report REV

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Attachment: Traffic Study (2444 : Legacy Park Project)

APPENDICES

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LIST OF EXHIBITS

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LIST OF TABLES

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CMP	Congestion Management Program
DIF	Development Impact Fee
E+P	Existing Plus Project
FHWA	Federal Highway Administration
HCM	Highway Capacity Manual
ITE	Institute of Transportation Engineers
LOS	Level of Service
MUTCD	Manual on Uniform Traffic Control Devices
N/A	Not Applicable
NP	No Project (or Without Project)
PHF	Peak Hour Factor
Project	Indian Street Commerce Center
RCTC	Riverside County Transportation Commission
RTA	Riverside Transit Authority
RTP	Regional Transportation Plan
SCAG	Southern California Association of Governments
SCS	Sustainable Communities Strategy
TIA	Traffic Impact Analysis
TUMF	Transportation Uniform Mitigation Fee
WP	With Project
WRCOG	Western Riverside Council of Governments
V/C	Volume to Capacity

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1 INTRODUCTION

This report presents the results of the traffic impact analysis (TIA) for the proposed Legacy Park (Tentative Tract Map No. 36760) development ("Project") located on the southeast corner of Indian Street and Gentian Avenue in the City of Moreno Valley as shown on Exhibit 1-1.

The purpose of this TIA is to evaluate the potential circulation system deficiencies that may result from the development of the proposed Project, and to recommend improvements to achieve acceptable circulation system operational conditions. This traffic study has been prepared in accordance with the City of Moreno Valley Transportation Engineering Division's *Traffic Impact Analysis Preparation Guide* (August 2007) and consultation with City of Moreno Valley staff during the scoping process. (1) The approved Project Traffic Study Scoping agreement is provided in Appendix 1.1 of this TIA.

1.1 PROJECT OVERVIEW

The Project is proposed to consist of a total of 221 single family detached residential dwelling units. Per the City's traffic study guidelines, the Opening Year will have a 5-year minimum horizon from baseline conditions. As such, the Opening Year analysis will assess 2021 traffic conditions.

Vehicular access will be provided via the following driveways (see Exhibit 1-1):

- Gentian Avenue via Street J and Street L – Full access driveways. Both driveways are proposed to align with future driveways on the north side of Gentian Avenue.
- Santiago Drive West via Street N – Knuckle from Street N into the Santiago Drive West
- Santiago Drive East via Street L – Knuckle from Street L into Santiago Drive East. Project is proposing to prohibit access to the existing Emma Lane (south of Santiago Drive).

Regional access to the project site is provided via the I-215 Freeway at Cactus Avenue interchange.

Trips generated by the Project's proposed land uses have been estimated based on trip generation rates collected by the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 9th Edition, 2012. (2) The Project is estimated to generate a net total of 2,104 trip-ends per day on a typical weekday with approximately 166 net AM peak hour trips and 221 net PM peak hour trips. The assumptions and methods used to estimate the Project's trip generation characteristics are discussed in greater detail in Section 4.1 *Project Trip Generation* of this report.

EXHIBIT 1-1: TENTATIVE TRACT MAP NO. 36760

Attachment: Traffic Study (2444 : Legacy Park Project)

1.2 ANALYSIS SCENARIOS

For the purposes of this traffic study, potential impacts to traffic and circulation have been assessed for each of the following conditions:

- Existing (2016) (1 scenario)
- Existing plus Project (E+P) (1 scenario)
- Opening Year Cumulative (2021), Without and With Project (2 scenarios)
- General Plan Buildout (2040), Without and With Project (2 scenarios)

1.2.1 EXISTING (2016) CONDITIONS

Information for Existing (2016) conditions is disclosed to represent the baseline traffic conditions as they existed at the time this report was prepared.

1.2.2 EXISTING PLUS PROJECT CONDITIONS

The Existing plus Project (E+P) analysis determines circulation system deficiencies that would occur on the existing roadway system in the scenario of the Project being placed upon Existing conditions.

1.2.3 OPENING YEAR CUMULATIVE (2020) CONDITIONS

To account for growth in traffic between Existing Conditions (2016) and the Project Opening Year (2021), a compounded annual traffic growth rate of 2 percent was assumed (10.41 percent aggregate growth in background traffic for the period 2016—2021). The 2 percent annual growth rate is intended to capture non-specific ambient traffic growth.

In context, the TIA's assumed 2 percent compounded annual growth rate is considered a reasonable approximation of future traffic growth when compared to demographic projections reflected in other local and regional growth modeling efforts. More specifically, the Southern California Association of Governments (SCAG) 2016—2040 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) growth forecasts for the City of Moreno Valley assume the City population to increase from 197,600 in 2012 to 256,600 by the year 2040, or an approximate 0.94 percent growth rate compounded annually. The RTP/SCS assumed growth in households over the same 28-year period reflects an increase from 51,800 households to 73,000 households; a rate of 1.23 percent compounded annually. At the upper end of assumed RTP/SCS growth rates, employment over the same 28-year period is projected to increase from 31,400 jobs to 83,200 jobs; a rate of approximately 3.54 percent compounded annually. (3) The 2 percent compounded annual traffic growth rate employed in the TIA reflects the fact that not all persons comprising population growth, household growth, or employment growth would translate on a one to one basis as a new vehicle trip in the region; and establishes a judicious midrange estimate lying between the RTP/SCS assumed regional population growth rate (0.94 percent) and the RTP/SCS assumed regional employment growth rate (3.54 percent).

Conservatively, the TIA estimates of area traffic growth then add traffic generated by other known or probable related projects. These related projects are at least in part already accounted for in the assumed annual 2 percent ambient growth in traffic noted above; and in some instances these related projects would likely not be implemented and operational within the 2021 Opening Year time frame assumed for the Project. The resultant assumed traffic growth rate employed in the TIA (2 percent annual ambient growth + traffic generated by related projects) would therefore tend to overstate rather than understate background cumulative traffic impacts under 2021 conditions

The Opening Year Cumulative (2021) Without and With Project traffic conditions analyses will be utilized to determine if improvements funded through regional transportation mitigation fee programs, such as the Transportation Uniform Mitigation Fee (TUMF) and Development Impact Fee (DIF) programs, or other approved funding mechanism can accommodate the near-term cumulative traffic at the target level of service (LOS) identified in the City of Moreno Valley General Plan. (4) If the "funded" improvements can provide the target LOS, then the Project's payment into TUMF and/or DIF will be considered as near-term cumulative mitigation through the conditions of approval. Other improvements needed beyond the "funded" improvements (such as localized improvements to non-TUMF facilities) are identified as such.

1.2.4 General Plan Buildout (2040) Conditions

At the City's direction, the evaluation of General Plan Buildout (2040) traffic conditions was contemplated for the purposes of this TIA. The development of the proposed Project (R5 land use designation) is anticipated to generate 1,799 fewer trip-ends per day with 135 fewer AM peak hour trips and 156 fewer PM peak hour trips, as compared to the currently adopted General Plan land uses (R5 and R30 land use designation). As such, evaluation of long-range traffic conditions was determined to be unnecessary as the proposed General Plan Amendment is anticipated to reduce the trips generated by the site. E+P and Opening Year Cumulative traffic conditions have been evaluated as part of this TIA in an effort to identify the near-term Project impacts, however, long-range traffic impacts are anticipated to be consistent with or less than those identified by the City's currently adopted General Plan.

1.3 Study Area

To ensure that this TIA satisfies the City of Moreno Valley's traffic study requirements, Urban Crossroads, Inc. prepared a project traffic study scoping package for review by City of Moreno Valley staff prior to the preparation of this report. The scoping agreement provides an outline of the Project study area, trip generation, trip distribution, and analysis methodology and is included in Appendix 1.1.

1.3.1 Intersections

The 13 study area intersections shown on Exhibit 1-2 and listed at Table 1-1 were selected for this TIA based on the City of Moreno Valley's Traffic Study Guidelines and in consultation with City of Moreno Valley staff. Pursuant to the Traffic Study Guidelines, the City requires analysis of intersections where the Project would contribute 50 or more peak hour trips.[1]

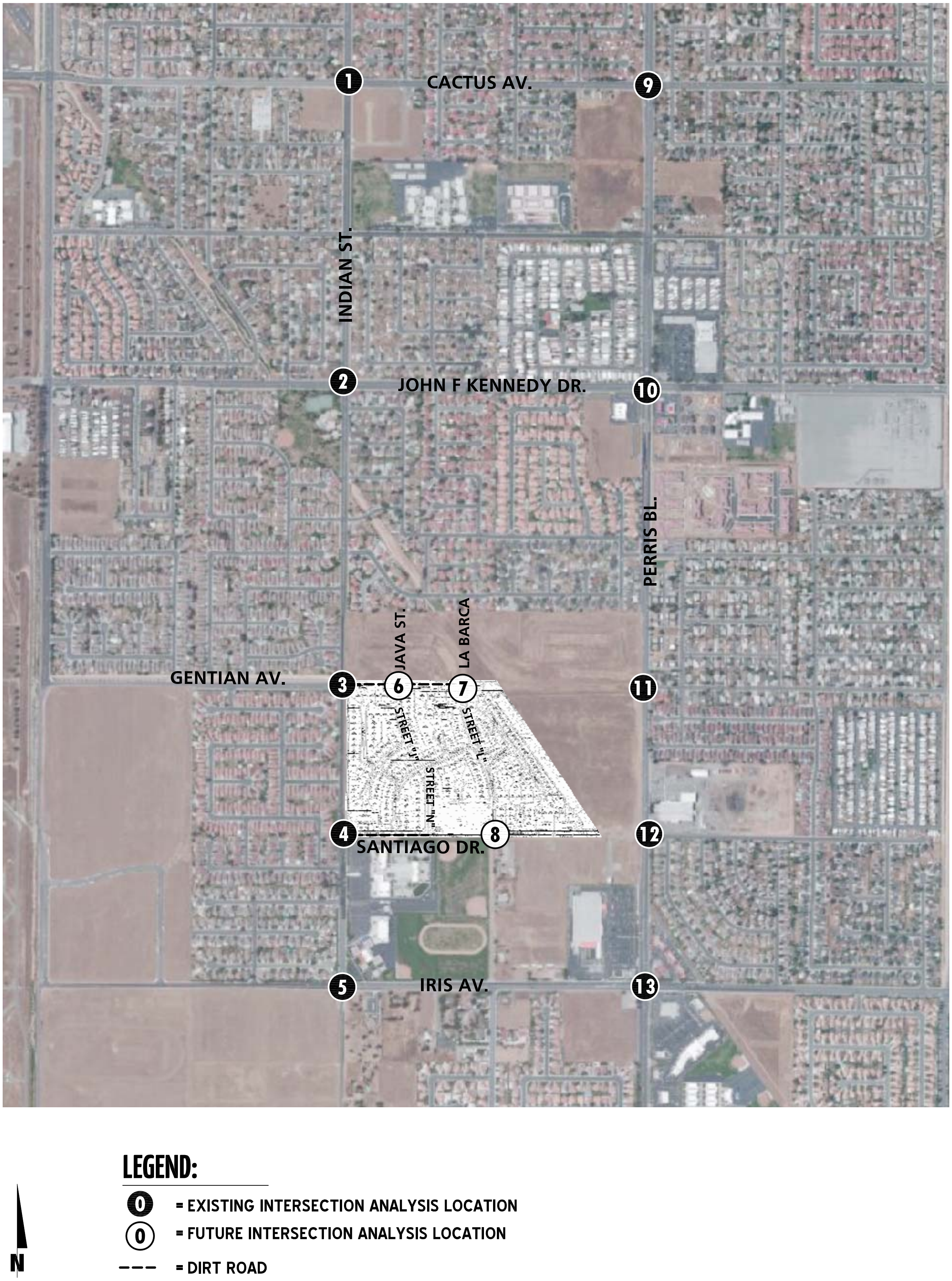
TABLE 1-1: INTERSECTION ANALYSIS LOCATIONS

ID	Intersection Location	Jurisdiction	CMP?
1	Indian St. / Cactus Av.	Moreno Valley	No
2	Indian St. / John F. Kennedy Dr.	Moreno Valley	No
3	Indian St. / Gentian Av.	Moreno Valley	No
4	Indian St. / Santiago Dr.	Moreno Valley	No
5	Indian St. / Iris Av.	Moreno Valley	No
6	Street J/Java Street / Gentian Av.	Moreno Valley	No
7	Street L/La Barca / Gentian Av.	Moreno Valley	No
8	Street L / Santiago Dr.	Moreno Valley	No
9	Perris Bl. / Cactus Av.	Moreno Valley	No
10	Perris Bl. / John F. Kennedy Dr.	Moreno Valley	No
11	Perris Bl. / Gentian Av.	Moreno Valley	No
12	Perris Bl. / Santiago Dr.	Moreno Valley	No
13	Perris Bl. / Iris Av.	Moreno Valley	No

The intent of a Congestion Management Program (CMP) is to more directly link land use, transportation, and air quality, thereby prompting reasonable growth management programs that will effectively utilize new transportation funds, alleviate traffic congestion and related impacts, and improve air quality. Counties within California have developed CMPs with varying methods and strategies to meet the intent of the CMP legislation. The County of Riverside CMP became effective with the passage of Proposition 111 in 1990 and updated most recently in 2011. The Riverside County Transportation Commission (RCTC) adopted the 2011 CMP for the County of Riverside in December 2011. (5) There are no study area intersections identified as CMP facilities.

[1] The "50 or more peak hour trips" intersection analytic protocol stipulated in the City Traffic Study Guidelines is consistent with standard industry practice. It is noted further that the 50 peak hour trip threshold is employed by other agencies throughout southern California including Caltrans, County of Riverside, County of San Bernardino, and the County of Orange.

EXHIBIT 1-2: LOCATION MAP



1.3.2 Roadway Segments

The roadway segment study area utilized for this analysis is based on a review of the key roadway segments in which the Project is anticipated to contribute 50 or more peak hour trips. The study area identifies a total of 10 existing/future roadway segments. The roadway segments include the segments on either side of the study area intersections and are listed in Table 1-2 and are identified on Exhibit 1-2.

TABLE 1-2: ROADWAY SEGMENT ANALYSIS LOCATIONS

ID	Street	Segment	Jurisdiction
1	Indian Street	Cactus Av. to John F. Kennedy Dr.	Moreno Valley
2		John F. Kennedy Dr. to Gentian Av.	Moreno Valley
3		Santiago Dr. to Iris Av.	Moreno Valley
4	Gentian Avenue	Indian St. to Street J/Java St.	Moreno Valley
5		Street J/Java St. to Street L/La Barca	Moreno Valley
6		West of Perris Bl.	Moreno Valley
7	Santiago Drive	East of Indian St.	Moreno Valley
8		West of Perris Bl.	Moreno Valley
9	Perris Boulevard	Cactus Av. to John F. Kennedy Dr.	Moreno Valley
10		John F. Kennedy Dr. to Gentian Av.	Moreno Valley

1.4 Summary of Intersection Analysis

1.4.1 Intersections

A summary of the operationally deficient study area intersections and recommended improvements required to achieve acceptable circulation system operational conditions are described in detail within Section 3.0 *Existing Conditions*, Section 5.0 *E+P Traffic Conditions*, and Section 6.0 *Opening Year Cumulative (2021) Traffic Conditions* of this report. The peak hour intersection LOS are summarized on Table 1-3 for each of the analysis scenarios.

1.4.2 Roadway Segments

A summary of the operationally deficient study area roadway segments and recommended improvements required to achieve acceptable circulation system operational conditions are described in detail within Section 3.0 *Existing Conditions*, Section 5.0 *E+P Traffic Conditions*, and Section 6.0 *Opening Year Cumulative (2021) Traffic Conditions* of this report. The roadway segment LOS are summarized on Table 1-4 for each of the analysis scenarios.

1.5 Local and Regional Funding Mechanisms

Transportation improvements throughout the City of Moreno Valley are funded through a combination of project mitigation, fair share contributions or development impact fee programs, such as Transportation Uniform Mitigation Fee (TUMF) program or the City's Development Impact Fee (DIF) program.

Table 1-3

Summary of Intersection Operations by Analysis Scenario

#	Intersection	Traffic Control [1]	Existing (2016)				E+P				2021 NP				2021 WP			
			Delay		LOS[2]		Delay		LOS[2]		Delay		LOS[2]		Delay		LOS[2]	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	Indian St / Cactus Av	TS	28.4	27.2	C	C	29.5	28.7	C	C	31.7	32.8	C	C	**37.6**	**37.3**	**D**	**D**
2	Indian St / John F. Kennedy Dr	TS	26.5	24.6	C	C	26.5	24.9	C	C	26.7	25.2	C	C	26.7	25.2	C	C
3	Indian St / Gentian Av	CSS	20.0	15.1	C	C	28.6	21.0	D	C	30.7	20.2	D	C	**36.5**	23.1	**E**	C
4	Indian St / Santiago Dr	TS	14.7	2.6	B	A	15.8	4.7	B	A	15.5	2.8	B	A	16.6	4.8	B	A
5	Indian St / Iris Av	TS	44.8	30.6	D	C	49.9	31.6	D	C	47.4	31.7	D	C	48.8	34.6	D	C
6	Street J / Gentian Av	<u>**CSS**</u>	Does Not Exist				8.8	8.9	A	A	8.6	8.7	A	A	8.8	9.1	A	A
7	Street L / Gentian Av	<u>**CSS**</u>	Does Not Exist				8.6	8.6	A	A	8.7	8.7	A	A	9.0	9.3	A	A
8	Street L / Santiago Dr	<u>**CSS**</u>	Does Not Exist				0.0	0.0	A	A	Does Not Exist				0.0	0.0	A	A
9	Perris Bl / Cactus Av	TS	25.2	33.6	C	C	32.2	35.9	C	D	33.8	42.7	C	D	35.9	45.8	D	D
10	Perris Bl / John F. Kennedy Dr	TS	40.9	44.7	D	D	41.4	45.9	D	D	43.9	50.1	D	D	44.0	54.5	D	D
11	Perris Bl / Gentian Av	TS	5.9	4.9	A	A	5.9	4.9	A	A	6.0	5.1	A	A	6.0	5.1	A	A
12	Perris Bl / Santiago Dr	CSS	**47.4**	**43.7**	**E**	**E**	**48.9**	**57.1**	**E**	**F**	**>100.0**	**>100.0**	**F**	**F**	**>100.0**	**>100.0**	**F**	**F**
13	Perris Bl / Iris Av	TS	44.5	36.2	D	D	45.0	36.3	D	D	46.5	48.6	D	D	48.4	49.9	D	D

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

-- = Not Applicable/Future Intersection

[1] CSS = Cross-street Stop; TS = Traffic Signal; <u>**CSS**</u> = Improvement

[2] LOS = Level of Service

Table 1-4

Summary of Roadway Segment Level of Service

#	Roadway	Segment Limits	Roadway Section	Existing V/C[1]	Existing LOS[2]	E+P V/C[1]	E+P LOS[2]	2021 NP V/C[1]	2021 NP LOS[2]	2021 WP V/C[1]	2021 WP LOS[2]	Acceptable LOS[2]
1	Indian Street	Cactus Avenue to John F. Kennedy Dr.	4D	0.23	A	0.25	A	0.26	A	0.27	A	C
2		John F. Kennedy Dr. to Gentian Av.	4D	0.25	A	0.27	A	0.28	A	0.29	A	C
3		Santiago Dr. to Iris Av.	2U	0.73	C	0.77	C	0.82	D	0.86	D	D
4	Gentian Avenue	Indian St. to Street J/Java St.	**2U**	N/A	N/A	0.07	A	N/A	N/A	0.03	A	C
5		Street J/Java St. to Street L/La Barca	**2U**	N/A	N/A	0.03	A	N/A	N/A	0.03	A	C
6		West of Perris Bl.	**2U**	N/A	N/A	N/A	N/A	N/A	N/A	0.05	A	C
7	Santiago Drive	East of Indian St.	2U	0.07	A	0.12	A	0.07	A	0.11	A	C
8		West of Perris Bl.	2U	0.00	A	0.05	A	0.52	A	0.56	A	C
9	Perris Boulevard	Cactus Avenue and John F. Kennedy Dr.	6D	0.46	A	0.47	A	0.65	B	0.66	B	D
10		John F. Kennedy Dr. to Gentian Av.	6D	0.53	A	0.54	A	0.77	C	0.79	C	D

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] V/C = Volume to Capacity Ratio

[2] LOS = Level of Service

1.5.1 TRANSPORTATION UNIFORM MITIGATION FEE (TUMF) PROGRAM

The Western Riverside Council of Governments (WRCOG) is responsible for establishing and updating TUMF rates. The County may grant to developers a credit against the specific components of fees for the dedication of land or the construction of facilities identified in the list of improvements funded by each of these fee programs. Fees are based upon projected land uses and a related transportation need to address growth based upon a 2009 Nexus study.

TUMF is an ambitious regional program created to address cumulative impacts of growth throughout western Riverside County. Program guidelines are being handled on an iterative basis. Exemptions, credits, reimbursements and local administration are being deferred to primary agencies. The County of Riverside serves this function for the proposed Project. Fees submitted to the County are passed on to the WRCOG as the ultimate program administrator.

TUMF guidelines empower a local zone committee to prioritize and arbitrate certain projects. The Project is located in the Central Zone. The zone has developed a 5-year capital improvement program to prioritize public construction of certain roads. TUMF is focused on improvements necessitated by regional growth. The Perris Boulevard is a designated TUMF roadway/facility within the Project's traffic study area.

1.5.2 CITY OF MORENO VALLEY DEVELOPMENT IMPACT FEE (DIF) PROGRAM

The City of Moreno Valley has created its own local Development Impact Fee (DIF) program to impose and collect fees from new residential, commercial and industrial development for the purpose of funding roadways and intersections necessary to accommodate City growth as identified in the City's General Plan Circulation Element. The City's DIF program includes facilities that are not part of, or which may exceed improvements identified and covered by the TUMF program. As a result, the pairing of the regional and local fee programs provides a more comprehensive funding and implementation plan to ensure an adequate and interconnected transportation system. Under the City's DIF program, the City may grant to developers a credit against specific components of fees when those developers construct certain facilities and landscaped medians identified in the list of improvements funded by the DIF program.

The timing to use the DIF fees is established through periodic capital improvement programs which are overseen by the City's Public Works Department. Periodic traffic counts, review of traffic accidents, and a review of traffic trends throughout the City are also periodically performed by City staff and consultants. The City uses this data to determine the timing of implementing the improvements listed in its facilities list.

The Project Applicant would pay requisite DIF pursuant to incumbent City ordinance requirements. Payment of requisite DIF would satisfy the Applicant's mitigation responsibilities for potentially significant impacts affecting DIF-funded facilities.

1.5.3 FAIR SHARE FEES

The Project Applicant's mitigation responsibilities may also be may be fulfilled through payment of fair-share fees. Fair share fees would be paid in instances where required traffic facilities are not otherwise funded by TUMF and/or DIF programs noted above.

1.6 PROJECT IMPACTS AND MITIGATION MEASURES

Based on the assessment of E+P traffic conditions, the intersection of Perris Boulevard and Santiago Drive is anticipated to be cumulatively impacted by the Project. Section 5 *E+P Traffic Analysis* includes the detailed analysis results.

1.7 CUMULATIVE IMPACTS AND MITIGATION MEASURES

This section provides a summary of recommended improvements and associated fee assessments necessary to address the Project's contributions to study area cumulative traffic impacts.

Table 1-5 lists the recommended improvements necessary to reduce the identified intersection LOS deficiencies, by analysis scenario. Street and intersection improvements that may be funded though the TUMF and/or DIF programs are noted. If a particular facility tentatively listed in Table 1-5 is ultimately excluded from the TUMF and/or DIF programs, the Project would be responsible for, and would be required to pay, fair share fees for improvement of affected facilities. These fees are collected as part of a funding mechanism aimed at ensuring that regional highways and arterial expansions keep pace with the projected vehicle trip increases. Alternatively, minor fair share responsibilities may be waived when collection is infeasible or where other mitigation assignments substantially exceed the Project's demonstrated impacts.

Improvements included in a defined program and constructed by development may be eligible for a fee credit or reimbursement through the program where appropriate. Tables 1-5 also summarizes the applicable fair share percentage associated with each of the recommended improvements. Detailed fair share calculations, for each peak hour, has been provided on Table 1-6 for the applicable deficient intersections shown previously on Table 1-5.

Mitigation Measure 1.1 – Prior to the issuance of building permits, the Project applicant shall participate in the City's DIF and County TUMF fee programs by paying the requisite fees at the time of building permit, and in addition pay the Project's fair share amount of $35,361 for the improvements identified in Table 1-5 that are consistent with the improvements shown on Table 6-3, or as otherwise agreed to by the City and Project Applicant. Project fair share payment shall only be collected if the City creates a fee program that includes the improvements the fair share contribution is intended to construct.

Table 1-5

Summary of Improvements by Analysis Scenario

#	Intersection Location	Jurisdiction	Recommended Improvements[1]				Improvements in DIF, TUMF, etc.[1]	Total Cost[2]	Fair Share %[3]	Fair Share Cost[3]
			Existing (2016)	E+P	2021 Without Project	2021 With Project				
1	Indian St / Cactus Av	Moreno Valley	None	None	None	EB right turn lane	No	$90,390	13.9%	$12,586
							TOTAL	**$90,390**		**$0**
3	Indian St / Gentian Av	Moreno Valley	None	None	None	NB left turn lane	No	$90,390	34.2%	$30,911
						2nd NB through lane[4]	No	$0		$0
						SB left turn lane[4]	No	$0		$0
						2nd SB through lane[4]	No	$0		$0
						WB shared left-through-right turn lane[4]	No	$0		$0
							TOTAL	**$90,390**		**$30,911**
12	Perris Bl / Santiago Dr	Moreno Valley	Traffic Signal	Same	Same	Same	Yes[5]	$0	4.9%	$0
					EB left turn lane	Same	No	$90,390		$4,450
							TOTAL	**$90,390**		**$4,450**
	Total Project Fair Share Contribution to the City of Moreno Valley (non-DIF/TUMF)[6]							**$271,170**		**$35,361**

[1] Improvements included in TUMF Nexus or City of Moreno Valley DIF programs.

[2] Costs have been estimated using the data provided in Appendix G of the San Bernardino County CMP (2003 Update) for preliminary construction costs. Appendix G costs escalated by a factor of 1.8078 to reflect 2021 conditions, except for T

[3] Program improvements constructed by project may be eligible for fee credit. In lieu fee payment is at discretion of City. Represents the fair share percentage for the Project during the most impacted peak hour.

[4] Improvements to be constructed by the Project as part of site adjacent or site access improvements.

[5] Fair share percentage is not applicable as the recommended improvements at this location are included in a pre-existing fee program.

[6] Total project fair share contribution consists of the improvements which are not already included in the City-wide DIF/County TUMF for those intersections wholly or partially within the City of Moreno Valley.

Table 1-6

Project Fair Share Calculations

#	Intersection		Existing	Project	2021 With Project	Total New Traffic	Project Fair Share[1]
1	Indian St / Cactus Av						
		AM:	2,669	49	3,077	408	12.0%
		PM:	2,430	66	2,904	474	**13.9%**
3	Indian St / Gentian Av						
		AM:	779	48	939	160	30.0%
		PM:	821	66	1,014	193	**34.2%**
12	Perris Bl / Santiago Dr						
		AM:	1,677	32	2,327	650	**4.9%**
		PM:	1,997	44	3,236	1,239	3.6%

* Highest fair share percentage represented in **BOLD** and shown on Table 1-5.

[1] Fair share based on net new traffic which is calculated from Opening Year Cumulative (2021) with Project traffic volumes less Existing (2016) traffic volumes.

1.8 SITE ADJACENT ROADWAY AND SITE ACCESS IMPROVEMENTS

This section summarizes Project site access and on-site circulation recommendations. The Project is proposed to have access on Gentian Avenue via Street J and Street L and Santiago Drive via Street N and Street L. All driveways are assumed to allow full-access, with the exception of the intersections on Santiago Drive, which are both knuckles. Regional access to the project site is provided via the I-215 Freeway at Cactus Avenue interchange.

Roadway improvements necessary to provide site access and on-site circulation are assumed to be constructed in conjunction with site development and are described below. These improvements are required to be in place prior to occupancy. Exhibit 1-3 illustrates the site-adjacent roadway improvement recommendations and site access improvements. Construction of on-site and site adjacent improvements are recommended to occur in conjunction with adjacent Project development activity or as needed for Project access purposes.

1.8.1 SITE ADJACENT ROADWAY IMPROVEMENTS

The recommended site-adjacent roadway improvements for the Project are described below. These improvements need to be incorporated into the project description prior to Project approval or imposed as conditions of approval as part of the Project approval. Exhibit 1-3 illustrates the site-adjacent roadway improvement recommendations.

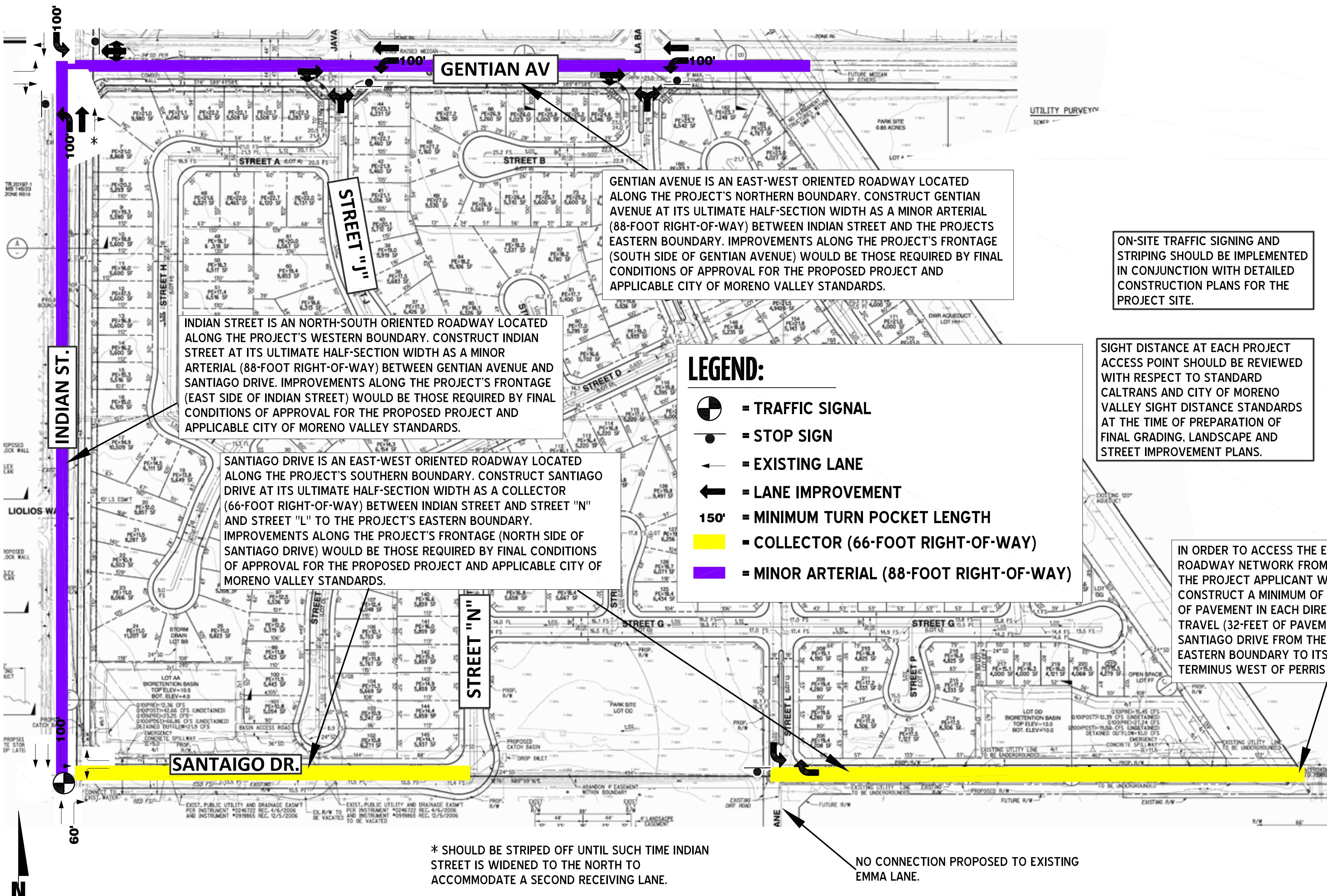
Gentian Avenue – Gentian Avenue is an east-west oriented roadway located along the Project's northern boundary. Construct Gentian Avenue at its ultimate half-section width as a minor arterial (88-foot right-of-way) between Indian Street and the Project's eastern boundary. Improvements along the Project's frontage (south side of Gentian Avenue) would be those required by final conditions of approval for the proposed Project and applicable City of Moreno Valley standards.

Indian Street – Indian Street is a north-south oriented roadway located along the Project's western boundary. Construct Indian Street at its ultimate half-section width as a minor arterial (88-foot right-of-way) between Gentian Avenue and Santiago Drive. Improvements along the Project's frontage (east side of Indian Street) would be those required by final conditions of approval for the proposed Project and applicable City of Moreno Valley standards.

Santiago Drive – Santiago Drive is an east-west oriented roadway located along the Project's southern boundary. Construct Santiago Drive at its ultimate half-section width as a collector (66-foot right-of-way) between Indian Street and Street N and Street L to the Project's eastern boundary. Improvements along the Project's frontage (north side of Santiago Drive) would be those required by final conditions of approval for the proposed Project and applicable City of Moreno Valley standards.

In order to access the existing roadway network from the site, the Project Applicant will also construct a minimum of one lane of pavement in each direction of travel (32-feet of pavement) along Santiago Drive from the Project's eastern boundary to its existing terminus west of Perris Boulevard.

Exhibit 1-3: Site Access and Site Adjacent Roadway Recommendations



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URBAN CROSSROADS

1.8.2 SITE ACCESS IMPROVEMENTS

The recommended site access driveway improvements for the Project are described below. Exhibit 1-3 illustrates the on-site and site adjacent recommended intersection lane improvements. Construction of on-site and site adjacent improvements are recommended to occur in conjunction with adjacent Project development activity or as needed for Project access purposes.

The following intersection recommendations represent the minimum lanes that must be provided to achieve acceptable peak hour operations. As there is not anticipated to be sufficient receiving lanes beyond the Project, a minimum of one lane should be provided in each direction of travel until such time that the adjacent roadways are also widened to their ultimate General Plan roadway classification. However, the site adjacent roadways will be improved consistent with Section 1.8.1 *Site Adjacent Roadway Improvements* of this report.

Indian Street & Gentian Avenue (#3) – Install a stop control on the westbound approach and construct the intersection with the following geometrics:

Northbound Approach: One left turn lane with a minimum of 100-feet of storage, one through lane, and one shared through right turn lane. The second northbound through lane should not be striped until such time Indian Street is widened to the north to accommodate a second receiving lane.

Southbound Approach: One left turn lane with a minimum of 100-feet of storage and one shared through-right turn lane.

Eastbound Approach: One left turn lane and restripe the right turn lane as a shared through-right turn lane.

Westbound Approach: One shared left-through-right turn lane.

Indian Street & Santiago Drive (#4) – Maintain the existing traffic signal control and the following existing geometrics:

Northbound Approach: One through lane and one right turn lane with 60-feet of storage.

Southbound Approach: One left turn lane with 100-feet of storage and two through lanes.

Eastbound Approach: Not Applicable (N/A)

Westbound Approach: One left turn lane and one right turn lane.

Street J & Gentian Avenue (#6) – Intersection is proposed to align with the future Java Street to the north. Install a stop control on the northbound approach and construct the intersection with the following geometrics:

Northbound Approach: One shared left-right turn lane.

Southbound Approach: N/A

Eastbound Approach: One shared through-right turn lane.

Westbound Approach: One left turn lane with a minimum of 100-feet of storage and one through lane.

Street L & Gentian Avenue (#7) – Intersection is proposed to align with the future La Barca to the north. Install a stop control on the northbound approach and construct the intersection with the following geometrics:

Northbound Approach: One shared left-right turn lane.

Southbound Approach: N/A

Eastbound Approach: One shared through-right turn lane.

Westbound Approach: One left turn lane with a minimum of 100-feet of storage and one through lane.

Street L & Santiago Drive (#8) – No connection is proposed from Street L to the existing Emma Lane. Install a stop control on the southbound approach and construct the intersection with the following geometrics:

Northbound Approach: N/A

Southbound Approach: One left turn lane.

Eastbound Approach: N/A

Westbound Approach: One right turn lane.

On-site traffic signing and striping should be implemented in conjunction with detailed construction plans for the Project site.

Sight distance at each project access point should be reviewed with respect to standard Caltrans and City of Moreno Valley sight distance standards at the time of preparation of final grading, landscape and street improvement plans.

1.9 QUEUING ANALYSIS AT THE PROJECT DRIVEWAYS

A queuing analysis was conducted along the site adjacent roadways of Gentian Avenue, Indian Street, and Santiago Drive for Opening Year Cumulative (2021) traffic conditions to determine the turn pocket lengths necessary to accommodate near term 95th percentile queues. The analysis was conducted for both the weekday AM and weekday PM peak hours.

The traffic modeling and signal timing optimization software package Synchro (Version 9) has been utilized to assess queues at the Project access points. Synchro is a macroscopic traffic software program that is based on the signalized and unsignalized intersection capacity analyses as specified in the HCM. SimTraffic is designed to model networks of signalized and unsignalized intersections, with the primary purpose of checking and fine tuning signal operations. SimTraffic uses the input parameters from Synchro to generate random simulations.

SimTraffic has been utilized to assess peak hour queuing at the site access driveways for Opening Year Cumulative With Project traffic conditions. The random simulations generated by SimTraffic have been utilized to determine the 95th percentile queue lengths observed for each turn lane. A SimTraffic simulation has been recorded 5 times, during the weekday AM and weekday PM peak hours, and has been seeded for 30-minute periods with 60-minute recording intervals.

A vehicle is considered queued whenever it is traveling at less than 10 feet/second. A vehicle will only become queued when it is either at the stop bar or behind another queued vehicle. Although only the 95th percentile queue has been utilized for purposes of determining the necessary turn pocket storage lengths, the 50th percentile queues are also reported. The 50th percentile queue is the maximum back of queue on a typical cycle during the peak hour, while the 95th percentile queue is the maximum back of queue with 95th percentile traffic volumes during the peak hour. In other words, if traffic were observed for 100 cycles, the 95th percentile queue would be the queue experienced with the 95th busiest cycle (or 5% of the time). The 50th percentile, or average, queue represents the typical queue length for peak hour traffic conditions, while the 95th percentile queue is derived from the average queue plus 1.65 standard deviations. The 95th percentile queue is not necessarily ever observed, it is simply based on statistical calculations. The average queue is the average of all the two-minute maximum queues observed by SimTraffic. The maximum back of queue observed for every two-minute period is recorded by SimTraffic. However, many jurisdictions utilize the 95th percentile queues for design purposes.

The storage length recommendations for the turning movements at the Project were shown previously on Exhibit 1-3 for Opening Year Cumulative traffic conditions. Queuing results are provided in Appendix 1.2.

2 METHODOLOGIES

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are generally consistent with City of Moreno Valley. (1)

2.1 LEVEL OF SERVICE

Traffic operations of roadway facilities are described using the term "Level of Service" (LOS). LOS is a qualitative description of traffic flow based on several factors such as speed, travel time, delay, and freedom to maneuver. Six levels are typically defined ranging from LOS A, representing completely free-flow conditions, to LOS F, representing breakdown in flow resulting in stop-and-go conditions. LOS E represents operations at or near capacity, an unstable level where vehicles are operating with the minimum spacing for maintaining uniform flow.

2.2 INTERSECTION CAPACITY ANALYSIS

The definitions of LOS for interrupted traffic flow (flow restrained by the existence of traffic signals and other traffic control devices) differ slightly depending on the type of traffic control. The LOS is typically dependent on the quality of traffic flow at the intersections along a roadway. The *Highway Capacity Manual* (HCM) methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. (6) The HCM uses different procedures depending on the type of intersection control.

2.2.1 SIGNALIZED INTERSECTIONS

City of Moreno Valley

The City of Moreno Valley requires signalized intersection operations analysis based on the methodology described in the HCM. (6) Intersection LOS operations are based on an intersection's average control delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. For signalized intersections, LOS is directly related to the average control delay per vehicle and is correlated to a LOS designation as described in Table 2-1. Study area intersections have been evaluated using the Synchro (Version 9) analysis software package.

Synchro is a macroscopic traffic software program that is based on the signalized intersection capacity analysis as specified in the HCM. Macroscopic level models represent traffic in terms of aggregate measures for each movement at the study intersections. Equations are used to determine measures of effectiveness such as delay and queue length. The level of service and capacity analysis performed by Synchro takes into consideration optimization and coordination of signalized intersections within a network.

TABLE 2-1: SIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay (Seconds), V/C ≤ 1.0	Level of Service, V/C ≤ 1.0	Level of Service, V/C > 1.0
Operations with very low delay occurring with favorable progression and/or short cycle length.	0 to 10.00	A	F
Operations with low delay occurring with good progression and/or short cycle lengths.	10.01 to 20.00	B	F
Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.01 to 35.00	C	F
Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.01 to 55.00	D	F
Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.01 to 80.00	E	F
Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths	80.01 and up	F	F

Source: HCM

The peak hour traffic volumes have been adjusted using a peak hour factor (PHF) to reflect peak 15 minute volumes. Common practice for LOS analysis is to use a peak 15-minute rate of flow. However, flow rates are typically expressed in vehicles per hour. The PHF is the relationship between the peak 15-minute flow rate and the full hourly volume (e.g. PHF = [Hourly Volume] / [4 x Peak 15-minute Flow Rate]). The use of a 15-minute PHF produces a more detailed analysis as compared to analyzing vehicles per hour. Existing PHFs have been used for all analysis scenarios. Per the HCM, PHF values over 0.95 often are indicative of high traffic volumes with capacity constraints on peak hour flows, while lower PHF values are indicative of greater variability of flow during the peak hour. (6)

2.2.2 UNSIGNALIZED INTERSECTIONS

All unsignalized intersections in the study area are located within the City of Moreno Valley. The City of Moreno Valley requires the operations of unsignalized intersections be evaluated using the methodology described the HCM. (6) The LOS rating is based on the weighted average control delay expressed in seconds per vehicle (see Table 2-2).

TABLE 2-2: UNSIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay Per Vehicle (Seconds)	Level of Service, V/C ≤ 1.0	Level of Service, V/C > 1.0
Little or no delays.	0 to 10.00	A	F
Short traffic delays.	10.01 to 15.00	B	F
Average traffic delays.	15.01 to 25.00	C	F
Long traffic delays.	25.01 to 35.00	D	F
Very long traffic delays.	35.01 to 50.00	E	F
Extreme traffic delays with intersection capacity exceeded.	> 50.00	F	F

Source: HCM

At two-way or side-street stop-controlled intersections, LOS is calculated for each controlled movement and for the left turn movement from the major street, as well as for the intersection as a whole. For approaches composed of a single lane, the delay is computed as the average of all movements in that lane. For all-way stop controlled intersections, LOS is computed for the intersection as a whole.

2.3 ROADWAY SEGMENT CAPACITY ANALYSIS

Roadway segment operations have been evaluated using the City of Moreno Valley Daily Roadway Capacity Values provided in the *City of Moreno Valley Transportation Engineering Division Traffic Impact Analysis (TIA) Preparation Guide* (1). Per the City of Moreno Valley TIA guidelines, roadway segments within the study area should maintain the LOS capacities illustrated on Exhibit 2-1. The daily roadway segment capacities for each type of roadway are summarized in Table 2-3. These roadway capacities are "rule of thumb" estimates for planning purposes and are affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic), and pedestrian bicycle traffic. As such, where the average daily traffic (ADT) based roadway segment analysis indicates a deficiency (unacceptable LOS), a review of the more detailed peak hour intersection analysis and progression analysis are undertaken. The more detailed peak hour intersection analysis explicitly accounts for factors that affect roadway capacity. Therefore, roadway segment widening is typically only recommended if the peak hour intersection analysis indicates the need for additional through lanes.

EXHIBIT 2-1: CITY OF MORENO VALLEY LEVEL OF SERVICE (LOS) STANDARDS

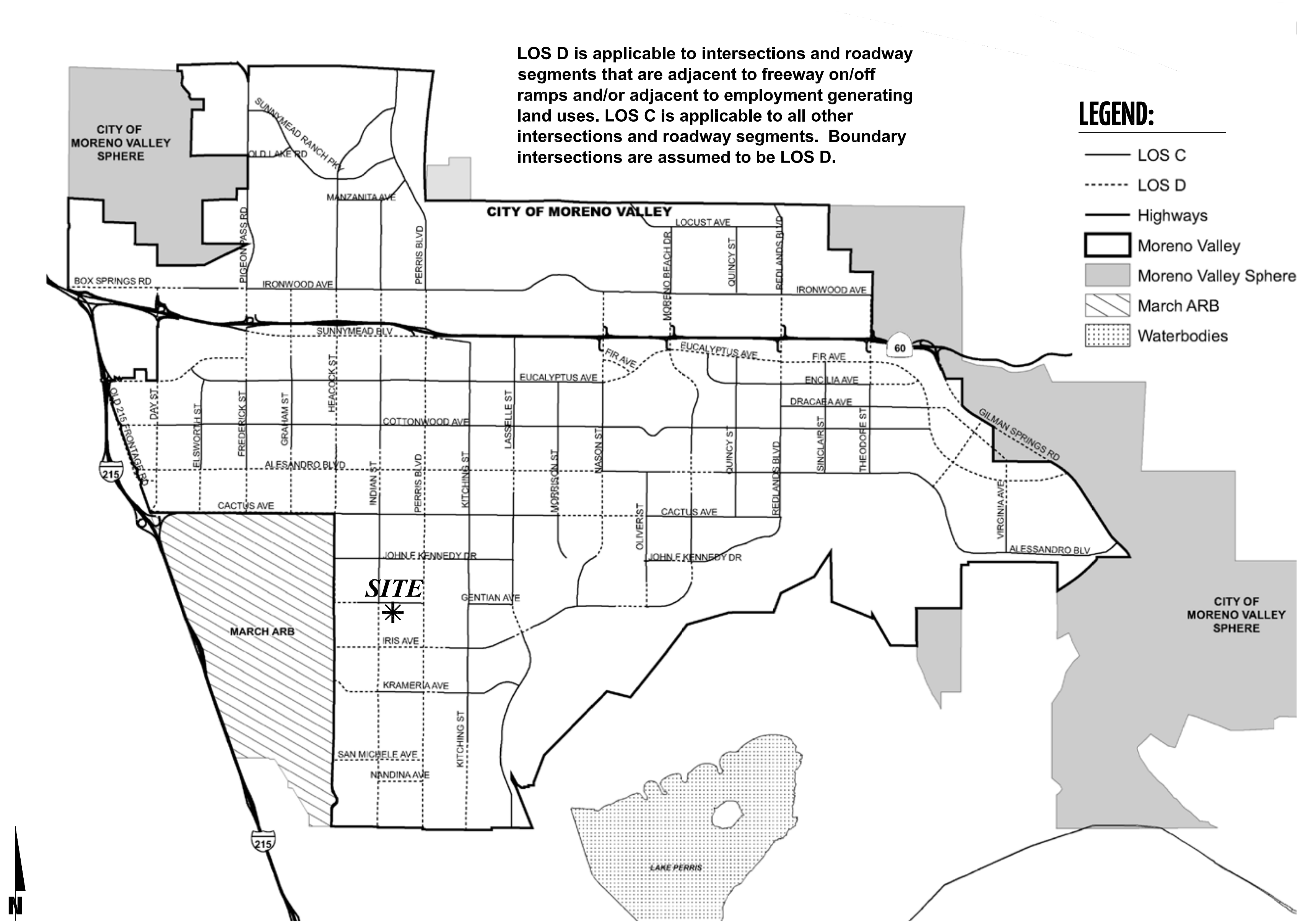

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TABLE 2-3: ROADWAY SEGMENT CAPACITY LOS THRESHOLDS[1]

Facility Type	Level of Service Capacity[1]				
	A	B	C	D	E
Six Lane Divided Arterial	33,900	39,400	45,000	50,600	56,300
Four Lane Divided Arterial	22,500	26,300	30,000	33,800	37,500
Four Lane Undivided Arterial	15,000	17,500	20,000	22,500	25,000
Two Lane Industrial Collector	7,500	8,800	10,000	11,300	12,500
Two Lane Undivided Residential	N/A	N/A	N/A	N/A	2,000

[1] These maximum roadway capacities have been extracted from the City of Moreno Valley's Transportation Division's TIA Preparation Guidelines (August 2007). These roadway capacities are "rule of thumb" estimates for planning purposes. The LOS E service volumes are estimated maximum daily capacity for respective roadway classifications. Capacity is affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian and bicycle traffic.

2.4 TRAFFIC SIGNAL WARRANT ANALYSIS METHODOLOGY

The term "signal warrants" refers to the list of established criteria used by the California Department of Transportation (Caltrans) and other public agencies to quantitatively justify or ascertain the potential need for installation of a traffic signal at an otherwise unsignalized intersection. This TIA uses the signal warrant criteria presented in the latest edition of the Federal Highway Administration’s (FHWA) *Manual on Uniform Traffic Control Devices (MUTCD)*, as amended by *the MUTCD 2014 California Supplement*, for all study area intersections. (7)

The signal warrant criteria for Existing study area intersections are based upon several factors, including volume of vehicular and pedestrian traffic, frequency of accidents, and location of school areas. Both the FHWA’s *MUTCD* and the *MUTCD 2014 California Supplement* indicate that the installation of a traffic signal should be considered if one or more of the signal warrants are met. (7) Specifically, this TIA utilizes the Peak Hour Volume-based Warrant 3 as the appropriate representative traffic signal warrant analysis for existing traffic conditions. Warrant 3 criteria are basically identical for both the FHWA’s *MUTCD* and the *MUTCD 2014 California Supplement*. Warrant 3 is appropriate to use for this TIA because it provides specialized warrant criteria for intersections with rural characteristics (e.g. located in communities with populations of less than 10,000 persons or with adjacent major streets operating above 40 miles per hour). For the purposes of this study, the speed limit was the basis for determining whether Urban or Rural warrants were used for a given intersection.

Future unsignalized intersections, that currently do not exist, have been assessed regarding the potential need for new traffic signals based on future average daily traffic (ADT) volumes, using the Caltrans planning level ADT-based signal warrant analysis worksheets.

Traffic signal warrant analyses were performed for the following unsignalized study area intersections during the peak weekday conditions wherein the Project is anticipated to contribute the highest trips:

- Indian Street / Gentian Avenue (#3)
- Street J / Gentian Avenue (#6)
- Street L / Gentian Avenue (#7)
- Street L / Santiago Drive (#8)
- Perris Boulevard / Santiago Drive (#12)

The Existing conditions traffic signal warrant analysis is presented in the subsequent section, Section 3 *Area Conditions* of this report. The traffic signal warrant analyses for future conditions are presented in Section 5 *E+P Traffic Analysis,* and Section 6 *Opening Year Cumulative (2021) Traffic Analysis* of this report.

It is important to note that a signal warrant defines the minimum condition under which the installation of a traffic signal might be warranted. Meeting this threshold condition does not require that a traffic control signal be installed at a particular location, but rather, that other traffic factors and conditions be evaluated in order to determine whether the signal is truly justified. It should also be noted that signal warrants do not necessarily correlate with LOS. An intersection may satisfy a signal warrant condition and operate at or above acceptable LOS or operate below acceptable LOS and not meet a signal warrant.

2.5 Minimum Level of Service (LOS)

The definition of an intersection deficiency has been obtained from each of the applicable surrounding jurisdictions.

2.5.1 City of Moreno Valley

The definition of an intersection deficiency in the City of Moreno Valley is based on the City of Moreno Valley General Plan Circulation Element. The City of Moreno Valley General Plan states that target LOS C or LOS D be maintained along City roads (including intersections) wherever possible. Exhibit 2-1 depicts the level of service standards within the City.

2.5.2 CMP

In an effort to more directly link land use, transportation and air quality and promote reasonable growth, the County of Riverside adopted a CMP (December 2011). The RCTC monitors the CMP roadway network system to minimize LOS deficiencies. Within the project study area, the I-215 Freeway is recognized as a key transportation facility within the CMP system. Although Caltrans utilizes LOS D as their stated threshold, RCTC has adopted LOS E as the minimum standard for intersections and segments along the CMP System of Highways and Roadways. There are no CMP intersections within the study area.

2.6 Project Fair Share Calculation Methodology

Improvements found to be included in the City of Moreno Valley's DIF program and WRCOG TUMF, will be identified as such. For improvements that do not appear to be in either of the pre-existing fee programs, a fair share financial contribution based on the Project's fair share impact may be imposed in order to mitigate the Project's share of impacts in lieu of construction.

If the intersection is currently operating at acceptable LOS under Existing traffic conditions, the Project's fair share cost of improvements would be determined based on the following equation, which is the ratio of Project traffic to <u>new</u> traffic, where new traffic is total future traffic less existing baseline traffic:

Project Fair Share % = Project Traffic / (2020 With Project Total Traffic – Existing Traffic)

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3 AREA CONDITIONS

This section provides a summary of the existing circulation network, the City of Moreno Valley General Plan Circulation Network, and a review of existing peak hour intersection operations, roadway segment, and traffic signal warrant analyses.

3.1 EXISTING CIRCULATION NETWORK

Pursuant to the scoping agreement with City of Moreno Valley staff (Appendix 1.1), the study area includes a total of 13 existing and future intersections as shown previously on Exhibit 1-2 where the Project is anticipated to contribute 50 or more peak hour trips. Exhibit 3-1 illustrates the study area intersections located near the proposed Project and identifies the number of through traffic lanes for existing roadways and intersection traffic controls.

3.2 CITY OF MORENO VALLEY GENERAL PLAN CIRCULATION ELEMENT

As noted previously, the Project site is located within the City of Moreno Valley. The roadway classifications and planned (ultimate) roadway cross-sections of the major roadways within the study area, as identified on the City of Moreno Valley General Plan Circulation Element, are described subsequently. Exhibit 3-2 shows the City of Moreno Valley General Plan Circulation Element, and Exhibit 3-3 illustrates the City of Moreno Valley General Plan roadway cross-sections.

3.3 TRANSIT SERVICE

The study area is currently served by the Riverside Transit Authority (RTA), a public transit agency serving the unincorporated Riverside County region. As shown on Exhibit 3-4, RTA Route 19 is the only existing bus route that serves a roadway within the study area in close proximity to the proposed Project. RTA Route 19 serves Perris Boulevard throughout the study area. However, Route 11 and Route 20 could also potentially serve the Project if extended to run along Indian Street.

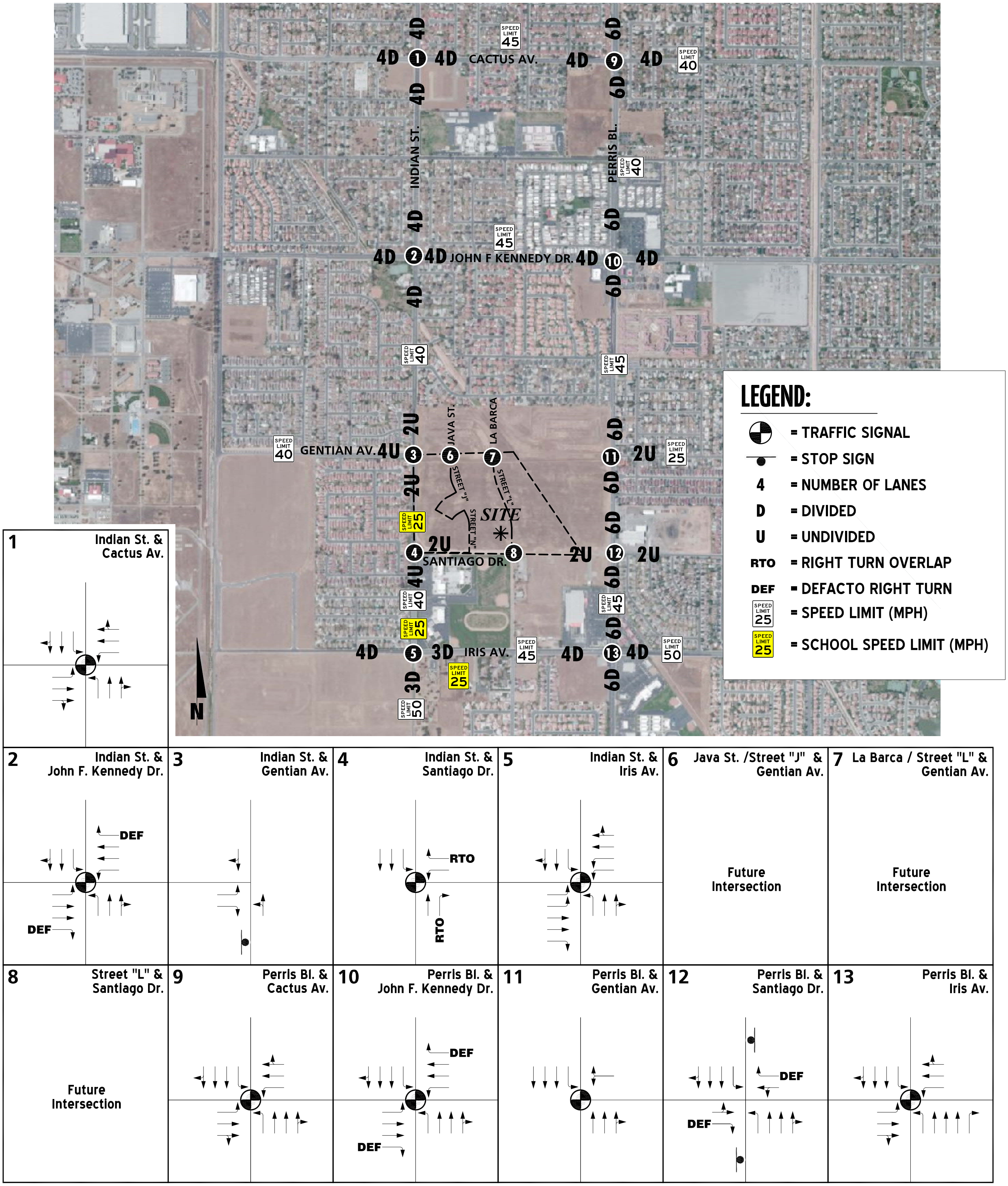
Transit service is reviewed and updated by RTA periodically to address ridership, budget, and community demands Changes in land use can affect these periodic adjustments which may lead to either enhanced or reduced service where appropriate.

3.4 BICYCLE & PEDESTRIAN FACILITIES

In an effort to promote alternative modes of transportation, the City of Moreno Valley also includes a trails and bikeway system. The City of Moreno Valley trails and bikeway system are shown on Exhibit 3-5 and Exhibit 3-6. The Juan Bautista de Anza (Aqueduct Trail) bike trail is adjacent to the eastern boundary of the Project and crosses Gentian Avenue. Indian Street and Gentian Avenue are both Class II bike routes.

Field observations conducted in April 2016 indicate nominal pedestrian and bicycle activity within the study area. Exhibit 3-7 illustrates the existing pedestrian facilities, including sidewalks and crosswalk locations.

EXHIBIT 3-1: EXISTING NUMBER OF THROUGH LANES AND INTERSECTION CONTROLS



Attachment: Traffic Study (2444 : Legacy Park Project)

EXHIBIT 3-2: CITY OF MORENO VALLEY GENERAL PLAN CIRCULATION ELEMENT

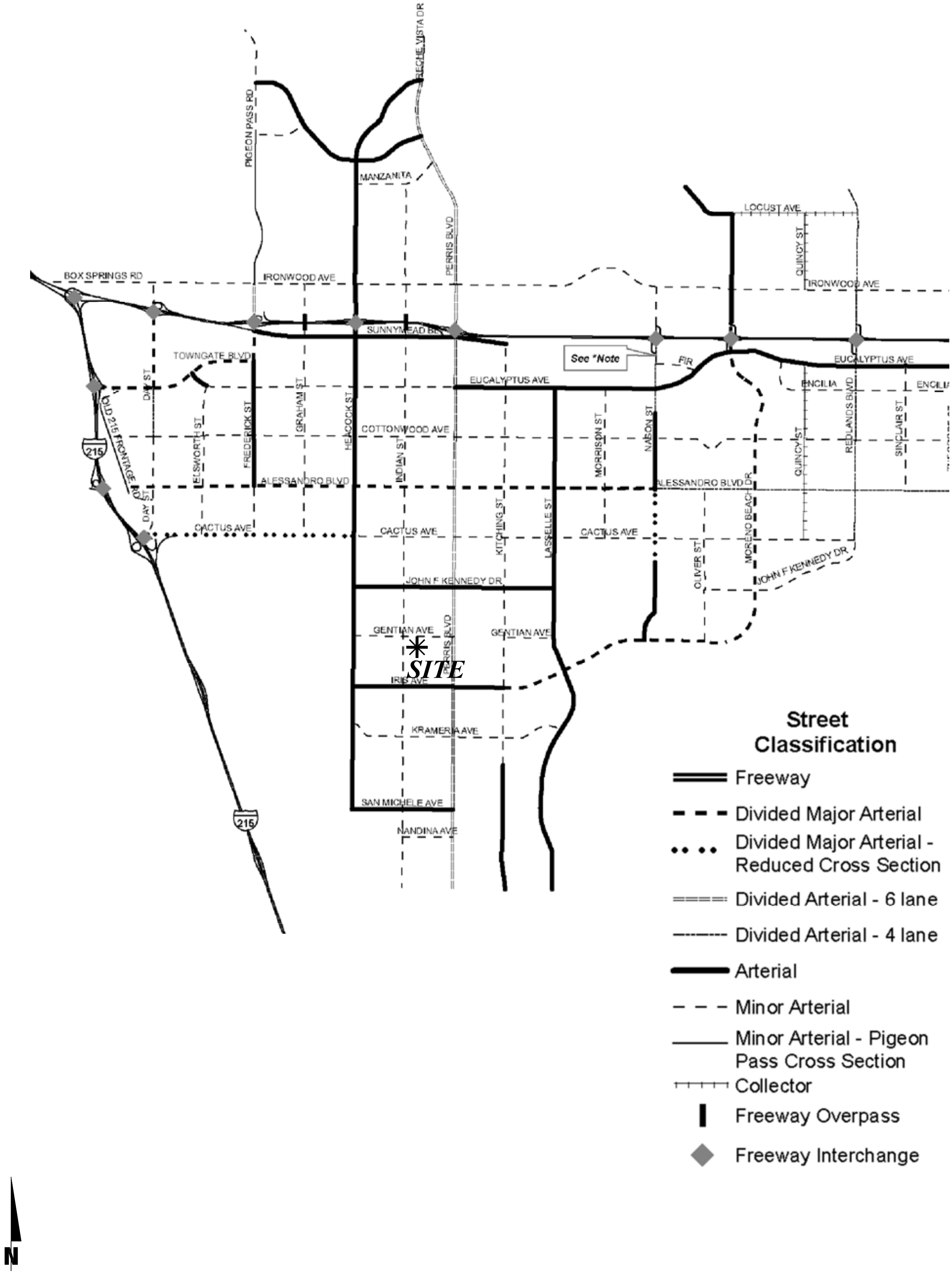


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EXHIBIT 3-3: CITY OF MORENO VALLEY GENERAL PLAN ROADWAY CROSS-SECTIONS

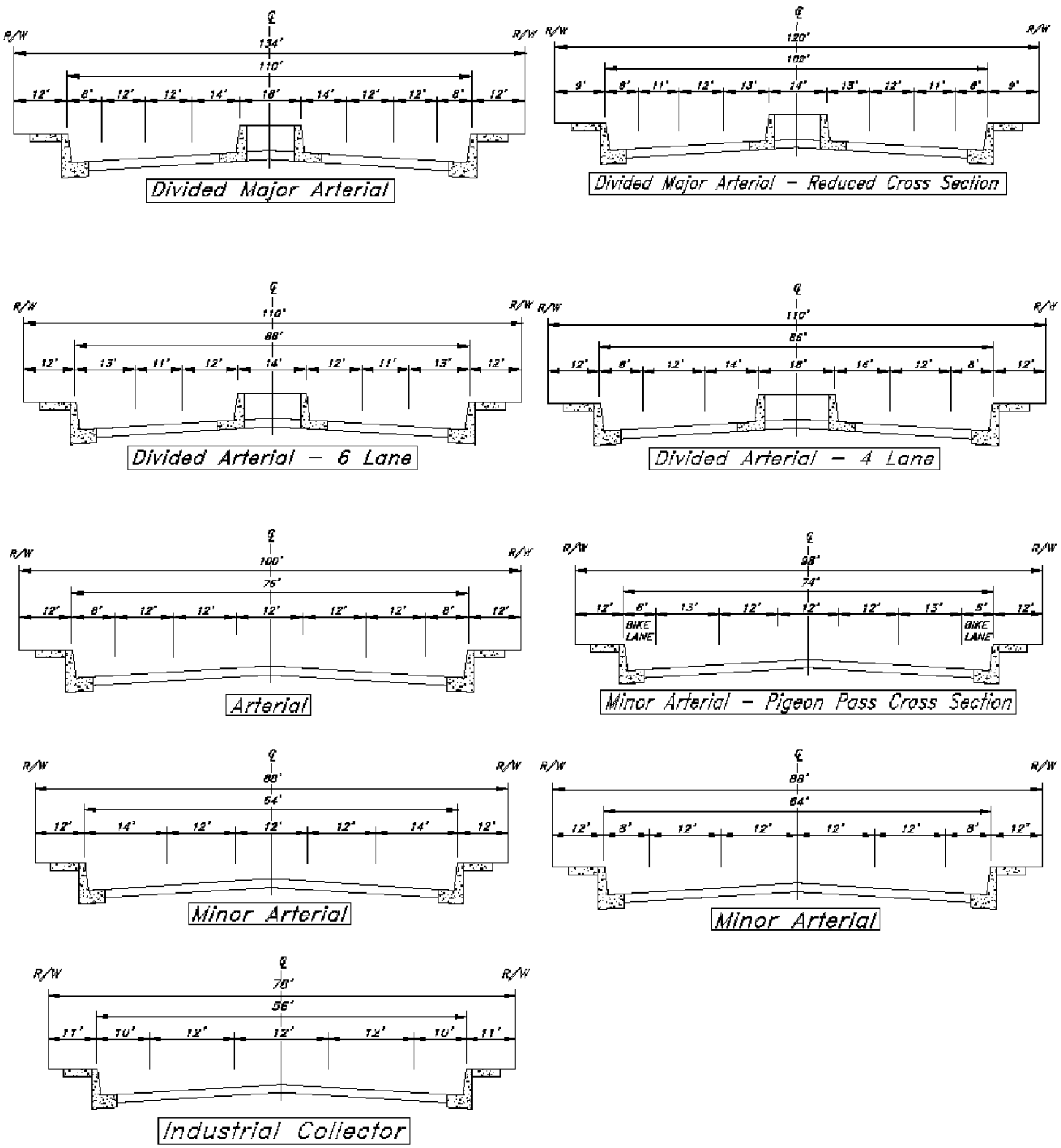

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EXHIBIT 3-4: EXISTING TRANSIT

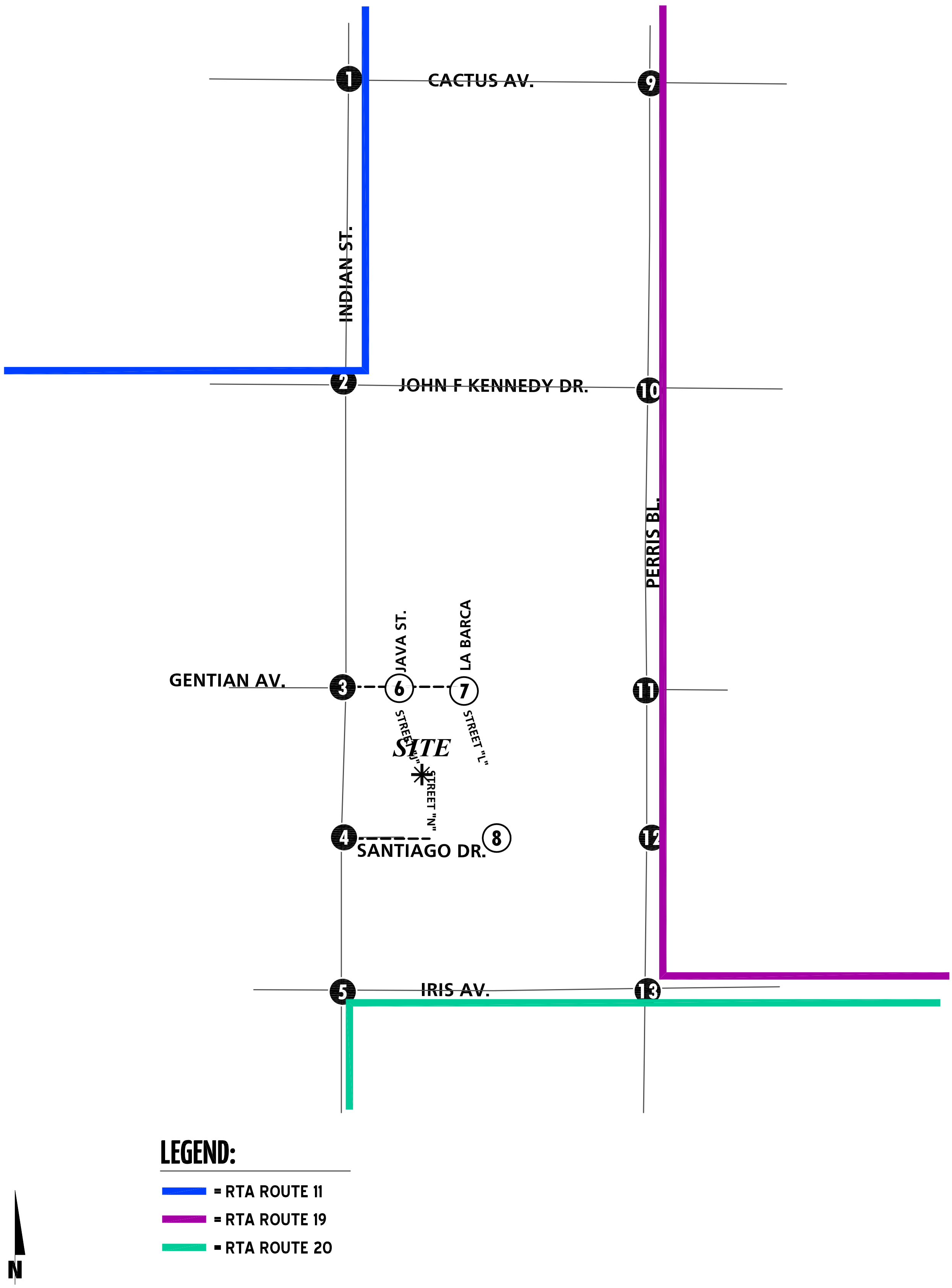

EXHIBIT 3-5: CITY OF MORENO VALLEY MASTER PLAN OF TRAILS

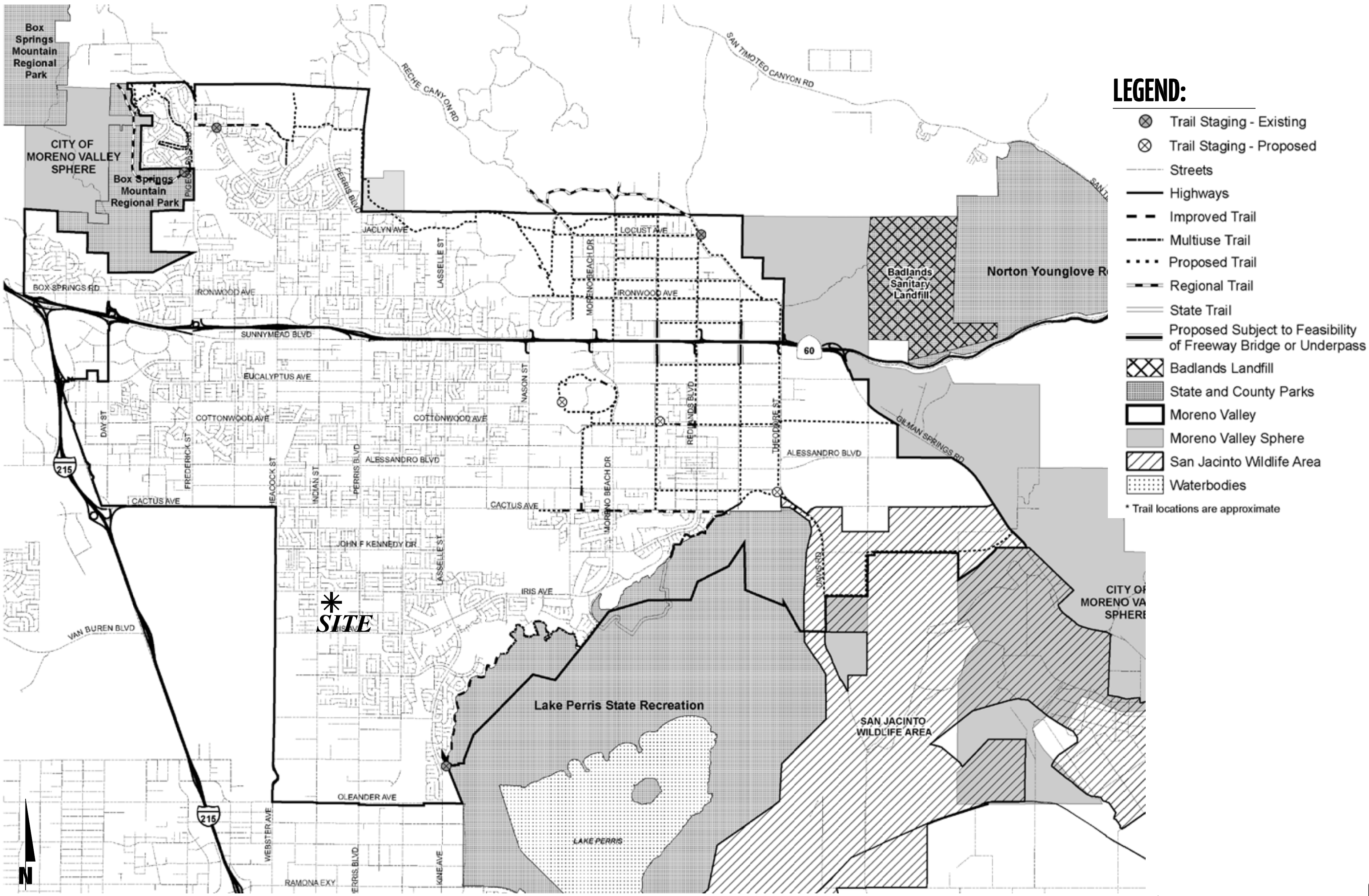

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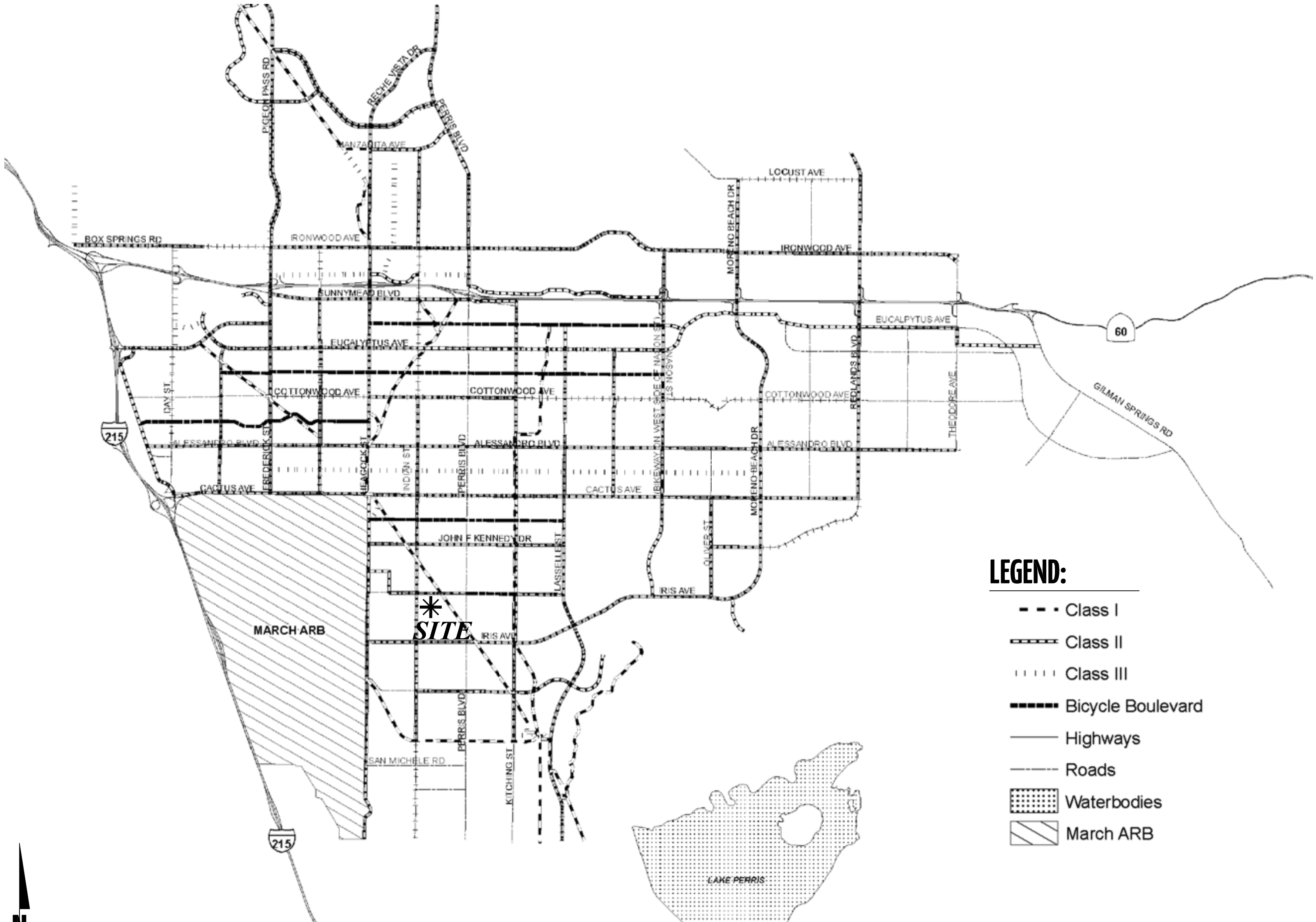
EXHIBIT 3-6: CITY OF MORENO VALLEY BIKE PLAN



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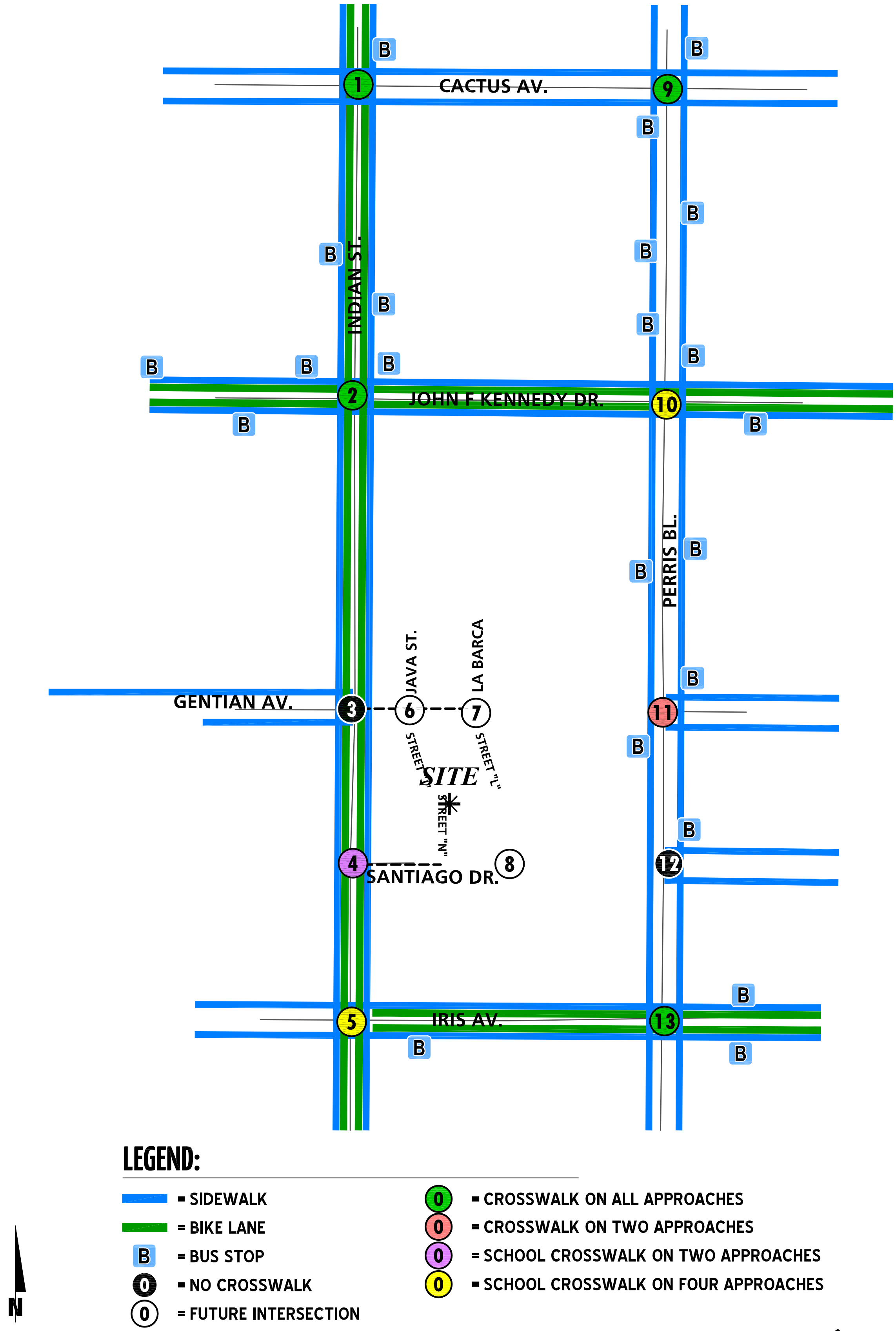
Attachment: Traffic Study (2444 : Legacy Park Project)

EXHIBIT 3-7: EXISTING PEDESTRIAN FACILITIES



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3.5 EXISTING (2016) TRAFFIC COUNTS

The intersection LOS analysis is based on the traffic volumes observed during the peak hour conditions using traffic count data collected in April 2016. The following peak hours were selected for analysis:

- Weekday AM Peak Hour (peak hour between 7:00 AM and 9:00 AM)
- Weekday PM Peak Hour (peak hour between 4:00 PM and 6:00 PM)

The weekday AM and weekday PM peak hour count data is representative of typical weekday peak hour traffic conditions in the study area. There were no observations made in the field that would indicate atypical traffic conditions on the count dates, such as construction activity or detour routes and near-by schools were in session and operating on normal schedules.

The raw manual peak hour turning movement traffic count data sheets are included in Appendix 3.1. These raw turning volumes have been flow conserved between intersections with limited access, no access, and where there are currently no uses generating traffic (e.g., between ramp-to-arterial intersections, etc.).

Existing weekday average daily traffic (ADT) volumes on arterial highways throughout the study area are shown on Exhibit 3-8. The ADT volumes shown are based on 24-hour tube count data collected in April 2016. Existing weekday AM and weekday PM peak hour intersection volumes are also shown on Exhibit 3-8.

3.6 INTERSECTION OPERATIONS ANALYSIS

Existing peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2.2 *Intersection Capacity Analysis* of this report. The intersection operations analysis results are summarized in Table 3-1 which indicates that all of the study area intersections are currently operating at an acceptable LOS during the peak hours, with the exception of the following intersection:

- Perris Boulevard / Santiago Drive (#12)

Consistent with Table 3-1, a summary of the peak hour intersection LOS for Existing conditions are shown on Exhibit 3-9. The intersection operations analysis worksheets are included in Appendix 3.2 of this TIA.

EXHIBIT 3-8: EXISTING (2016) TRAFFIC VOLUMES

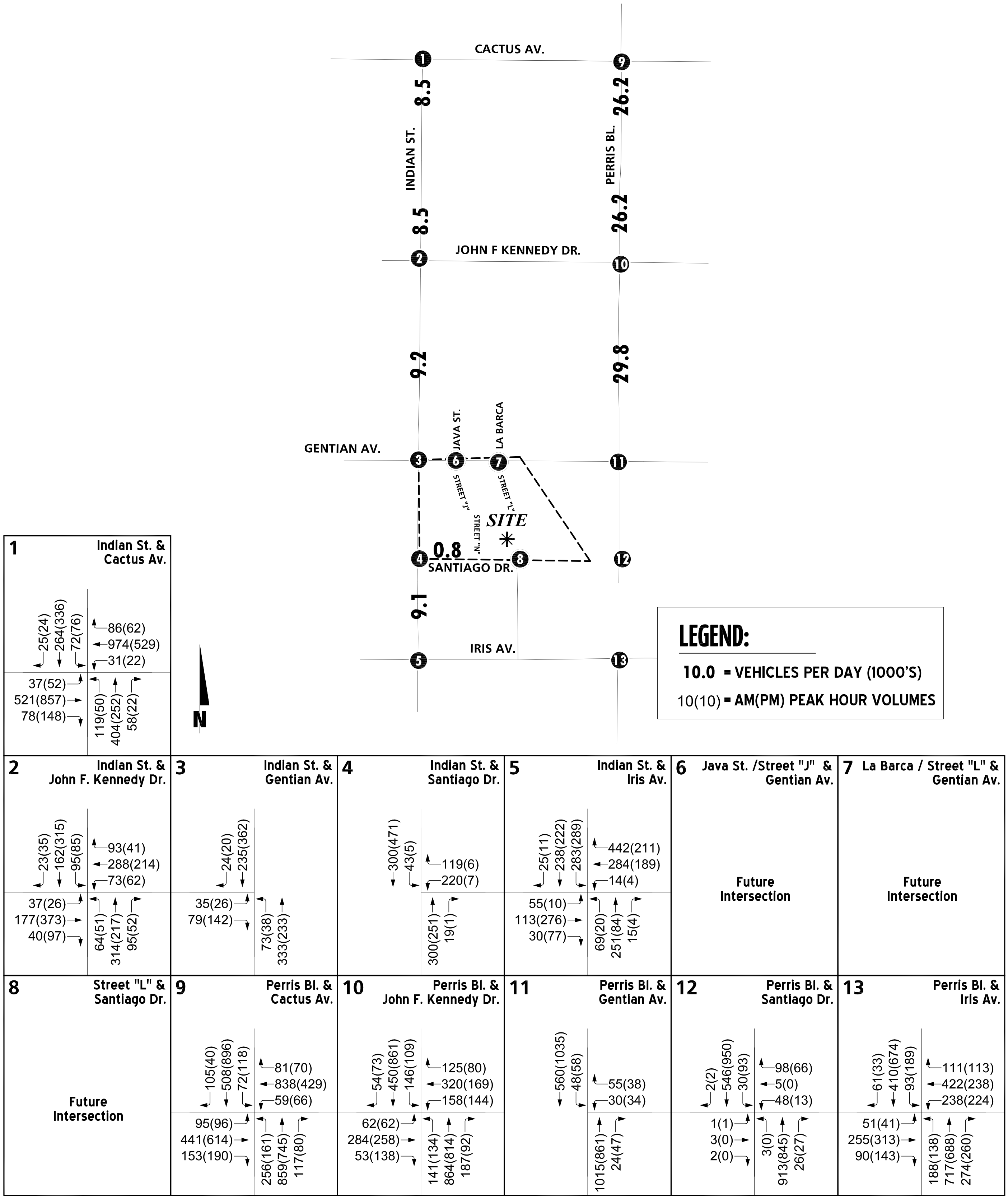

EXHIBIT 3-9: EXISTING (2016) SUMMARY OF LOS

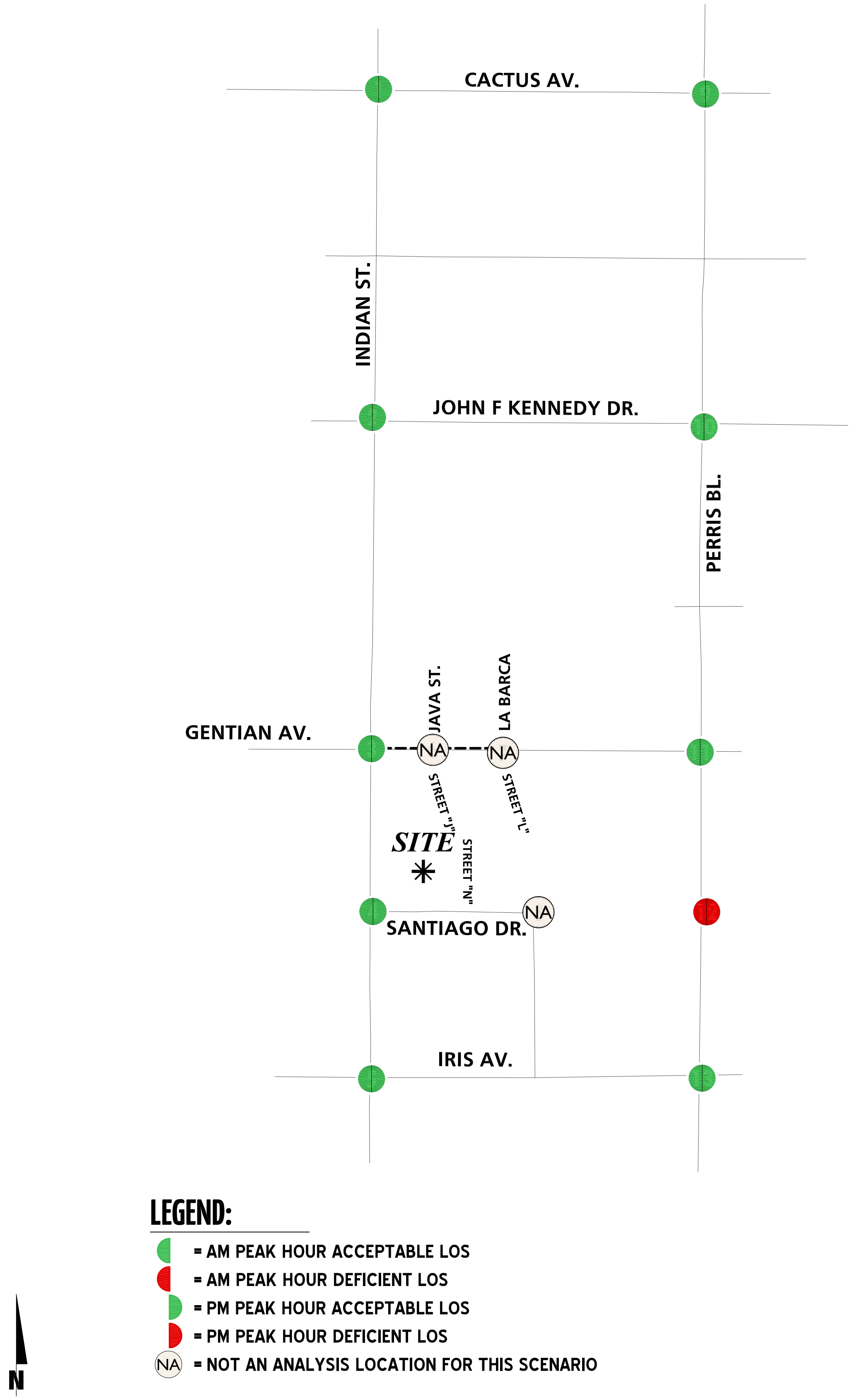

Table 3-1

Intersection Analysis for Existing (2016) Conditions

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Delay[2] (secs.)		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
1	Indian St / Cactus Av	TS	1	2	0	1	2	0	1	2	0	1	2	0	28.4	27.2	C	C
2	Indian St / John F. Kennedy Dr	TS	1	2	0	1	2	0	1	2	d	1	2	d	26.5	24.6	C	C
3	Indian St / Gentian Av	CSS	0	1	0	0	1	0	1	0	1	0	0	0	20.0	15.1	C	C
4	Indian St / Santiago Dr	TS	0	1	1>	1	2	0	0	0	0	1	0	1>	14.7	2.6	B	A
5	Indian St / Iris Av	TS	1	2	0	1	2	0	2	2	1	2	2	0	44.8	30.6	D	C
6	Street J / Gentian Av		Future Intersection															
7	Street L / Gentian Av		Future Intersection															
8	Street L / Santiago Dr		Future Intersection															
9	Perris Bl / Cactus Av	TS	1	3	0	1	3	0	1	2	0	1	2	0	25.2	33.6	C	C
10	Perris Bl / John F. Kennedy Dr	TS	1	3	0	1	3	0	1	2	d	1	2	d	40.9	44.7	D	D
11	Perris Bl / Gentian Av	TS	0	3	0	1	3	0	0	0	0	0	1	0	5.9	4.9	A	A
12	Perris Bl / Santiago Dr	CSS	1	3	0	1	3	0	0	1	d	0	1	d	**47.4**	**43.7**	**E**	**E**
13	Perris Bl / Iris Av	TS	1	3	1	1	3	0	1	2	0	1	2	0	44.5	36.2	D	D

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; > = Right-Turn Overlap Phasing; d= Defacto Right Turn Lane

[2] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] CSS = Cross-street Stop; TS = Traffic Signal

3.7 Roadway Segment Capacity Analysis

The City of Moreno Valley General Plan Circulation Element provides roadway volume capacity values presented previously on Table 2-3. The roadway segment capacities are approximate figures only and are used at the General Plan level to assist in determining the roadway functional classification (number of through lanes) needed to meet traffic demand. Table 3-2 provides a summary of the Existing (2016) conditions roadway segment capacity analysis based on the City of Moreno Valley and City of Perris General Plan Circulation Element Roadway Segment Capacity/ LOS Thresholds identified previously on Table 2-3. As shown on Table 3-2, all the study area roadway segments currently operate at an acceptable LOS based on the City's planning level daily roadway capacity thresholds (i.e., LOS C or better).

3.8 Traffic Signal Warrants Analysis

Traffic signal warrants for Existing traffic conditions are based on existing peak hour intersection turning volumes. The following study area intersection currently warrants a traffic signal for Existing traffic conditions:

- Perris Boulevard / Santiago Drive (#12)

Existing conditions traffic signal warrant analysis worksheets are provided in Appendix 3.3.

3.9 Recommended Improvements

3.9.1 Recommended Improvements to Address Deficiencies at Intersections

Improvement strategies have been recommended at intersections that have been identified as deficient to reduce each location's peak hour delay and improve the associated LOS grade to an acceptable LOS (LOS D or better). The effectiveness of the proposed recommended improvements is presented in Table 3-3 for Existing traffic conditions. Recommended improvements to address deficiencies for Existing traffic conditions are described below and analysis worksheets are provided in Appendix 3.4.

Recommended Improvement –Perris Boulevard / Santiago Drive (#12)

- Install a traffic signal.

3.9.2 Recommended Improvements to Address Deficiencies on Roadway Segments

All study area roadway segments are anticipated to operate at acceptable LOS (LOS C or better) for Existing (2016) traffic conditions. As such, no roadway improvements have been recommended.

Table 3-2

Roadway Segment Capacity Analysis for Existing (2016) Conditions

#	Roadway	Segment Limits	Roadway Section	LOS Capacity[1]	Existing (2016)	V/C	LOS	Acceptable LOS
1	Indian Street	Cactus Avenue to John F. Kennedy Dr.	4D	37,500	8,525	0.23	A	C
2		John F. Kennedy Dr. to Gentian Av.	4D	37,500	9,215	0.25	A	C
3		Santiago Dr. to Iris Av.	2U	12,500	9,105	0.73	C	D
4	Gentian Avenue	Indian St. to Street J/Java St.	--	--	N/A	N/A	N/A	C
5		Street J/Java St. to Street L/La Barca	--	--	N/A	N/A	N/A	C
6		West of Perris Bl.	--	--	N/A	N/A	N/A	C
7	Santiago Drive	East of Indian St.	2U	12,500	842	0.07	A	C
8		West of Perris Bl.	2U	12,500	13	0.00	A	C
9	Perris Boulevard	Cactus Avenue and John F. Kennedy Dr.	6D	56,300	26,172	0.46	A	D
10		John F. Kennedy Dr. to Gentian Av.	6D	56,300	29,801	0.53	A	D

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

N/A = Not Applicable; Segment does not exist.

[1] These maximum roadway capacities have been extracted from the City of Moreno Valley's Transportation Division's Traffic Impact Analysis Transportation Division's Traffic Impact Analysis Preparation Guidelines (August 2007). These roadway capacities are "rule of thumb" estimates for planning purposes. The LOS E service volumes are estimated maximum daily capacity for respective classifications. Capacity is affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian and bicycle traffic.

Table 3-3

Intersection Analysis for Existing (2016) Conditions With Improvements

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Delay[2] (secs.)		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
12	Perris Bl / Santiago Dr																	
	- Without Improvements	CSS	1	3	0	1	3	0	0	1	d	0	1	d	**47.4**	**43.7**	**E**	**E**
	- With Improvements	**TS**	1	3	0	1	3	0	0	1	d	0	1	d	9.1	8.3	A	A

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for righ turning vehicles to travel outside the through lanes

L = Left; T = Through; R = Right; > = Right-Turn Overlap Phasing; d= Defacto Right Turn Lane

[2] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal o all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (o movements sharing a single lane) are shown.

[3] CSS = Cross-street Stop; TS = Traffic Signal

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4 PROJECTED FUTURE TRAFFIC

This section presents the traffic volumes estimated to be generated by the Project, as well as the Project's trip assignment, onto the study area roadway network. The Project is proposed to consist of a total of 221 single family detached residential dwelling units. Per the City's traffic study guidelines, the Opening Year will have a 5-year minimum horizon. As such, the Opening Year analysis will assess 2021 traffic conditions.

The Project is proposed to have access on Gentian Avenue via Street J and Street L and Santiago Drive via Street N and Street L. All driveways are assumed to allow full-access, with the exception of the intersections on Santiago Drive, which are both knuckles. Regional access to the project site is provided via the I-215 Freeway at Cactus Avenue interchange.

4.1 PROJECT TRIP GENERATION

Trip generation represents the amount of traffic which is both attracted to and produced by a development. Determining traffic generation for a specific project is therefore based upon forecasting the amount of traffic that is expected to be both attracted to and produced by the specific land uses being proposed for a given development. The trip generation rates used for this assessment are based upon information collected by the Institute of Transportation Engineers (ITE) as provided in their Trip Generation manual (9th Edition, 2012). The ITE Trip Generation manual is a nationally recognized source for estimating site specific trip generation.

4.1.1 PROPOSED PROJECT: R5 RESIDENTIAL

The Single Family Residential land use (ITE Land Use Code 210) has been utilized for the purposes of this trip generation evaluation. The Project is proposing to develop the entire site (approximately 52.94 acres) per the R5 Residential General Plan Land Use designation, allowing up to 5 dwelling units per acre. Specifically, the Project is proposing 221 dwelling units, or approximately 4.2 dwelling units per acre. Trip generation rates and the daily and peak hour trip generation for proposed Project are also shown in Table 4-1. The proposed Project is anticipated to generate a net total of approximately 2,104 based trip-ends per day with 166 based AM peak hour trips and 221 based PM peak hour trips.

4.1.2 CURRENTLY ADOPTED GENERAL PLAN: R5 AND R30 RESIDENTIAL

Table 4-2 summarizes the resulting trip generation estimates based on the Currently Adopted General Plan approved land use (R5 and R30 Residential). 37.88 acres of the site is currently designated with the R5 residential land use, however, the remaining 15.06 acres is designated with the R30 land use with an allowable density of 24 to 30 dwelling units per acre. Based on the currently adopted General Plan land use designations, the site currently allows for the development of up to 551 dwelling units. The currently adopted land use is anticipated to generate a net total of approximately 3,903 trip-ends per day with 301 AM peak hour trips and 377 PM peak hour trips.

Table 4-1

Proposed Project Trip Generation Summary

Land Use	Units[2]	ITE LU Code	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Trip Generation Rates [1]									
Single Family Detatched Residential	DU	210	0.19	0.56	0.75	0.63	0.37	1.00	9.52

Land Use	Quantity	Units[2]	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Proposed Project Trip Generation Summary									
Single Family Detatched Residential	221	DU	42	124	166	139	82	221	2,104

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, Ninth Edition (2012).

[2] DU = Dwelling Units

Table 4-2

Currently Adopted General Plan Land Use Trip Generation Summary

Land Use	Units[2]	ITE LU Code	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Trip Generation Rates [1]									
Single Family Detatched Residential	DU	210	0.19	0.56	0.75	0.63	0.37	1.00	9.52
Condo/Townhomes	DU	230	0.07	0.37	0.44	0.35	0.17	0.52	5.81

Land Use	Acres	Quantity	Units[2]	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Currently Adopted Trip Generation Summary										
Single Family Detatched Residential (R5)[3]	37.88	189	DU	36	106	142	119	70	189	1,803
Condo/Townhomes (R30)[4]	15.06	361	DU	25	134	159	127	61	188	2,100
Total	**52.94**	**551**	**DU**	**61**	**240**	**301**	**246**	**131**	**377**	**3,903**

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, Ninth Edition (2012).

[2] DU = Dwelling Units

[3] Allowable density: 5 dwelling units per acre.

[4] Allowable density: 24-30 dwelling units per acre.

4.1.3 TRIP GENERATION COMPARISON

As shown in Table 4-2, the development of the proposed Project is anticipated to generate 1,799 fewer trip-ends per day with 135 fewer AM peak hour trips and 156 fewer PM peak hour trips as compared to the currently adopted General Plan land uses. As such, evaluation of long-range traffic conditions was determined to be unnecessary as the proposed General Plan Amendment is anticipated to reduce the trips generated by the site. E+P and Opening Year Cumulative traffic conditions have been evaluated as part of this TIA in an effort to identify the near-term Project impacts, however, long-range traffic impacts are anticipated to be consistent with or less than those identified by the City's General Plan.

4.2 PROJECT TRIP DISTRIBUTION

Trip distribution is the process of identifying the probable destinations, directions, or traffic routes that will be utilized by Project traffic. The potential interaction between the planned land uses and surrounding regional access routes are considered to identify the route where the Project traffic would distribute.

The Project trip distribution was developed based on anticipated travel patterns to and from the Project site for both passenger cars and truck traffic. The truck trip distribution patterns have been developed based on the anticipated travel patterns for the high-cube warehousing trucks. The Project trip distribution patterns for both passenger cars and trucks were developed based on an understanding of existing travel patterns in the area, the geographical location of the site, and the site's proximity to the regional arterial and state highway system.

The trip distributions utilized for the purposes of this analysis are shown on Exhibit 4-1 and Exhibit 4-2. E+P conditions will assume Gentian Avenue to connect to the west at Indian Street only (see Exhibit 4-1). The trip distribution patterns assume that Gentian Avenue will be in place from the Project boundary east to Perris Boulevard for Opening Year Cumulative conditions only (see Exhibit 4-2). It is our understanding that the Project would have access to Indian Street via Santiago Drive and also Perris Boulevard via Santiago Drive. As such, this connection is assumed for both E+P and Opening Year Cumulative traffic conditions.

4.3 MODAL SPLIT

The traffic reducing potential of public transit, walking, or bicycling have not been considered in this TIA. Essentially, the traffic projections are "conservative" in that these alternative travel modes might be able to reduce the forecasted traffic volumes.

4.4 PROJECT TRIP ASSIGNMENT

The assignment of traffic from the Project area to the adjoining roadway system is based upon the Project trip generation, trip distribution, and the arterial highway and local street system improvements that would be in place by the time of initial occupancy of the Project. Based on the identified Project traffic generation and trip distribution patterns, Project ADT and peak hour intersection turning movement volumes are shown on Exhibit 4-3 for E+P and Exhibit 4-4 for Opening Year Cumulative traffic conditions.

Table 4-3

Trip Generation Comparison

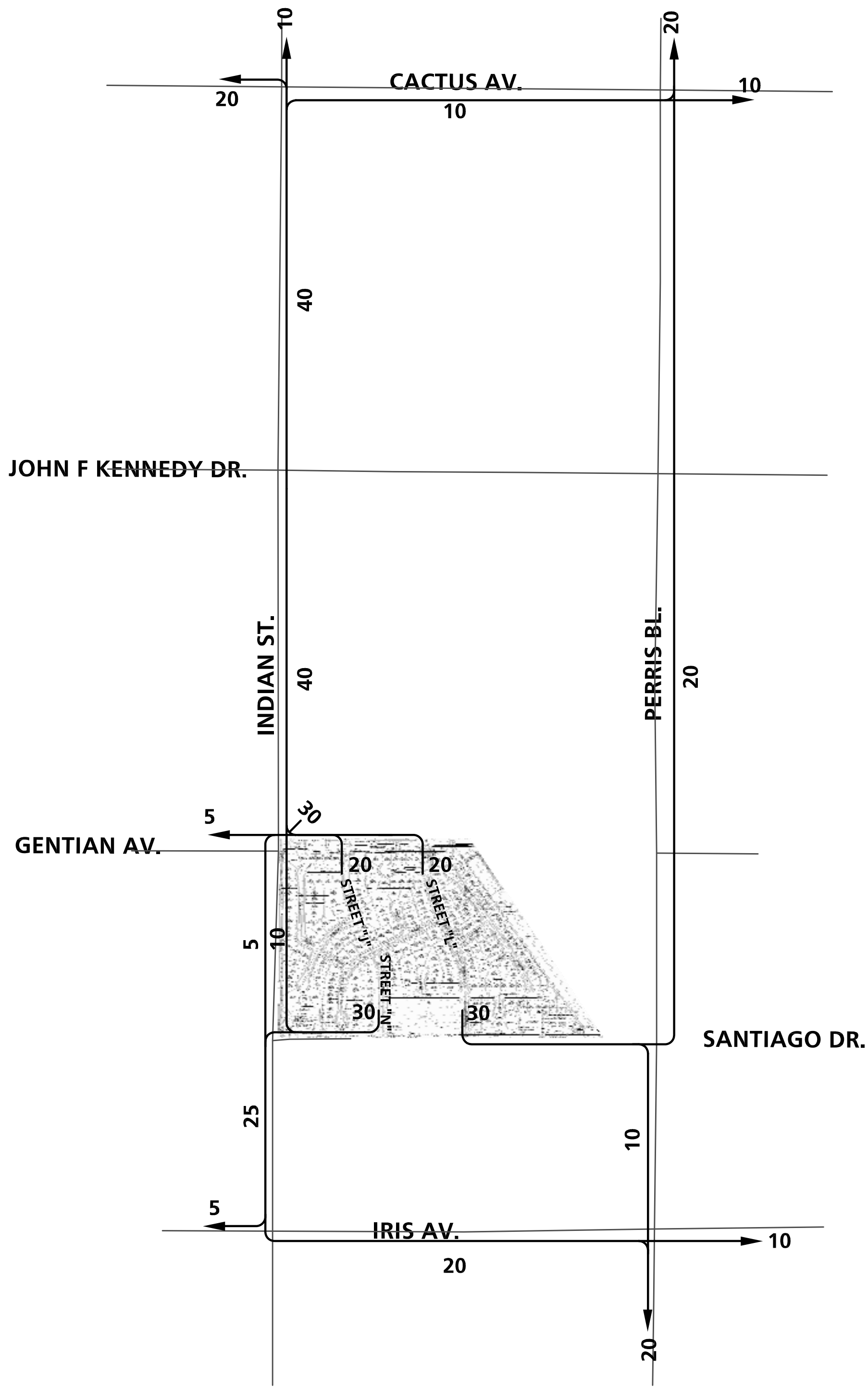
Land Use	Acres	Quantity	Units[2]	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Proposed Project	52.94	221	DU	42	124	166	139	82	221	2,104
Currently Adopted	52.94	265	DU	61	240	301	246	131	377	3,903
Variance (Proposed - Currently Adopted)				**-19**	**-116**	**-135**	**-107**	**-49**	**-156**	**-1,799**

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, Ninth Edition (2012).

[2] DU = Dwelling Units

Attachment: Traffic Study (2444 : Legacy Park Project)

EXHIBIT 4-1: PROJECT (E+P) TRIP DISTRIBUTION



LEGEND:

10 = PERCENT TO/FROM PROJECT

NOTE: PROJECT DISTRIBUTION ASSUMES SANTIAGO DRIVE IS IN PLACE BETWEEN THE PROJECT AND PERRIS BOULEVARD.

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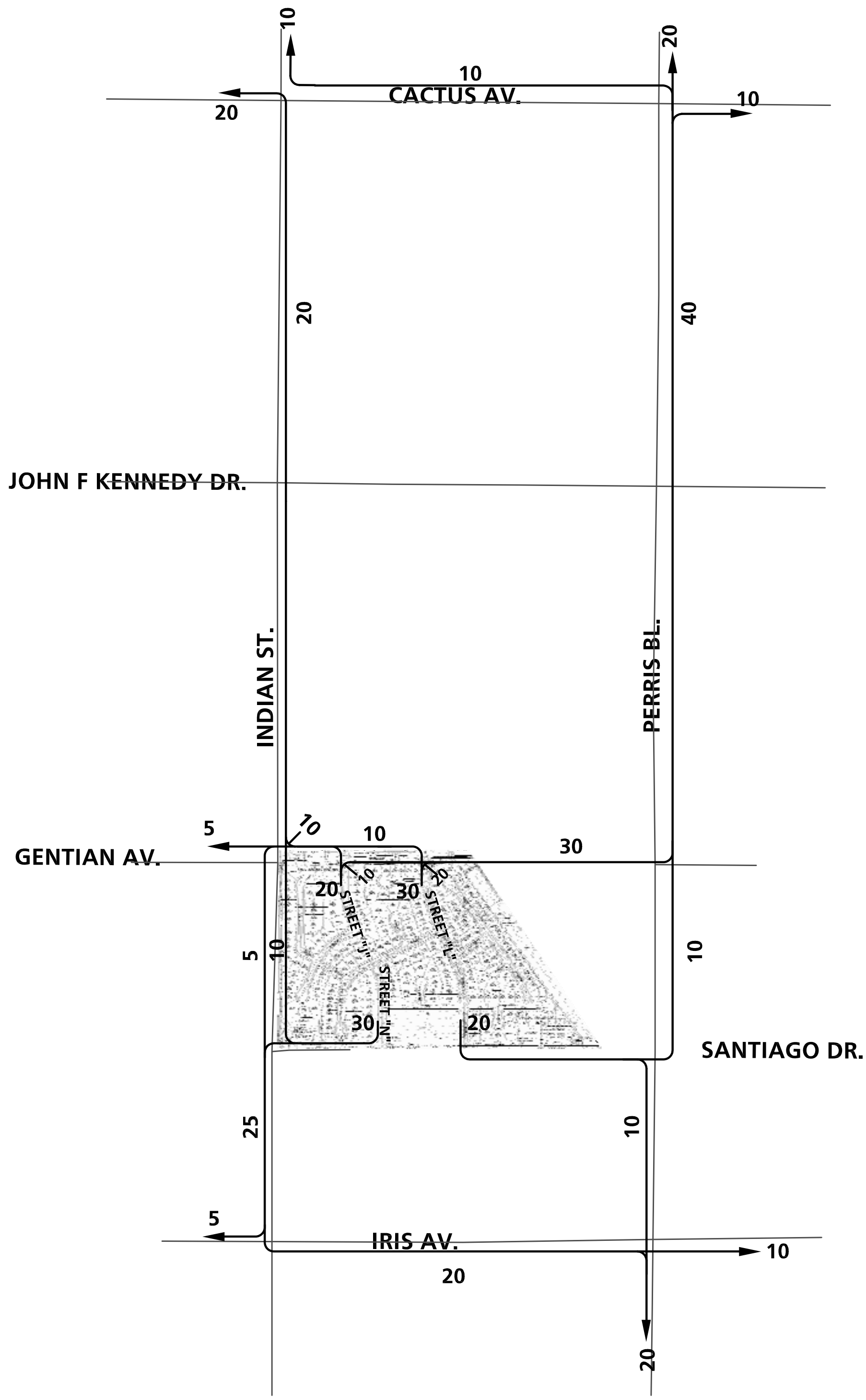
EXHIBIT 4-2: PROJECT (OPENING YEAR CUMULATIVE) TRIP DISTRIBUTION



LEGEND:

10 = PERCENT TO/FROM PROJECT

N

NOTE: PROJECT DISTRIBUTION ASSUMES GENTIAN AVENUE AND SANTIAGO DRIVE ARE IN PLACE BETWEEN THE PROJECT AND PERRIS BOULEVARD.

EXHIBIT 4-3: PROJECT ONLY (E+P) TRAFFIC VOLUMES

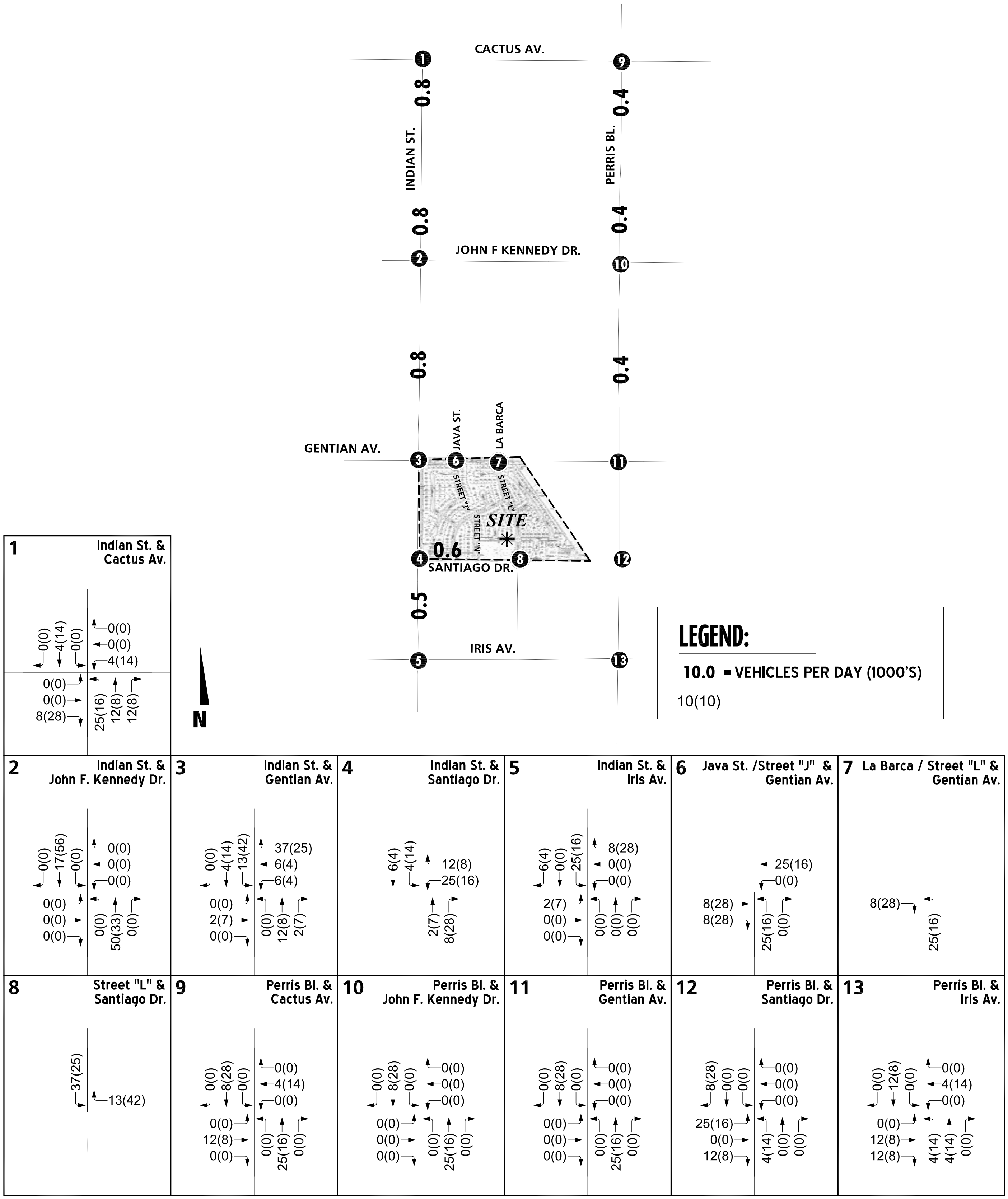
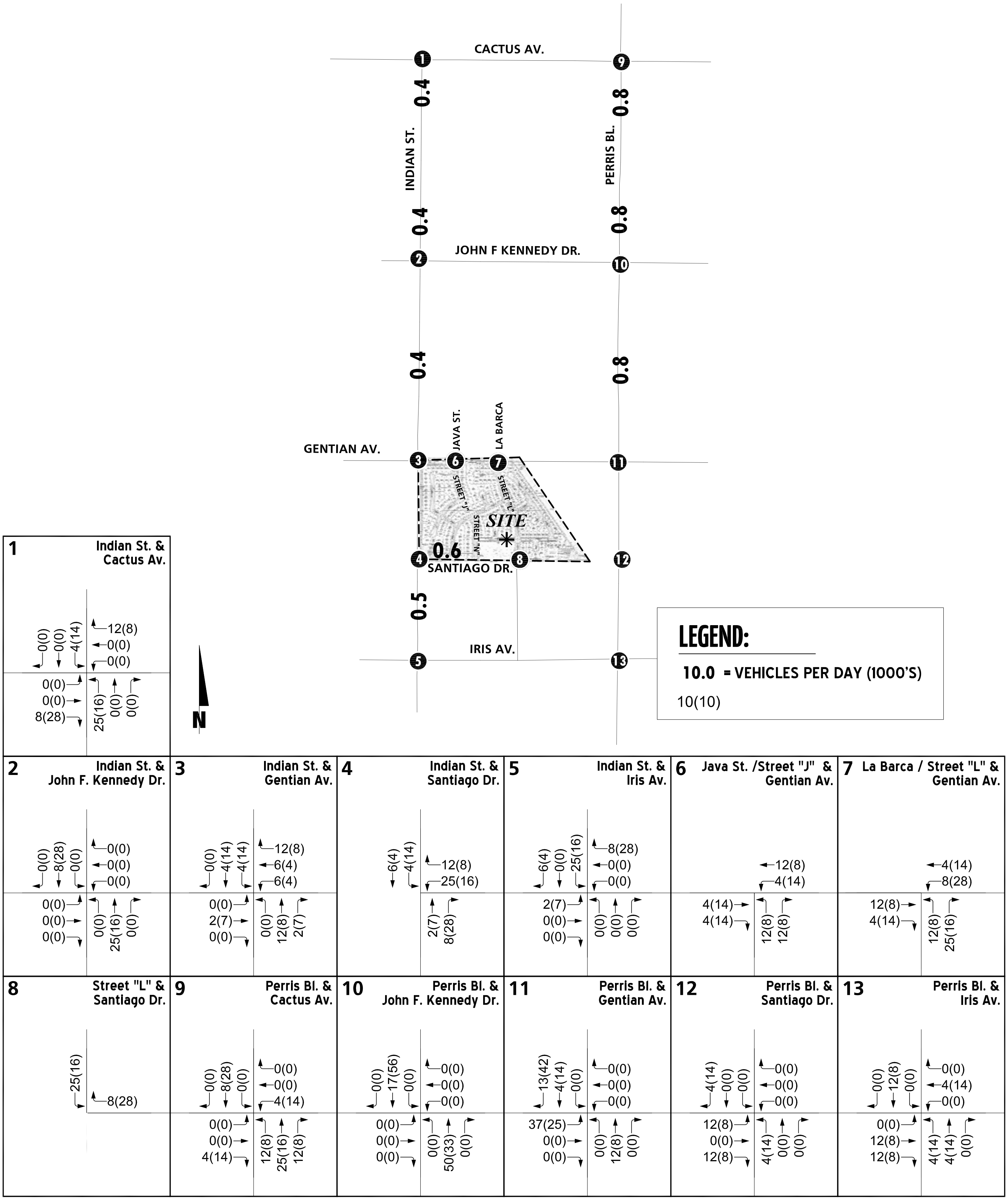


EXHIBIT 4-4: PROJECT ONLY (OPENING YEAR CUMULATIVE) TRAFFIC VOLUMES



4.5 BACKGROUND TRAFFIC

To account for growth in traffic between Existing Conditions (2016) and the Project Opening Year (2021), a compounded annual traffic growth rate of 2 percent was assumed (10.41 percent aggregate growth in background traffic for the period 2016—2021). The 2 percent annual growth rate is intended to capture non-specific ambient traffic growth.

In context, the TIA's assumed 2 percent compounded annual growth rate is considered a reasonable approximation of future traffic growth when compared to demographic projections reflected in other local and regional growth modeling efforts. More specifically, the Southern California Association of Governments (SCAG) 2016—2040 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) growth forecasts for the City of Moreno Valley assume the City population to increase from 197,600 in 2012 to 256,600 by the year 2040, or an approximate 0.94 percent growth rate compounded annually. The RTP/SCS assumed growth in households over the same 28-year period reflects an increase from 51,800 households to 73,000 households; a rate of 1.23 percent compounded annually. At the upper end of assumed RTP/SCS growth rates, employment over the same 28-year period is projected to increase from 31,400 jobs to 83,200 jobs; a rate of approximately 3.54 percent compounded annually. (3) The 2 percent compounded annual traffic growth rate employed in the TIA reflects the fact that not all persons comprising population growth, household growth, or employment growth would translate on a one to one basis as a new vehicle trip in the region; and establishes a judicious midrange estimate lying between the RTP/SCS assumed regional population growth rate (0.94 percent) and the RTP/SCS assumed regional employment growth rate (3.54 percent).

Conservatively, the TIA estimates of area traffic growth then add traffic generated by other known or probable related projects. These related projects are at least in part already accounted for in the assumed annual 2 percent ambient growth in traffic noted above; and in some instances these related projects would likely not be implemented and functional within the 2021 Opening Year time frame assumed for the Project. The resultant assumed traffic growth rate employed in the TIA (2 percent annual ambient growth plus traffic generated by related projects) would therefore tend to overstate rather than understate background cumulative traffic impacts under 2021 conditions.

4.6 CUMULATIVE DEVELOPMENT TRAFFIC

The California Environmental Quality Act (CEQA) guidelines require that other reasonably foreseeable development projects which are either approved or being processed concurrently in the study area also be included as part of a cumulative analysis scenario. A cumulative project list was developed for the purposes of this analysis through consultation with planning and engineering staff from the City of Moreno Valley. The cumulative project list includes known and foreseeable projects that are anticipated to contribute traffic to the study area intersections. The cumulative projects provided by each of the applicable surrounding agencies are provided in Appendix 4.1.

Where applicable, cumulative projects anticipated to contribute measurable traffic (i.e. 50 or more peak hour trips) to study area intersections have been manually added to the study area network to generate Opening Year Cumulative forecasts. In other words, this list of cumulative development projects has been reviewed to determine which projects would likely contribute measurable traffic through the study area intersections (e.g., those cumulative projects in close proximity to the proposed Project). For the purposes of this analysis, the cumulative projects that were determined to affect one or more of the study area intersections are shown on Exhibit 4-5, listed on Table 4-4, and have been considered for inclusion.

Although it is unlikely that these cumulative projects would be fully built and occupied by Year 2021, they have been included in an effort to conduct a conservative analysis and overstate as opposed to understate potential traffic impacts.

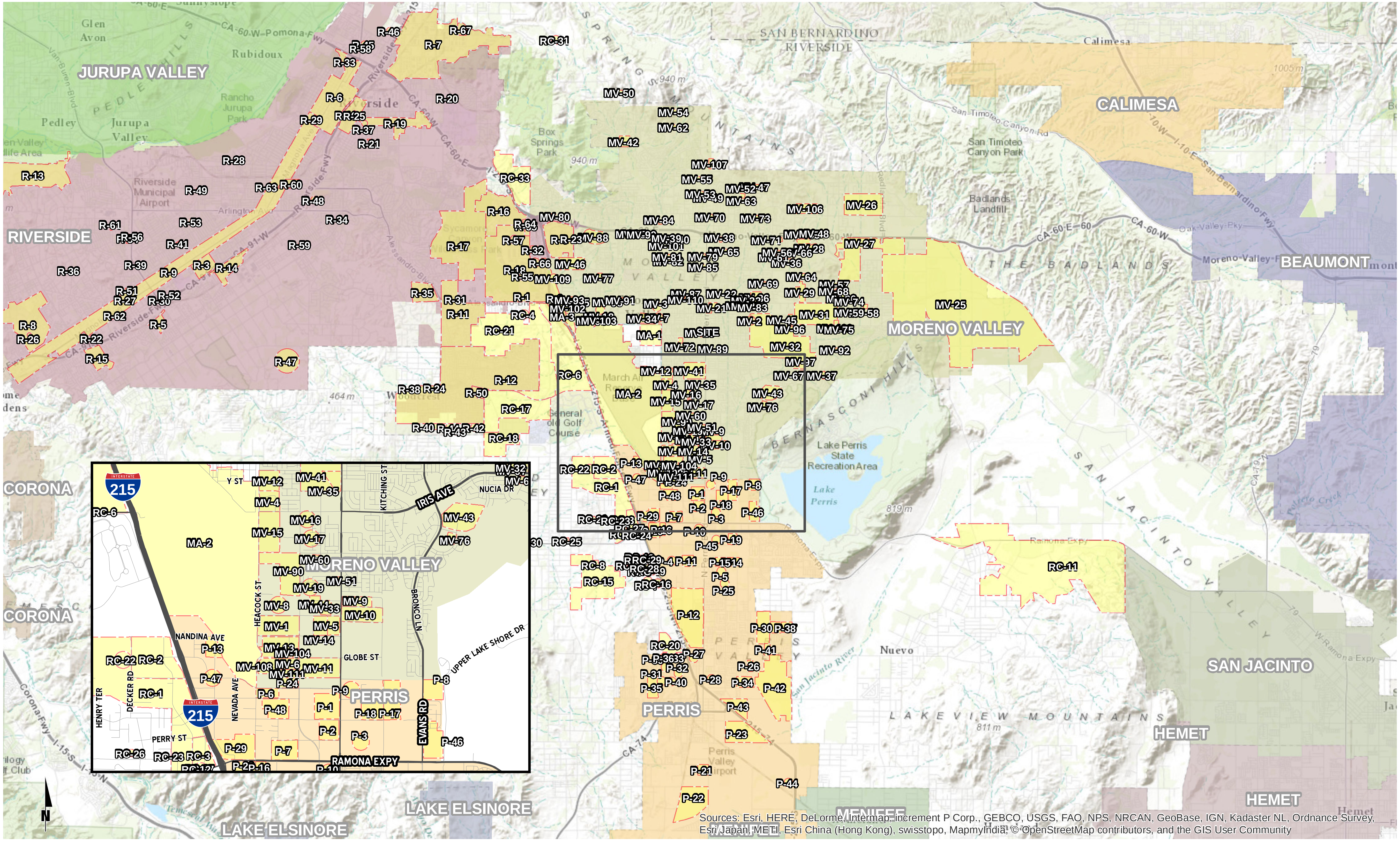
Any other cumulative projects that are not expected to contribute measurable traffic to study area intersections have not been included since the traffic would dissipate due to the distance from the Project site and study area intersections. Any additional traffic generated by other projects not on the cumulative projects list is accounted for through background ambient growth factors that have been applied to the peak hour volumes at study area intersections as discussed in Section 4.5 *Background Traffic*. Cumulative development project ADT and peak hour intersection turning movement volumes are shown on Exhibit 4-5.

4.7 NEAR-TERM TRAFFIC FORECASTS

To provide a comprehensive assessment of potential transportation network deficiencies, the “buildup” analysis was performed in support of this work effort. The “buildup” method was used to approximate the Opening Year Cumulative traffic forecasts, and is intended to identify the cumulative impacts on both the existing and planned near-term circulation system. The Opening Year Cumulative traffic forecasts include background traffic, traffic generated by other cumulative development projects within the study area, and the traffic generated by the proposed Project.

The “buildup” approach combines existing traffic counts with a background ambient growth factor to forecast the near-term 2020 traffic conditions. An ambient growth factor of 10.41% (2021) accounts for background (area-wide) traffic increases that occur over time, up to the year 2021 from the year 2016 (compounded two percent per year growth over a 5-year period). Traffic volumes generated by the Project are then added to assess the Opening Year Cumulative traffic conditions. The 2021 roadway network is similar to the existing conditions roadway network with the exception of future roadways and intersections proposed to be developed by the Project.

Exhibit 4-5: Cumulative Development Projects Location Map



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URBAN CROSSROADS

EXHIBIT 4-6: CUMULATIVE DEVELOPMENT ONLY TRAFFIC VOLUMES

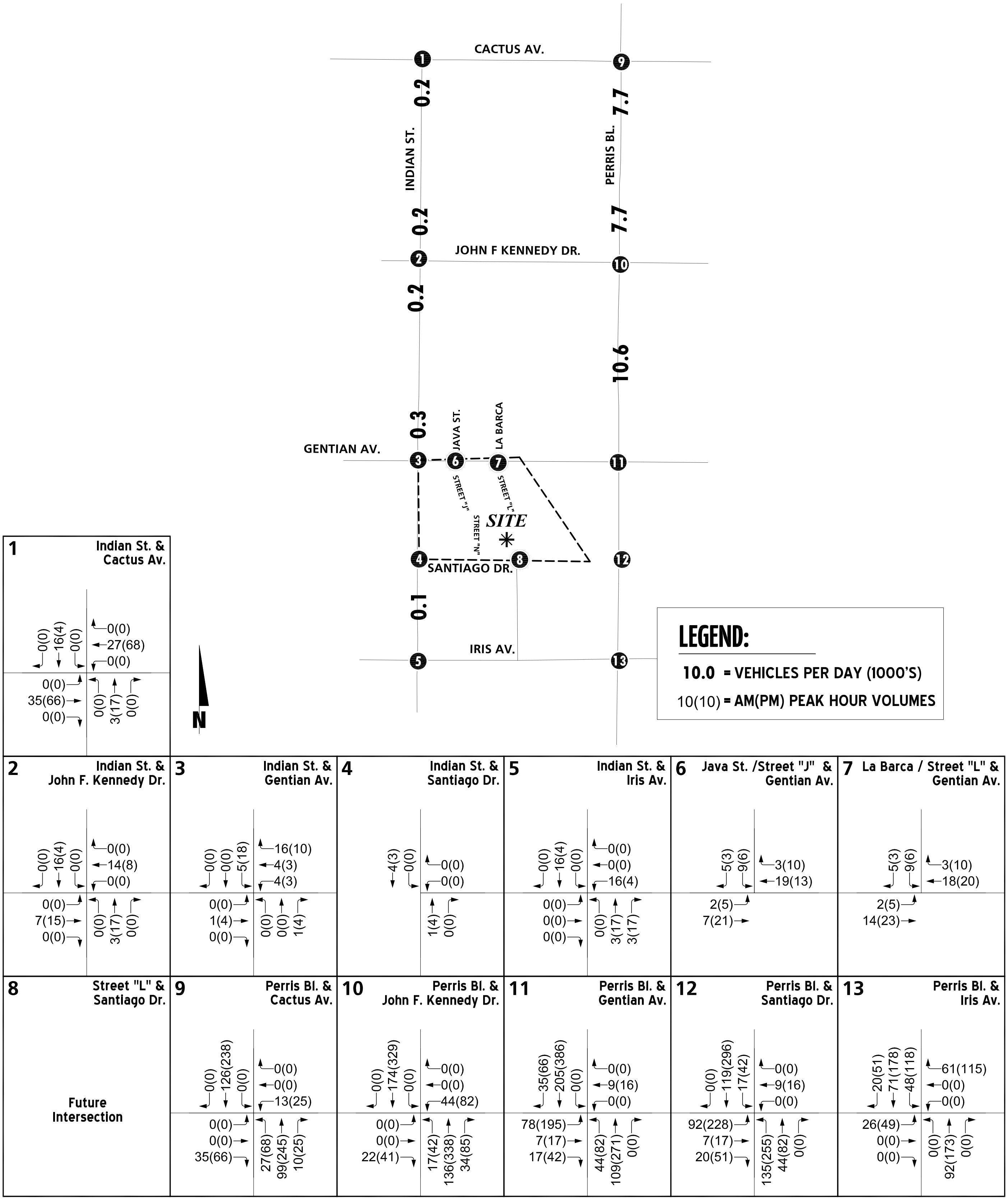

Table 4-4
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Cumulative Development Land Use Summary

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
		CITY OF MORENO VALLEY		
MV-1	PA 06-0152 & PA 06-0153 (First Park Nandina I & II)	High-Cube Warehouse	483.767	TSF
MV-2	Bella Vista Apartments	Apartments	220.00	DU
MV-3	PA 04-0063 (Centerpointe Buildings 8 and 9)	General Light Industrial	361.384	TSF
MV-4	PA 07-0035; PA 07-0039 (Moreno Valley Industrial Park)	General Light Industrial	204.657	TSF
		High-Cube Warehouse	409.920	TSF
MV-5	First Inland Logistics Center	High-Cube Warehouse	400.130	TSF
MV-6	Indian Street Commerce Center Project	High-Cube Warehouse	436.350	TSF
MV-7	PA 08-0093 (Centerpointe Business Park II)	General Light Industrial	99.988	TSF
MV-8	PA 06-0021; PA 06-0022; PA 06-0048; PA 06-0049 (Komar Investments)	Warehousing	287.100	TSF
MV-9	PA 06-0017 (Ivan Devries)	Industrial Park	569.200	TSF
MV-10	Modular Logistics (Dorado Property)	High-Cube Warehouse	1109.378	TSF
MV-11	PA 09-0004 (Vogel)	High-Cube Warehouse	800.000	TSF
	Sares Regis	High-Cube Warehouse	1600.000	TSF
MV-12	TM 34748	SFDR	135	DU
MV-13	First Nandina Logistics Center	High-Cube Warehouse	1450.000	TSF
MV-14	First Park Nandina III	High-Cube Warehouse	691.960	TSF
	Moreno Valley Commerce Park	High-Cube Warehouse	354.321	TSF
MV-15	March Business Center	General Light Industrial	16.732	TSF
		Warehousing	87.429	TSF
		High-Cube Warehouse	1380.246	TSF
MV-16	TM 33810	SFDR	16	DU
MV-17	TM 34151	SFDR	37	DU
MV-18	373K Industrial Facility	High-Cube Warehouse	373.030	TSF
MV-19	TM 32716	SFDR	57	DU
MV-20	TM 33417	Condo/Townhomes	60	DU
MV-21	TM 34988	Condo/Townhomes	271	DU
MV-22	TM 34216	Condo/Townhomes	39	DU
MV-23	TM 34681	Condo/Townhomes	49	DU
MV-24	PA 08-0079-0081 (WinCo Foods)	Discount Supermarket	95.440	TSF
		Specialty Retail	14.800	TSF
MV-25	Moreno Beach Marketplace (Lowe's)	Commercial Retail	175.000	TSF
	Auto Mall Specific Plan (Planning Area C)	Commercial Retail	304.500	TSF
	Westridge	High-Cube Warehouse	937.260	TSF
	ProLogis	High-Cube Warehouse	1916.190	TSF
		Warehousing	328.448	TSF
	World Logistics Center	High-Cube Warehouse	41400.000	TSF
		Warehousing	200.000	TSF
		Gas Station w/ Market	12	VFP
		Existing SFDR	7	DU
MV-26	a TR 32460 (Sussex Capital)	SFDR	57	DU
	b TR 32459 (Sussex Capital)	SFDR	11	DU
	c TR 30411 (Pacific Communities)	SFDR	24	DU
	d TR 33962 (Pacific Scene Homes)	SFDR	31	DU
	e TR 30998 (Pacific Communities)	SFDR	47	DU
MV-27	a P06-158 (Gascon)	Commercial Retail	116.360	TSF
	b Auto Mall Specific Plan (PAC)	Commercial Retail	304.500	TSF
	c ProLogis	SFDR	126	DU
		High-Cube Warehouse	1529.498	TSF
	d TR 35823 (Stowe Passco)	SFDR	261	DU
		Apartments	216	DU
MV-28	TR 36340	SFDR	275	DU
MV-29	a TR 31771 (Sanchez)	SFDR	25	DU
	b TR 34397 (Winchester Associates)	SFDR	52	DU
	c TR 32645 (Winchester Associates)	SFDR	53	DU
MV-30	Lowe's (Moreno Beach Marketplace)	Home Improvement Store	175.000	TSF
MV-31	a Senior Assisted Living	Assisted Living Units	139	DU
	b TR 31590 (Winchester Associates)	SFDR	96	DU
	c TR 32548 (Gabel, Cook & Associates)	SFDR	107	DU
	d TR 32218 (Whitney)	SFDR	63	DU
	e Medical Plaza	Medical Offices	311.633	TSF
MV-32	a Moreno Medical Campus	Medical Offices	80.000	TSF
	b Aqua Bella Specific Plan	SFDR	2,922	DU
	c TR 34329 (Granite Capitol)	SFDR	90	DU
	d Cresta Bella	General Office	30.000	TSF

Attachment: Traffic Study (2444 : Legacy Park Project)

Table 4-4

Cumulative Development Land Use Summary

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
MV-33	Moreno Valley Industrial Center (Industrial Area SP)	General Light Industrial	354.810	TSF
MV-34	Centerpointe Business Park	General Light Industrial	356.000	TSF
MV-35	Moreno Valley Shopping Center	Free Standing Discount Store	189.520	TSF
		Gas Station w/ Market / Car Wash	16	VFP
MV-36	TR 31305 / Richmond American	Residential	87	DU
MV-37	TR 34329 / Granite Capitol	Residential	90	DU
MV-38	TR 31814 / Moreno Valley Investors	Residential	60	DU
MV-39	TR 33771 / Creative Design Associates	Residential	12	DU
MV-40	TR 35663 / Kha	Residential	12	DU
MV-41	TR 22180 / Young Homes	Residential	140	DU
MV-42	TR 32515	Residential	161	DU
MV-43	TR 32142	Residential	81	DU
MV-44	San Michele Industrial Center (Industrial Area SP)	General Light Industrial	865.960	TSF
MV-45	Commercial Medical Plaza	Medical Offices	311.633	TSF
MV-46	Edgemont Street, South of Eucalyptus Av. (PA14-0042)	Apartments	112	DU
MV-47	28860 Professor's Fun IV, LLC/Winchester Associates, Inc.	SFDR	9	DU
MV-48	20636 Pacific Communities	SFDR	67	DU
MV-49	31297 Randy McFarland	SFDR	7	DU
MV-50	31394 Pigeon Pass, Ltd.	SFDR	78	DU
MV-51	31442 SKG Pacific Enterprises Inc.	SFDR	63	DU
MV-52	31517 Professors Prop Six/Winchester Assoc.	SFDR	83	DU
MV-53	31621 Peter Sanchez	SFDR	25	DU
MV-54	32005 Red Hill Village, LLC	SFDR	214	DU
MV-55	32126 Salvador Torres	SFDR	35	DU
MV-56	32194 Arman Pezeshkifar	SFDR	32	DU
MV-57	32408 Sanstone Inc.	SFDR	80	DU
MV-58	32844 Winchester Associates	SFDR	17	DU
MV-59	32978 Focus Estates	SFDR	19	DU
MV-60	33024 Adam Wislar	SFDR	8	DU
MV-61	33275 Jose Guzman	SFDR	4	DU
MV-62	33388 SCH Development, LLC	SFDR	16	DU
MV-63	33436 Winchester Associates	SFDR	105	DU
MV-64	33963 Rance Garrett	SFDR	31	DU
MV-65	34043 RM3 Building and Development	SFDR	12	DU
MV-66	31621 Beazer Homes	SFDR	274	DU
MV-67	30268 Pacific Communities	SFDR	83	DU
MV-68	31414 GRF - Majestic Hills	SFDR	31	DU
	Tract 31618	SFDR	55	DU
MV-69	31494 Winchester Associates	SFDR	12	DU
MV-70	32715 GFR - Trinity	SFDR	30	DU
MV-71	33256 Granite Homes	SFDR	79	DU
MV-72	32711 Isaac Genah	SFDR	9	DU
MV-73	35530 Moreno Gilman 650, LLC-Quail Ranch	SFDR	1,105	DU
MV-74	35534 Leedco Engineers	SFDR	12	DU
MV-75	36436 CV Communities	SFDR	159	DU
MV-76	36401 Continental East Fund III, LLC	SFDR	92	DU
MV-77	32215 Winchester Associates "Scottish Village"	MFDR	194	DU
MV-78	32756 Jimmy Lee	MFDR	24	DU
MV-79	35369 Tason Myers Property	MFDR	12	DU
MV-80	35414 Lincoln Property Co. Southwest	MFDR	266	DU
MV-81	35769 Michael Chen	MFDR	16	DU
MV-82	PA09-0006 Jim Nydam	MFDR	15	DU
MV-83	35861 Frederick Homes	MFDR	24	DU
MV-84	36038 Alessandro Village Plaza, LLC	MFDR	96	DU
MV-85	35304 Jimmy Lee	MFDR	12	DU
MV-86	Alessandro & Lasselle	Shopping Center	140.000	TSF
MV-87	Food 4 Less - Fueling Station	Gas Station with Convenience Market	16	VFP
MV-88	El Paso (food court)	Fast Food no Drive Thru	--	TSF
MV-89	O'Reilly Automotive	Automobile Parts Sale	7.500	TSF
	PA15-004	Retail/Restaurant/Fast Food	2.973	TSF
MV-90	Moreno Valley Logistics	High-Cube Warehouse	1351.770	TSF
		Light Industrial	385.748	TSF
MV-91	Restaurant	Restaurant	9.000	TSF
MV-92	Rancho Belago Plaza - Retail	Retail	14.000	TSF
MV-93	Yum Yum Donut Shop	Coffee/Donut Shop w/o Drive-Thru	4.351	TSF

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Cumulative Development Land Use Summary

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
MV-94	Hawthorn Inn & Suites	Hotel	79	RMS
MV-95	Sleep Inn Suites	Hotel	66	RMS
MV-96	Integrated Care Communities	Nursing Home	44.000	TSF
MV-97	Kaiser Permanente - Emergency Room Expansion	Medical Offices	--	TSF
MV-98	Moreno Valley Professional Center	General Office	84.000	TSF
MV-99	Olivewood Plaza - Office Building	General Office	23.000	TSF
MV-100	Renaissance Village of Moreno Valley	Senior Adult Housing-Attached	44	DU
MV-101	Riverside County Office Building	General Office	52.000	TSF
MV-102	Gateway Business Park	Residential Condo/Townhouse	34	DU
MV-103	Shaw Development	High-Cube Warehouse	367.000	TSF
MV-104	IDS/Real Estate Group - Nandina Distribution Center	High-Cube Warehouse	697.000	TSF
MV-105	Stoneridge Town Centre - Vacant Restaurant	Restaurant	5700.000	TSF
MV-106	Ironwood Residential	SFDR	144	DU
MV-107	TTM 31592 (P 13-078) Covey Ranch	SFDR	115	DU
MV-108	PA 06-0014 (Pierce Hardy Limited Partnership)	Lumbar Yard	67.000	TSF
MV-109	P06-1408	Retail	75.300	TSF
MV-110	PA13-009	Gas Station	16	VFP
MV-111	Moval Assemblage	High-Cube Warehouse	459.945	TSF
MARCH JOINT POWERS AUTHORITY				
MA-1	March Lifecare Campus Specific Plan[4]	Medical Offices	190.000	TSF
		Commercial Retail	210.000	TSF
		Research & Education	200.000	TSF
		Hospital	50	Beds
		Institutional Residential	660	Beds
MA-2	Airport Master Plan	Airport Use	559.000	TSF
MA-3	Freeway Business Center (March JPA)	High-Cube Warehouse	710.083	TSF
COUNTY OF RIVERSIDE				
RC-1	SP 341; PP 21552 (Majestic Freeway Business Center)	High-Cube Warehouse	6100.715	TSF
RC-2	PP 20699 (Oleander Business Park)	Warehousing	1206.710	TSF
RC-3	Ramona Metrolink Station	Light Rail Transit Station	300	SP
RC-4	PP 22925 (Amstar/Kaliber Development)	Office (258.102 TSF)	258.102	TSF
		Warehousing	409.312	TSF
		General Light Industrial	42.222	TSF
		Retail	10.000	TSF
RC-5	Alessandro Metrolink Station	Light Rail Transit Station	300	SP
RC-6	Meridian Business Park North	Industrial Park	5985.000	TSF
RC-7	PP 18908	General Light Industrial	133.000	TSF
RC-8	Tract 33869	SFDR	39.000	DU
RC-9	PP 16976	General Light Industrial	85.000	TSF
RC-10	PP 21144	Industrial Park	190.802	TSF
RC-11	a Villages of Lakeview	SFDR	860	DU
		Condo/Townhomes	1,920	DU
		Elementary School	1,200	STU
		Commercial Retail	100.000	TSF
		Soccer Complex	12	Fields
		City Park	8.9	AC
		County Park	8.1	AC
		Regional Park	107.1	AC
	b Motte Lakeview Ranch	SFDR	847	DU
		Condo/Townhomes	686	DU
		Apartments	467	DU
		Elementary School	650	STU
		Middle School	300	STU
		Commercial Retail	120.000	TSF
		Regional Park	177.0	AC
RC-12	CUP03315	Gas Station w/ Market	17	VFP
		Fast Food w/o Drive Thru	5.600	TSF
		High-Turnover Restaurant	6.500	TSF
RC-13	PP23342	Industrial Park	180.600	TSF
RC-14	TR30592	SFDR	131	DU
RC-15	Rider Street Quarry	Quarry	2500.0	AC
RC-16	PP 20711	Manufacturing	20.0	AC
	Yocum Baldwin	Warehousing	46.8	AC

Attachment: Traffic Study (2444 : Legacy Park Project)

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Cumulative Development Land Use Summary

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
RC-17	March Business Center - South Campus	Shopping Center	108.900	TSF
		Industrial Park	1336.700	TSF
		Large Industrial Park	3269.000	TSF
		General Office Building	140.600	TSF
		Manufacturing	215.600	TSF
		Warehousing	1379.200	TSF
		Park	50.0	AC
		R&D	1611.800	TSF
RC-18	Ben Clark Training Facility	Students	5,045	STU
		Employees	354	EMP
RC-19	PP 20103	Gen. Light Industrial	290.985	TSF
RC-20	Nuevo Business Park	Gen. Light Industrial	357.156	TSF
		Warehousing	1767.618	TSF
RC-21	Meridian (March Business Park SP)	Business Park	41917.000	TSF
RC-22	Blanding Assemblage	High-Cube Warehouse	707.880	TSF
RC-23	CUP 03527	Warehousing	8.000	TSF
RC-24	CUP 03599	Hotel	52.798	TSF
RC-25	PP 24608	Retail	9.280	TSF
RC-26	PM 32699	SFDR	2.00	DU
RC-27	PP 25699	Fast-Food w/Drive Thru	2.800	TSF
		Retail	19.000	TSF
RC-28	TR 30592	SFDR	131.00	DU
RC-29	PP 25768	Manufacturing	52.450	TSF
RC-30	CUP 03620R1	Gas Station w/ Market	8.00	VFP
RC-31	TTM 33410 Box Springs	SFDR	142	DU
RC-32	Knox Logistics	High-Cube Warehouse	1,259.050	TSF
RC-33	University Highlands	SFDR	405	DU
		Condo/Townhomes	320	DU
		Apartments	1,475	DU
		Shopping Center	50.0	TSF
		Parks	42.4	AC
		CITY OF RIVERSIDE		
R-1	P07-1028 (Alessandro Business Park)	General Light Industrial	662.018	TSF
	Alessandro and Gorgonio	Fast Food w/Drive Thru	4.050	TSF
R-2	Alessandro Bl. (APN 263-091-008; 263-100-019; 263-100-005; P14-0841 to 0848)	Commercial and Industrial Complex	101.580	TSF
R-3	California Baptist University Specific Plan	University	157.0	AC
R-4	Canyon Springs Specific Plan	Hospital	280	BEDS
		Medical-Dental Office	370.000	TSF
		Senior Adult Housing-Attached	234	DU
		Assisted Living	267	BEDS
R-5	Citrus Business Park Specific Plan	Industrial Business Park	49.0	AC
R-6	Downtown Specific Plan	Residential	5,000	DU
R-7	Hunter Business Park	Industrial	1300.0	AC
R-8	La Sierra University Specific Plan	Mixed-Use		
R-9	Magnolia Avenue Specific Plan	Mixed-Use/Very High Residential	1473.0	AC
R-10	Marketplace Specific Plan	Commercial Retail/Office	200.0	AC
R-11	Mission Grove Specific Plan	Business/Office Park	56.8	AC
		Commercial Retail	68.1	AC
		High Density Residential	53.8	AC
		Low Density Residential	78.4	AC
		Medium Density Residential	155.3	AC
R-12	Orangecrest Specific Plan	Rural Residential	2.1	AC
		Business/Office Park	2.7	AC
		Commercial Retail	139.0	AC
		High Density Residential	13.7	AC
		Low Density Residential	540.8	AC
		Medium Density Residential	1217.8	AC
		Public Facilities/Institutions	121.6	AC
		Public Park	59.5	AC
R-13	Rancho La Sierra Specific Plan	SFDR	598	DU
R-14	Riverside Auto Center Specific Plan	Auto Center		
R-15	Riverwalk Vista Specific Plan	Residential	402	DU

Table 4-4

Cumulative Development Land Use Summary

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
R-16	Sycamore Canyon Specific Plan	Hillside Residential	41.8	AC
		Low Density Residential	97.3	AC
		Medium Density Residential	14.8	AC
		Very Low Density Residential	884.2	AC
		Public Park	27.9	AC
R-17	Sycamore Canyon Business Park Specific Plan	Business/Office Park	847.2	AC
		Commercial Retail	10.3	AC
R-18	Sycamore-Highlands Specific Plan	Commercial Retail	14.6	AC
		High Density Residential	52.2	AC
		Medium Density Residential	99.1	AC
		Public Facilities	1.6	AC
			144.2	AC
		Very Low Density Residential	49.1	AC
R-19	University Avenue Specific Plan	Mixed-Use	Varies	
R-20	807 Blaine Street (P09-0717; P09-0718)	Apartments	55	DU
R-21	2340 Fourteenth Street (P09-0808; P08-0809)	Senior Housing	134	BEDS
R-22	Park Sierra Avenue (P14-0026; P14-0027)	Fast Food w/Drive Thru	3.500	TSF
R-23	6287 Day Street (P10-0090; P10-0091)	Gas Station	2	VFP
	2570 Canyon Springs Parkway (P08-0274; P08-0275)	Bank w/ Drive Thru	2.746	TSF
	6211 Valley Springs Parkway (Steak 'N Shake Restaurant; P14-0536)	Fast Food w/Drive Thru	3.750	TSF
R-24	N. of Van Buren Boulevard; W. of Wood Street (P10-0808; P10-0708)	Fast Food w/Drive Thru	2.361	TSF
R-25	E. of Commerce St., between Mission Inn Av. and Ninth St. (P14-0045; P14-0046; P14-0047; P14-0048; P14-0049)	Apartments	208	DU
R-26	NWC of Riverwalk Parkway and Flat Rock Drive (P12-0019; P12-0156; P12-0158)	Convenience Store	2.400	TSF
		Coffee Shop	3.946	TSF
R-27	3875 Dawes Street (P10-0438; Magnolia Garden Condominiums)	Condo/Townhomes	62	DU
R-28	5938-5944 Grand Avenue (P12-0266; P12-0267; P12-0268)	Senior Housing	37	DU
R-29	4445 Magnolia Avenue (P13-0207; P13-0208; P13-0209; P13-0210; P13-0211)	Hospital Expansion	Varies	
R-30	SR-91/Van Buren Commercial	Commercial Retail	23.565	TSF
R-31	360 Alessandro Boulevard (P12-0419; P12-0557; P12-0558; P12-0559)	Bank	3.858	TSF
R-32	6465 Sycamore Canyon Boulevard	Health Club	4.000	TSF
R-33	2450 Market Street (P13-0087; P13-0262)	Apartments	77	DU
R-34	6091 Victoria Avenue (P13-0432)	Day Care	1.831	TSF
R-35	14601 Dauchy Av. - TM 36370 (P12-0601; P12-0697; P12-0698)	SFDR	10	DU
	TM 32180 (P07-1073)	SFDR	9	DU
	18875 Moss Road	SFDR	8	DU
	South of Clarke St., west of Crystal View Terrace (PM 34583' {09-0141; P09-173)	SFDR	3	DU
R-36	4824 Jones Avenue (P13-0181; P13-0182)	Church	23.124	TSF
R-37	2586 University avenue (P13-0650; P13-0651)	Bed and Breakfast	3.618	TSF
R-38	18580 Van Buren Boulevard (P08-0402; P13-0822)	Auto Repair Shop	8.142	TSF
R-39	4247 Van Buren Boulevard (P13-0785; P13-0787)	Church Expansion	12.166	TSF
R-40	SWC of Lurin Avenue and Wood Road (P06-0900; P08-0269; P08-0270; TTM 32301)	SFDR	20	DU
R-41	8616 California Avenue (P08-0084; PM 35852)	Condo/Townhomes	21	DU
R-42	19811 Lurin Avenue (P06-1355; TM 33480)	SFDR	32	DU
R-43	APN:266140029, 030 (P06-1396; Mariposa Avenue; TM 33481)	SFDR	25	DU
R-44	APN:266140002, 021, 022 (P06-1404; Lurin Avenue; TM 33482)	SFDR	29	DU
R-45	3719 Strong Street (P05-0269; P08-0416; TM 33550)	SFDR	9	DU
R-46	1006 & 1008 Clark Street (P06-0782; TM 34908)	SFDR	15	DU
R-47	E. of Gratton St., W. of Corsica Av., N. of Van Buren Bl. (P05-1528; P09-0087; TM 34509)	SFDR	50	DU
R-48	NWC of Dominion Avenue and Division Street (P08-0396; P08-0397; P08-0398; P08-0399; TM 35620)	Condo/Townhomes	36	DU
R-49	6639 Hillside Avenue (P08-0727; PM 35901)	Industrial	5	LOTS
R-50	19985 Van Buren Boulevard (P10-0118; Gless Ranch)	Commercial Retail	425.447	TSF
R-51	3990 Reynolds Road (P12-0021; P12-0022; P12-0074; PM 36442)	Condo/Townhomes	102	DU
R-52	NEC of Martha Way & Everest Avenue (P13-0389; TM 36579)	SFDR	5	DU
R-53	4325, 4335, 4345, 4355, 4375 Adams Street (P13-0723; P13-0724; P13-0725; TM 36654)	SFDR	62	DU
R-54	5200 Van Buren Boulevard (P09-0600; P09-0601; Walmart Expansion)	Free Standing Discount Store	22.272	TSF
R-55	P06-0160	Gen. Light Industrial	316.224	TSF
	P06-1281	Warehousing	107.732	TSF

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Cumulative Development Land Use Summary

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
R-56	9241 & 9265 Audrey Avenue (P12-0184; P12-0185; P12-0187; Azar Plaza)	Commercial Retail	6.150	TSF
R-57	Office, Magnon & Panattoni	Office	131.000	TSF
		Warehousing	1400.000	TSF
		Warehousing	300.000	TSF
		Warehousing	216.000	TSF
R-58	1710 Main Street (P12-0717)	Family Dollar Store	8.039	TSF
R-59	2861 Mary Street (P12-0442; P12-0443; P12-0444)	Shopping Center	56.101	TSF
R-60	3545 Central Avenue (P12-0741; P12-0743)	Riverside Plaza Renovations	35.0	AC
R-61	5731, 5741, 5761 & 5797 Pickler Street (P13-0198; P13-0199; P13-0200; P13 0201)	Apartments	30	DU
R-62	3705 Tyler Street (P13-0501; P13-0502)	Restaurant	6.000	TSF
R-63	6570 Magnolia Avenue; 3739 & 3747 Central Avenue (P13-0196; P13-0197)	Fast Food w/Drive Thru	3.795	TSF
R-64	5940-5980 Sycamore Canyon Boulevard (P13-0553; P13-0554; P13-0583; P14-0065)	Apartments	275	DU
R-65	SEC Sycamore Canyon Boulevard & Box Springs Road (P13-0607; P13-0608; P0609; P13-0854)	General Light Industrial	171.616	TSF
R-66	P06-0591	Office	37.939	TSF
		Warehousing	782.188	TSF
		Manufacturing	168.294	TSF
R-67	474 Palmyrita Avenue (P13-0956; P13-0959; P13-0960; P13-0963; P13-0964; P13-0965; P13-0966)	High-Cube Warehouse	1461.449	TSF
	CITY OF PERRIS			
P-1	P 05-0113 (IDI)	High-Cube Warehouse	1750.000	TSF
P-2	P 05-0192 (Oakmont I)	High-Cube Warehouse	697.600	TSF
P-3	P 05-0477	High-Cube Warehouse	462.692	TSF
P-4	Rados Distribution Center	High-Cube Warehouse	1200.000	TSF
P-5	Investment Development Services (IDS) II	High-Cube Warehouse	350.000	TSF
P-6	P 07-09-0018	Warehousing	170.000	TSF
P-7	P 07-07-0029 (Oakmont II)	High-Cube Warehouse	1600.000	TSF
P-8	TR 32707	SFDR	137	DU
P-9	TR 34716	SFDR	318	DU
P-10	P 05-0493 (Ridge I)	High-Cube Warehouse	700.000	TSF
P-11	Ridge II	High-Cube Warehouse	2000.000	TSF
P-12	Harvest Landing Specific Plan	SFDR	717	DU
		Condo/Townhomes	1,139	DU
		Sports Park	16.7	AC
		Business Park	1233.401	TSF
		Shopping Center	73.181	TSF
	Perris Marketplace	Shopping Center	450.000	TSF
P-13	P 06-0411 (Concrete Batch Plant)	Manufacturing	2.000	TSF
P-14	Jordan Distribution	High-Cube Warehouse	378.000	TSF
P-15	Aiere	High-Cube Warehouse	642.000	TSF
P-16	P 08-11-0005; P 08-11-0006 (Starcrest)	High-Cube Warehouse	454.088	TSF
P-17	Stratford Ranch Specific Plan	High-Cube Warehouse	1725.411	TSF
P-18	Stratford Ranch Specific Plan	High-Cube Warehouse	480.000	TSF
		General Light Industrial	120.000	TSF
P-19	P05-0493	Logistics	597.370	TSF
P-20	Starcrest, P011-0005; 08-11-0006	General Light Industrial	454.088	TSF
P-21	South Perris Industrial Phase 1	Logistics	787.700	TSF
P-22	South Perris Industrial Phase 2	Logistics	3448.734	TSF
P-23	South Perris Industrial Phase 3	Logistics	3166.857	TSF
P-24	P 04-0343	Warehousing	41.650	TSF
P-25	P 06-0228	General Light Industrial	149.738	TSF
P-26	P 06-0378	Senior Housing	429	DU
P-27	P 11-09-0011	Retail	80.000	TSF
P-28	P 12-05-0013	Apartments	75	DU
P-29	P 12-10-0005	High-Cube Warehouse	1463.887	TSF
P-30	TR 30850	Residential	496	DU
P-31	TR 30973	Residential	35	DU
P-32	TR 31225	Residential	57	DU
P-33	TR 31226	Residential	82	DU
P-34	TR 31240	Residential	114	DU
P-35	TR 31407	Residential	243	DU

Table 4-4

Cumulative Development Land Use Summary

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
P-36	TR 31650	SFDR	61	DU
P-37	TR 31659	SFDR	161	DU
P-38	TR 32041	Residential	122	DU
P-39	TR 32406	SFDR	15	DU
P-40	TR 33193	Townhomes	94	DU
P-41	TR 33338	Residential	75	DU
P-42	Park West Specific Plan	SFDR	521	DU
		Elementary School	750	STU
		Neighborhood Park	5.0	AC
P-43	The Venue	Commercial Retail	642.627	TSF
	Retail on San Jacinto	Commercial Retail	217.800	TSF
	Retail on Redlands	Fast Food w/ Drive Thru	4.500	TSF
		Pharmacy w/ Drive Thru	14.000	TSF
		Specialty Retail	31.500	TSF
P-44	South Perris Metrolink Station	Light Rail Transit Station	680	SP
P-45	IDS 04-0464	High-Cube Warehouse	1686.760	TSF
P-46	TTM 32708 (50% Complete)	SFDR	238	DU
P-47	PM 34199	Gen. Light Industrial	46.500	TSF
	DPR 05-0387	Gen. Light Industrial	9.854	TSF
	DPR 05-0452	Warehousing	31.200	TSF
	TPM 34697	Gen. Light Industrial	47.400	TSF
	DPR 06-0396	Warehousing	159.823	TSF
P-48	Integra Pacific Industrial Facility	High-Cube Warehouse	880.000	TSF

[1] SFDR = Single Family Detached Residential ; MFDR = Multi-Family Detached Residential

[2] DU = Dwelling Units; TSF = Thousand Square Feet; SP = Spaces; VFP = Vehicle Fueling Positions; RMS = Rooms; AC = Acres; EMP = Employees

[3] Source: Cactus Avenue and Commerce Center Drive Commercial Center TIA, Urban Crossroads, Inc., December 9, 2008 (Revised).

[4] Source: March Lifecare Campus Specific Plan Traffic Impact Analysis, Mountain Pacific, Inc., May 2009 (Revised).

As noted previously, an analysis of the proposed Project at various development tiers has been assessed for the purposes of this traffic study. The near-term traffic analysis includes the following traffic conditions, with the various traffic components:

- Opening Year Cumulative (2021)
    - Existing 2016 counts
    - Ambient growth traffic (10.41%)
    - Cumulative Development Project traffic
    - Project traffic

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5 E+P TRAFFIC CONDITIONS

This section discusses the traffic forecasts for Existing plus Project (E+P) conditions and the resulting intersection operations, roadway segment, and traffic signal warrant analyses.

5.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for E+P conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- Project driveways and those facilities assumed to be constructed by the Project to provide site access are also assumed to be in place for E+P conditions only (e.g., intersection and roadway improvements at the Project's frontage and driveways).

5.2 E+P TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus Project traffic. Exhibit 5-1 shows the ADT and peak hour intersection turning movement volumes, which can be expected for E+P traffic conditions.

5.3 INTERSECTION OPERATIONS ANALYSIS

E+P peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA. The intersection analysis results are summarized in Table 5-1, which indicate that consistent with Existing traffic conditions, the following study area intersection is anticipated to operate at an unacceptable LOS:

Exhibit 5-2 summarizes the weekday AM and PM peak hour study area intersection LOS under E+P traffic conditions, consistent with the summary provided in Table 5-1. The intersection operations analysis worksheets are included in Appendix 5.1 of this TIA.

5.4 ROADWAY SEGMENT CAPACITY ANALYSIS

As noted previously, the City of Moreno Valley stated roadway segment capacities are approximate figures only and are used at the General Plan level to assist in determining the roadway functional classification (number of through lanes) needed to meet future traffic demand.

Table 5-2 provides a summary of the E+P conditions roadway segment capacity analysis based on the City of Moreno Valley General Plan Circulation Element Roadway Segment Capacity/LOS Thresholds identified previously on Table 2-3. As shown on Table 5-2, there are no roadway segments that are anticipated to operate at an unacceptable LOS under E+P traffic conditions, consistent with Existing traffic conditions.

EXHIBIT 5-1: E+P TRAFFIC VOLUMES

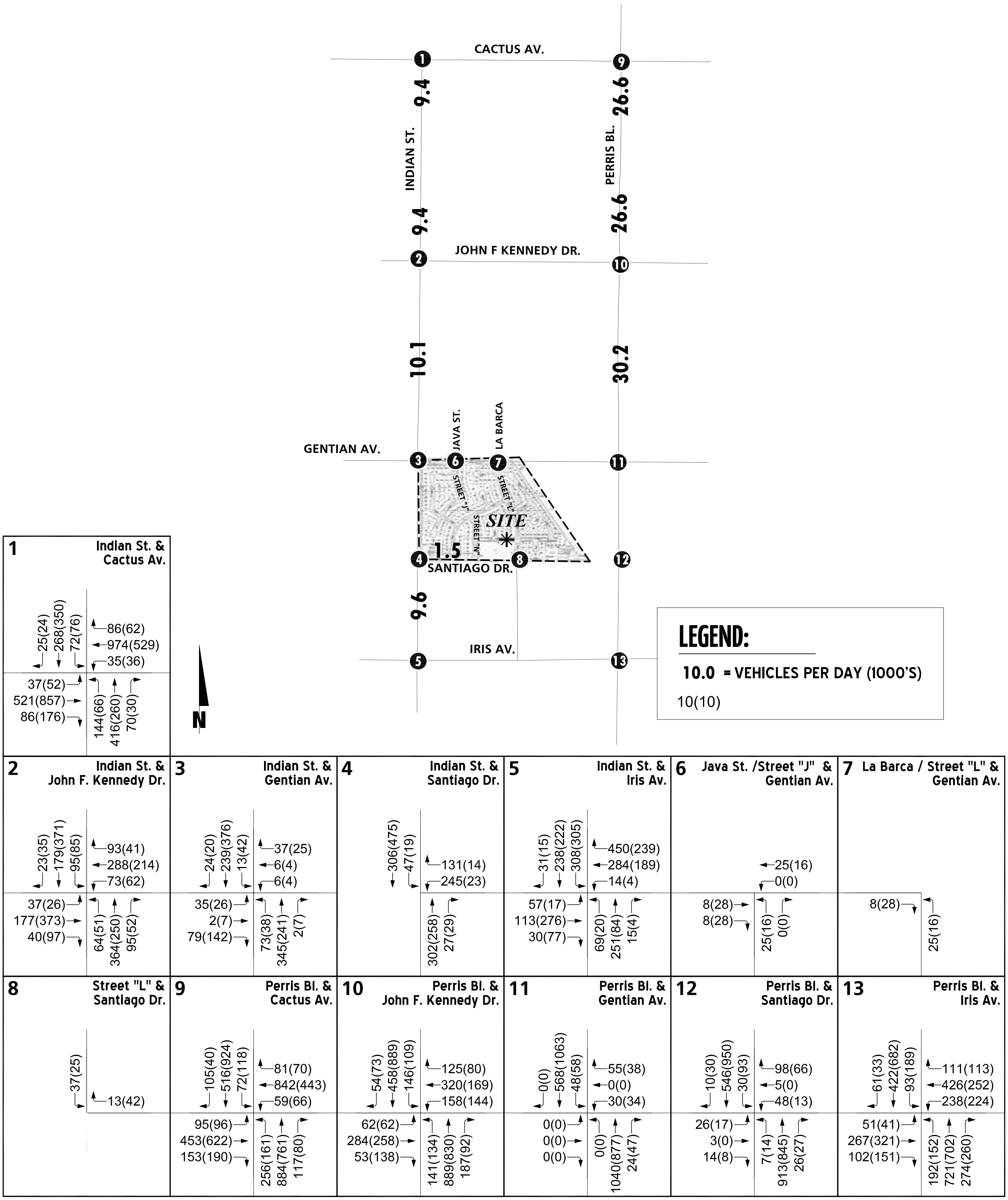
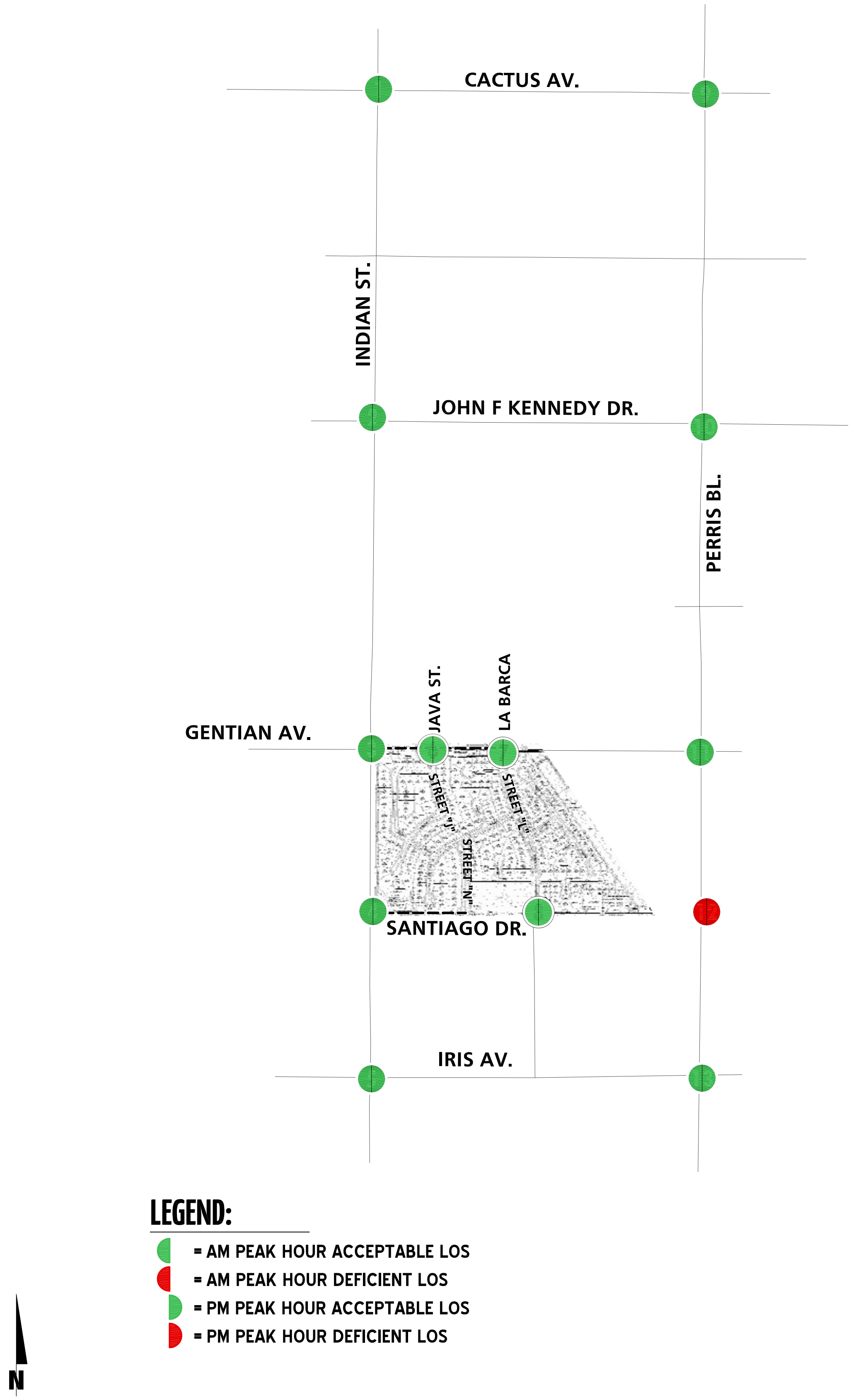


EXHIBIT 5-2: E+P SUMMARY OF LOS



Attachment: Traffic Study (2444 : Legacy Park Project)

Table 5-1

Intersection Analysis for E+P Conditions

#	Intersection	Traffic Control [2]	Existing (2016) Delay [1] (secs.) AM	Existing (2016) Delay [1] (secs.) PM	Existing (2016) Level of Service AM	Existing (2016) Level of Service PM	E+P Delay [1] (secs.) AM	E+P Delay [1] (secs.) PM	E+P Level of Service AM	E+P Level of Service PM
1	Indian St / Cactus Av	TS	28.4	27.2	C	C	29.5	28.7	C	C
2	Indian St / John F. Kennedy Dr	TS	26.5	24.6	C	C	26.5	24.9	C	C
3	Indian St / Gentian Av	CSS	20.0	15.1	C	C	28.6	21.0	D	C
4	Indian St / Santiago Dr	TS	14.7	2.6	B	A	15.8	4.7	B	A
5	Indian St / Iris Av	TS	44.8	30.6	D	C	49.9	31.6	D	C
6	Street J / Gentian Av	<u>**CSS**</u>	Future Intersection				8.8	8.9	A	A
7	Street L / Gentian Av	<u>**CSS**</u>	Future Intersection				8.6	8.6	A	A
8	Street L / Santiago Dr	<u>**CSS**</u>	Future Intersection				0.0	0.0	A	A
9	Perris Bl / Cactus Av	TS	25.2	33.6	C	C	32.2	35.9	C	D
10	Perris Bl / John F. Kennedy Dr	TS	40.9	44.7	D	D	41.4	45.9	D	D
11	Perris Bl / Gentian Av	TS	5.9	4.9	A	A	5.9	4.9	A	A
12	Perris Bl / Santiago Dr	CSS	**47.4**	**43.7**	**E**	**E**	**48.9**	**57.1**	**E**	**F**
13	Perris Bl / Iris Av	TS	44.5	36.2	D	D	45.0	36.3	D	D

[1] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; TS = Traffic Signal

Table 5-2

Roadway Segment Capacity Analysis for E+P Conditions

#	Roadway	Segment Limits	Roadway Section	LOS Capacity[1]	Existing (2016)	V/C	LOS	E+P	V/C	LOS	Acceptable LOS
1	Indian Street	Cactus Avenue to John F. Kennedy Dr.	4D	37,500	8,525	0.23	A	9,367	0.25	A	C
2		John F. Kennedy Dr. to Gentian Av.	4D	37,500	9,215	0.25	A	10,057	0.27	A	C
3		Santiago Dr. to Iris Av.	2U	12,500	9,105	0.73	C	9,631	0.77	C	D
4	Gentian Avenue	Indian St. to Street J/Java St.	**2U**	12,500	N/A	N/A	N/A	840	0.07	A	C
5		Street J/Java St. to Street L/La Barca	**2U**	12,500	N/A	N/A	N/A	420	0.03	A	C
6		West of Perris Bl.	--	--	N/A	N/A	N/A	N/A	N/A	N/A	C
7	Santiago Drive	East of Indian St.	2U	12,500	842	0.07	A	1,474	0.12	A	C
8		West of Perris Bl.	2U	12,500	13	0.00	A	643	0.05	A	C
9	Perris Boulevard	Cactus Avenue and John F. Kennedy Dr.	6D	56,300	26,172	0.46	A	26,592	0.47	A	D
10		John F. Kennedy Dr. to Gentian Av.	6D	56,300	29,801	0.53	A	30,221	0.54	A	D

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

N/A = Not Applicable; Segment does not exist.

[1] These maximum roadway capacities have been extracted from the City of Moreno Valley's Transportation Division's Traffic Impact Analysis Transportation Division's Traffic Impact Analysis Preparation Guidelines (August 2007). These roadway capacities are "rule of thumb" estimates for planning purposes. The LOS E service volumes are estimated maximum daily capacity for respective classifications. Capacity is affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian and bicycle traffic.

5.5 TRAFFIC SIGNAL WARRANTS ANALYSIS

There are no additional study area intersections anticipated to meet either peak hour or planning level (ADT) volume based traffic signal warrants under E+P traffic conditions, in addition to those previously warranted under Existing traffic conditions (see Appendix 5.2).

5.6 RECOMMENDED IMPROVEMENTS

5.6.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

Improvement strategies have been recommended at intersections that have been identified as deficient to reduce each location's peak hour delay and improve the associated LOS grade to an acceptable LOS (i.e., LOS D or better). The effectiveness of the proposed recommended improvements is presented in Table 5-3 for E+P traffic conditions. Recommended improvements to address deficiencies for E+P traffic conditions are described below. All recommended improvements are consistent with Existing (2016) traffic conditions (see Table 3-3).

Recommended Improvement – Perris Boulevard / Santiago Drive (#12)

- Install a traffic signal.

Worksheets for E+P conditions, with improvements, HCM calculations are provided in Appendix 5.3.

5.6.2 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES ON ROADWAY SEGMENTS

All study area roadway segments are anticipated to operate at acceptable LOS (LOS C or better) for E+P traffic conditions. As such, no roadway improvements have been recommended.

Table 5-3

Intersection Analysis for E+P Conditions With Improvements

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1] Northbound L	T	R	Southbound L	T	R	Eastbound L	T	R	Westbound L	T	R	Delay[2] (secs.) AM	PM	Level of Service AM	PM
12	Perris Bl / Santiago Dr																	
	Existing (2016):																	
	Without Improvements	CSS	1	3	0	1	3	0	0	1	d	0	1	d	**47.4**	**43.7**	**E**	**E**
	With Improvements	**TS**	1	3	0	1	3	0	0	1	d	0	1	d	9.1	8.3	A	A
	E+P:																	
	Without Improvements	CSS	1	3	0	1	3	0	0	1	d	0	1	d	**48.9**	**57.1**	**E**	**F**
	With Improvements	**TS**	1	3	0	1	3	0	0	1	d	0	1	d	19.3	11.3	B	B

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for righ turning vehicles to travel outside the through lanes

L = Left; T = Through; R = Right; > = Right-Turn Overlap Phasing; d= Defacto Right Turn Lane

[2] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal o all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (o movements sharing a single lane) are shown.

[3] CSS = Cross-street Stop; TS = Traffic Signal

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6 OPENING YEAR CUMULATIVE (2021) TRAFFIC CONDITIONS

This section discusses the methods used to develop Opening Year Cumulative (2021) traffic forecasts and the resulting intersection operations, roadway segment, and traffic signal warrant analyses.

6.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Opening Year Cumulative (2021) conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- Project driveways and those facilities assumed to be constructed by the Project to provide site access are also assumed to be in place for Opening Year Cumulative conditions only (e.g., intersection and roadway improvements along the Project's frontage and driveways).
- Driveways and those facilities assumed to be constructed by cumulative developments to provide site access are also assumed to be in place for Opening Year Cumulative conditions only (e.g., intersection and roadway improvements along the cumulative development's frontages and driveways).

6.2 OPENING YEAR CUMULATIVE (2021) WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

To account for background traffic, other known cumulative development projects in the study area were included in addition to 10.41% of ambient growth for Opening Year Cumulative traffic conditions. The weekday ADT and weekday AM and PM peak hour volumes which can be expected for Opening Year Cumulative (2021) Without Project traffic conditions are shown on Exhibit 6-1.

6.3 OPENING YEAR CUMULATIVE (2021) WITH PROJECT TRAFFIC VOLUME FORECASTS

To account for background traffic, other known cumulative development projects in the study area were included in addition to 10.41% of ambient growth for Opening Year Cumulative traffic conditions in conjunction with traffic associated with the proposed Project. The weekday ADT and weekday AM and PM peak hour volumes which can be expected for Opening Year Cumulative (2021) With Project traffic conditions are shown on Exhibit 6-2.

EXHIBIT 6-1: OPENING YEAR CUMULATIVE (2021) WITHOUT PROJECT TRAFFIC VOLUMES

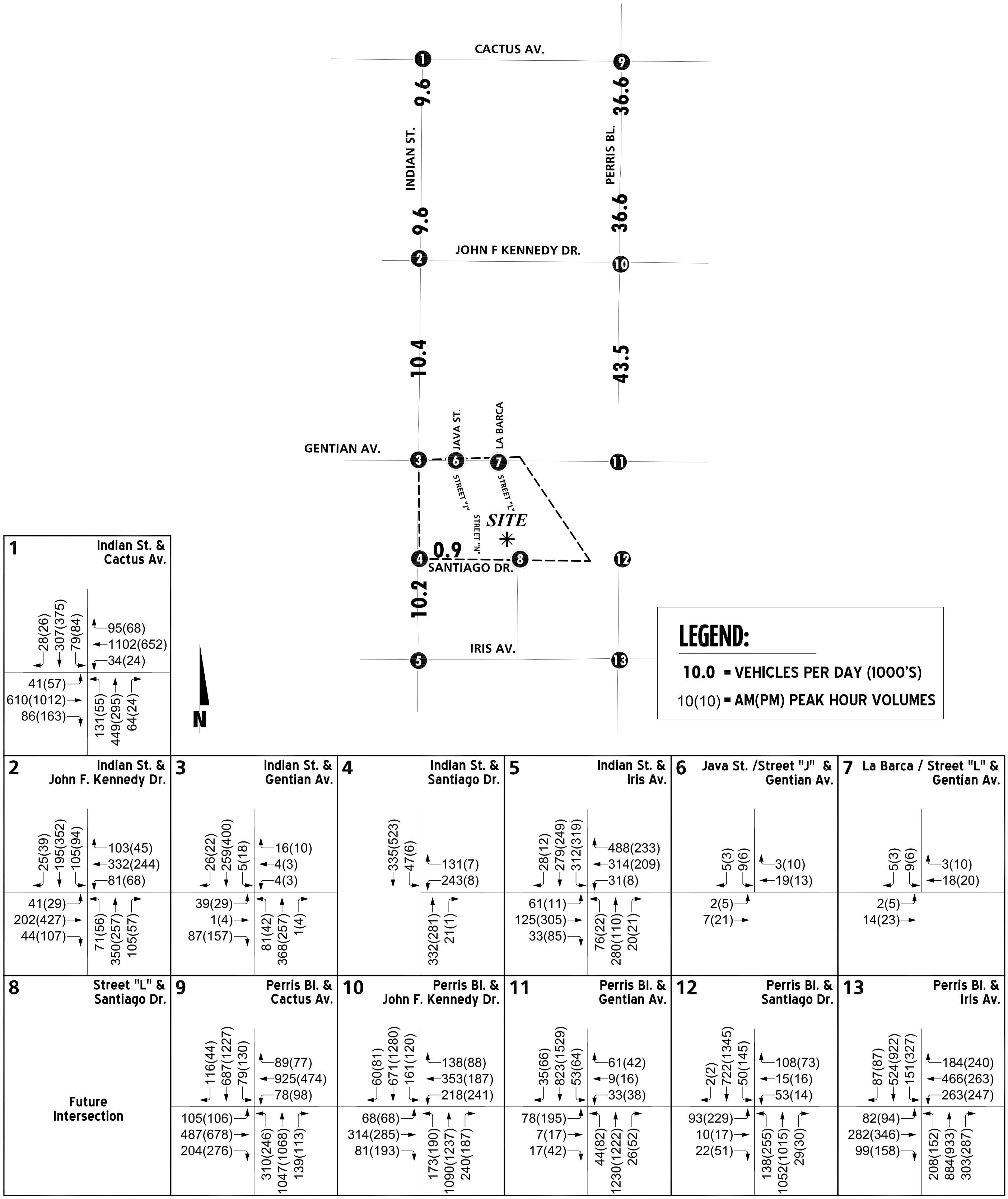
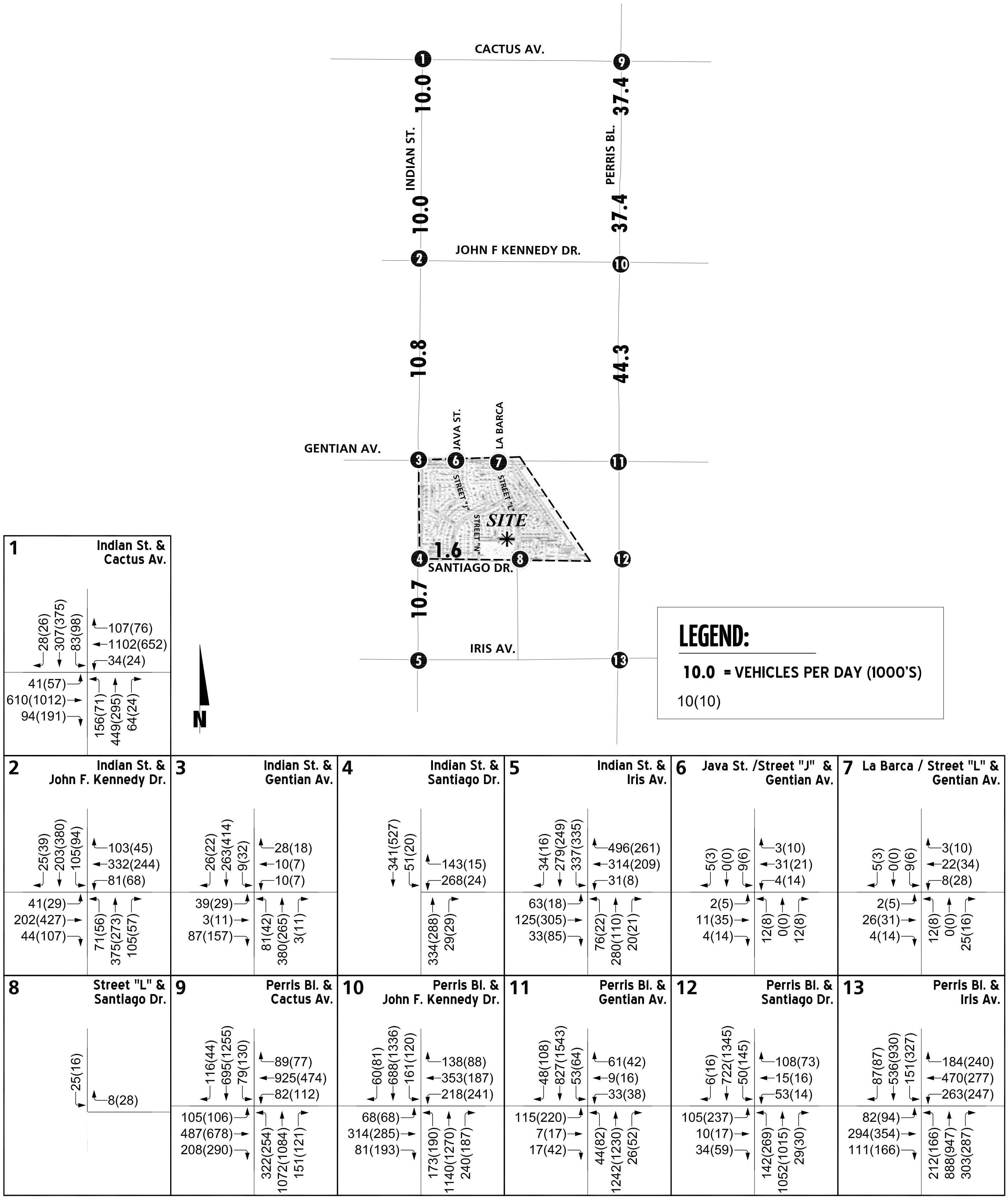


EXHIBIT 6-2: OPENING YEAR CUMULATIVE (2021) WITH PROJECT TRAFFIC VOLUMES



6.4 INTERSECTION OPERATIONS ANALYSIS

LOS calculations were conducted for the study intersections to evaluate their operations under Opening Year Cumulative conditions with roadway and intersection geometrics consistent with Section 6.1 *Roadway Improvements*. As shown in Table 6-1, there are no study area intersections are anticipated to operate at unacceptable LOS during the peak hours under Opening Year Cumulative (2021) without Project traffic conditions, in addition to the location previously identified under Existing (2016) traffic conditions.

The following additional study area intersections are anticipated to operate at unacceptable LOS with the addition of Project traffic, in addition to those previously identified for Opening Year Cumulative Without Project traffic conditions:

- Indian Street / Cactus Avenue (#1)
- Indian Street / Gentian Avenue (#3)

A summary of the peak hour intersection LOS for Opening Year Cumulative (2021) Without Project conditions are shown on Exhibit 6-3 and on Exhibit 6-4 for Opening Year Cumulative (2021) With Project traffic conditions. The intersection operations analysis worksheets for Opening Year Cumulative (2021) Without and With Project traffic conditions are included in Appendix 6.1 and Appendix 6.2 of this TIA, respectively. Measures to address near-term cumulative deficiencies for Opening Year Cumulative traffic conditions are discussed in Section 6.7 *Recommended Improvements.*

6.5 ROADWAY SEGMENT CAPACITY ANALYSIS

As noted previously, the roadway segment capacities are approximate figures only, and are typically used at the General Plan level to assist in determining the roadway functional classification (number of through lanes) needed to meet future forecasted traffic demand. Table 6-2 provides a summary of the Opening Year Cumulative (2021) conditions roadway segment capacity analysis based on the City of Moreno Valley General Plan Circulation Element Roadway Segment Capacity/LOS Thresholds identified previously on Table 2-3. As shown on Table 6-2, there are no roadway segments that are anticipated to operate at an unacceptable LOS under Opening Year Cumulative Without and With Project traffic conditions, consistent with Existing traffic conditions.

Table 6-1

Intersection Analysis for Opening Year Cumulative (2021) Conditions

#	Intersection	Traffic Control [2]	2021 Without Project Delay [1] (secs.) AM	2021 Without Project Delay [1] (secs.) PM	2021 Without Project Level of Service AM	2021 Without Project Level of Service PM	2021 With Project Delay [1] (secs.) AM	2021 With Project Delay [1] (secs.) PM	2021 With Project Level of Service AM	2021 With Project Level of Service PM
1	Indian St / Cactus Av	TS	31.7	32.8	C	C	**37.6**	**37.3**	**D**	**D**
2	Indian St / John F. Kennedy Dr	TS	26.7	25.2	C	C	26.7	25.2	C	C
3	Indian St / Gentian Av	CSS	30.7	20.2	D	C	**36.5**	23.1	**E**	C
4	Indian St / Santiago Dr	TS	15.5	2.8	B	A	16.6	4.8	B	A
5	Indian St / Iris Av	TS	47.4	31.7	D	C	48.8	34.6	D	C
6	Street J / Gentian Av	**<u>CSS</u>**	8.6	8.7	A	A	8.8	9.1	A	A
7	Street L / Gentian Av	**<u>CSS</u>**	8.7	8.7	A	A	9.0	9.3	A	A
8	Street L / Santiago Dr	**<u>CSS</u>**	Future Intersection				0.0	0.0	A	A
9	Perris Bl / Cactus Av	TS	33.8	42.7	C	D	35.9	45.8	D	D
10	Perris Bl / John F. Kennedy Dr	TS	43.9	50.1	D	D	44.0	54.5	D	D
11	Perris Bl / Gentian Av	TS	6.0	5.1	A	A	6.0	5.1	A	A
12	Perris Bl / Santiago Dr	CSS	**>100.0**	**>100.0**	**F**	**F**	**>100.0**	**>100.0**	**F**	**F**
13	Perris Bl / Iris Av	TS	46.5	48.6	D	D	48.4	49.9	D	D

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; TS = Traffic Signal

Table 6-2

Roadway Segment Capacity Analysis for Opening Year Cumulative (2021) Conditions

#	Roadway	Segment Limits	Roadway Section	LOS Capacity[1]	2021 NP	V/C	LOS	2021 WP	V/C	LOS	Acceptable LOS
1	Indian Street	Cactus Avenue to John F. Kennedy Dr.	4D	37,500	9,588	0.26	A	10,008	0.27	A	C
2		John F. Kennedy Dr. to Gentian Av.	4D	37,500	10,350	0.28	A	10,770	0.29	A	C
3		Santiago Dr. to Iris Av.	2U	12,500	10,229	0.82	D	10,755	0.86	D	D
4	Gentian Avenue	Indian St. to Street J/Java St.	**2U**	12,500	N/A	N/A	N/A	420	0.03	A	C
5		Street J/Java St. to Street L/La Barca	**2U**	12,500	N/A	N/A	N/A	420	0.03	A	C
6		West of Perris Bl.	**2U**	12,500	N/A	N/A	N/A	632	0.05	A	C
7	Santiago Drive	East of Indian St.	2U	12,500	930	0.07	A	1,350	0.11	A	C
8		West of Perris Bl.	2U	12,500	6,559	0.52	A	6,979	0.56	A	C
9	Perris Boulevard	Cactus Avenue and John F. Kennedy Dr.	6D	56,300	36,597	0.65	B	37,439	0.66	B	D
10		John F. Kennedy Dr. to Gentian Av.	6D	56,300	43,490	0.77	C	44,332	0.79	C	D

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

N/A = Not Applicable; Segment does not exist.

[1] These maximum roadway capacities have been extracted from the City of Moreno Valley's Transportation Division's Traffic Impact Analysis Transportation Division's Traffic Impact Analysis Preparation Guidelines (August 2007). These roadway capacities are "rule of thumb" estimates for planning purposes. The LOS E service volumes are estimated maximum daily capacity for respective classifications. Capacity is affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian and bicycle traffic.

EXHIBIT 6-3: OPENING YEAR CUMULATIVE (2021) WITHOUT PROJECT SUMMARY OF LOS

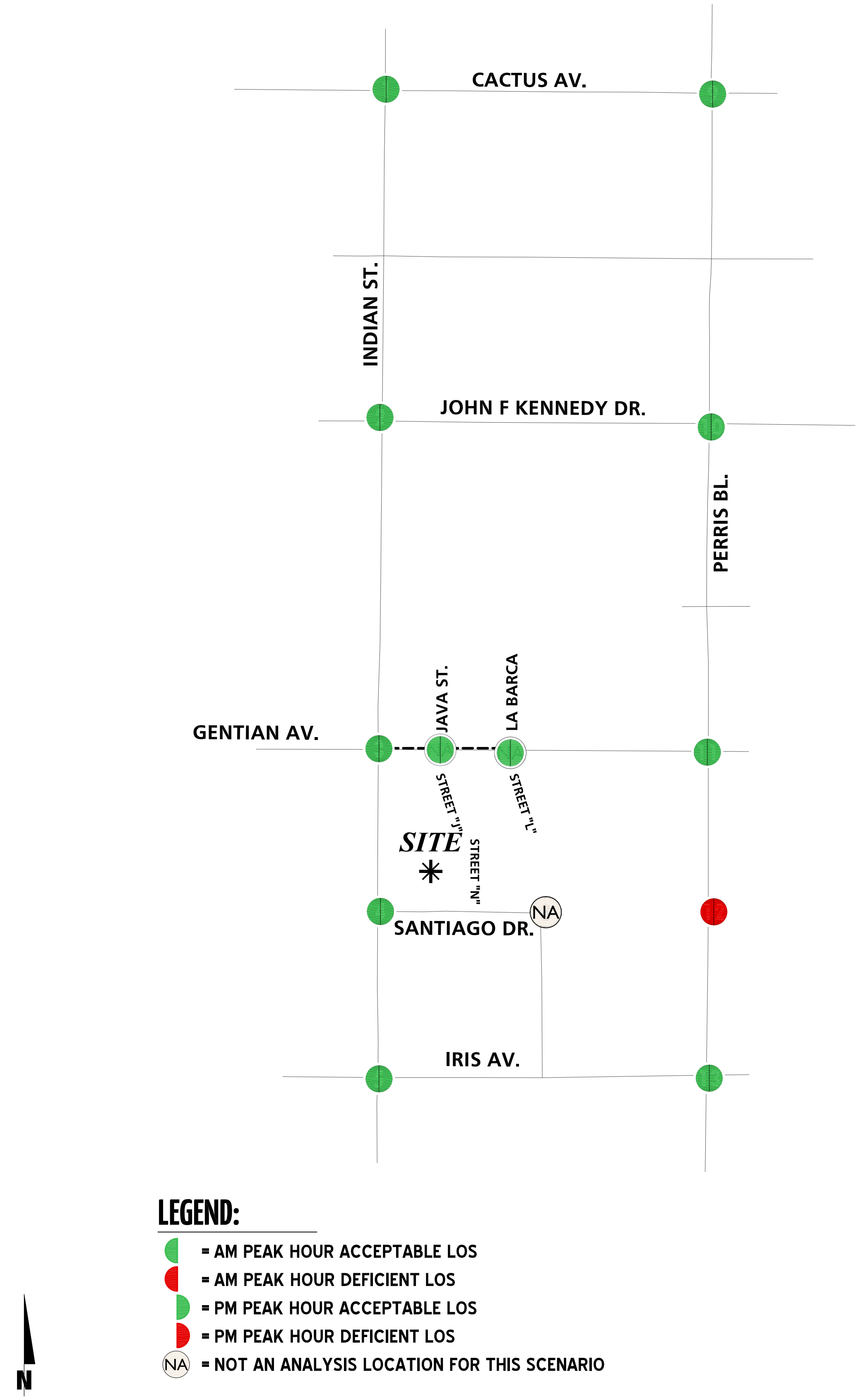
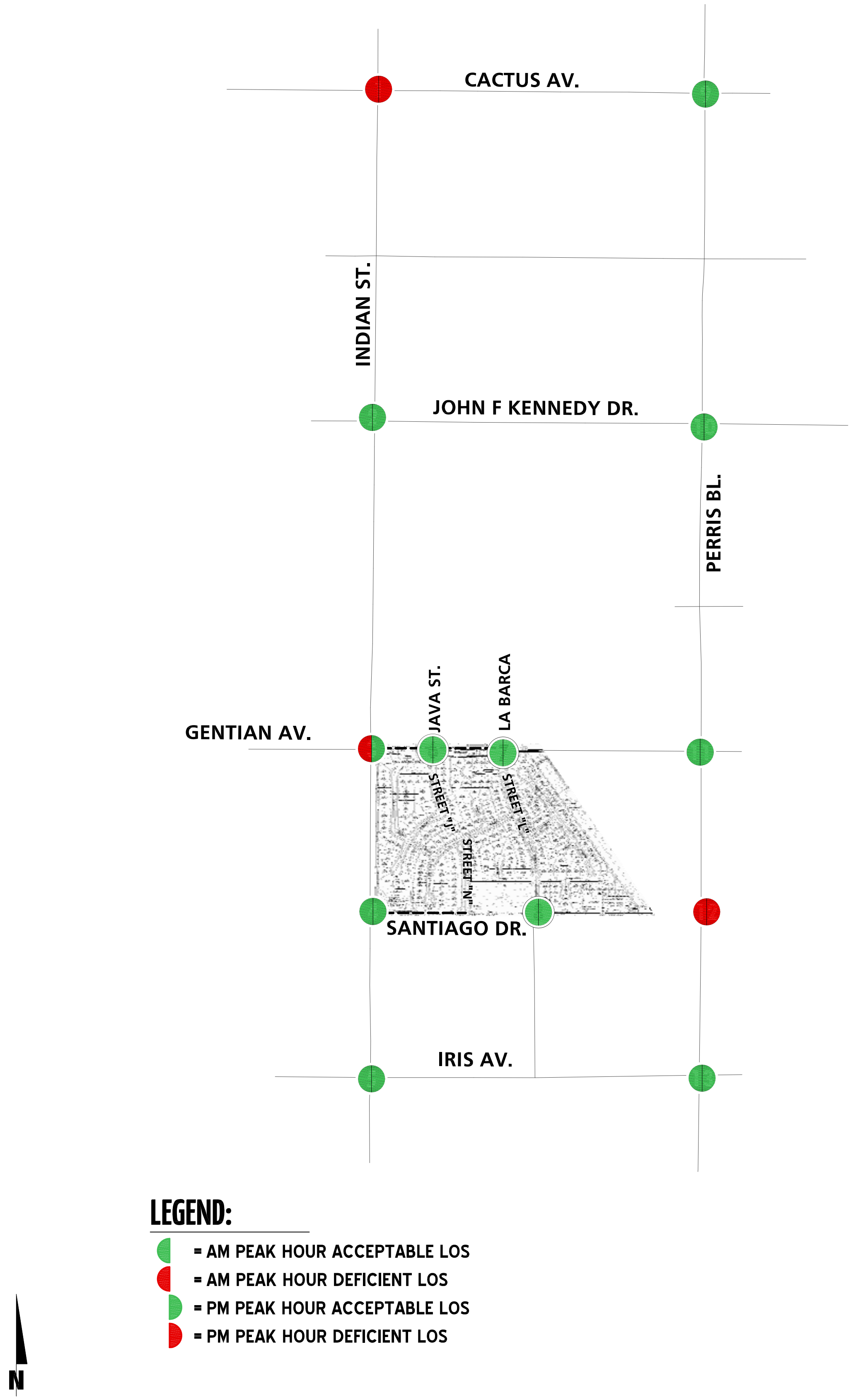


EXHIBIT 6-4: OPENING YEAR CUMULATIVE (2021) WITH PROJECT SUMMARY OF LOS



6.6 TRAFFIC SIGNAL WARRANTS ANALYSIS

There are no additional study area intersections that are anticipated to meet either peak hour or planning level (ADT) volume based traffic signal warrants for Opening Year Cumulative traffic conditions (see Appendix 6.3 and Appendix 6.4).

6.7 OPENING YEAR CUMULATIVE DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

6.7.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

Improvement strategies have been recommended at intersections that have been identified as deficient in an effort to reduce each location's peak hour delay and improve the associated LOS grade to an acceptable LOS (LOS D or better). The effectiveness of the recommended improvement strategies discussed below to address Opening Year Cumulative traffic deficiencies is presented in Table 6-3.

The applicant shall participate in the funding of off-site improvements, including traffic signals that are needed to serve cumulative traffic conditions through the payment of Western Riverside County TUMF, City DIF, or a fair share contribution as directed by the City. These fees are collected as part of a funding mechanism aimed at ensuring that regional highways and arterial expansions keep pace with the projected population increases. Each of the improvements discussed above have been identified as being included as part of TUMF fee program, DIF fee program, or fair share contribution in Section 1.5 *Local and Regional Funding Mechanisms* of this TIA.

Worksheets for Opening Year Cumulative (2021) Without and With Project traffic conditions, with improvements, HCM calculation worksheets are provided in Appendix 6.5 and Appendix 6.6, respectively.

6.7.2 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES ON ROADWAY SEGMENTS

All study area roadway segments are anticipated to operate at acceptable LOS (LOS D or better) for Opening Year Cumulative traffic conditions. As such, no roadway improvements have been recommended.

Table 6-3

Intersection Analysis for Opening Year Cumulative (2021) Conditions With Improvements

#	Intersection	Traffic Control[3]	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Delay[2] (secs.) AM	Delay[2] (secs.) PM	Level of Service AM	Level of Service PM
1	Indian St / Cactus Av																	
	2021 Without Project:																	
	Without Improvements	TS	1	2	0	1	2	0	1	2	0	1	2	0	31.7	32.8	C	C
	With Improvements	Not Applicable																
	2021 With Project:																	
	Without Improvements	TS	1	2	0	1	2	0	1	2	0	1	2	0	**37.6**	**37.3**	**D**	**D**
	With Improvements	TS	1	2	0	1	2	0	1	2	1	1	2	0	32.5	26.9	C	C
3	Indian St / Gentian Av																	
	2021 Without Project:																	
	Without Improvements	CSS	0	1	0	0	1	0	1	1	0	0	1	0	30.7	20.2	D	C
	With Improvements	Not Applicable																
	2021 With Project:																	
	Without Improvements	CSS	0	1	0	0	1	0	1	0	1	0	0	0	**36.5**	23.1	**E**	C
	With Improvements	CSS	1	2	0	1	2	0	1	1	0	0	1	0	18.1	17.5	C	C
12	Perris Bl / Santiago Dr																	
	2021 Without Project:																	
	Without Improvements	CSS	1	3	0	1	3	0	0	1	d	0	1	d	**>100.0**	**>100.0**	**F**	**F**
	With Improvements	TS	1	3	0	1	3	0	1	1	0	0	1	d	15.4	26.2	B	C
	2021 With Project:																	
	Without Improvements	CSS	1	3	0	1	3	0	0	1	d	0	1	d	**>100.0**	**>100.0**	**F**	**F**
	With Improvements	TS	1	3	0	1	3	0	1	1	0	0	1	d	18.2	26.9	B	C

1 When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for righ turning vehicles to travel outside the through lanes

L = Left; T = Through; R = Right; > = Right-Turn Overlap Phasing; d= Defacto Right Turn Lane

2 Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal c all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (o movements sharing a single lane) are shown.

3 CSS = Cross-street Stop; TS = Traffic Signal

7 REFERENCES

1. **City of Moreno Valley Transportation Engineering Division.** *Traffic Impact Analysis Preparation Guide.* Moreno Valley : s.n., August 2007.
2. **Institute of Transportation Engineers.** *Trip Generation.* 9th Edition. 2012.
3. **Southern California Association of Governments.** *2016 Regional Transportation Plan.* April 2016.
4. **City of Moreno Valley.** *City of Moreno Valley General Plan.* Moreno Valley : s.n., July 11, 2006.
5. **Riverside County Transportation Commission.** *2011 Riverside County Congestion Management Program.* County of Riverside : RCTC, December 14, 2011.
6. **Transportation Research Board.** *Highway Capacity Manual (HCM).* s.l. : National Academy of Sciences, 2010.
7. **Federal Highway Administration.** Manual on Uniform Traffic Control Devices (MUTCD). [book auth.] California Department of Transportation. *California Manual on Uniform Traffic Control Devices (CAMUTCD).* 2014.

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PLANNING COMMISSION

STAFF REPORT

Meeting Date: January 26, 2017

IRONWOOD VILLAGE - GENERAL PLAN AMENDMENT, CHANGE OF ZONE, TENTATIVE TRACT MAP 37001, AND DESIGN GUIDELINES FOR A 181 LOT SINGLE FAMILY RESIDENTIAL DEVELOPMENT

Case:	Ironwood Village - General Plan Amendment, Change of Zone, Tentative Tract Map 37001, and Design Guidelines for a 181 Lot Single family Residential Development
Applicant:	Global Investment & Development LLC
Owner:	Ironwood 8 Properties LP
Representative:	Anderson Consulting Engineers, Inc.
Location:	Ironwood Avenue, east of Nason Street and west of Oliver Street (APN: 473-160-004)
Case Planner:	Claudia Manrique
Council District:	2

SUMMARY

The applicant, Global Investment & Development LLC, is requesting to amend the land use and zoning designations on an existing 78.4 gross acre parcel (Assessor's Parcel Number (APN) 473-160-004) for the subdivision and development of a 181 lot single family residential tract (Tentative Tract Map 37001). The project consists of the following entitlements:

- The General Plan Amendment will amend the existing Land Use Designation

from Residential 2 (R2) to Residential 3 (R3) and Residential 5 (R5). Approximately 10.3 acres of Residential 2 (R2) in the northwest corner of the site will become Hillside Residential (HR) (Attachment 1). As part of the General Plan Amendment, the project will amend both the "General Plan Figure 4-2 Future Parkland Acquisition Area" map (Attachment 2) and "General Plan Figure 4-3 Master Plan of Trails" map (Attachment 3). The project site will no longer be considered for future parkland acquisition and the proposed City maintained trail through the center of the site will be removed.

- The Change of Zone will amend the underlying zoning from Residential Agriculture 2 (RA2) to Residential 3 (R3) and Residential 5 (R5) (Attachment 4). The existing approximately 10.3 acres of Hillside Residential (HR) in the northwest corner of the site will remain as Hillside Residential (HR). The Change of Zone also includes withdrawal of the parcel from the Primary Animal Keeping Overlay (PAKO) (Attachment 5).

- Tentative Tract Map proposes to subdivide the 78.4 gross acre parcel into 68.1 net developable acres and 10.3 acres of natural open space. Tentative Tract Map 37001 includes 181 single family residential parcels (Residential 3 (R3) Lots #20 through 68 and Residential 5 (R5) Lots #1 through 19 and 69 through 181) and 16 lettered lots (Attachment 6).

- A Plot Plan for approval of the Ironwood Village Design Guidelines, which include site development regulations in order to provide cohesive design throughout the Ironwood Village Project (Attachment 7). The proposed Project encourages a range of housing alternatives with a variety of lot sizes intermixed with trails, a park, open space areas and water quality features;

- An Initial Study and Mitigated Negative Declaration (MND) were prepared to analyze the potential environmental impacts associated with the project (Attachment 8). The MND was prepared by a qualified environmental consultant in accordance with established California Environmental Quality Act Guidelines and underwent thorough independent review by City staff.

The project, as designed and conditioned, conforms to all development standards and design guidelines for single family residential uses as prescribed in the City's Municipal Code and City Landscape Standards for development within Residential 3 (R3) and Residential 5 (R5) zoning districts.

The proposed project will not have a significant effect on the environment with the implementation of mitigation measures. The Initial Study/Mitigated Negative Declaration recommends 30 mitigation measures to reduce project specific and cumulative impacts related to Air Quality, Biological Resources, Cultural Resources, Geology and Soils, Hazards and Hazardous Materials, Noise, Transportation/Traffic and Public Safety.

PROJECT DESCRIPTION

The Ironwood Village Project proposes a residential community with design guidelines that will ensure a consistent quality development. The proposed Change of Zone will modify the existing General Plan and zoning designations of RA2 (maximum of 2 dwelling units per acre) to R3 (maximum of 3 dwelling units per acre) on the westerly portion of the site, and R5 (maximum of 5 dwelling units per acre) on the easterly portion. The proposed residential lots are considerably larger than single family residences that could otherwise be permitted under the proposed R3 and R5 zones. The General Plan Amendment amends the General Plan designation from R2 to Hillside Residential (HR) in the northwest portion of the site for consistency with the existing zoning map. The General Plan Amendment to HR will also help to ensure that the steeper slopes within the project are protected and not developed in the future.

The design includes a combination of open spaces, interior walking paths, and park space as a dividing edge between the two density districts. This project includes appropriate use of natural open space, landscaping, trails, right-of-ways and fire access facilities to create a pleasing visual and physical transition between the existing rural residential uses in the vicinity, the project site, and open adjacent hillside residential areas that will remain with the project. The project as designed provides for a suburban life-style in a cohesively planned “private” non-gated community with amenities not commonly found in the adjacent large lot subdivisions.

Tentative Tract Map 37001

Tentative Tract Map 37001 proposes to subdivide a 78.4 gross acre parcel into 68.1 net developable acres and 10.3 acres of natural open space. Tentative Tract Map 37001 includes 181 single family residential parcels (Residential 3 (R3) Lots 20 through 68 and Residential 5 (R5) Lots 1 through 19 and 69 through 181) and 16 lettered lots. Lot sizes for the proposed single-family homes range from a minimum of 7,200 square feet to over 17,200 square feet. The average lot size proposed within the Residential 3 (R3) zoning designation is 11,654 square feet, and within the Residential 5 (R5) zoning is 8,359 square feet. The overall lot size average for the entire tract is 9,251 square feet.

The proposed Ironwood Village Project anticipates 181 units on approximately 38.5 acres, along with approximately twenty-nine point four (29.4) acres of open space, and an additional 10.3 acres of natural open space (i.e. hillsides and rock outcroppings).

Residential Density

The Ironwood Village project is a mix of 49 Residential 3 (R3) lots and 132 Residential 5 (R5) lots for a total of 181 lots on 68.1 net developed acres and a total density of 2.7 dwelling units per acre. The density calculation does not include the approximately 10.3 acres of the site that will remain undeveloped natural open space and designated Hillside Residential (HR).

The density calculation of the entire parcel acreage is 2.3 dwelling units per acre or just

0.3 dwelling units per acre over the maximum allowable density under the existing Residential 2 (R2) General Plan land use designation.

General Plan Amendment

The existing General Plan designation for the project site is Residential 2 (R2), which provides for suburban lifestyles on residential lots larger than commonly available in suburban subdivisions and to provide a rural atmosphere where large animal keeping is allowed. The proposed General Plan designations of Hillside Residential (HR), Residential 3 (R3), Residential 5 (R5) will still allow for suburban lifestyles on lots larger than commonly available in suburban subdivisions. The project provides the opportunity for active lifestyle living with trail linkages, recreational, and open space amenities.

Approximately 10.3 acres of Residential 2 (R2) in the northwest corner of the site will become Hillside Residential (HR) as a result of the proposed General Plan Amendment. The proposed HR portion of the site provides for conservation of the steeper slopes more so than afforded by the existing R2 General Plan designation. In addition, the proposed R3 General Plan designation on the westerly portion of the site will provide an appropriate transition from the proposed R5 area of the project to the existing R2 General Plan designated land to the immediate west of the project site.

The Goals and Objectives of the Community Development Element of the General Plan include providing a wide range of housing types in sufficient numbers suitable to meet the diverse needs of present and future residents of all socioeconomic groups and to support healthy economic development without creating an oversupply of any particular type of housing (Goal 2.4 and Objective 2.2). The proposal will provide a wider range of housing types than currently permitted under the R2 General Plan designation by clustering development on the flatter portions of the site, and protecting the hillside areas.

The range of residential opportunities and dwelling types (Residential 3 (R3), Residential 5 (R5), and Hillside Residential (HR)) proposed in the Ironwood Village Project are described in the General Plan as follows:

- The primary purpose of areas designated Residential 3 (R3) is to provide a transition between rural and urban density development areas, and to provide for a suburban lifestyle on residential lots larger than those commonly found in suburban subdivisions. The maximum allowable density shall be 3.0 dwelling units per acre.

- The primary purpose of areas designated Residential 5 (R5) is to provide for single-family detached housing on standard sized suburban lots. The maximum allowable density shall be 5.0 dwelling units per acre.

- The primary purpose of areas designated Hillside Residential (HR) is to balance the preservation of hillside areas with the development of view-oriented residential uses. General Plan Policy 2.2.2.c goes on to require development in the Hillside Residential (HR) designation to maximize preservation of natural hillside contours, vegetation and other characteristics. Hillside area developments should minimize grading by following the natural contours as much as possible.

As a component of the proposed General Plan Amendment, the project proposes to remove the site from the "General Plan Figure 4-2 Future Parkland Acquisition Area" map and proposes to revise "General Plan Figure 4-3 Master Plan of Trails." The current Master Plan of Trails identifies a theoretical future public trail running north and south through the center of the project parcel connecting to a forked future trail just north of the project limits. This central City trail section is proposed to be replaced with private, Home Owners Association (HOA) maintained multi-use trails that would connect the Ironwood Village Project neighborhoods, interior open spaces and on-site park, and will connect to the future City of Moreno Valley public off-site trails on Ironwood Avenue, Oliver Street and to the north of the project site. Parks, Recreation and Open Space Element Policy 4.2.8 encourages the development of recreational facilities within private developments with appropriate mechanisms to ensure that such facilities are properly maintained and that they remain available to residents in perpetuity.

Based upon the information presented above, the proposed change in land use and trail system are compatible and would not conflict with the goals, objectives, policies or programs of the General Plan. Ironwood Village exhibits a balanced land use pattern that accommodates a range of residential opportunities (Goal 9.1.I), provides recreational amenities including a park, multi-use trails and open space (Goal 9.1.V), and recognizes the need to conserve natural resources by preserving 10.3 acres of the project site as open space (Goal 9.1.VIII).

Change of Zone

The proposed project includes a request for a Change of Zone. The current zoning is Residential Agriculture 2 (RA2) and Hillside Residential (HR). The proposed Change of Zone requests a combination of Residential 3 (R3) and Residential 5 (R5) zoning to provide for a higher number of single family residential units than is currently permitted. The existing Hillside Residential (HR) zone in the northwest corner of the site measures approximately 10.3 acres and is proposed to remain as Hillside Residential (HR) and retained as open space with no residential units planned for development in this area of the project site.

The maximum density allowed in Residential Agriculture 2 (RA2) zones is two (2) units per acre. As an innovative approach, which attempts to respect the integrity of the current General Plan and zoning designations for larger residential lots while also respecting present and anticipated market demands for efficient residential subdivisions, the applicant has proposed a blended zoning modification. The applicant is requesting a change of zone to Residential 3 (R3), which allows up to 3 dwelling units per acre, on the western portion of the Project site and Residential 5 (R5), which allows up to 5 dwelling units per acre, on the eastern portion of the site. A proposed open space and recreation corridor would bisect the property in a north-south orientation, thereby separating the lower density and higher density components. As a result, the tentative tract is proposed at an overall density of 2.7 dwelling units per acre with overall average lot sizes of 9,260 square feet, some lots over 17,000 square feet, and considerate use of open space and trails.

Relationship of Proposed Zoning to Existing Zoning Designations

The project will provide a transition between existing lower density Residential 1 (R1) zoned residential uses immediately to the west of the Project site across Nason Street. Existing parcels to the west range in parcel size from roughly one-half acre to over an acre. The project provides for a thoughtful transition to the existing Residential 2 (R2) residential development to the south and farther to the east across Moreno Beach Drive, as well as Residential Agriculture 2 (RA2), zoning immediately to the east of the Project site.

Discussion of PAKO Overlay

The Change of Zone includes withdrawal of the 78.4 acres of the project area from the Primary Animal Keeping Overlay (PAKO). Residential 3 (R3) and Residential 5 (R5) zoning do not allow for medium and large animal keeping. The purpose of the PAKO district is to provide for animal keeping in areas of the City with rural characteristics. The PAKO overlay applies to animal keeping activities in the Rural Residential (RR), Residential 1 (R1) and Residential Agriculture 2 (RA2) land use districts only within an area bounded by Nason Street to the west, Theodore Street to the east, the city limit line to the north and Cottonwood Avenue to the south. This boundary of available land designated in the City for PAKO is quite large (estimated at 2,500 acres); the withdrawal of the 78.4 acres does not preclude all opportunity for PAKO. Furthermore, the residential market trend in the City over the last decade demonstrates almost no measurable interest/demand for PAKO development.

The residential areas to the west and south of the site are not currently designated as within the PAKO. The existing designated areas within the PAKO overlay in proximity to the project area are immediate north, east, and southeast.

Plot Plan/Design Guidelines

The proposed Project is proposed to be implemented in accordance with the Ironwood Village Design Guidelines (Design Guidelines). The Design Guidelines serve as the codified site development regulations that will ensure cohesive design throughout the Ironwood Village Project. The Design Guidelines respect the intended and desired diversity of housing choices not available with typical tract developments. The Design Guidelines consider the variety of lot sizes available, the intermixed with trails, the park, open space areas and water quality features.

The development standards included in the Ironwood Village Design Guidelines call for a quality mix of floor plans, elevations, colors and materials, and create a walkable neighborhood with access to trails, outdoor recreation and open space opportunities.

The proposed Project Guidelines respect the existing topography, maintain rock outcroppings where feasible and provide a transition into the hillside areas.

Architecture for the Ironwood Village Project reflects the diversity of architectural styles found throughout California. The Ironwood Village Architectural Design Guidelines are intended to ensure design quality and consistency throughout the project while at the same time allowing flexibility during project implementation. The Design Guidelines provide a palette of options for design features and elements to create a comprehensive project that has continuity of design throughout, but is not monotonous or repetitive. The Design Guidelines allow for five different styles of architecture, including Monterey, Spanish Colonial, Santa Barbara, Napa, and Tuscan. The Design Guidelines allow for updated styles as long as the defining features can be identified and applied to the floor plans. The actual detailed architectural design elements and details that will be implemented within the Ironwood Village community will be submitted for review and approval during project implementation.

Site

The 78.4 acre Project site is located in the northeastern portion of City of Moreno Valley immediately northeast of the intersection of Ironwood Avenue and Nason Street, and bounded by Ironwood Avenue on the south, Nason Street on the west, Oliver Street on the east, and vacant land to the north. The Project site is located immediately south of the foothills of the San Timoteo Badlands, and consists of one single-family residential designated parcel (APN 473-160-004-5). There is no street address associated with the property, which is currently vacant land, though several unimproved trails/dirt roads traverse the property, which are oriented east-west and north-south.

Surrounding Area

The surrounding land uses near the site include single-family residential development to the west (Residential 1 (R1) large-lot residential uses, one acre and larger in size) and south (Residential 2 (R2) residential uses up to 2 units per acre). To the east and northeast of the site there vacant land zoned for single-family residential uses (Residential Agriculture 2 (RA2) residential agriculture up to 2 units per acre) and to the north and northeast vacant land zoned for single-family residential uses (Residential Agriculture 2 (RA2) and Hillside Residential (HR) uses). Further east of Moreno Beach Drive and Pettit Street is mix of developed Residential 2 (R2) and Residential Agriculture 2 (RA2) as well as the Calvary Chapel Church of Moreno Valley and School.

Access/Parking

Vehicular access to the Project site will be provided via Ironwood Avenue, Nason Street, and Oliver Street. As shown in Figure A-4 above, the primary driveway for the Project site would be located on Ironwood Avenue about mid-block between Nason Street and Oliver Street, immediately opposite from and north of Lantz Lane. Secondary site access would be provided by driveways on both Nason Street and Oliver Street just north of Ironwood Avenue.

The internal streets within the “private” non-gated Ironwood Village community are proposed to be privately maintained streets. The private roadway section is based on the City’s standard street width of 36 feet from curb face to curb face. However, in order to maintain a unique streetscape within the community, the typical parkway landscape cross-section would be replaced with a dedicated, HOA-maintained, eight-foot lettered landscape lot containing a four-foot-wide concrete sidewalk along a single side of the roadway. The other side of the private road would have homeowner maintain yards to the back of the curb. The roadway section, including curb face, would be dedicated to, and maintained by, the Ironwood Village HOA. Separate easements for utilities would also be dedicated, as necessary, to provide proper services to the “private” non-gated community.

REVIEW PROCESS

A pre-application for this project was submitted on December 19, 2014 with the review process completed in late January 2015. The Project applications were submitted in October 2015. This type of project warrants a comprehensive review, therefore, the plans were routed several City departments, including Public Works, Fire Department, Public Safety, Building, and Planning as well as various outside agencies including, but not limited to the Riverside County Airport Land Use Commission, Moreno Valley Unified School District, Eastern Municipal Water District, Riverside Transit Agency, gas and electric utilities, and several Indian Tribes for their review.

Upon completion of the initial plan review, the project was reviewed by the Pre-Project Review Staff Committee (Pre-PRSC) in January 2016. Modifications were requested to the General Plan and Change of Zone proposal of Residential 3 (R3) with a Planned Unit Development (PUD) application. As the Tentative Tract Map 37001 (TTM) design satisfied the lot standards of both Residential 3 (R3) and Residential 5 (R5) zoning districts without the need for the PUD, the PUD application was replaced with the Design Guidelines, which will regulate site development of TTM and provide cohesive design throughout the Ironwood Village Project. Additional modifications were requested including providing a greater range of pedestrian access throughout the site, south to Ironwood Avenue, limiting development in the northwesterly portion of the site, which will remain zoned Hillside Residential (HR) and a variety of site design considerations. Written comments were provided to the applicant.

Revised plans were submitted by the applicant in May 2016, and progressed through the second and subsequent reviews to work through various site design options between May and September 2016. During this process, the applicant’s environmental consultants were working on the required environmental studies for the project. The Initial Study/Mitigated Negative Declaration and related studies were submitted in August 2016. The environmental documents were finalized in November 2016.

Upon resolution of all outstanding site, building, preliminary grading and environmental review issues, the Initial Study/Mitigated Negative Declaration document was completed and final conditions of approval were drafted so that the project could be scheduled for the Planning Commission public hearing on January 26. 2017.

ENVIRONMENTAL

An Initial Study was prepared by ESA/PCR in compliance with California Environmental Quality Act (CEQA) Guidelines. The Initial Study examined the potential of the proposed project to have an impact on the environment. The Initial Study provides information in support of the findings for a Mitigated Negative Declaration (MND) as the proposed project will not have a significant effect on the environment with the implementation of mitigation measures required for the project. Studies prepared for this project included a traffic study, an air quality study/greenhouse gas analysis, a cultural resource assessment, preliminary hydrology study, geotechnical study, biological resources assessment, Determination of Biologically Equivalent or Superior Preservation (DBESP), and a Preliminary Water Quality Management Plan.

The 30-day public review period for the MND commenced on November 15, 2016 and concluded on December 14, 2016 for the project. The Notice of Intent to Adopt a MND was mailed to interested parties, public agencies and to the State Clearinghouse (#2016111039) and published in the Press Enterprise newspaper on November 15, 2016. The 43 public comment documents (consisted of emails and letters) received have been considered fully in preparing the final MND. A written summary response memorandum to the comment documents received has been prepared and is included as Attachment 9.

Findings of Less Than Significant Impacts with Mitigation Incorporated

Based on the analysis of the Project's impacts provided in the Initial Study, with the incorporation of mitigation, there is no indication that this Project could result in substantial adverse effects the environment. While there would be a variety of effects during construction related to traffic, noise and air quality, these impacts were found to be less than significant based on compliance with applicable regulatory requirements and established impact thresholds, as well as in consideration of the mitigation measures set forth in the Mitigation Monitoring and Reporting Program (MMRP) (Attachment 10). Long-term effects considered include increased vehicular traffic, traffic-related noise, periodic on-site operational noise, various changes to on-site drainage, and change to visual character of the site, with a majority of these impacts affecting adjacent roadway segments and intersections in the immediate area. The analysis concluded that direct and indirect environmental effects can be reduced to less than significant levels with mitigation.

The City staff completed a detailed review of the Initial Study/Mitigated Negative Declaration. Based on the independent judgment of City staff, the analysis fully addresses the requirements of the California Environmental Quality Act. City staff also concur with the determination that the project as designed and conditioned will be consistent with the Multi-species Habitat Conservation Plan (MSHCP). Based on analysis in the Initial Study, the City finds that direct and indirect impacts to human beings and the environment as a whole will be less than significant with mitigation incorporated.

Mitigation Measures

The Initial Study/Mitigated Negative Declaration recommends 30 mitigation measures to reduce project specific and cumulative impacts related to Air Quality, Biological Resources, Cultural Resources, Geology and Soils, Hazards and Hazardous Materials, Noise, Transportation/Traffic and Public Safety. CEQA requires that public agencies "adopt a reporting and monitoring program for the changes to the project which it has adopted or made a condition of project approval in order to mitigate or avoid significant effects on the environment." (Public Resources Code Section 21081.6) Compliance with these mitigation measures will be accomplished through administrative controls over project planning and implementation through the Mitigation Monitoring and Reporting Program prepared for the project. Monitoring would be accomplished under Reporting Procedures through verification and certification by City staff.

NOTIFICATION

The public hearing notice for this project was published in the local newspaper on January 15, 2017. Public notice was sent to all property owners of record within 300 feet of the project site on January 13, 2017 (Attachment 11). The public hearing notice for this project was also posted on the project site on January 13, 2017.

As of the date of report preparation, staff has received six (6) email correspondences, two (2) phone call and two (2) members of the public at the Planning Division front counter in response to the noticing for this project.

REVIEW AGENCY COMMENTS

In the course of the entitlement phase plan review process, staff sent all potentially affected reviewing agencies a transmittal of project documents for their review. The following responses were received:

Agency	Response Date	Comments
Moreno Valley Utility	November 15, 2015	Will serve notice
Eastern Municipal Water District	November 18, 2015	Submit for a Plan of Service
Riverside County Flood Control	December 19, 2016	Approved storm water plan
Airport Land Use Commission	November 18, 2016	No comments
Santa Ana Regional Water Quality Control Board	December 13, 2016	Project may require permits

The City complied with the requirements of State Assembly Bill 52 requiring notice and consultation to Native American tribal groups. The City coordinated with all participating

Native American tribal groups requesting consultation for this project, and incorporated conditions of approval and mitigation measures as requested. A copy of the Mitigated Negative Declaration was provided to the following Tribes:

- Pechanga Band of Luiseno Mission Indians
- Soboba Band of Luiseño Indians
- Agua Caliente Band of Cahuilla Indians (ACBCI)
- San Manuel Band of Mission Indians (SMBMI)

Staff has coordinated with the agencies listed above and where applicable, conditions of approval have been included to address concerns from the responding agencies.

STAFF RECOMMENDATION

Staff recommends that the Planning Commission take the following action:

1. **APPROVE** Resolution No. 2017-05 and thereby **RECOMMEND** that the City Council:

    - **ADOPT** a Mitigated Negative Declaration, pursuant to the California Environmental Quality Act (CEQA) Guidelines for General Plan Amendment Application No. PEN16-0077 (PA15-0037); and

    - **ADOPT** the Mitigation Monitoring and Reporting Program prepared for General Plan Amendment Application No. PEN16-0077 (PA15-0037 pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

    - **APPROVE** General Plan Amendment Application No. PEN16-0077 (PA15-0037)

2. **APPROVE** Resolution No. 2017-06 and thereby **RECOMMEND** that the City Council:

    - **ADOPT** a Mitigated Negative Declaration, pursuant to the California Environmental Quality Act (CEQA) Guidelines for Change of Zone Application No. PEN16-0078 (PA15-0038); and

    - **ADOPT** the Mitigation Monitoring and Reporting Program prepared for Change of Zone Application No. PEN16-0078 (PA15-0038) pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

    - **APPROVE** Change of Zone Application No. PEN16-0078 (PA15-0038)

3. **APPROVE** Resolution No. 2017-07 and thereby **RECOMMEND** that the City Council:

- **ADOPT** a Mitigated Negative Declaration, pursuant to the California Environmental Quality Act (CEQA) Guidelines for Tentative Tract Map 37001 Application No. PEN16-0079 (PA15-0039) and Plot Plan Application PEN16-0080 (PA15-0040); and

- **ADOPT** the Mitigation Monitoring and Reporting Program prepared for Tentative Tract Map 37001 Application No. PEN16-0079 (PA15-0039) and Plot Plan Application PEN16-0080 (PA15-0040) for the Ironwood Village Design Guidelines pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

- **APPROVE** Tentative Tract Map 37001 Application No. PEN16-0079 (PA15-0039)

- **APPROVE** Plot Plan Application PEN16-0080 (PA15-0040) for the Ironwood Village Design Guidelines

Prepared by:
Claudia Manrique
Associate Planner

Approved by:
Allen Brock
Community Development Director

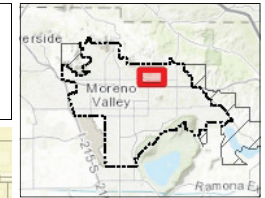
ATTACHMENTS

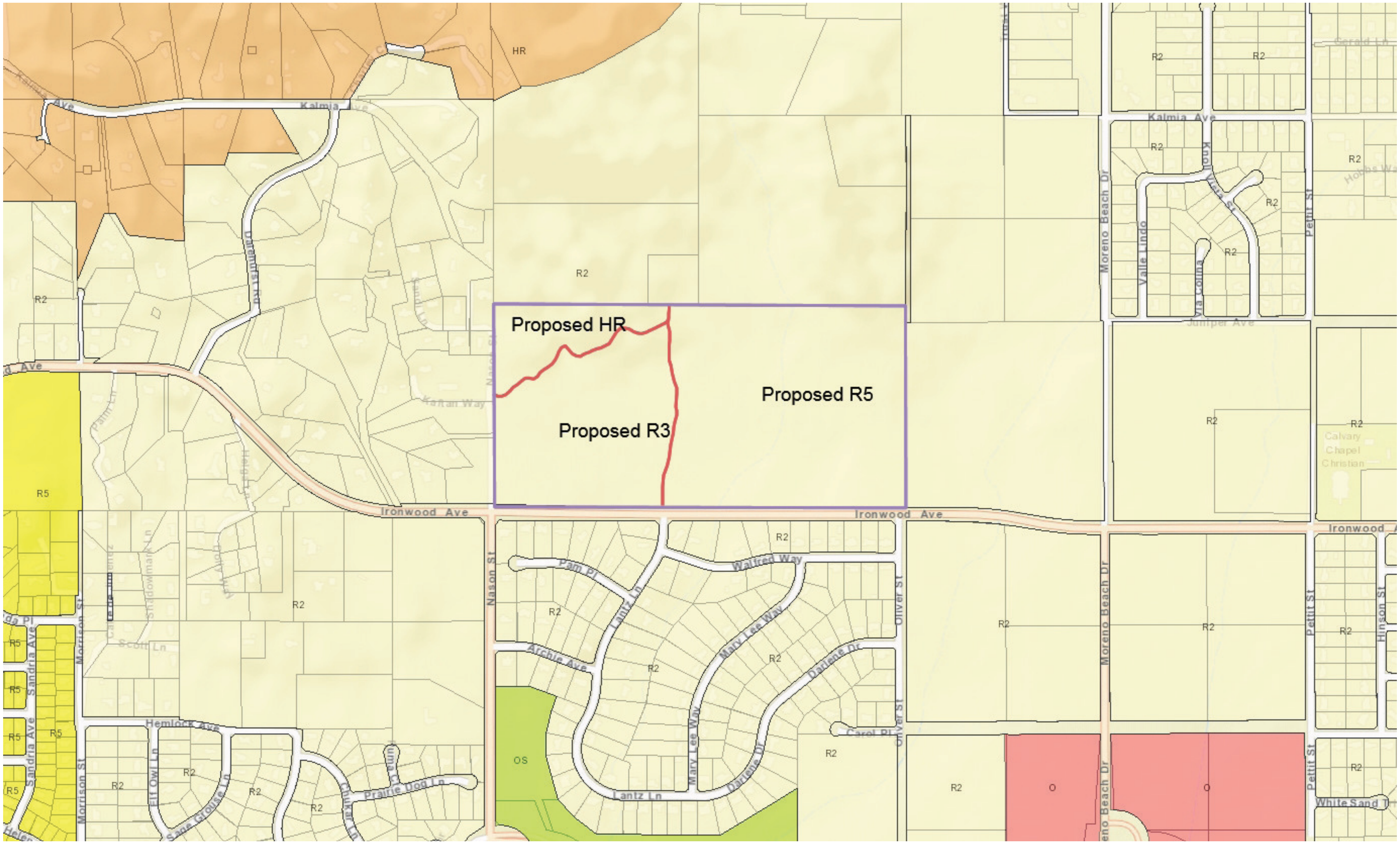
1. Proposed General Plan Amendment Map
2. General Plan Figure 4-2 Parklands Acquistion Areas with Proposed Amendment
3. General Plan Figure 4-3 Master Plan of Trails with Proposed Amendment
4. Proposed Change of Zone Map
5. Proposed Change of Zone Related to the PAKO Map
6. Tentative Tract Map 37001
7. Ironwood Village Design Guidelines
8. Initial Study/Mitigated Negative Declaration (IS/MND)
9. Memo from ESA Addressing IS/MND Comments
10. Ironwood Village Mitigation Monitoring and Reporting Program (MMRP)
11. Public Hearing Notice
12. Resolution 2017-05
13. Exhibit A General Plan Amendment Map 8x11
14. Exhibit B General Plan Figure 4-2 Future Parkland Acquisition Area
15. Exhibit C General Plan Figure 4-3 Master Plan of Trails
16. Resolution 2017-06
17. Exhibit A: Proposed Changes to the Zoning Atlas
18. Exhibit B: Change of Zone Map
19. Exhibit C: PAKO Map

20. PC Resolution 2017-07
21. Exhibit A: Condition of Approval for PEN16-0079 and PEN16-0080
22. Exhibit B: Ironwood Village Design Guidelines
23. Air Quality Impact Analysis
24. Biological Resources Assessment
25. Cultural Resources Assessment
26. DBESP Report
27. Greenhouse Gas Analysis
28. Rockfall Investigation Report
29. Noise Impact Analysis
30. Phase I Environmental Site Assessment
31. Preliminary Hydrology Study
32. Preliminary Geotechnical Study
33. Public Service Correspondence
34. Traffic Impact Analysis
35. Traffic Impact Analysis Appendices
36. Preliminary Water Quality Management Plan

General Plan Amendment
PEN16-0077 (PA15-0037)

MORENO VALLEY
WHERE DREAMS SOAR





Legend

Land Use

- Residential: Max. 1 du/ac
- Mixed Use
- Residential: Max. 2 du/ac
- Rural Residential: Max 2.5 du/ac
- Residential: Max. 3 du/ac
- Residential: Max. 5 du/ac
- Residential: Max. 5 or 15 du/ac
- Residential: Max. 10 du/ac
- Residential: Max.15 du/ac
- Residential: Max. 20 du/ac
- Residential: Max. 30 du/ac
- Hillside Residential
- Planned Residential
- Residential/Office
- Office
- Commercial
- Business Park/Light Industrial
- Open Space
- Public Facilities
- Floodplain

Parcels

1,261.9 0 630.96 1,261.9 Feet

N

WGS_1984_Web_Mercator_Auxiliary_Sphere

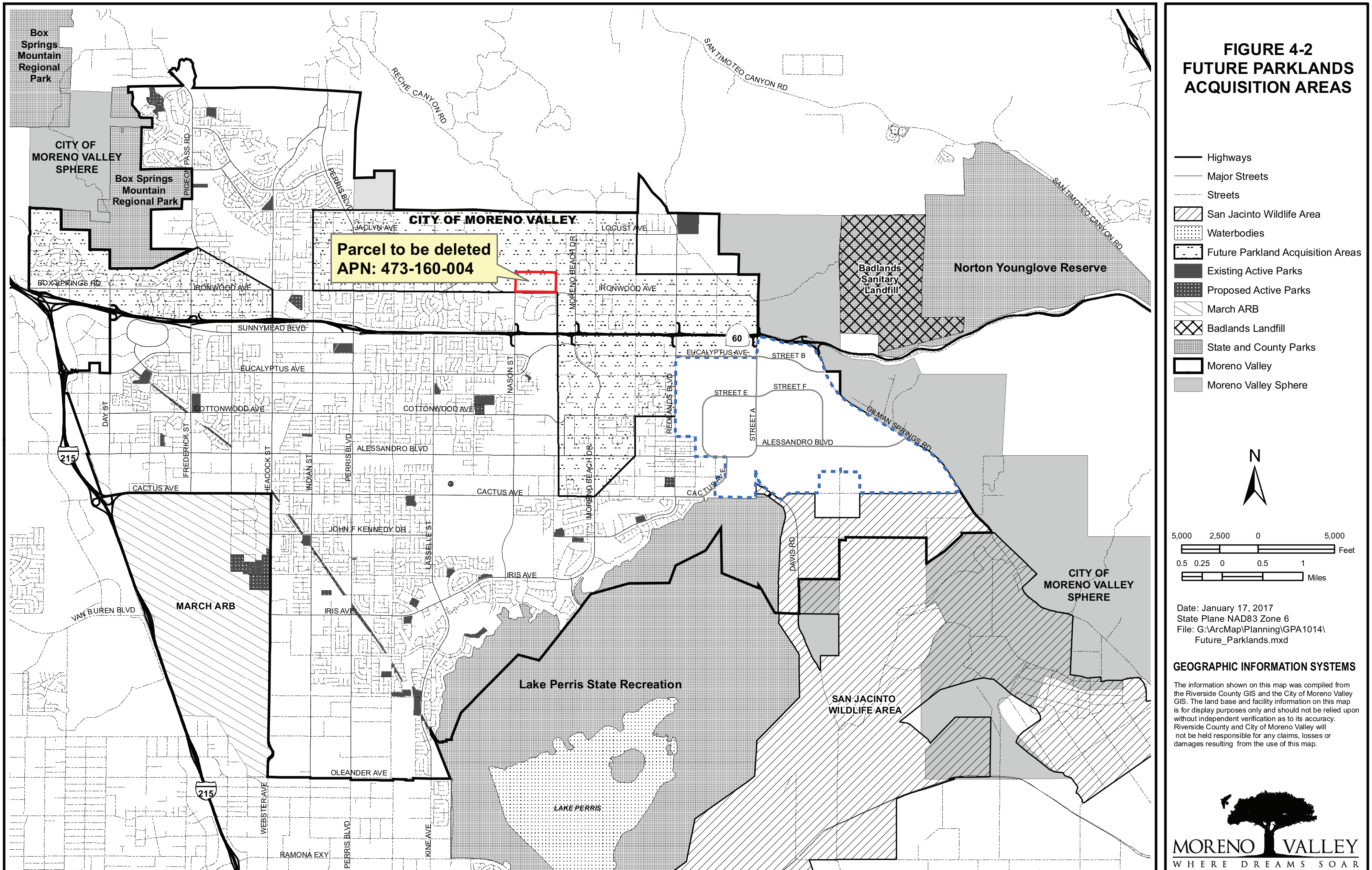
Print Date: 1/18/2017

DISCLAIMER: The information shown on this map was compiled from the City of Moreno Valley GIS and Riverside County GIS. The land base and facility information on this map is for display purposes only and should not be relied upon without independent verification as to its accuracy. Riverside County and City of Moreno Valley will not be held responsible for any claims, losses or damages resulting from the use of this map.

Notes

The current Land Use Designation is R2, proposed are HR, R3 and R5 for APN 473-160-004.

4.a



4.b

Attachment: General Plan Figure 4-2 Parklands Acquistion Areas with Proposed Amendment [Revision 1] (2437 : Ironwood Village (PEN16-0077

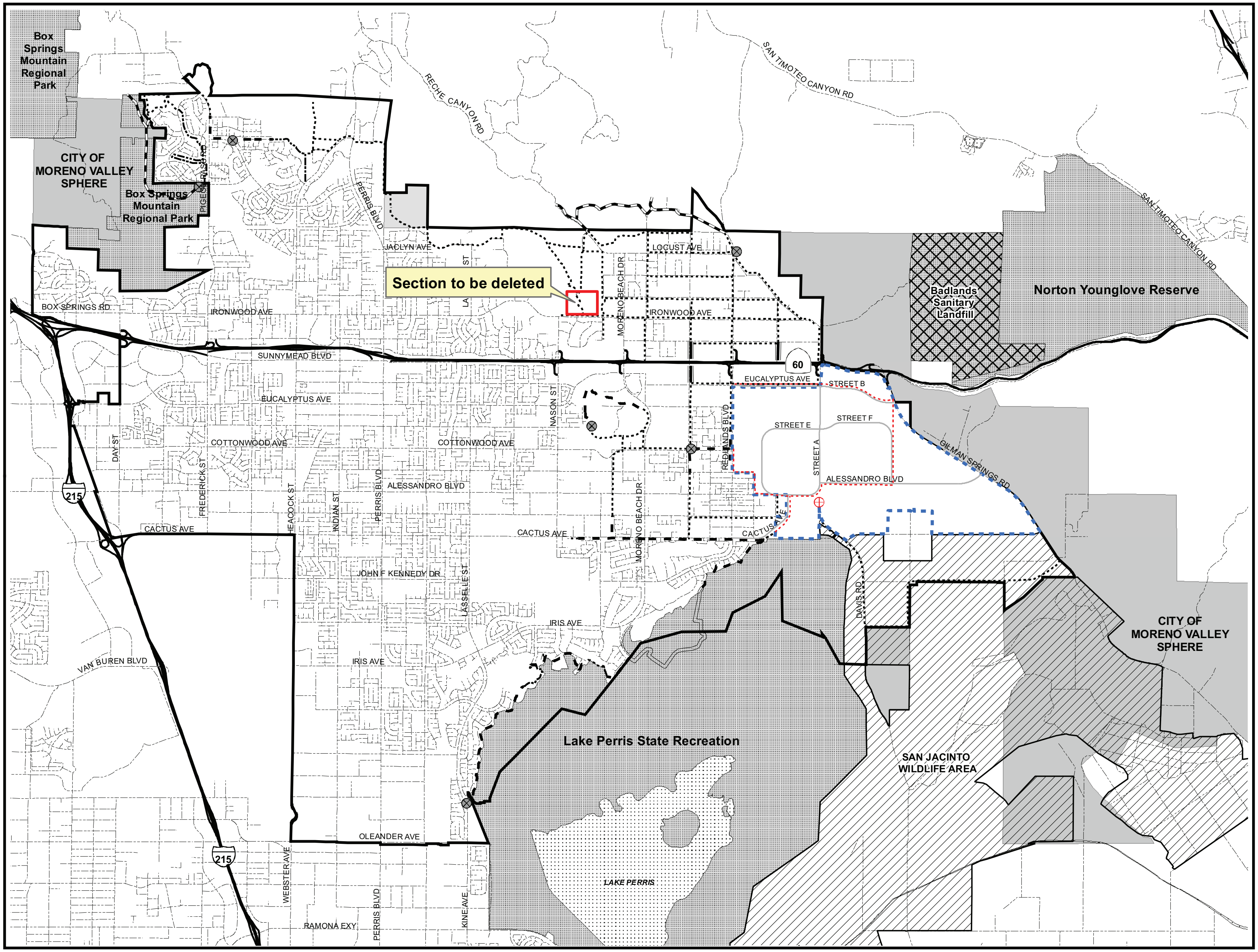


FIGURE 4-3 MASTER PLAN OF TRAILS

- Trail Staging - Existing
- Trail Staging - Proposed
- Streets
- Highways
- Improved Trail
- Multiuse Trail
- Proposed Trail
- Regional Trail
- State Trail
- Proposed Subject to Feasibility of Freeway Bridge or Underpass
- Badlands Landfill
- State and County Parks
- Moreno Valley
- Moreno Valley Sphere
- San Jacinto Wildlife Area
- Waterbodies

* Trail locations are approximate

N

5,000 2,500 0 5,000 Feet

0.5 0.25 0 0.5 1 Miles

Date: January 17, 2017
State Plane NAD83 Zone 6
File: G:\ArcMap\Planning\GPA1014\MasterTrails.mxd

GEOGRAPHIC INFORMATION SYSTEMS

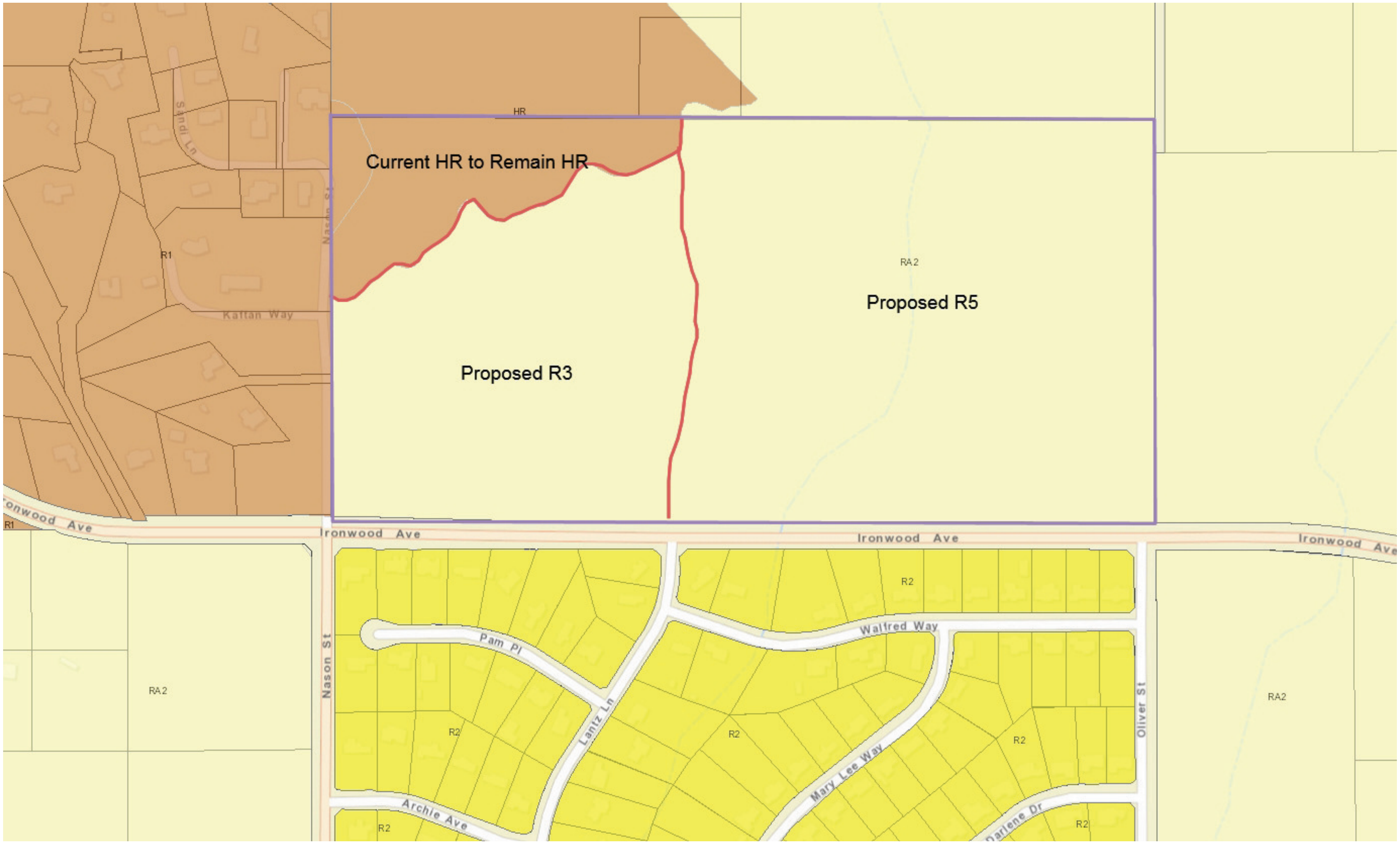
The information shown on this map was compiled from the Riverside County GIS and the City of Moreno Valley GIS. The land base and facility information on this map is for display purposes only and should not be relied upon without independent verification as to its accuracy. Riverside County and City of Moreno Valley will not be held responsible for any claims, losses or damages resulting from the use of this map.

MORENO VALLEY
WHERE DREAMS SOAR

4.c

Attachment: General Plan Figure 4-3 Master Plan of Trails with Proposed Amendment [Revision 1] (2437 : Ironwood Village (PEN16-0077

Change of Zone
PEN16-0078 (PA15-0038)



Legend

Zoning

- Commercial
- Industrial/Business Park
- Public Facilities
- Office
- Planned Development
- Large Lot Residential
- Residential Agriculture 2 DU/AC
- Residential 2 DU/AC
- Suburban Residential
- Multi-family
- Open Space/Park

Parcels

631.0 0 315.48 631.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere

Print Date: 1/18/2017

N

DISCLAIMER: The information shown on this map was compiled from the City of Moreno Valley GIS and Riverside County GIS. The land base and facility information on this map is for display purposes only and should not be relied upon without independent verification as to its accuracy. Riverside County and City of Moreno Valley will not be held responsible for any claims, losses or damages resulting from the use of this map.

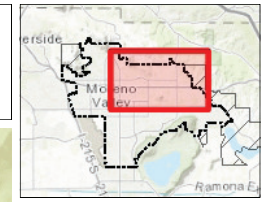
Notes

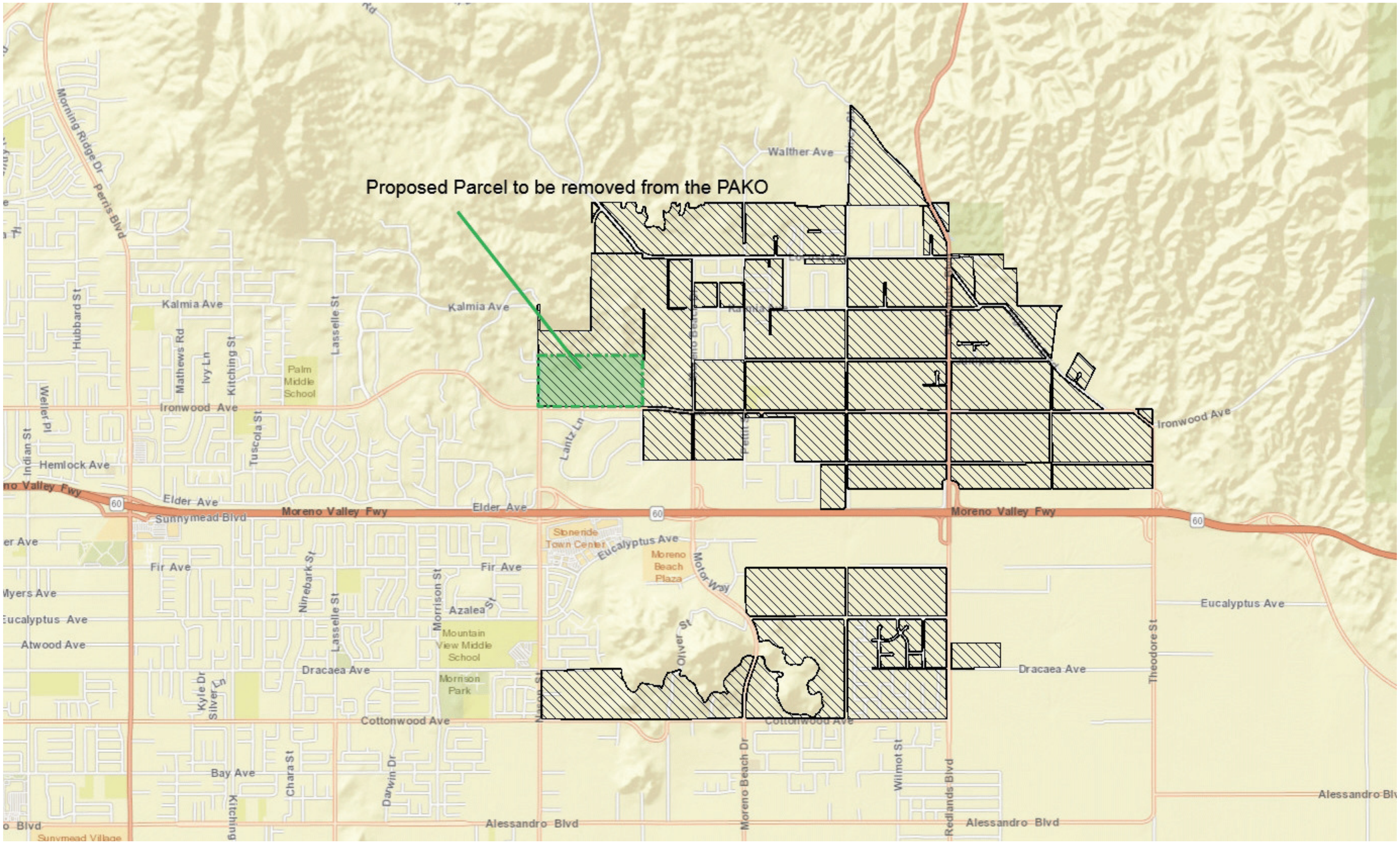
The current Zoning Districts are HR and RA2. The proposed Zoning Districts for APN: 473-160-004 are HR, R3 and R5.

4.d

Attachment: Proposed Change of Zone Map [Revision 1] (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Change of Zone (PAKO)
PEN16-0078 (PA15-0038)





Legend
Primary Animal Keeping Overl

5,047.7	0	2,523.83	5,047.7 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere

Print Date: 1/18/2017

N

DISCLAIMER: The information shown on this map was compiled from the City of Moreno Valley GIS and Riverside County GIS. The land base and facility information on this map is for display purposes only and should not be relied upon without independent verification as to its accuracy. Riverside County and City of Moreno Valley will not be held responsible for any claims, losses or damages resulting from the use of this map.

Notes
Proposed removal of APN 473-160-004 from the Primary Animal Keeping Overlay (PAKO).

4.e

CITY OF MORENO VALLEY, STATE OF CALIFORNIA

TENTATIVE TRACT MAP NO. 37001

THE SOUTH HALF OF THE SOUTHWEST QUARTER OF SECTION 34, TOWNSHIP 2 SOUTH, RANGE 3 WEST, SAN BERNARDINO MERIDIAN, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF. EXCEPTING THEREFROM THAT PORTION OF IRONWOOD AVENUE DESCRIBED IN DEED TO THE COUNTY OF RIVERSIDE RECORDED NOVEMBER 11, 1985 AS INSTRUMENT NO. 124978.

ASSESSOR PARCEL NUMBER 473-160-004

DECEMBER, 2018

GENERAL NOTES

1. ASSESSOR'S PARCEL NO.: 473-160-004
2. THE PROPERTY SHOWN HEREON CONTAINS THE ENTIRE CONTIGUOUS OWNER.
3. ALL ONSITE STREETS AND LETTERED LOTS SHALL BE MAINTAINED BY THE HOME OWNERS ASSOCIATION (HOA).
4. CONTOUR INTERVAL = 1 FOOT.
5. ALL SLOPES ARE 2:1 OR FLATTER. FOR BASIN GRADING, REFER TO DRAINAGE REPORT.
6. THIS MAP IS COMPILED FROM RECORD INFORMATION ONLY AND IS NOT TO BE USED AS A BOUNDARY SURVEY.
7. NO REGULATED WELLS EXIST ON SITE, UNLESS NOTED.
8. THE LOCATIONS OF ALL EXISTING UTILITIES SHOWN ON THIS MAP ARE APPROXIMATE.
9. TENTATIVE MAP AREA IS WITHIN FLOOD HAZARD ZONE X PER FIRM PANELS 755 AND 760 OF 2008.
10. TENTATIVE MAP IS NOT WITHIN THE SPECIFIC PLAN.
11. TENTATIVE MAP IS NOT WITHIN AN ACTIVE FAULT ZONE.
12. TENTATIVE MAP AREA IS NOT SUBJECT TO LIQUEFACTION.
13. EXISTING TOPOGRAPHY: ARROWHEAD MAP CO. 2014
14. TENTATIVE MAP AREA IS LOCATED IN PAGE 718, GRIDS B1 AND C1, RIVERSIDE, 2015 EDITION

PROPOSAL APPLICATION

TTM, GPA, AND CZ

LAND USE NOTES

EXISTING ZONING: RA2

PROPOSED ZONING: R3 AND R5

EXISTING LAND USE: R2

PROPOSED LAND USE: R3 AND R5

ADJACENT EXISTING LAND USE:
NORTH = HR
SOUTH = RA2
EAST = RA2
WEST = R1

LETTERED LOT SUMMARY

LOT "A" – OPEN SPACE/RECREATIONAL AREA
LOTS "B", "C", "D", "E", "F", "G", "H", "L", AND "P" – LANDSCAPING/WALKWAY
LOTS "I" AND "K" – OPEN SPACE/DRAINAGE BASINS
LOTS "J", AND "N" – CITY MAINTAINED MULTI-USE TRAILS
LOT "M" – BUFFER
LOT "O" – BUFFER/CITY MAINTAINED MULTI-USE TRAIL

AREA AND DENSITY SUMMARY TABLE

GROSS ACREAGE	78.4 AC
NET DEVELOPED ACREAGE	68.1 AC*
NATURAL OPEN SPACE	10.3 AC
TOTAL NUMBER OF NUMBERED LOTS	181
TOTAL LOT AREA	39.5 AC
DENSITY (NET DEVELOPED)	2.7 DU/AC
DENSITY (GROSS)	2.3 DU/AC
MINIMUM LOT SIZE	7,200 SF (RESIDENTIAL LOTS)
AVERAGE LOT SIZE	9,257 SF (RESIDENTIAL LOTS)
TOTAL NUMBER OF LETTERED LOTS	16
TOTAL LOT AREA	28.6 AC

*MAY INCLUDE FUEL MODIFICATION AREA

SETBACK SUMMARY TABLE

MINIMUM LOT SIZE	10,000 SF	7,200 SF
LOTS	20-68	1-19, 69-181
MINIMUM LOT WIDTH	80 FT	60 FT
MINIMUM LOT DEPTH	100 FT	100 FT
FRONT SETBACKS:		
MINIMUM TYPICAL FRONT YARD	25 FT	25 FT
REAR SETBACKS:		
MINIMUM REAR	30 FT	15 FT
SIDE SETBACKS:		
MINIMUM INTERIOR SIDE YARD	15 FT	10 FT
MINIMUM STREET SIDE YARD	15 FT	15 FT
BUILDING HEIGHT:		
MAXIMUM HEIGHT (TWO STORIES)	35 FT	35 FT

EARTHWORK

CUT: 275,000 CY
FILL: 275,000 CY
EXPORT: 0 CY
IMPORT: 0 CY

NOTE: THE NUMBERS PROVIDED HEREIN ARE CONCEPTUAL FOR TENTATIVE MAP PURPOSES ONLY AND ARE TO BE CONSIDERED "RAW" NUMBERS, WITHOUT CONSIDERATION OF EARTHWORK FACTORS.

STORM WATER NOTE

THE PROJECT SITE WILL COLLECT OFFSITE FLOWS VIA ONE OF THREE STORM DRAIN SYSTEMS DESIGNATED AS LINE A1, LINE A5 AND LINE B1. THE STORM DRAIN SIZES RANGE FROM 18 TO 48 RCP. LINES A1 AND B1 DISCHARGE INTO BASINS A (WESTERLY BASIN) AND B (EASTERLY BASIN), RESPECTIVELY. LINE A5 CONNECTS DIRECTLY TO THE EXISTING 42" CMP "WEST" STORM DRAIN CROSSING IRONWOOD AVENUE. THE TRIBUTARY OFFSITE AREA COLLECTED BY THESE SYSTEMS IS ROUGHLY 133 ACRES. THE PROJECT SITE DISCHARGES FLOWS FROM BASINS A AND B INTO THE EXISTING 42" CMP "MIDDLE" AND EXISTING 24" CMP "EAST". SEE "PRELIMINARY HYDROLOGY AND HYDRAULIC STUDY FOR TENTATIVE TRACT MAP 37001 – IRONWOOD" PREPARED BY ALC ENGINEERING AND CONSULTING, INC.

APPLICANT

JOSEPH RIVANI
GLOBAL INVESTMENTS & DEVELOPMENTS, INC
3470 WILSHIRE BLVD, SUITE 1020
LOS ANGELES, CA 90010
(213) 380-8800

ENGINEER

ANDERSON CONSULTING ENGINEERS, INC
JEFF A. ANDERSON, PE # C048730
12526 HIGH BLUFF DRIVE, SUITE 300
SAN DIEGO, CA 92130
(858) 925-7910

OWNER

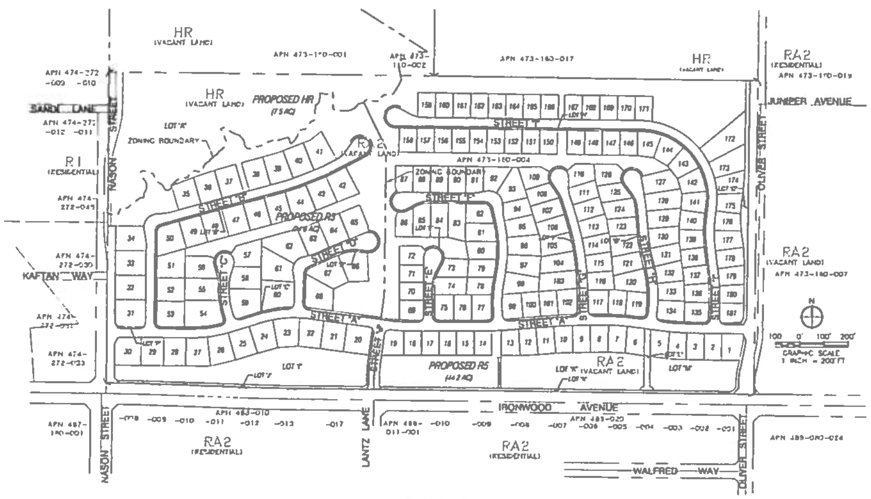
IRONWOOD 8 PROPERTIES LP
CHANG CHUNG TANG
1837 MCFARLANE ST
SAN MARINO, CA 91108
(626) 400-8178

UTILITY PURVEYORS

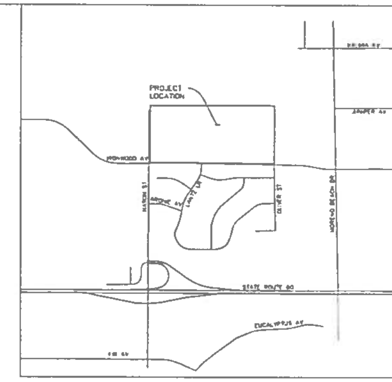
WATER:	EASTERN MUNICIPAL WATER DISTRICT 2270 TRUMBLE ROAD PERRIS, CA 92572 (951) 928-3777
SEWER:	EASTERN MUNICIPAL WATER DISTRICT 2270 TRUMBLE ROAD PERRIS, CA 92572 (951) 928-3777
ELECTRIC:	SOUTHERN CALIFORNIA EDISON 6100 NEIGHBORS ROAD POMONA, CA 92503 (909) 928-8290
NATURAL GAS:	SOUTHERN CALIFORNIA GAS COMPANY P.O. BOX 3003, 1981 W LUGONIA REDLANDS, CA 92374 (800) 427-2200
TELEPHONE:	VERIZON 30000 MAIN RD #725 HEMET, CA 92544 (951) 723-8432 www.VERIZON.COM
CABLE SERVICE:	TIME WARNER CABLE 4077 W STETSON AVENUE HEMET, CA 92545 (888) 892-2253
SCHOOL DISTRICT:	MORENO VALLEY SCHOOL DISTRICT 25634 ALESSANDRO BLVD MORENO VALLEY CA 92553 (951) 571-7500

LEGEND

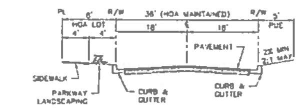
FS	FINISH SURFACE
FG	FINISH GRADE
GB	GRADE BREAK
HP	HIGH POINT
LP	LOW POINT
R	RADIUS
RET.	RETAINING
(68.8 FS)	EXISTING ELEVATION
75	LOT NUMBER
83.8 PE	PAD ELEVATION
	TRACT BOUNDARY
	CONCRETE DITCH OR CHANNEL
	SLOPE
	RETAINING WALL
	SANITARY SEWER
	POTABLE WATER
	STORM DRAIN



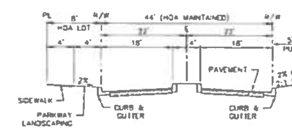
INDEX MAP
SCALE: 1" = 200'



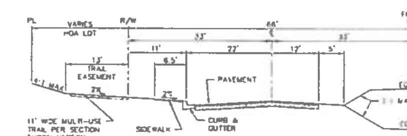
VICINITY MAP
NOT TO SCALE



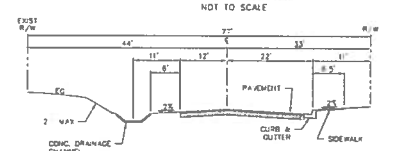
INTERIOR STREET
MODIFIED STD. MVSI-107A-0
NOT TO SCALE



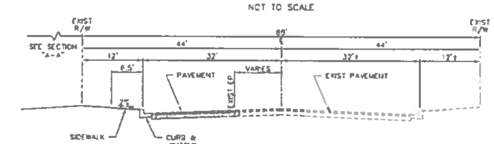
INTERIOR STREET – STREET "J" (IRONWOOD AVE ENTRANCE)
MODIFIED CITY STD. MVSI-107A-0
NOT TO SCALE



OLIVER STREET
CITY STD. MVSI-106B-0
NOT TO SCALE



NASON STREET
CITY STD. MVSI-106B-0
NOT TO SCALE



IRONWOOD AVENUE
CITY STD. MVSI-105A-0
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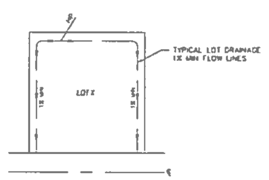
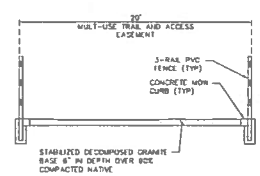
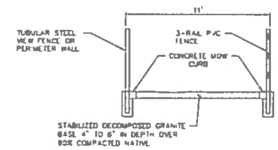


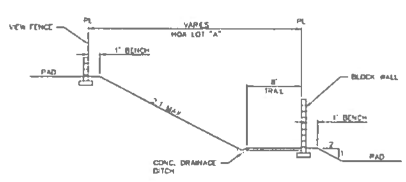
TYPICAL LOT DRAINAGE
NOT TO SCALE



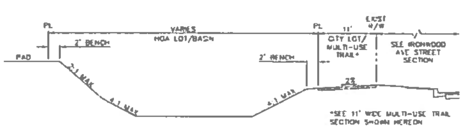
20' WIDE MULTI-USE TRAIL WITH FIRE ACCESS
CITY STD. MVGI-610I-0
NOT TO SCALE



11' WIDE MULTI-USE TRAIL
MODIFIED CITY STD. MVGI-610A-0
NOT TO SCALE



SECTION "B-B"
LOT "A" ADJACENT TO VIEW LOTS
NOT TO SCALE



SECTION "A-A"
SOUTHERN BASINS AND IRONWOOD AVENUE
NOT TO SCALE

ANDERSON CONSULTING ENGINEERS, INC. 12526 HIGH BLUFF DR., SUITE 300 SAN DIEGO, CA 92130 (858) 925-7910	TENTATIVE TRACT MAP NO. 37001 CITY OF MORENO VALLEY, STATE OF CALIFORNIA TITLE SHEET	SUBMITTALS DESIGNED BY: JAA DRAWN BY: MC CHECKED BY: JAA SHEET 1 OF

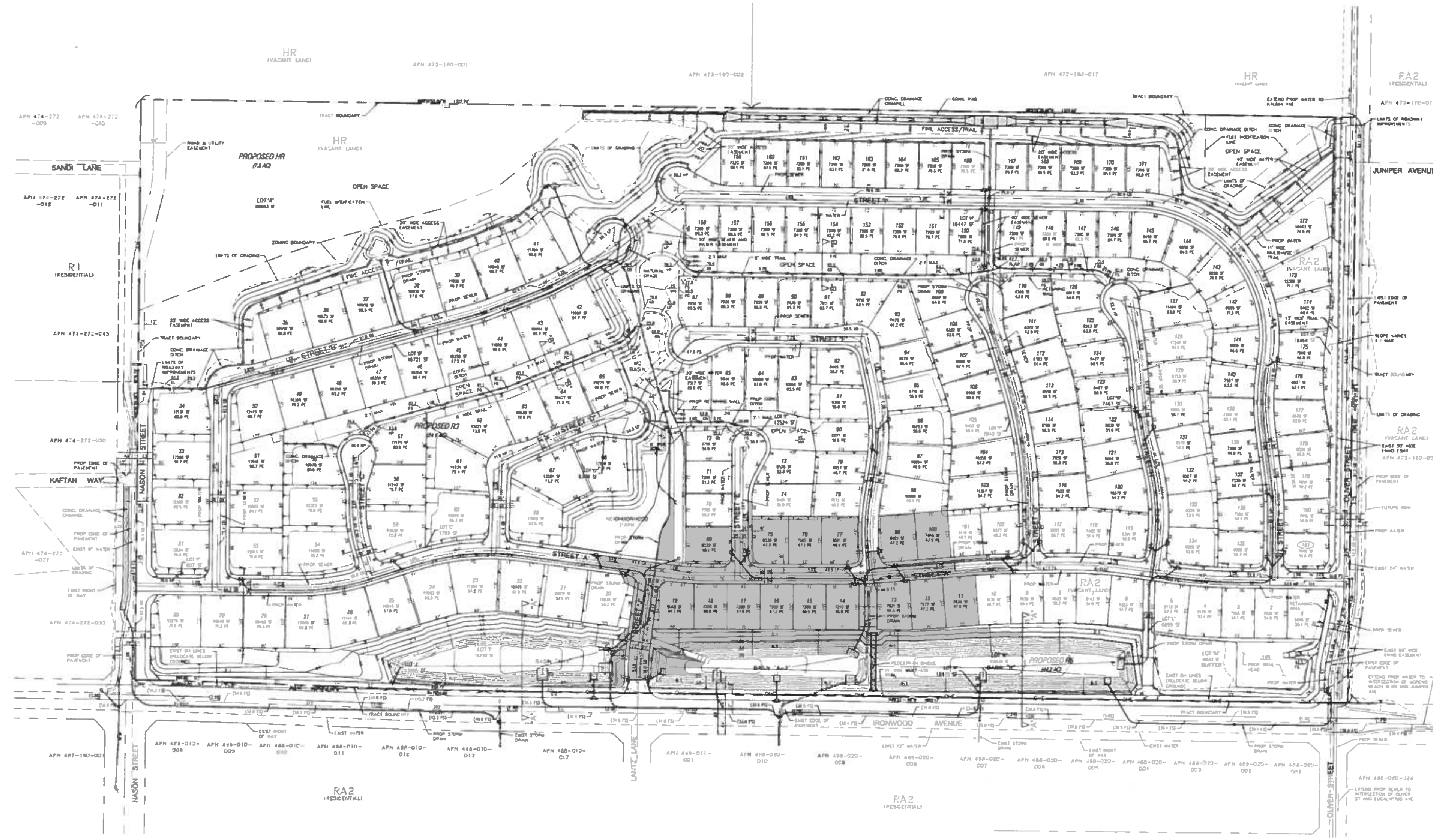
Attachment: Tentative Tract Map 37001 (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

CITY OF MORENO VALLEY, STATE OF CALIFORNIA

TENTATIVE TRACT MAP NO. 37001

THE SOUTH HALF OF THE SOUTHWEST QUARTER OF SECTION 34, TOWNSHIP 2 SOUTH, RANGE 3 WEST, SAN BERNARDINO MERIDIAN, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF. EXCEPTING THEREFROM THAT PORTION OF IRONWOOD AVENUE DESCRIBED IN DEED TO THE COUNTY OF RIVERSIDE RECORDED NOVEMBER 11, 1965 AS INSTRUMENT NO. 124978.

DECEMBER, 2018



NOTES:
1. SEE SHEET 1 FOR ROADWAY AND GRADING SECTIONS.

Attachment: Tentative Tract Map 37001 (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Ironwood Village

Design Guidelines

Tract 37001

January 2017

Ironwood Village

Design Guidelines

Tract 37001

January 2017

Prepared For:

GLOBAL
INVESTMENT & DEVELOPMENT

Prepared By:

ANDERSON
CONSULTING
ENGINEERS, INC.

ktgy
Architecture+Planning

JLC Engineering & Consulting, Inc.

URBAN
CROSSROADS

Attachment: Ironwood Village Design Guidelines (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

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LIST OF FIGURES *Page*

Ironwood Village Design Guidelines:
Tentative Tract 31007

Project Location

The location of the *Ironwood Village* Tentative Tract Number 31007 (TTM 31007) is North of Ironwood Avenue, East of Nason Street, West of Oliver Street and the northern boundary is just north of the proposed Juniper Avenue alignment in the City of Moreno Valley, California. ***Please refer to Figure 1-1 Site Location.***

Purpose

The purpose of the *Ironwood Village* TTM 31007 Design Guidelines (site development regulations) is to provide cohesive design throughout the *Ironwood Village* project. Creating a diversity of housing choices not available with a standard tract map, the project will encourage a range of housing alternatives with a variety of lot sizes intermixed with trails, a park, trail head, open space areas and water quality features. The design guidelines will require a quality mix of products, while creating walkable neighborhood with access to trails and other outdoor recreation / open space opportunities. The *Ironwood Village* project will conserve the northwestern hillside areas and will not be building on that portion of the site. The project is designed to respect the existing topography, maintain rock outcroppings where feasible and provide a transition into the hillside areas. The Design Guidelines provide the development standards, architecture, and landscaping standards necessary to create this unique housing project within the City of Moreno Valley. The *Ironwood Village* project will provide a buffer with the appropriate use of natural open space, landscaping, trails, right-of-ways and fire access creating a pleasing visual transition between the existing rural residential uses. While providing for a suburban life-style in a cohesively planned community with amenities not commonly found in typical subdivisions. The proposed *Ironwood Village* anticipates one hundred eighty-one (181) units on approximately thirty-eight and one half (38.5) acres, along with approximately twenty-nine point three (29.3) acres of open space and basin areas, and an additional ten point six (10.6) acres of natural open space (i.e. hillsides and rock outcroppings) with a mix of lot sizes range from ten thousand (10,000) square feet minimum down to seven thousand two hundred (7,200) square feet minimum lot sizes.

Theme

The theme for *Ironwood Village* will be typical traditional California styles of architecture (i.e. Monterey, Spanish Colonial, Santa Barbara, Napa, & Tuscan.) The theme is broad enough to allow for a diversity of architectural and landscape details, elements and styles to create a cohesive but, unique residential community. The architecture and overall project theme allows for varied streetscapes, while keeping a consistent and welcoming community atmosphere that will be inviting and comfortable for the residents and visitors alike.

1. Site Planning and Design

The following section includes the *Ironwood Village* development standards that encourages innovative housing development, with a diversity of housing choices, not typically found in a standard housing tract. To ensure that the neighborhoods are interesting and varied in appearance, at least one (1) single-story design is required. The addition of a single-story elements help to create a mix of not only architectural styles but, an array of building heights and building articulation avoiding the creation of a monotonous streetscape. The project is designed to respect the existing topography and provide a transition to the steeper hillside areas, within and adjacent to the project site. ***Please refer to Figure 1- 2 Land Use Plan.***

a. Setbacks

Table 1-1 lists the development standards required for development within the *Ironwood Village* project area.

TABLE 1-1

Summary of Setback Requirements		
Minimum Lot Size (sq. ft. net area)	10,000 sf **(R3)**	7,200 sf **(R5)**
Minimum Lot Width	90'	70'
Minimum Lot width Cul-De-Sac / Knuckle Frontage	50'	50'
Minimum Lot Depth	100'	100'
Typical House Width		
Front Setbacks		
Minimum Typical Front yard setback	25'	20'
Minimum Front Facing Garage	25'	20'
Minimum Swing-in Garage	16'	16'

Ironwood Village

Rear Setbacks		
Minimum Rear	30'	15'
Side Setbacks		
Minimum Interior Side Yard	*combined 20'	**combined 15'
Minimum Street Side yard	15'	15'
Maximum Building Height		
Dwelling Unit Maximum two stories	35'	35'
Accessory Structures	35'	35'
Miscellaneous		
Maximum Lot Coverage	50%	50%
Minimum Dwelling Size, (sq. ft.)	1,250 sf	1,250 sf
Minimum Distance Between buildings	10'	10'

* Combined interior side yard setbacks of 20' shall be provided with a minimum of 5' on one side.
** Combined interior side yard setbacks of 15' shall be provided with a minimum of 5' on one side.

All of the setbacks are minimums unless noted as otherwise and shall be measured from the property line.

Side yard setbacks shall have a minimum of five feet (5′) of flat usable pad area in all conditions as measured to the center of any wall or fence, or top of slope, or toe of slope.

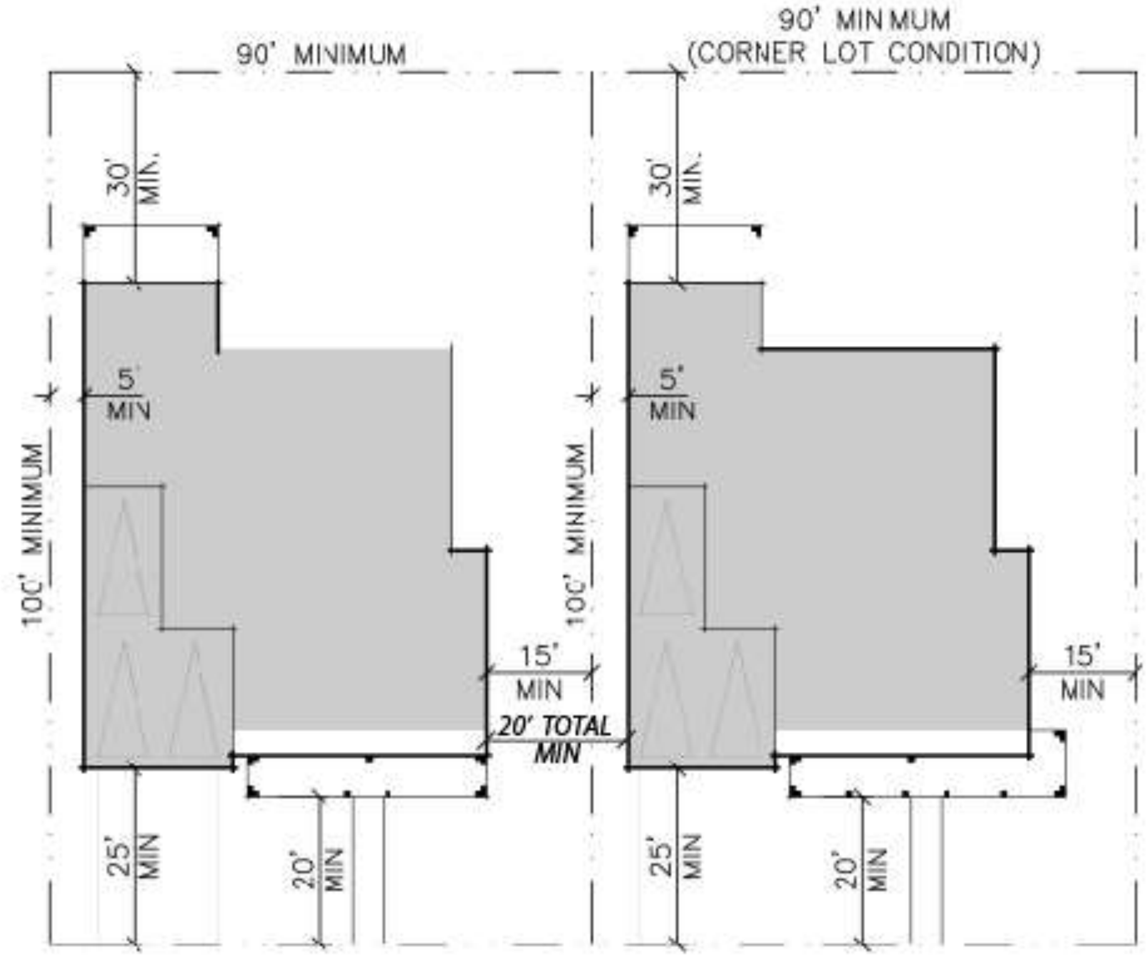
Vary front setbacks up to five feet (5′) to the extent flat useable pad depths exceed one-hundred ten feet (110′) (at their narrowest point) when possible.

Where feasible, center the house within the buildable pad width to maximize separation between adjacent houses.

Maximum lot coverage including garage shall be fifty percent (50%.)

Side-on garages are one of the optional architectural design elements that can increase the architectural variation, enhancing the project’s overall visual appeal.

Figure 1- 3 10,000 sf building footprint (R3)

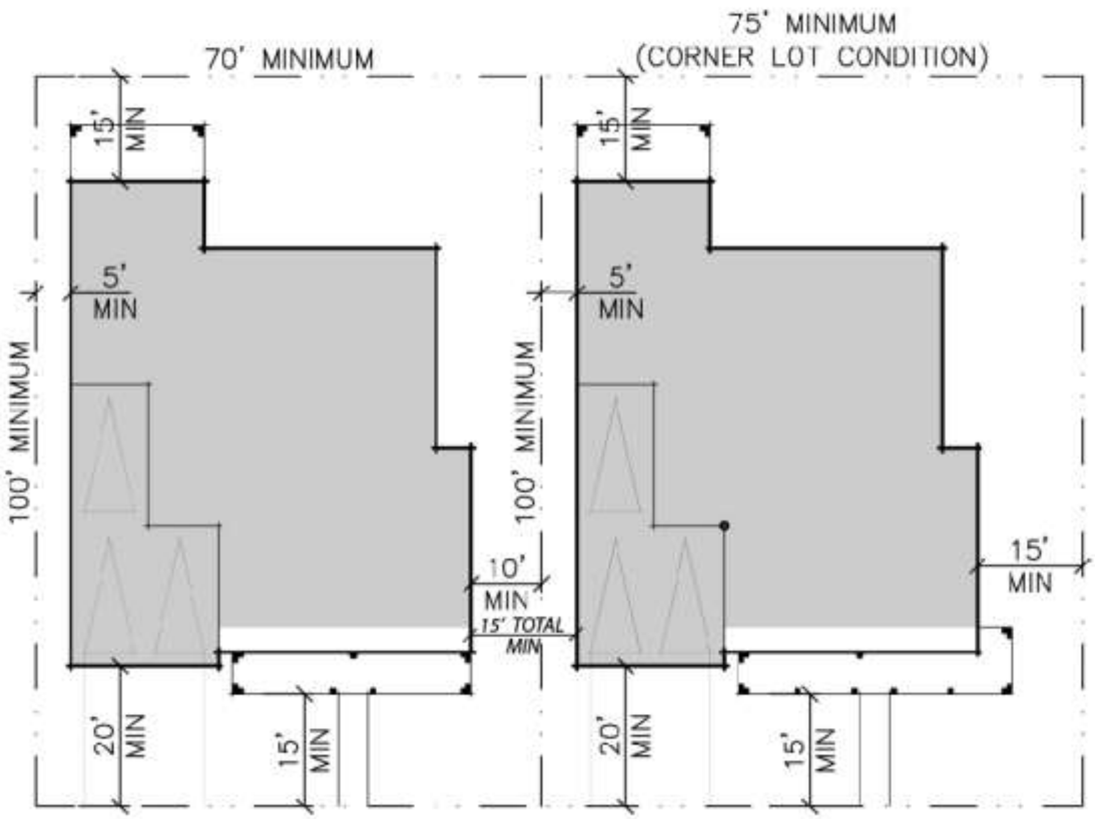


WALL LEGEND

SINGLE-STORY

TWO-STORY

Figure 1- 4 7,200 sf building footprint (R5)



b. Plotting Requirements

A mix of dwelling unit sizes, floor plans, and elevations shall be provided (*Refer to Section 3 Architectural Style*).

To create a varied and unique streetscape, neither the same floor plan nor the same elevation style shall be plotted next to or directly across the street from itself. "Directly across the street" is defined as more than one half (½) of the narrower lot overlapping the wider lot across the street from the lot in question.

- Repetitive patterns of garage placement shall be avoided when possible.
- Unless street slope prevents otherwise, a left or right side on garage may not be plotted more than three (3) times in a row.
- Corner lots shall incorporate single-story elements into their design to minimize visual impacts.

2. Architectural Design

The *Ironwood Village* Architectural Design Guidelines are envisioned as just that "guidelines"; they are intentionally created to allow ultimate flexibility to the builder and are purely illustrative in character for the final buildout. The guidelines provide the builder with a palette of options of design features and elements to be mixed and matched to create a comprehensive project that has one personality throughout, although is not boring or repetitive. The actual detailed architectural design elements and details that will be used within the *Ironwood Village* community will be decided at time of buildout by the builder with approval by the City of Moreno Valley.

a. Design Principals

While these design guidelines suggest architectural styles, the styles utilized should be authentic and distinct. Traditional styles tend to have defining features that should be consistently implemented throughout the *Ironwood Village* development. These guidelines allow for updated styles as long as the defining features can be identified and applied to the floor plans.

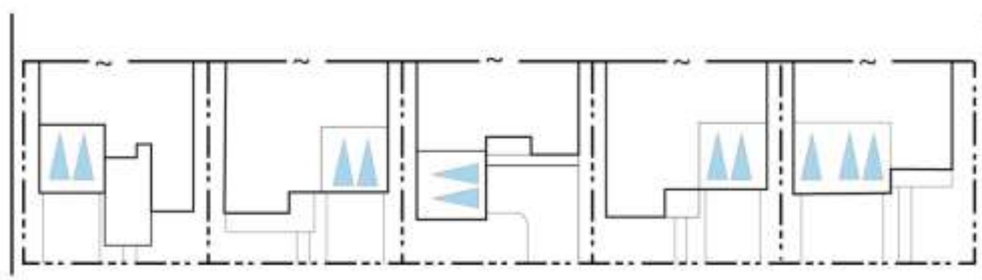
Architectural styles should be dictated by the massing of the floor plans and a certain style should not be forced upon every floor plan. By emphasizing authentic styles, these guidelines discourage similarity and uniformity of residential buildings. The street scene should be diverse as to form, massing, features, windows, front doors, garage doors, materials and colors.

As appropriate resource efficiency should influence architectural styles. The concept of resource efficiency includes reduction of wasteful elements in the design and construction of the house as well as conservation of energy, natural resources and water during occupancy of the home.

b. Form and Massing

Building mass and scale are key design elements that affect how a structure and the immediate surrounding areas are perceived. Controlling the mass of a building through design articulation of the building facades, attention to rooflines and variation in vertical and horizontal planes reduces the visual mass of a building. Building massing should be varied to provide interesting form, proportion and scale. Monolithic forms are discouraged; massing variety should be three dimensional. The perception of a buildings massing may be altered through the use of landscaping as well as the use of light and shadows.

Figure 2- 1 Varied Massing Diagram



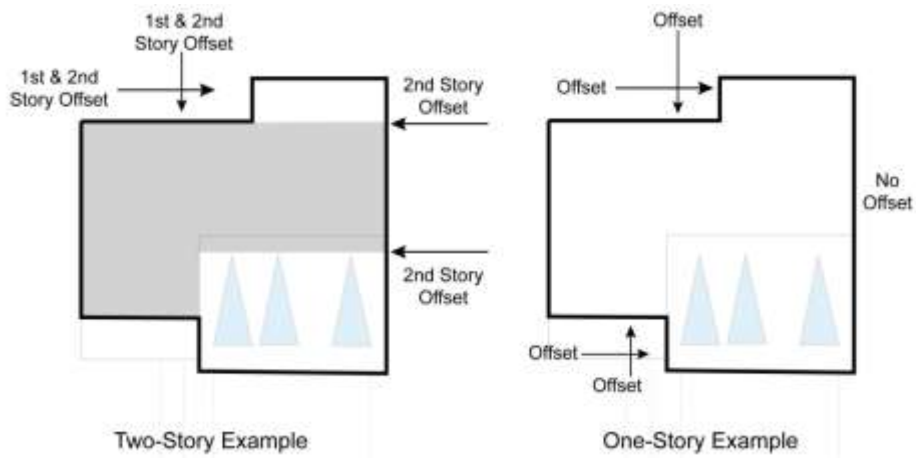
The Varied Massing Diagram is for illustrative purposes only, the floor plans and mix of two (2) and three (3) car garages may vary.

Design details should be included on the rear and sides of homes, creating four (4) sided architecture. Neighborhood housing should be arranged to create a varied appearance of building heights, articulation and setbacks for a comprehensive and integrated street scene.

Special design features (i.e. recessed entry ways, covered front porches, window and door articulation, variety of masonry accents, balcony's, courtyards, extended overhangs and varied building setbacks) are expected. General massing should vary perceptibly among the distinct floor plans. Together with variable setbacks, massing variation will create visual diversity along neighborhood streets.

- Every side of a two-story house must have at least one plane break "offset" at the first and/or second story in order to avoid monolithic elevations. A plane break must be at least two feet (2').
- Three (3) sides of a single-story floor plan must have at least one (1) plane break "offset". A plane break must be at least two feet (2').
- The floor area of a second story, including the stairs, may not exceed eighty percent (80%) of the floor area of the first story including the garage and any porch areas.
- Shadow patterns created by architectural details such as overhangs, projections and recesses of stories, balconies, reveals and/or awnings are encouraged, adding interest and aiding in climate control.

Figure 2-2 Example of Offsets



The Example Offsets are for illustrative purposes only, the floor plans and actual offsets may vary.

c. Roofs

Rows of homes backing onto a hillside are perceived by their contrast against the hillside area. The prevailing impact is the shape of the house and roofline. The house mass shall be varied to minimize the visual impact of similar housing silhouettes and similar ridge heights. This can be achieved by using a variety of roof structure designs such as; front-to-rear, side-to-side, gables and hipped roofs and/or by the introduction of single-story elements.

- Roof pitches should vary according to the architectural style. Primary roof pitches may be three to twelve (3:12), four to twelve (4:12), five to twelve (5:12) or six to twelve (6:12) (*for solar panel efficiency*). Secondary roof pitches can vary from primary roof pitches but only if such variation is consistent with the architectural style.
- To the extent they are consistent with an architectural style; hipped roofs are encouraged in order to accommodate solar panels and to cast shade over windows.
- Simplified rooflines are encouraged in order to accommodate integrated solar panels. Provide large enough unbroken roof planes to be sufficient to meet the state code for "solar zones."
- Eave depths should vary according to the architectural style and may range in depth from twelve to twenty-four inches (12 – 24").
- Porches and balconies are encouraged when consistent with the architectural style of the house. The minimum porch depth shall be five feet (5') to edge of the porch.

Figure 2-3 Varied roof examples

The variety of roof examples shown may be utilized for both single-story and two-story floor plans. These roof types are found within the architectural styles to be used within the *Ironwood Village* community.

d. Garage Orientation / Location and Design

The visual impact of three-car garages should be reduced wherever feasible. Although not necessarily depicted on the architectural elevations (see Section 3 Architectural Styles), the builder(s) of *Ironwood Village* will pay attention to the design, placement, and orientation of garages. Depending on the lot size, this can be achieved in a number of ways including but not limited to the following:

- Garage setback greater than the front of the house.
- Side-on a side-on garage shall have a minimum back-up area of twenty-eight feet (28'). (*Side-on garages are one of the optional architectural design elements that can increase the architectural variation, enhancing the project's overall visual appeal.)*
- Porte-cochere architectural element (covered parking area).
- Tandem garages allow for parking a boat or two vehicles (one behind the other) inside "one stall" of the garage that is twice the depth.
- Garage door details shall vary in manner that is consistent with the architectural style.
- Garage door windows are standard.
- Front-facing garages shall not be wider than sixty-five percent (65%) of the house width.
- Exclusive use of three-car front-facing garages in all floor plans is not permitted. Three-car front-facing garages may only be utilized if a single garage door is offset from the double garage door.

e. Architectural Elements

Architectural styles for *Ironwood Village* should be chosen in part as an opportunity to introduce a variety of exterior accent details and materials (i.e. brick, wood siding, masonry, metal, pre-cast concrete, timber, stucco or ceramic tile).

- Color schemes should be simple, attractive and consistent with the architectural style.
- Front door details shall vary according to architectural style.
- Feature window shapes shall vary according to architectural style.
- Acceptable roof materials include concrete tiles, and metal but exclude composition shingles and should be consistent with the architectural style of the building.

- Chimneys, which may cast shadows over solar panels, are optional and should be consistent with the architectural style.
- A minimum of two (2) photosensitive carriage lights per house are required and the style should vary according to architectural style.
- Shutters are not required; but to the extent they are used, shutter sizes should be proportional to the window and shutter styles should vary in accordance with the architectural style.
- Trim details from the front elevation should be applied to the sides and rear elevations of the house for continuity and vary in accordance with the architectural style.

f. Mechanical Equipment

All mechanical equipment for individual dwelling units (i.e. air conditioners, heating, cooling and ventilation equipment and/or all other such equipment) will not be roof mounted and shall be screened from surrounding properties and streets (by using screening, privacy fencing/walls and/or landscaping) and shall not be located in the front yard or street side yard outside of building setbacks.

Architectural Style

Architecture within *Ironwood Village* reflects the diversity of architectural styles found throughout California. The architectural elements and details provided within this Design Guidelines document are guidelines, not required details and/or elements. The implementation of modern interpretations of the historical architectural styles are allowed as appropriate.

The Architectural styles and the design elements shown in this document are purely for illustrative purposes and the actual product may vary. It is required that the chosen architectural styles be utilized and the elevations are identifiable and the street scene is varied. Generic box architecture that has an unidentifiable style or detailing is not permitted. The actual detailed architectural designs and details that will be used within the *Ironwood Village* community will be decided at time of buildout by the builder with approval by the City of Moreno Valley.

ARCHITECTURAL STYLES

Architectural Styles

Ironwood Village is envisioned as a community with a variety of home styles where architectural massing, roof forms, detailing, walls and landscape are integrated to reflect historic, regional, and climate-appropriate styles. Five styles have been chosen for the Ironwood Village community.

- Monterey
- Spanish Colonial
- Santa Barbara
- Napa
- Tuscan

ARCHITECTURAL STYLES

1. Monterey

The Monterey style emerged in the town of Monterey on California's central coast in the mid-19th Century. The style developed from a combination of two-story New England colonial house with an Adobe brick exterior. Later, the Monterey style was merged with elements from the Spanish Eclectic and Colonial Revival styles. Regardless of this evolution, the defining feature of the Monterey style remained the same: a prominent second-floor balcony.

Identifying Characteristics

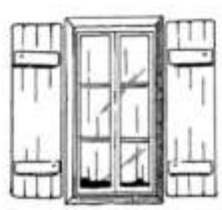
- Simple 2-story building forms
- Cantilevered balconies on front facades
- Pot shelves and decorative vents

Figure 3-1 Monterey Style

ARCHITECTURAL STYLES

Style Elements	Required
Form	• Typically two stories with simple building massing
Roof	• Low pitched gable roofs (occasionally hipped), 3.5:12 to 4:12 • 12" to 24" overhangs • Shallow sloped, concrete 'S' tile roofs in variegated colors (red clay is predominant color) • Flat concrete shingle
Walls	• Stucco exterior walls, smooth to light sand finish • Brick or siding (shingle, or vertical board-and-batten) • First and second stories frequently have different finish materials, with wood over brick being most common
Windows	• Rectangular, vertically proportioned windows • Paired windows • Full length window opening onto balcony • Simple window trim
Details	• Wood balcony and railing • Decorative shaped rafter tails • Ornate chimney cap • Round tile attic vents • Shutters as occasional accents
Colors	• Whites, painted brick building color • White or dark brown trim

Cantilevered Second



Shutter and Window

Pot Shelves

Graphics shown are for illustrative purpose only

ARCHITECTURAL STYLES

2. Spanish Colonial

The Spanish Colonial style was popular during the 1920s and early 1930s. This style evolved in California and the southwest as an adaptation of Mission Revival infused with additional elements and details from Latin America. It is common in California, Arizona, Texas and Florida. The key elements of this style were adapted to the California lifestyle. Plans were informally organized around a courtyard with the front elevation simply articulated and detailed.

Identifying Characteristics

- Terra cotta or red concrete tile roofs
- Entry courtyards with gates
- Decorative elements, including wrought iron, clay vents, ceramic tiles, etc.

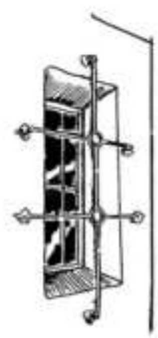
Figure 3-2 Spanish Colonial Style

Ironwood Village

ARCHITECTURAL STYLES

Style Elements	Required
Form	• One-and Two-story building massing, often asymmetrical in form
Roof	• Typical 4:12 roof pitch • Predominant gable and shed with tight rake and 12"-18" eaves • Full 'S' concrete tile • Limited use of conical roofs on circular towers
Walls	• Stucco exterior walls, smooth to light sand finish • Shaped stucco eave details
Windows	• Recessed Feature windows • Square, rectilinear or round accent window • Vertical proportioned windows • Simple window trim • Tile or pre-cast window trim at select locations
Details	• Decorative iron lanterns, sconces, hinges, railing and hardware • Fabric or metal awnings • Sculpted walls and chimneys • Gable end roof vents • Pre-cast concrete accents • Round pre-cast concrete columns, or stucco pilaster with decorative cornice trim
Colors	• Off-white or cream building color • Dark brown trim • Bright accent color on entry door, shutters and awnings

Decorative Tile



Recessed Window

Decorative Wrought Iron

Graphics shown are for illustrative purpose only

ARCHITECTURAL STYLES

3. Santa Barbara

This style was established in the City of Santa Barbara. After the devastating earthquake of 1925, the City adopted the Hispanic style as its official style. The Santa Barbara style has its roots in the Spanish colonial revival style. White-washed stucco walls are inherent to the Santa Barbara style, which also features boxy, simple forms, low-pitched gable roof form, and the use of wood and tile as accent details.

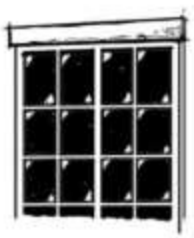
Identifying Characteristics

- Stucco with light sand finish
- Boxy, simple massing
- Fully rounded arch elements
- Deeply recessed wall fenestration and asymmetrical volumes grouped about courtyards
- Dark wood exposed rafter tails
- Wrought iron accents

Figure 3-3 Santa Barbara Style

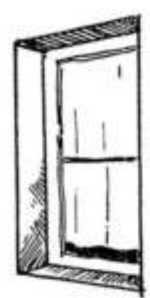
ARCHITECTURAL STYLES

Style Elements	Required
Form	• Boxy, simple massing • One- and two-story stacked elements • Recessed entry or covered porch
Roof	• Roof pitch: 4:12 to 5:12 • 0-6" rake and 18"-24" eaves • Full 'S' concrete tile • Hip or intersecting gable roof
Walls	• Stucco exterior walls, smooth to light sand finish • Stucco eave details
Windows	• Vertical multi-paned windows • Accent recessed window • Simple window trim
Details	• Decorative wrought iron accent details • Decorative shaped rafter tails • Sculpted walls and chimneys • Gable end roof vents • Full round arched arcades or openings • Juliette balconies
Colors	• Off-white and cream building color • Cream and earth tone trim • Dark colored eaves and fascia



Window Headers

Balcony



Recessed Windows

Graphics shown are for illustrative purpose only

ARCHITECTURAL STYLES

4. *Napa*

This style has evolved in California's Napa Valley. The architecture shares elements of California Eclectic and Mediterranean historical styles. To respond to the local climate environment, large overhangs are incorporated into the style in order to shield the house from sun in summer and warm the house in winter. Deep earth tone colors help to ground the Architecture and blend into the landscape design.

Identifying Characteristics

- Deep earth tone
- 'S'- shaped or flat concrete roof tiles
- Large overhang
- Stucco finish
- Masonry veneer accents

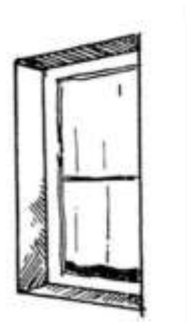
Figure 3-4 Napa Style

ARCHITECTURAL STYLES

Style Elements	Required
Form	• Informal arrangement of one- and two-story building forms
Roof	• Roof pitch: 4:12 to 6:12 • 12" to 24" overhangs at eaves • 6" to 12" overhangs at rakes • Full 'S' concrete tile or flat shingle w/ barrel tile hips/ridges • Main hip or gable roof with secondary shed or gable roofs over one-story elements
Walls	• Stucco finish with masonry veneer accents
Windows	• Recessed windows • Vertically oriented, multi-light window • Simple window trim
Details	• Decorative iron accents • Decorative shaped rafter tails • Pre-cast door or window trims
Colors	• Deep earth tone building color • Lighter or darker contrasting trim color • Dark or rich accent color

Window with Louvered Shutters

Overhang



Recessed Windows

Graphics shown are for illustrative purpose only

ARCHITECTURAL STYLES

5. Tuscan

The Tuscan style home originates from the Tuscany region of Italy and has become a highly sought-after style of architecture. The style represents the unique heritage of the region and is true to its original design created during the Middle Ages. Tuscan style homes incorporate accent materials such as stone, fieldstone, brick, or other rustic materials. Shed and hip roofs or occasional gable or cross gables help identify the Tuscan style as well.

Identifying Characteristics

- Stucco wall materials with stone accent wall planes
- Typically shallower pitched hip or gable roofs with "S" tile
- Exposed rafter tails with decorative end cuts
- Front entries typically detailed with a pre-cast trim surround and wood head trim

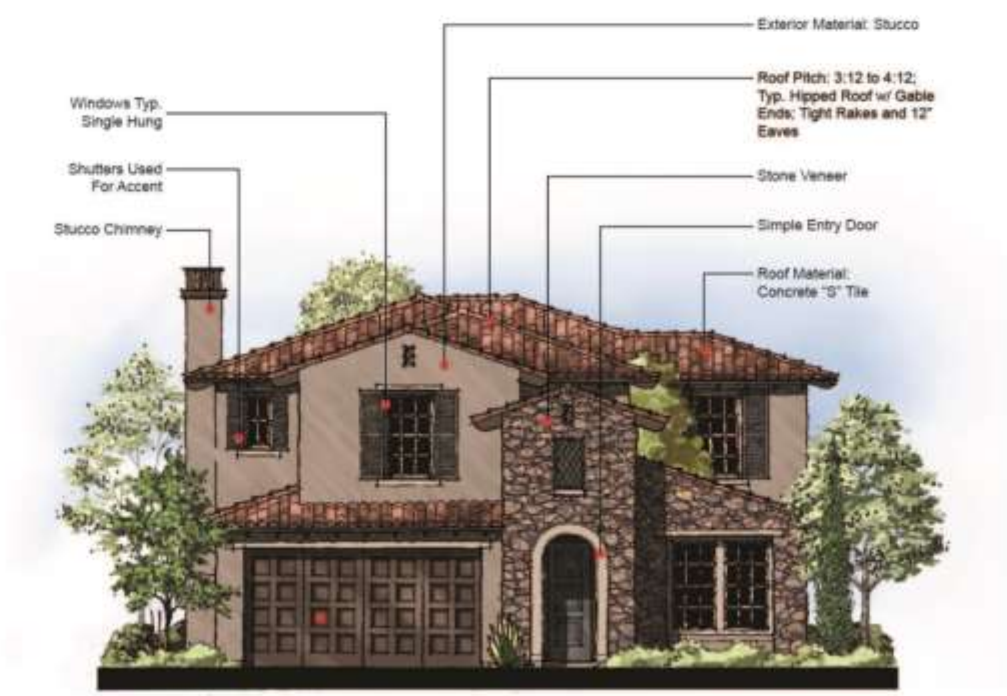
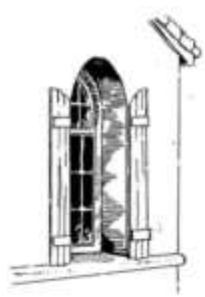


Figure 3-5 Tuscan Style

ARCHITECTURAL STYLES

Style Elements	Required
Form	• Informal arrangement of one- and two-story building forms
Roof	• Low pitched roofs, 3:12 to 4:12 • Tight to 18" overhangs at eaves • Tight to 12" overhangs at rakes • Full 'S' concrete tile • Shed and hip roofs or occasional gable or cross gable
Walls	• Stucco exterior walls, smooth to light sand finish • Hill stone accents
Windows	• Recessed windows • Shaped window trim
Details	• Decorative "lacy" wrought iron grille work • Entry door patterns shall reflect architectural style of the building • Decorative iron accents • Decorative shutters and awnings • Arched windows or openings • Decorative shaped rafter tails
Colors	• Variety of rich earth tone building color • Lighter or darker contrasting trim color • Dark or bright accent color


Round Arches


Recessed Window


Decorative Balcony

Graphics shown are for illustrative purpose only

a. Variation Requirements

The variation requirements below have been determined by fixing the maximum average frequency of a given house at two (2) times per development. The frequency equals the number of lots in a planning area divided by the number of required house footprint combinations. These variation requirements, along with the mix requirements, will help to ensure development of an architecturally diverse community.

Table 2-1 Summary of Variation Requirements

Summary of Footprint Variation Requirements		
Number of Lots	**Minimum Footprints**	**Minimum Elevation Footprints**
181	6	6

Note: These minimum Footprints are per the City of Moreno Valley Municipal Code 9.16.130 (Table 9.16.130B)

If the project is split into two or more planning areas, ***Table 2-1 Summary of variation requirements*** for the revised number of lots will meet or exceed the City of Moreno Valley Municipal Code Section 9.16.130 Table B which applies to all projects within the City of Moreno Valley.

The table should be regarded as a minimum, reverse versions of each floor plan must be provided.

To minimize visual impact, corner residential structures shall be single-story or if two-story, shall incorporate single-story elements into the design. The short and low side of the home should be sited fronting the street corner.

b. Mix Requirements

A single floor plan may not be plotted with less than fifteen percent (15%) or more than a twenty-five percent (25%) frequency, unless otherwise directed to do so by City of Moreno Valley staff.

c. Colors and Materials

A range colors and textures of building materials are required to lend to the appearance of a varied street scene. The use of appropriate building materials and colors helps to maintain a specific architectural style, as well as providing a diverse neighborhood design. Material breaks, transitions and terminations should produce clear definitions of separation while maintaining a defined color and/or materials theme. This is important when transitioning from stucco and/or siding to masonry veneers. Colors and materials should visually blend with the hillsides. The actual colors and materials to be used within the *Ironwood Village* community will be decided at time of buildout by the builder with approval by the City of Moreno Valley.

3. Landscape Design

The conceptual landscape and planting design provides the identity to the *Ironwood Village* community that at time of buildout the builder shall comply with the ***City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code***. The plant palette for *Ironwood Village* will be appropriate to the project's climate. The landscaping shall be where appropriate drought tolerant/native vegetation and utilize water-conserving equipment including the installation of bubblers, drip systems, low volume sprays and/or smart irrigation controls when feasible.

Landscaping shall consist predominately of plant materials that include water efficient "drought tolerant", and/or native plants. The landscape areas shall be designed to promote water retention and allow runoff from impervious surfaces to permeable areas. Hardscape areas are recommended to be constructed with pervious surfaces where feasible to reduce run off and allow water percolation.

The landscape plan incorporates the water retention/detention/ water quality basins as well as the hillside areas that are to be conserved and the fuel modification areas as shown on TTM 37001. Project open space, fuel modification area, interior streets, interior trails and park will be maintained by the *Ironwood Village* Home Owners Association (HOA.) In addition, there are exterior multi-use trails along the roadways adjacent to the project, and a trail head (*located in the southeast corner of the project at Ironwood Avenue and*

Oliver Street) connecting to future City of Moreno Valley Proposed off-site trails; these will be maintained by the City of Moreno Valley. The drainages will be maintained by the City of Moreno Valley, however the water basins will be maintained by the *Ironwood Village* HOA (landscaping) . ***Please refer to Figure 4-1 Maintenance Responsibility***. The actual detailed landscape design and placement that will be used within the *Ironwood Village* community will be decided at time of buildout by the builder with approval by the City of Moreno Valley.

a. Community Landscape, Walls and Fencing

All of the *Ironwood Village's* community areas will be landscaped as appropriate per ***City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code***. The landscape will provide a cohesive appearance to the community and aid in the transition to and from adjacent areas. The visible *Ironwood Village* perimeter walls include a six feet (6') high block wall with pilasters and concrete block cap. Neighborhood walls will be six feet (6') high concrete masonry walls and vinyl privacy fencing in tan or white for residential privacy are to be a five feet six inches (5' 6") high, made with 6" vinyl tongue and groove with 7" top and bottom vinyl rails. Adjacent to the multi-use trails, a five feet (5') high, in tan or white three rail vinyl fence or a Three (3) Cable and Post fencing along the trails should be minimized, unless needed when out of "public view". Therefore, a trail may have no fence or a Three (3) cable and post fence, along the hilly trail sections if necessary the two trail fencing types are to be per City of Moreno Valley standards will define the trail areas. Top of slopes in the rear yards, a six feet (6') high view wall will be built; a low wall with tubular steel fencing on top will be provided. Tubular steel fencing will also be provided adjacent to water quality basins and the park per City of Moreno Valley standards. There will be an Entry monument located at the project entry into the project from Ironwood Avenue. In addition, there will be secondary entry monument at the Nason Street entry road and the Oliver Street entry road. ***Please refer to Figure 4- 2 Preliminary Wall/Fence Plan & Figure 4-4 Trails and Open Space Plan.***

The walls and fencing shall meet the following requirements as shown on ***Figure 4- 2 Preliminary Walls and Fence Plan.*** All of the public walls and fencing will be maintained by the *Ironwood Village* HOA. However, individual residential lot walls/ fences will be maintained by the homeowner. The Wall and Fence materials and colors will be decided at time of buildout by the builder with approval from the City of Moreno Valley.

Block Community Walls (*Perimeter Wall & Neighborhood Wall*)

- Block walls will be block or an approved alternative. This includes perimeter walls and private areas.
- Colored concrete caps at wall and pilaster tops shall match the color of the masonry.
- Perimeter wall pilasters will match the block material and color.
- Retaining walls will match the block wall conditions.
- Perimeter & neighborhood walls should have two feet (2′) wide square block pilasters which match the wall, with a two inch (2″) cap block.
- Perimeter walls should be four inches by six inches by sixteen inches (6″x 8″x 16″) stucco over regular CMU or split face CMU.
- Perimeter walls should have six inches by eight inches by sixteen inches (6″x 8″x 16″) split face CMU along the top edge of the wall.
- Perimeter walls should have fourteen inches (14″) Concrete Cap on top of the wall.
- Neighborhood walls should be four inches by eight inches by sixteen inches (4″x 8″x 16″) regular CMU.
- Entry Monuments with the Ironwood Village logo will be placed within the Ironwood Avenue, Nason Street and Oliver Street entrance road landscape setback areas. (*Exact design has not been determined at this time and will be determined at time of buildout by the builder and approved by the City of Moreno Valley*.)
- *Please refer to* ***Figure 4—3 Wall/Fence Details****.*

Rear Fencing on Slopes (*View Wall*)

- The "View Wall" low block wall twenty-four inches (24″) high lower wall will match the community block wall, with tubular steel fencing placed on top of the lower block wall.

- The view walls will be made with tubular steel fencing materials.
- View walls should have one and one-half inches (1 ½ “) square tubular steel tubing, top and bottom rails.
- View walls should have one inch (1”) square steel tubing pickets set four and one-half inches (4 ½ “) on-center spacing.
- View walls should have two feet (2’) wide square block pilasters which match the wall, with a two inch (2”) cap block.
- View walls should be stucco over or split face CMU block six inches by eight inches by sixteen inches (6”x 8”x 16”) regular CMU.
- View walls should have four inch (4”) square tubular steel posts at property line corners, with a Newel Post Ball on top.
- View walls should be along the back of the lots, that back onto open space or other lots that back to open space areas but, not along trails.
- *Please refer to **Figure 4—3 Wall/Fence Details**.*

Interior Fencing (*Privacy Fence*)

- Interior privacy fencing will be tan or white vinyl for both interior property lines and fence return conditions.
- Interior fencing heights will vary but no lower than five feet six inches (5’ 6”) high.
- Privacy fencing should have five inches by five inches (5” x 5”) Vinyl Post.
- Privacy fencing should have a domed cap on top of the post.
- Privacy fencing should have six inch (6”) wide tongue and groove Vinyl or fencing that simulates tongue and groove.
- Privacy fencing should have two inches by seven inches (2” x 7”) Top and Bottom vinyl rails.
- Vinyl privacy fencing will be tan or white.
- Gates will be constructed to match the tan or white interior vinyl privacy fence.
- *Please refer to **Figure 4—3 Wall/Fence Details**.*

Trail Fencing (*3 Rail Fence*)

- Trail fencing will be per City of Moreno Valley standards.
- Vinyl Ribbed Rails in tan or white.
- Five inches by five inches (5”x 5”) Vinyl Posts in tan or white.

- Posts will be topped with post caps that match the vinyl posts in tan or white.
- Three rail fencing should have one and one-half inches by five and one-half inches (1 ½ x 5 ½ “) vinyl ribbed rails, spaced eleven inches to twelve and one-half inches (11” – 12 ½ “) apart.
- *Please refer to **Figure 4—3 Wall/Fence Details**.*

Trail Fencing (*3 Cable & Post Fence*)

- Trail fencing will be per City of Moreno Valley Standard MVGF-616-0.
- Galvanized Posts, Cable and Hardware.
- Posts 2” Standard Galvanized Post.
- Cable 1/4” Galvanized Cable.
- Posts will be topped with post caps that are driven fit.
- 5/16” Turnbuckle with 4 - ½ “ adjustment and 2 - ¼” Cable Clamps per end
- Three cable and post fencing should have cable spaced twelve inches (12”) apart.
- *Please refer to **Figure 4—3 Wall/Fence Details**.*

Basin / Open Space Fencing (*View Fence*)

- The view fencing will be made with tubular steel fencing materials.
- View Fencing should have one and one-half inches (1 ½ “) square tubular steel tubing, top and bottom rails.
- View fencing should have five-eight inches (5/8”) square steel tubing pickets set four and one-half inches (4 ½ “) on-center spacing.
- View fencing should have one and one-half inches (1 ½ “) square tubular steel posts set six feet (6’) on-center maximum spacing.
- View fencing should have four inch (4”) square tubular steel posts at property line corners, with a Newel Post Ball on top.
- View fencing should also be around the basins and other open space areas.
- *Please refer to **Figure 4—3 Wall/Fence Details**.*

b. Fuel Modification Requirements

On the north side of the *Ironwood Village* community are fuel modification zone areas. The removal and or preservation of plants/trees will be subject to review and approval by the City's fuel management officer. Maintenance of the fuel modification zone will be the responsibility of the *Ironwood Village* HOA. The twenty to twenty-four feet (20'– 24') wide fire access road and the multi-use trail that travels along the northern edge of the developed portion of the project, is built into the fuel modification zone for this project. All landscaping within *Ironwood Village* shall comply with the ***City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code***.

c. Trails

The multi-use trails interconnect the *Ironwood Villag*e project neighborhoods to the interior open spaces and park as well as to the future City of Moreno Valley's off-site trails system. A Trail Head will be located at the southeast corner of the Ironwood Village at Oliver Street and Ironwood Avenue. The Trail Head will connect to the exterior trail system along Ironwood Avenue and Oliver Street which connects to the interior trail system as well as to the off-site trails. There will be "nodes of interest" located along the central trail that leads from north to south to and from the neighborhood park. The "nodes of interest" may be but not limited to the following: scenic views, exercise equipment, benches, dog stations, drinking fountains, trash/recycling containers and/or other items along the project's trails. There are trail connections onto the central trail from trails leading off the adjacent cul-de-sacs. The central trail will have areas to rest and enjoy the outdoors within walking distance of home. In addition to the trails creating interconnectivity on site the project includes two (2) trail connections from Street "A" directly to Ironwood Avenue. These connections will provide view corridors from Ironwood Avenue into Ironwood Village as well as rest stops. The combination of trails and fire access located to the rear of the houses on the northern portion of the development are to be a minimum of twenty-four feet (20'– 24') wide per City of Moreno Valley standards. ***Please refer to Figure 4-4 Trails and Open Space Plan.***

Trails will provide connections through the central open space area and will branch off east and west along this north-south open space area, with additional trails connecting to neighborhood streets, and other trails. All the trails will loop throughout the *Ironwood Village* project and allows pedestrian connections to the park and the proposed City Trails north, east and west of the site. The trails will be built per City of Moreno Valley Standards. ***Please refer to Figure 4-4 Trails and Open Space Plan & Figure 4-5 Conceptual Trails Section.***

i. Trail Head

A Trail Head will be located within lot "M", adjacent to the corner of Oliver Street and Ironwood Avenue, parking will be on-street parking along Oliver Street. The Trail Head may include but is not limited to the following amenities: bench seating, covered picnic area, trash/recycling receptacles, dog station, water fountain, hitching post, horse watering station and/or exercise equipment. The actual Trail Head amenities will be decided at time of buildout by the builder with approval from the City of Moreno Valley. ***Please refer to Figure 4—8 Conceptual Trail Head.***

ii. Ironwood Avenue Trail Connections

There are two (2) Trail connections to Ironwood Avenue from Street "A" within the *Ironwood Village* project. The first trail connection is located between lots 13 & 14 and is a part of lot "K", this trail will cross the water basin with a bridge and a pedestrian walkway. The design and materials of the bridge will be determined at time of buildout by the builder with approval from City of Moreno Valley. The second trail connection is located between lots 5 & 6 and crosses between lot "K" and lot "M". The trail connections will be pedestrian walkways that will allow direct access from the project interior to the exterior trails along Ironwood Avenue. One of the trail connections bulbs/flares out on the Ironwood Avenue end of the connection, allowing room for enhanced landscaping and, seating areas and/or other amenities. Each of these trail connections may include but is not limited to the following amenities: bench seating, trash/recycling receptacles, dog station, shade structure and/or water fountain. The actual Trail Connection amenities will be decided at time of buildout by the builder with approval from the City of Moreno Valley. ***Please refer to Figure 4--9 Trails Connectivity and Figure 4-10 Ironwood Pedestrian Connections.***

All landscaping within *Ironwood Village* shall comply with the ***City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code***.

d. Hillside Nature Area

The hillside nature / open space areas are to be left undeveloped or minimally developed on the northwest and northeastern areas along the northern most project boundaries as shown on TTM 31007. ***Please refer to Figure 4-4 Trails and Open Space Plan .***These areas will be conserved as natural open space to help preserve the scenic views of the hillsides from the City of Moreno Valley. These areas will not be landscaped and/or watered the area will be maintained as is, unless otherwise required by the City of Moreno Valley. The hillside nature / open space areas creates a "natural" transition between the developed and undeveloped areas and, may include the fuel modification vegetation clearance zone and/or fire access/trail. The hillside areas will help to buffer and transition the project from the surrounding land uses to the proposed *Ironwood Village* community. Preserving the hillside areas for scenic and transitional reasons allows for some of the natural rock outcroppings as well as the existing off-site trails to remain intact.

e. Open Space

The *Ironwood Village* open space areas that are not to remain as natural vegetation will be planted as appropriate to the project's climate. The landscaping shall be where appropriate drought tolerant or native plants and utilize water-conserving equipment including the installation of bubblers, drip systems, low volume sprays and/or smart irrigation controls when feasible. No detailed plant palettes have been proposed within this document due to the currently evolving nature of the water conservation measures in the State of California. All landscaping within *Ironwood Village* shall comply with the ***City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code***.

Landscaping shall consist predominately of plant materials that include water efficient "drought tolerant" and native plants. Landscape areas shall be designed to promote water retention and allow runoff from impervious surfaces. Hardscape areas are recommended to be constructed with pervious surfaces where feasible to reduce run off and allow water percolation. ***Please refer to Figure 4-4 Trails and Open Space Plan.***

f. Park

The *Ironwood Village* park is located centrally within to the project, allowing residents to walk to the park safely using the project wide inter-looping trails system. The park may include but not limited to: bench seating, an open play area, Bocce ball courts, ½ court basketball, volleyball court, exercise equipment, picnic area and/or a tot lot "children's play equipment". The actual park amenities will be decided at time of buildout by the builder with approval from the City of Moreno Valley. ***Please refer to Figure 4--6 Conceptual Park Plan.***

The park areas will be planted as appropriate to the project's climate. The landscaping shall be where appropriate drought tolerant and utilize water-conserving equipment including the installation of bubblers, drip systems, low volume sprays and/or smart irrigation controls when feasible. No detailed plant palettes have been proposed within this document due to the currently evolving nature of the water conservation measures in the State of California. All landscaping within *Ironwood Village* shall comply with the ***City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code***.

Landscaping shall consist predominately of plant materials that include water efficient "drought tolerant" native plants. Landscape areas shall be designed to promote water retention and allow runoff from impervious surfaces. Hardscape areas are recommended to be constructed with pervious surfaces where feasible to reduce run off and allow water percolation.

g. Basins

The basins within *Ironwood Village* community are located along the southern edge of the project site. The basins will not only provide a necessary job for retaining water on-site to prevent run-off, they also provide a transition and visual buffer to the existing residences south of Ironwood Avenue. The basins make the transition softer and more visually appealing by having landscaping and open space, instead of walls and roof tops. The basins will be planted as appropriate to the project's climate. The landscaping shall be where appropriate drought tolerant and utilize water-conserving equipment including the installation of bubblers, drip systems, low volume sprays and/or smart irrigation controls when feasible. No detailed plant palettes have been proposed within this document due to the currently evolving nature of the water conservation measures in the State of California. All landscaping within *Ironwood Village* shall comply with the ***City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code***.

Landscaping shall consist predominately of plant materials that include water efficient "drought tolerant" native plants. Landscape areas shall be designed to promote water retention and allow runoff from impervious surfaces. Hardscape areas are recommended to be constructed with pervious surfaces where feasible to reduce run off and allow water percolation. ***Please refer to Figure 4-- 7 Typical Basin Section.***

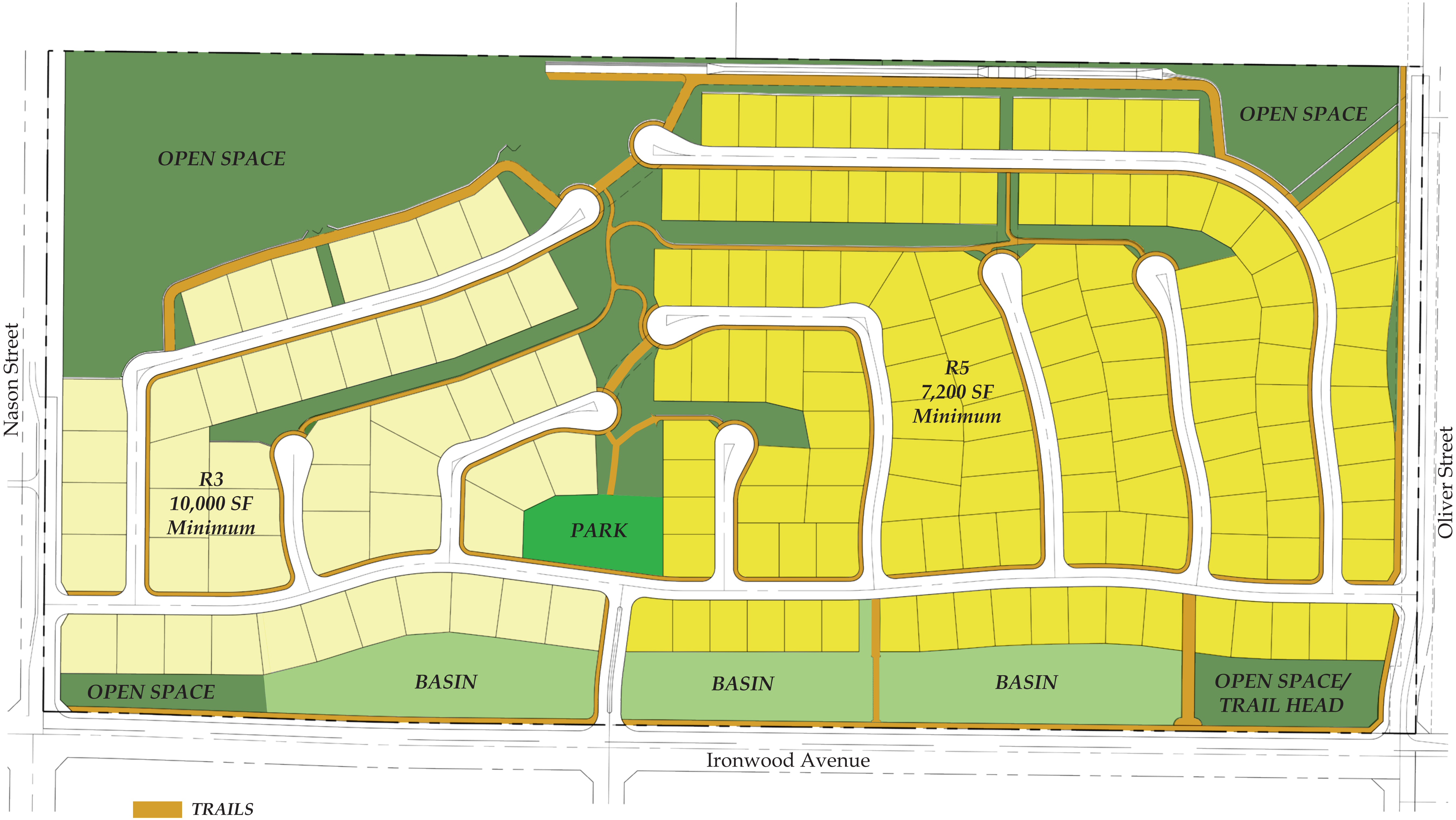
Ironwood Village Design Guidelines

FIGURES

Site Location Map
Figure 1-1

Ironwood Village

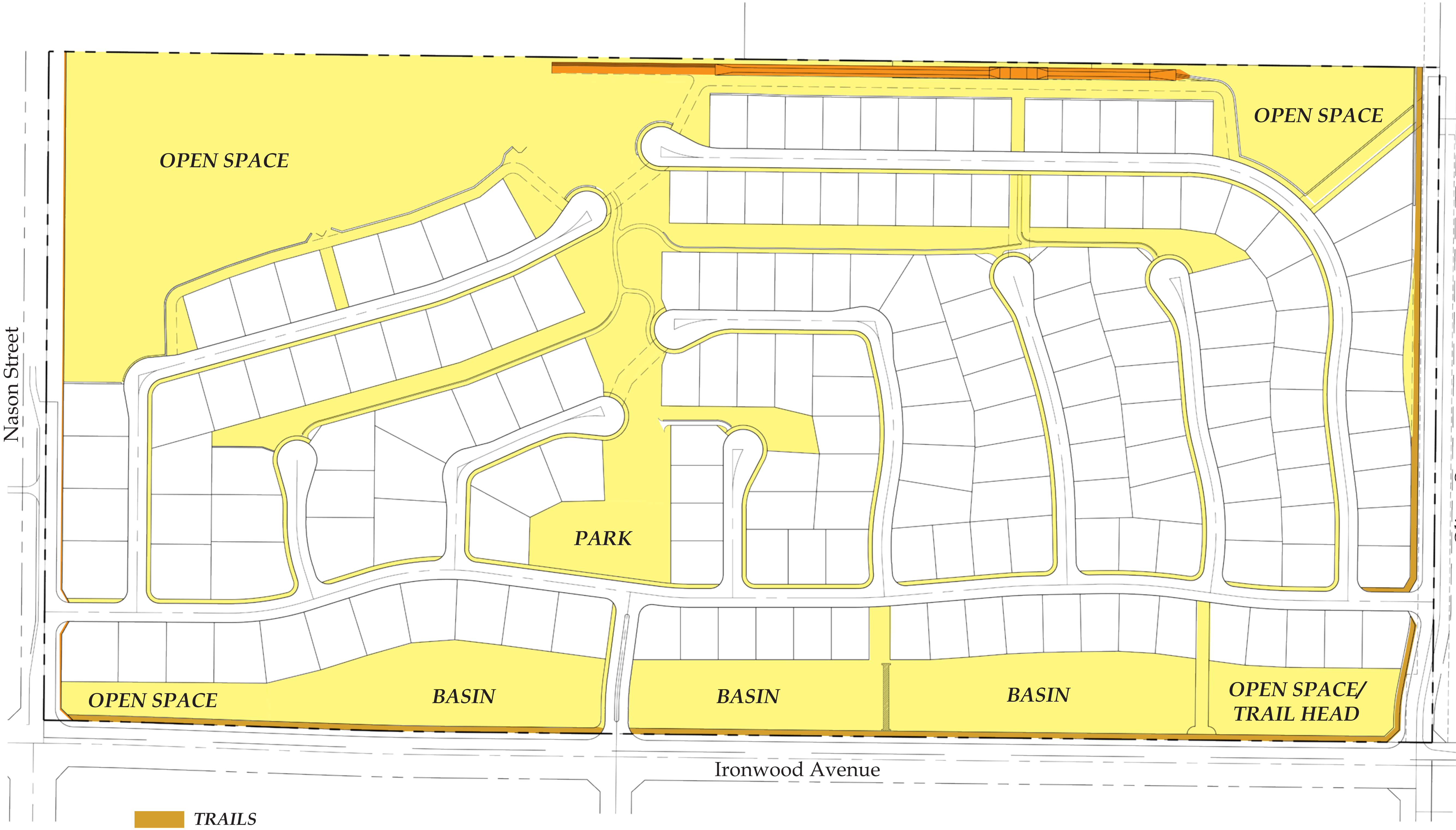
Conceptual Land Use Plan
Figure 1-2



Ironwood Village

Maintenance Responsibility Plan

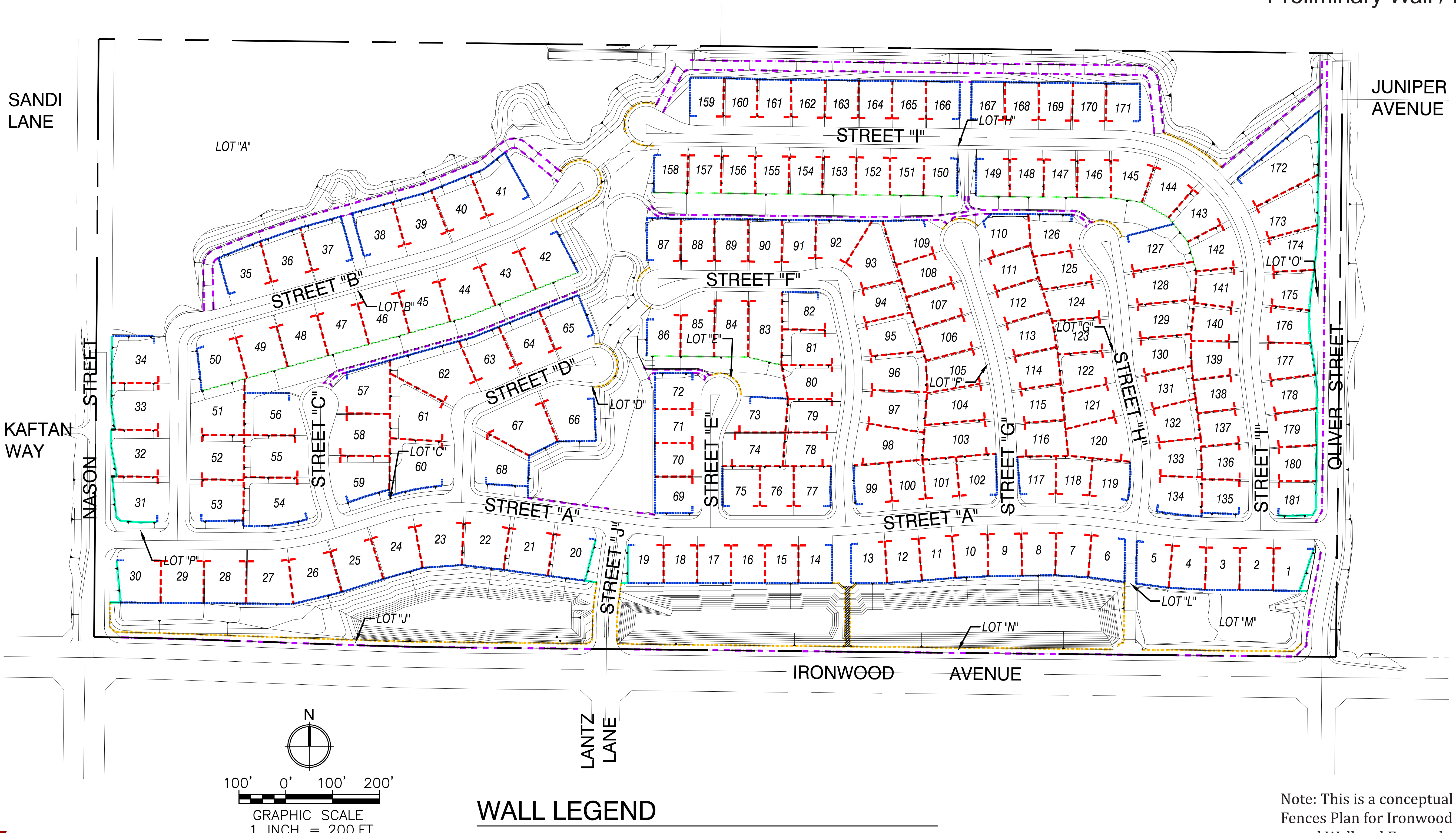
Figure 4-1



Note:
This is a preliminary Maintenance Responsibility Plan the final plan will be provided at time of construction and approved by the City of Moreno Valley.

Ironwood Village

Preliminary Wall / Fence Plan
Figure 4-2



WALL LEGEND

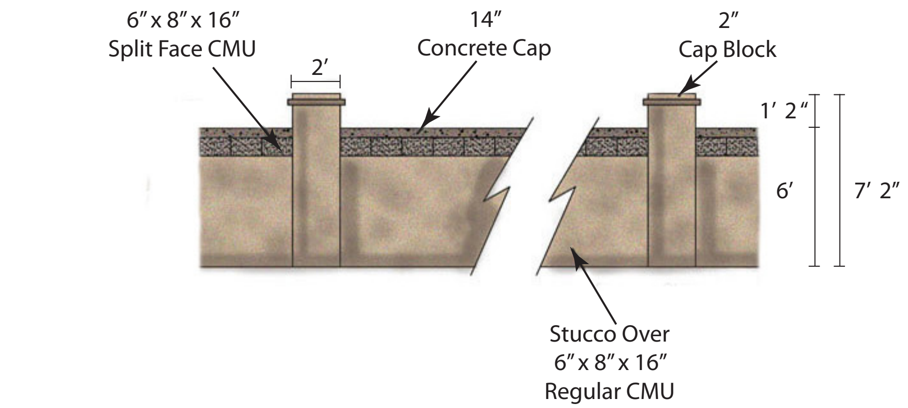
	PERIMETER WALL		3 RAIL FENCE or 3 CABLE & POST FENCE
	NEIGHBORHOOD WALL		VIEW FENCE
	VIEW WALL		PRIVACY FENCE

Note: This is a conceptual Wall and Fences Plan for Ironwood Village the actual Wall and Fence plan may differ at time of construction with approval by the City of Moreno Valley.

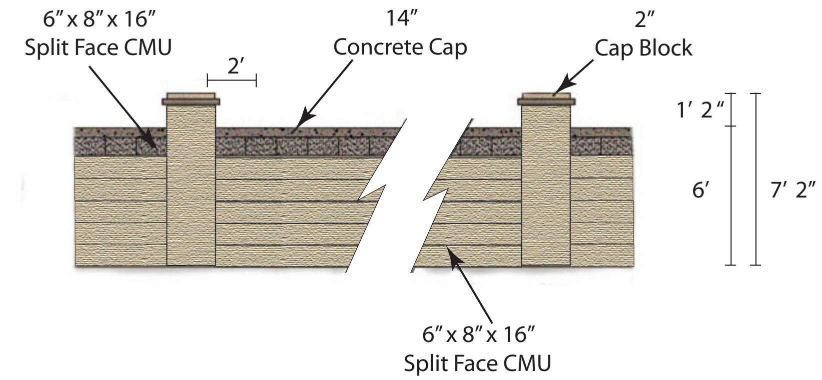
ANDERSON CONSULTING ENGINEERS, INC.

Conceptual Wall & Fencing
Figure 4-3

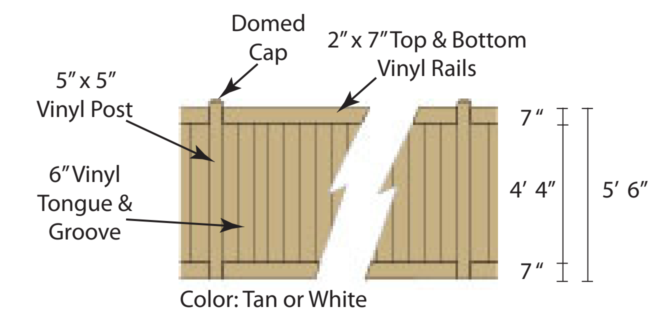
Perimeter Wall



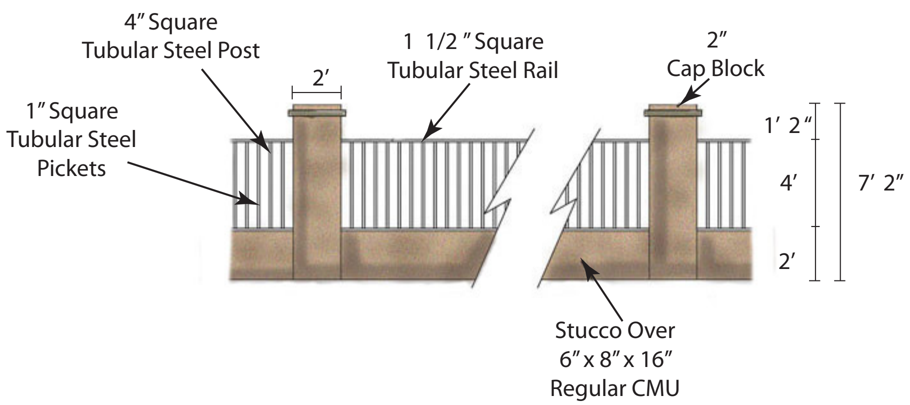
Perimeter Wall



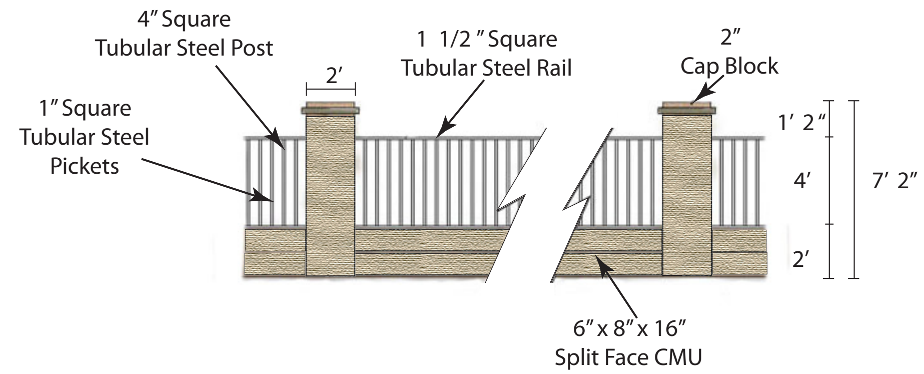
Vinyl Privacy Fence



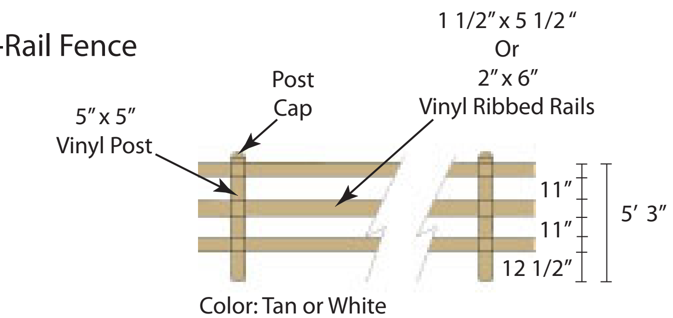
View Wall



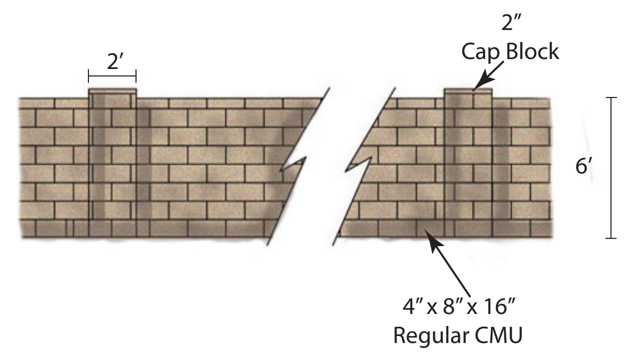
View Wall



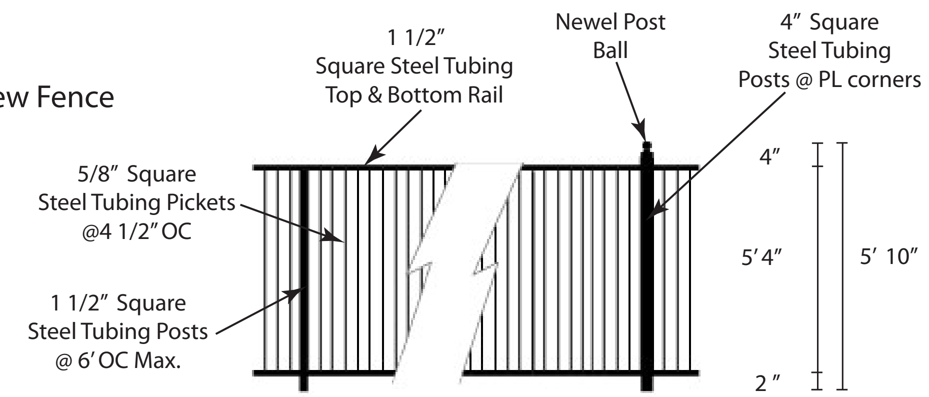
Vinyl 3-Rail Fence



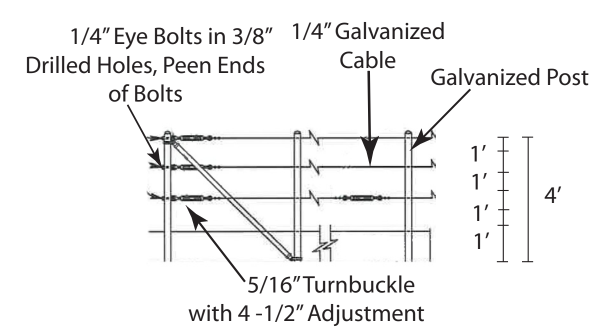
Neighborhood Wall



View Fence



3-Cable & Post Fence



Note: 3 Cable & Post:
To Be Constructed Per
City of Moreno Valley
Standard MVGF-616-0 or
Current Standard at Time

Note: Perimeter and View Walls - May be Split Face CMU, or Stucco over Regular CMU.

The Wall materials will be determined at time of contstruction with approval by the City of Moreno Valley.

Ironwood Village

Trails and Open Space Plan
Figure 4-4

Note: This is a conceptual Trails and Open Space Plan for Ironwood Village the actual Trails and Open Space may differ at time of construction with approval by the City of Moreno Valley.

Conceptual Trail Section
Figure 4-5

Note: This is for Illustrative purposes, of the interior Trail Section for Ironwood Village the actual Trails may differ at time of construction with approval by the City of Moreno Valley.

IRONWOOD

CONCEPTUAL TRAIL SECTION

Moreno Valley, CA

KTGY # 20150218 09.16.2015

KTGY Group, Inc.
Architecture+Planning
17922 Fitch
Irvine, CA 92614
949.851.2133
ktgy.com

GLOBAL INVESTMENT & DEVELOPMENT

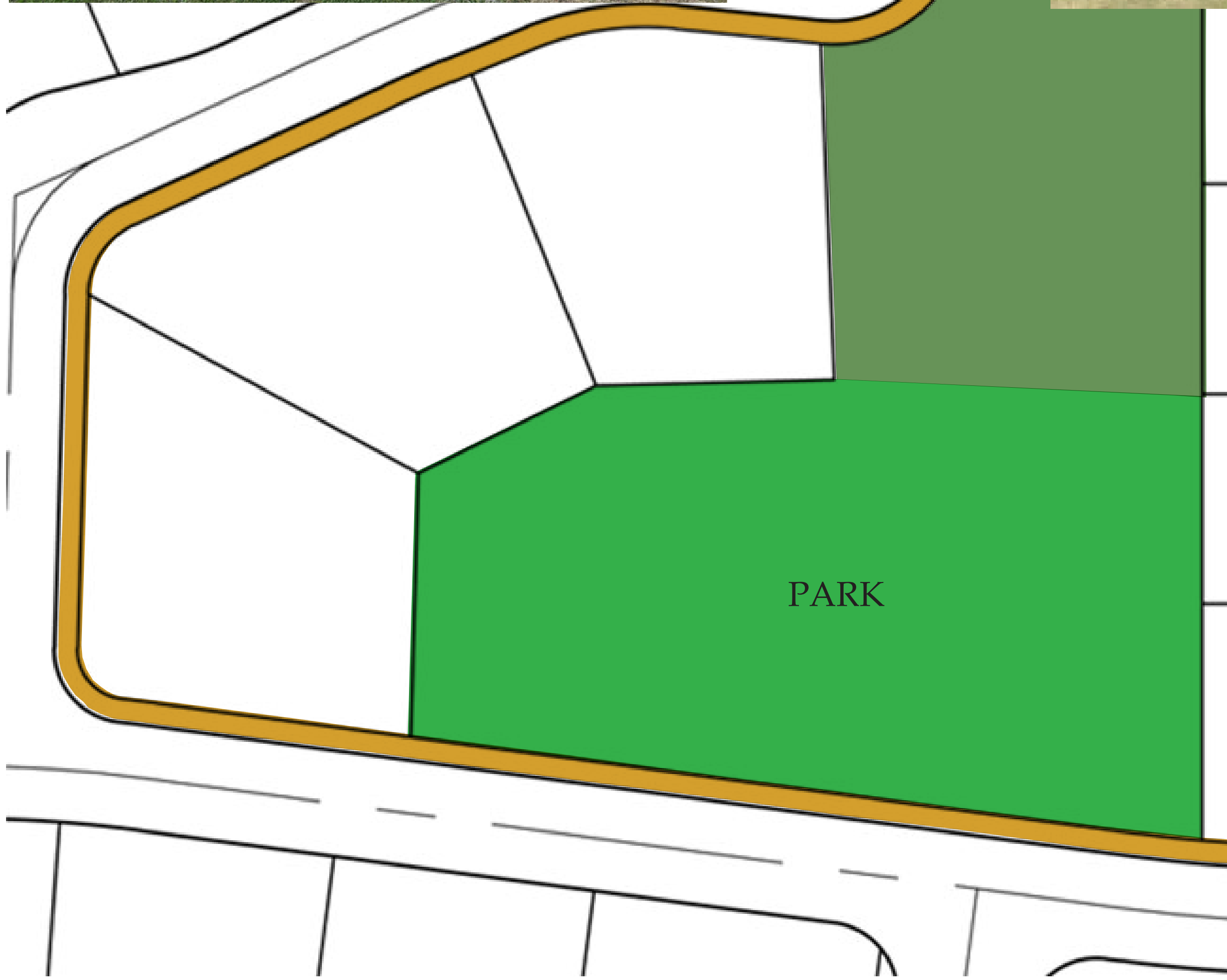
Conceptual Park Plan
Figure 4-6

BBQ & Picnic Area

1/2 Court Basketball

Childrens Play Area

Covered Picnic Table



Volleyball Court

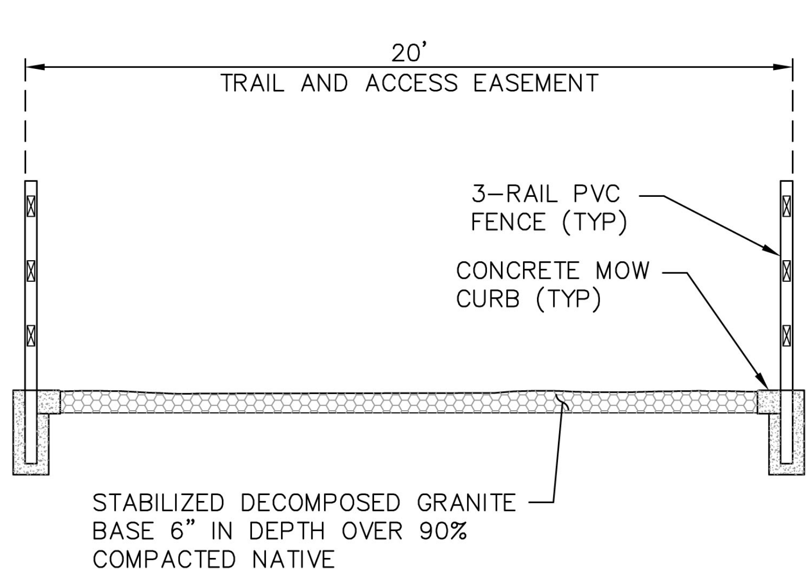
The photos are samples of the amenities that could be included in the Park area. The actual design / style and location of the amenities may change, other amenities could be used in-lieu of those indicated in this exhibit.

Bike Rack

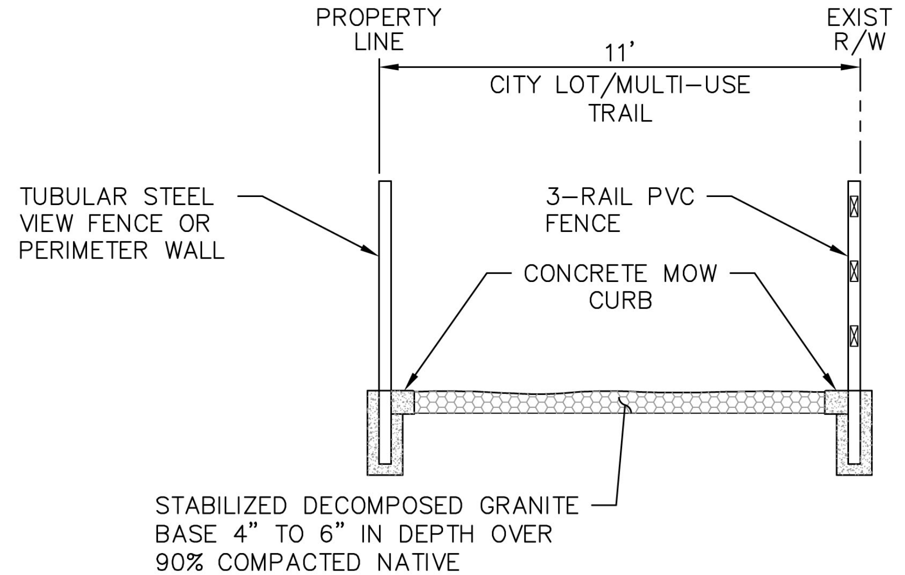
Note: This is a Conceptual Park Plan for Ironwood Village the actual Park may differ at time of construction with approval by the City of Moreno Valley.

Trails and Basin Sections

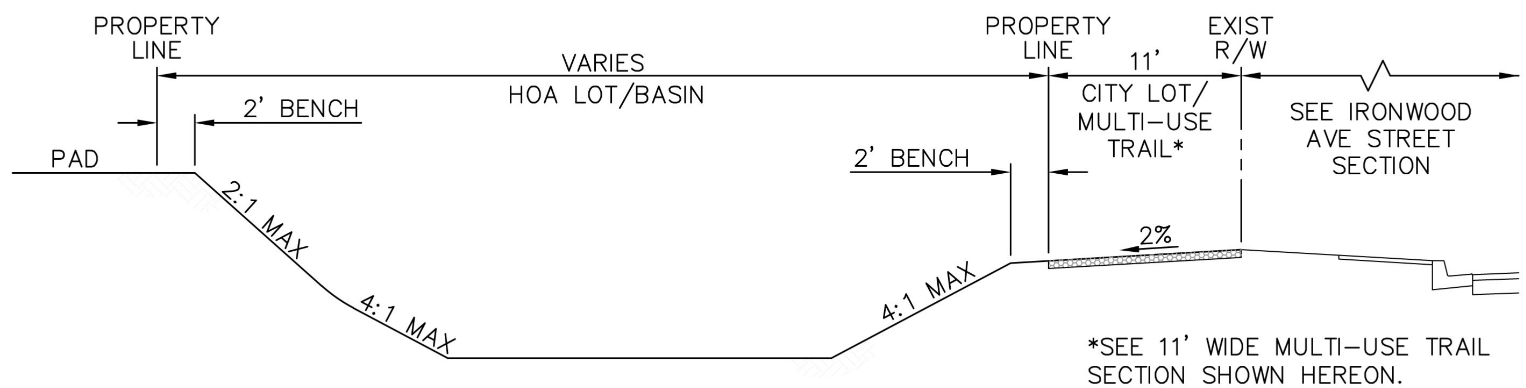
Figure 4-7



20' WIDE MULTI-USE TRAIL WITH FIRE ACCESS
STD. MVGF-610I-0
NOT TO SCALE



11' WIDE MULTI-USE TRAIL
MODIFIED STD. MVGF-610A-0
NOT TO SCALE



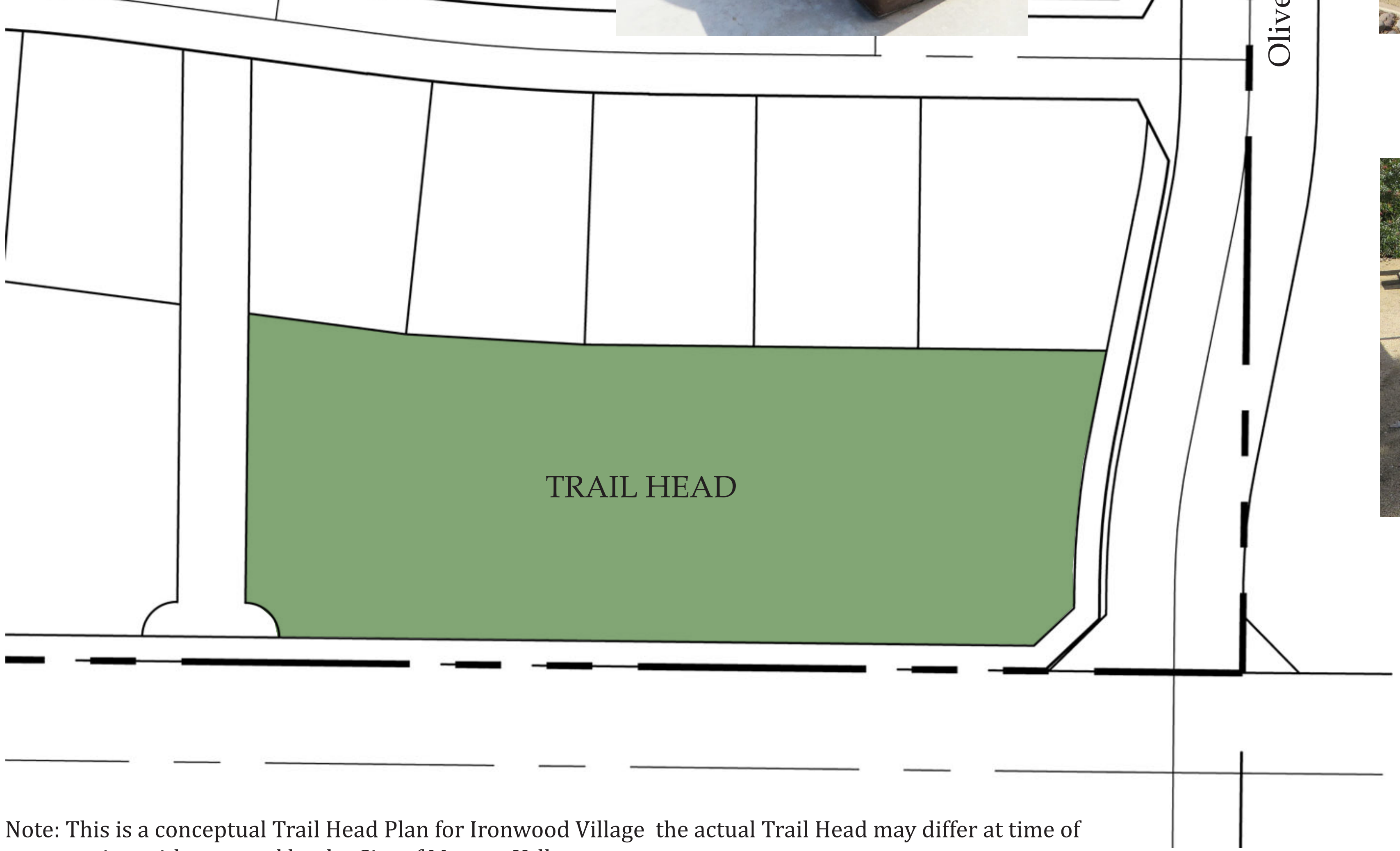
SECTION "A-A"
SOUTHERN BASINS AND
IRONWOOD AVENUE
NOT TO SCALE

Note:
These are typical Sections for the trails and the basins the final plans will be provided at time of construction and approved by the City of Moreno Valley.

Conceptual Trail Head
Figure 4-8

Bike Rack

Bench Seating



Shaded Picnic Area

Hitching Post & Picnic Area

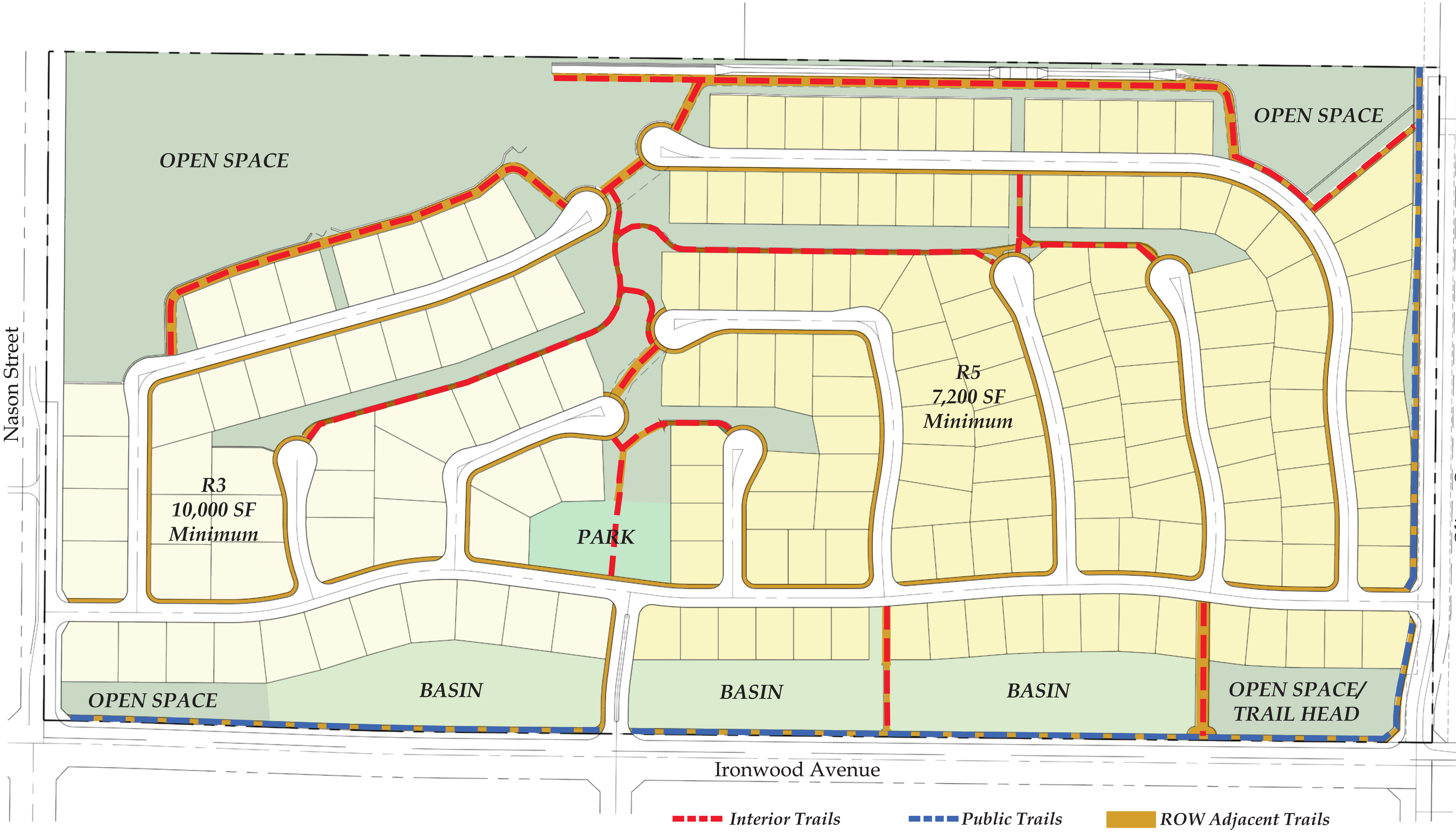
Drinking Fountain

Note: This is a conceptual Trail Head Plan for Ironwood Village the actual Trail Head may differ at time of construction with approval by the City of Moreno Valley.
Photo Samples are for Illustrative Purposes, the actual amenities and locations may vary.
All parking for the Trail Head will be on-street parking along Oliver Street.

The photos are samples of the amenities that could be included in the Trail Head area. The actual design / style and location of the amenities may change, other amenities could be used in-lieu of those indicated in this exhibit.

Ironwood Village

Trails Connectivity
Figure 4-9



Note: This is a conceptual Trails Connectivity for Ironwood Village the actual Trail Connectivity may differ at time of construction with approval by the City of Moreno Valley.

Ironwood Pedestrian Connections

Figure 4-10

Bike Rack

Bench Seating

Drinking Fountain

Dog Station

Trash/Recycling Containers

Note: These are conceptual amenities for the Ironwood Pedestrian Connections, the actual amenities may differ at time of construction with approval by the City of Moreno Valley.
Photo Samples are for Illustrative Purposes, the actual amenities and locations may vary.

The photos are samples of the amenities that could be included at the Ironwood Pedestrian Connections. The actual design / style and location of the amenities may change, other amenities could be used in-lieu of those indicated in this exhibit.

IRONWOOD RESIDENTIAL PROJECT

Initial Study/Mitigated Negative Declaration

Prepared for
City of Moreno Valley

November 2016

ESA PCR

IRONWOOD RESIDENTIAL PROJECT

Initial Study/Mitigated Negative Declaration

Prepared for
City of Moreno Valley
14177 Frederick Street
Moreno Valley, California 92553
Claudia Manrique, Associate Planner
(951) 413-3225

November 2016

2121 Alton Parkway
Suite 100
Irvine, CA 92606
949.753.7001
www.pcrnet.com

ESA PCR

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Los Angeles
Oakland
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San Francisco
Santa Monica
Seattle
Tampa
Woodland Hills

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ENVIRONMENTAL CHECKLIST FORM

1. **Project title:** Ironwood Residential Project

2. **Lead agency name and address:** City of Moreno Valley
14177 Frederick Street
Moreno Valley, CA 92553

3. **Contact person and phone number:** Claudia Manrique, Associate Planner: (951) 413-3225

4. **Project location:** The approximately 75-acre project site does not have a physical address but is located within the City of Moreno Valley and is bound by Ironwood Avenue on the south, Nason Street on the west, Oliver Street on the east, and vacant land within the San Timoteo Badlands to the north. The rectangular-shaped site consists of a single parcel (APN 473-160-004-5). The site is currently undeveloped and supports a mix of native, non-native and ruderal (i.e., weedy) vegetation, and the site also contains a number of unimproved roads/trails that traverse the property. Elevations on-site range from approximately 1,840 feet above mean sea level (MSL) to 1,980 feet above MSL.

5. **Project sponsor's name and address:** Global Investments and Development, LLC
3470 Wilshire Boulevard, Suite 1020
Los Angeles, California 90010
Contact: Joseph Rivani, Principal
(p) (213) 365-0005
e-mail: jrivani@gidllco.com

6. **General plan designation:** R2 (Residential – 2 units per acre max) and HR (Hillside Residential)

7. **Zoning:** RA2 (Residential Agriculture – 2 units per acre max) and HR (Hillside Residential)

8. **Description of project: (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation. Attach additional sheets if necessary.)**

   The proposed project consists of the development of a 181-unit single-family residential subdivision with lot sizes ranging from 7,200 square feet to over 17,200 square feet on the approximately 75-acre property. The project would also provide public and private open space, private recreational facilities (on-site park), public and private trails, public and private streets, on- and off-site utility improvements (including off-site water distribution pipelines), and stormwater detention basins and water quality features.

9. Surrounding land uses and setting: Briefly describe the project's surroundings:

Surrounding land uses include low density single-family residential development to the west and south of the site, which are zoned R1 and R2, respectively. To the east of the project site is vacant land to the east of Oliver Street, which is zoned RA2 similar to the project site, and to the north of the project site is vacant land zoned HR and RA2 within the foothills of the San Timoteo Badlands.

10. Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement.)

The discretionary actions for the project may include, but are not limited to, the following: General Construction Permit and Section 401 Water Quality Certification from the Regional Water Quality Control Board (RWQCB); Section 404 Permit (U.S. Army Corps of Engineers); Section 1602 Streambed Alteration Agreement (CDFW); grading, excavation, foundation, and/or associated building permits, as required; and other permits and approvals by other agencies as deemed necessary.

PURPOSE OF THE INITIAL STUDY

The Ironwood Residential Project is analyzed in this Initial Study/Mitigated Negative Declaration (IS/MND) in accordance with the California Environmental Quality Act (CEQA) to determine if approval of the proposed project would have a significant impact on the environment. This IS/MND has been prepared pursuant to the requirements of CEQA, under Public Resources Code 21000-21177, of the State CEQA Guidelines (California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387) and under the guidance of the City of Moreno Valley. The City of Moreno Valley is the Lead Agency under CEQA and is responsible for preparing the IS/MND for the proposed project.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Geology/Soils
☐ Greenhouse Gas Emissions	☐ Hazards/Hazardous Materials	☐ Hydrology/Water Quality
☐ Land Use/Planning	☐ Mineral Resources	☐ Noise
☐ Population/Housing	☐ Public Services	☐ Recreation
☐ Transportation/Traffic	☐ Utilities and Service Systems	☐ Mandatory Findings of Significance

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

[signature]	11/10/16
Signature	Date
Claudia Manrique	City of Moreno Valley
Printed Name	For

EVALUATION OF ENVIRONMENTAL IMPACTS:

The impact columns heading definitions in the table below are as follows:

- "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.
- "Less Than Significant Impact with Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The mitigation measures must be described, along with a brief explanation of how they reduce the effect to a less than significant level.

- "Less Than Significant Impact" applies where the project creates no significant impacts, only Less Than Significant impacts.
- "No Impact" applies where a project does not create an impact in that category. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one proposed (e.g., the project falls outside of a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
I. AESTHETICS – Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐
II. AGRICULTURE AND FORESTRY RESOURCES – In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire protection regarding the state's inventory of forest land, including the Forest and Range Assessment of and the Forest Legacy Assessment Project; and forest carbon measurements methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project::				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 1220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?	☐	☐	☐	☒

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
III. AIR QUALITY – Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☒	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☒	☐	☐
IV. BIOLOGICAL RESOURCES – Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☐	☒	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☒	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native nursery sites?	☐	☒	☐	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☒	☐	☐

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
V. CULTURAL RESOURCES – Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☒	☐	☐
VI. GEOLOGY AND SOILS – Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii) Strong seismic ground shaking?	☐	☒	☐	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☒	☐	☐
iv) Landslides?	☐	☐	☒	☐
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☒	☐	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☒	☐	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
VII. GREENHOUSE GAS EMISSIONS – Would the Project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment, based on any applicable threshold of significance?	☐	☐	☒	☐
b) Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐
VIII. HAZARDS AND HAZARDOUS MATERIALS – Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☒	☐
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☒	☐	☐

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
IX. HYDROLOGY AND WATER QUALITY – Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☒	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☒	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐
d) Substantially alter the existing drainage pattern of the site or area, including through the alternation of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☒	☐
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐
f) Otherwise substantially degrade water quality?	☐	☐	☒	☐
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☒
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☒
j) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒
X. LAND USE AND PLANNING – Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☒	☐	☐
XI. MINERAL RESOURCES – Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒
XII. NOISE – Would the project result in:				
a) Exposure of persons to or generation of noise level in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☒	☐	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
XIII. POPULATION AND HOUSING – Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
XIV. PUBLIC SERVICES				
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, the need for new or physically altered governmental facilities, construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?	☐	☒	☐	☐
Police protection?	☐	☒	☐	☐
Schools?	☐	☐	☒	☐
Parks?	☐	☐	☒	☐
Other public facilities?	☐	☐	☒	☐
XV. RECREATION				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☒	☐
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☒	☐
XVI. TRANSPORTATION/TRAFFIC – Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☒	☐	☐
b) Conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☒	☐
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☒	☐
e) Result in inadequate emergency access?	☐	☐	☒	☐

Issues:	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities??	☐	☐	☒	☐
XVII. UTILITIES AND SERVICE SYSTEMS – Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☒	☐
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☒	☐
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☒	☐
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☒	☐
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☒	☐
XVIII. MANDATORY FINDINGS OF SIGNIFICANCE				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☒	☐	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

Attachment A
Project Description

ATTACHMENT A - PROJECT DESCRIPTION

A. Introduction

Global Investment and Development, LLC (Project Applicant) is proposing a Tentative Tract Map (TTM No. 37001) to develop up to 181 single-family residential units on the approximately 75-acre undeveloped Project site within the City of Moreno Valley, herein referred to as the Ironwood Village Project (the "Project" or "proposed Project"). The following describes the Project site location, existing site conditions, the proposed residential development and related improvements, anticipated construction schedule, and necessary discretionary approvals for the Project.

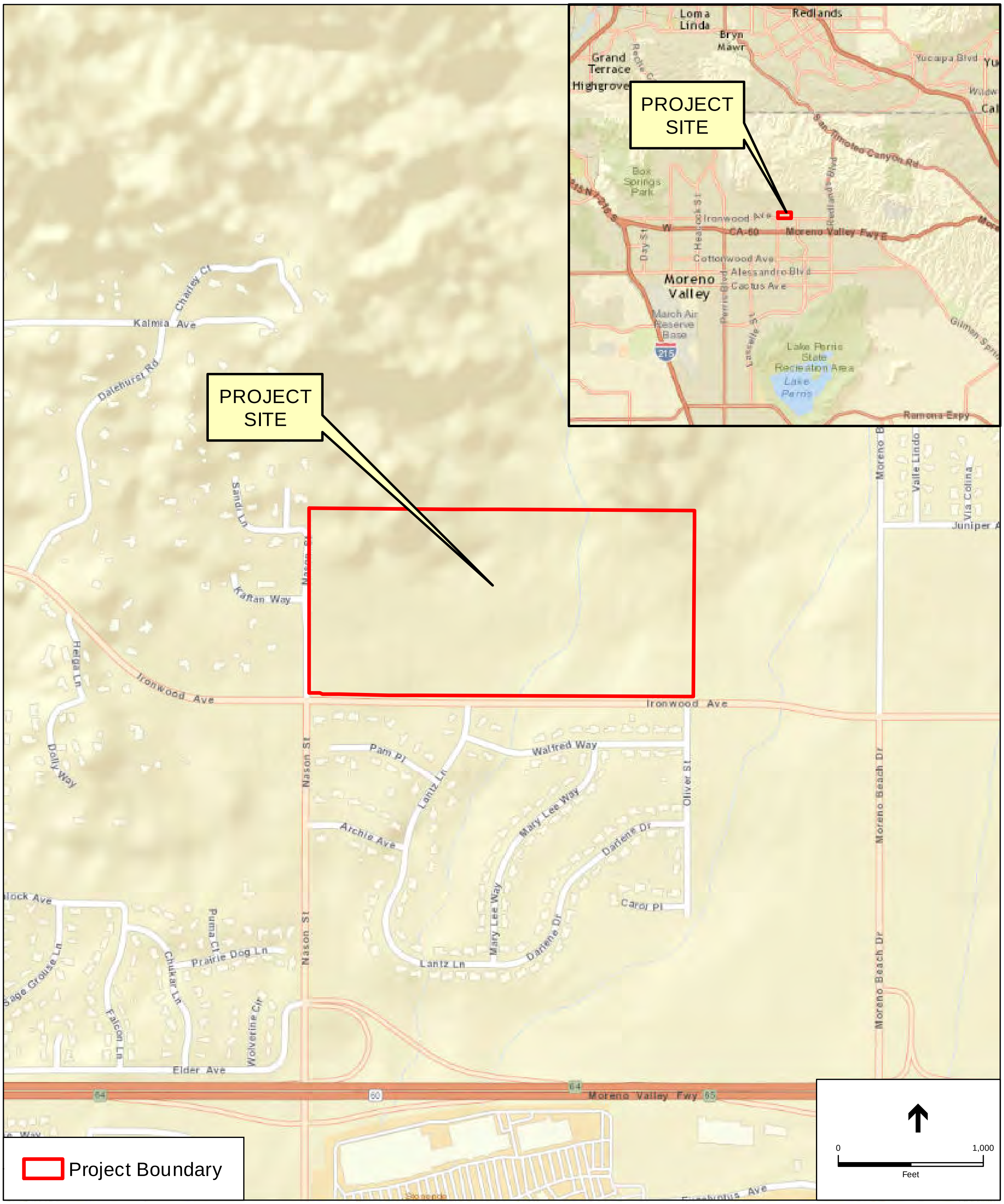
B. Project Location and Surrounding Uses

The approximately 75-acre Project site is located in the northeastern portion of City of Moreno Valley immediately northeast of the intersection of Ironwood Avenue and Nason Street, and bounded by Ironwood Avenue on the south, Nason Street on the west, Oliver Street on the east, and vacant land to the north. **Figure A-1,** *Regional Location and Vicinity Map,* illustrates the regional location and the local vicinity of the Project site, while **Figure A-2**, *Aerial Photograph*, provides an aerial view of the Project site with surrounding land uses indicated by land use type. The Project site is located immediately south of the foothills of the San Timoteo Badlands, and consists of one single-family residential designated parcel (APN 473-160-004-5). There is no street address associated with the property, which is currently vacant land, though several unimproved trails/dirt roads traverse the property which are oriented east-west and north-south.

The Project site is designated for low-density residential uses (R2 residential uses up to 2 units per acre) per the City's General Plan Land Use Map, and is zoned Residential Agriculture (RA2, up to 2 units per acre) and Hillside Residential (HR). As shown in Figure A-2, surrounding land uses near the site include single-family residential development to the west (R1 large-lot residential uses) and south (R2 residential uses up to 2 units per acre). To the east of the site is vacant land zoned for single-family residential uses (RA2 residential agriculture up to 2 units per acre), while vacant land zoned for single-family residential uses (RA2 and HR hillside residential uses).

C. Existing Conditions

Elevations on-site range from approximately 1,840 feet above mean sea level (MSL) in the south-central portion of the site to approximately 1,980 feet above MSL in the northwestern portion of the site. From east to west across the property is a series of north-south-oriented ridges and alternating drainage gullies in the lower, southern portion of the property.



SOURCE: ESRI Street Map, 2009.

Ironwood Village Project

Figure A-1

Regional and Project Vicinity Map

SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project

Figure A-2

Aerial Photograph and Surrounding Land Uses

ESA PCR

Attachment: Initial Study/Mitigated Negative Declaration (IS/MND) (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

The intervening ridges are generally about 5 to 10 feet higher in elevation them the adjacent drainage gullies. Rounded granitic outcrops are exposed in the northwestern and northeastern sections of the property. The overall surface gradient across the property is gently to moderately south or south-southeast. The Project site is undeveloped and supports a limited mix of native, non-native, and ruderal (i.e., weedy) vegetation. Although the majority of the site consists of ruderal and non-native vegetation, the site also supports a few small, isolated patches of native scrub habitats (e.g., lemonade berry scrub, purple sage scrub/California sagebrush scrub, and California sagebrush scrub). No blueline streams or drainages exist on-site.

D. Description of the Proposed Project

1. Project Summary

The proposed Project would entail the construction of a new, 181-unit single-family residential development on the currently undeveloped approximately 75-acre Project site. Lot sizes for the proposed single-family homes would range from a minimum of 7,200 square feet to over 17,200 square feet, with an average lot size of approximately 9,260 square feet. In order to accommodate the proposed density on the Project site, which is currently zoned RA2 with a density of up to two units per acre, the applicant is requesting a change of zone to R3 (single-family residential up to 3 units per acre) on the western portion of the Project site, and R5 (single-family residential uses up to 5 units per acre) on the eastern portion of the site. Please see **Figure A-3**, *Conceptual Land Use Plan*, below, for an illustration of the proposed land use plan and associated residential densities on the Project site. As such, the residential density would be lower on the western side of the Project site, to the west of a proposed open space and recreation corridor that would bisect the property in a north-south orientation, while higher density development would be located east of the of this corridor. The shift in density is intended to serve a transition between existing lower density R1 residential uses immediately to the west of the Project site across Nason Street and existing R2 residential uses to the south and farther to the east across Moreno Beach Drive, as well as R2 or potentially higher density residential uses immediately to the east of the Project site. As illustrated below in **Figure A-4**, *Project site Plan*, the proposed Tentative Tract Map (TTM No. 37001) for the Project would subdivide the property into 181 for-sale residential lots as well as a number of lettered lots for open space, recreation, private recreational facilities, stormwater detention facilities, utility easements, trails, and a “buffer lot” at the southeast corner of the property.

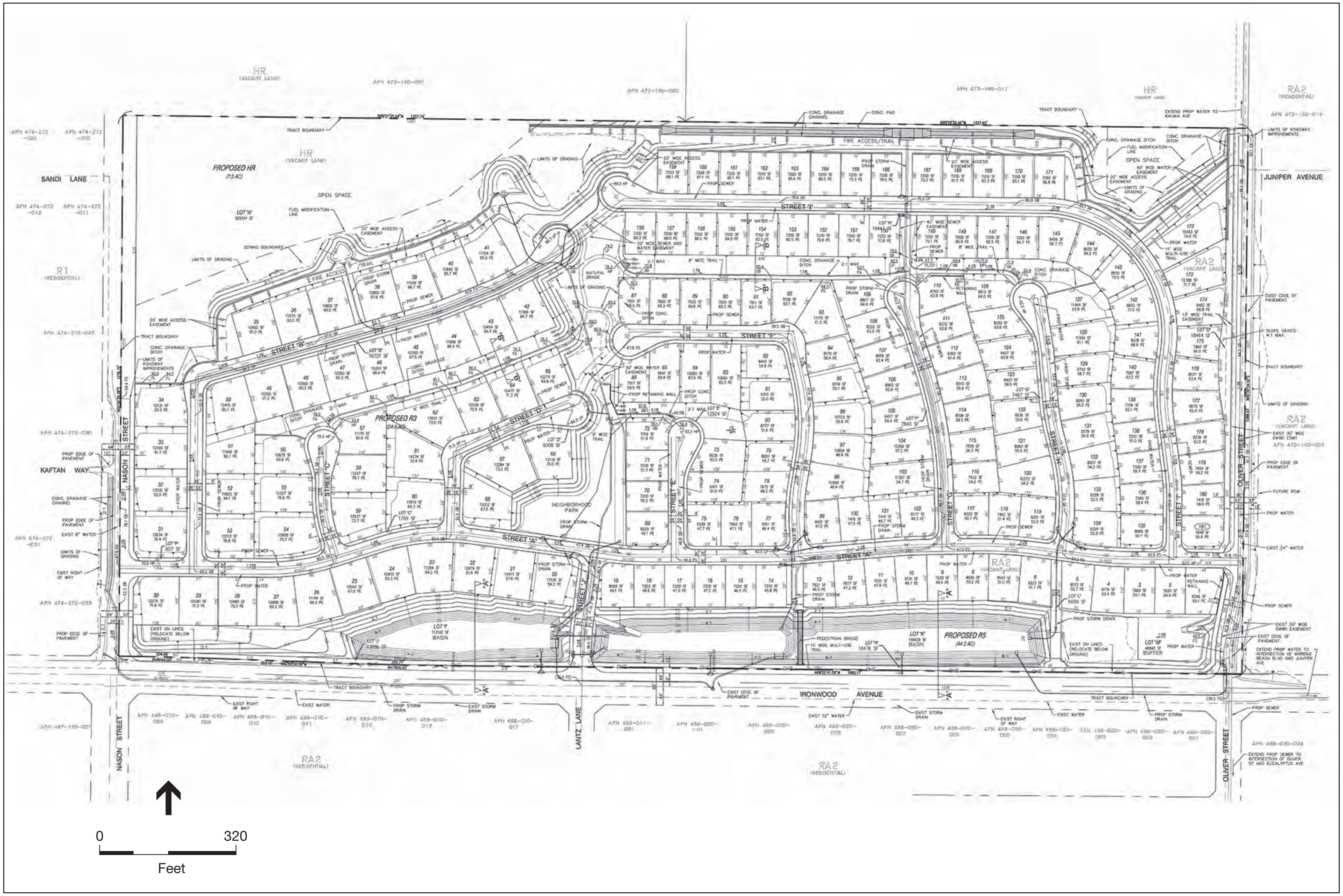
The proposed Project is proposed to be implemented in accordance with the Ironwood Village Design Guidelines (Design Guidelines), which would serve as a guide for implementation of the residential development. The Design Guidelines include site development regulations in order to provide cohesive design throughout the Ironwood Village Project. Creating a diversity of housing choices not available with a typical tract map, the proposed Project is intended to encourage a range of housing alternatives with a variety of lot sizes intermixed with trails, a park, open space areas and water quality features.

SOURCE: KTGY Group, Inc., 2016

Ironwood Village Project

Figure A-3
Conceptual Land Use Plan

ESA PCR



SOURCE: Anderson Consulting Engineers, Inc., 2016

Ironwood Village Project

Figure A-4

Project Site Plan

ESA PCR

The development standards included in the Design Guidelines require a quality mix of products, while creating walkable neighborhood with access to trails and other outdoor recreation and open space opportunities. The Ironwood Village Project would conserve the northwestern hillside areas of the Project site and would not build any physical improvements in that area. The proposed Project is designed to respect the existing topography, maintain rock outcroppings where feasible and provide a transition into the hillside areas.

2. Site Design and Architectural Theme

a. Site Design

The Ironwood Village Project is intended to provide a buffer with the appropriate use of natural open space, landscaping, trails, right-of-ways and fire access creating a pleasing visual transition between the existing rural residential uses, while providing for a suburban life-style in a cohesively planned “private” non-gated community with amenities not commonly found in typical subdivisions. This Project is intended for the development of lots a bit larger than typical single family residences at a maximum allowable density of three (3) dwelling units per acre on the western portion of the site and five units per acre on the eastern portion.

The proposed Ironwood Village Project anticipates 181 units on approximately 38.5 acres, along with approximately twenty-nine point four (29.4) acres of open space, and an additional 10.3 acres of natural open space (i.e. hillsides and rock outcroppings) with a mix of lot sizes ranging from 10,000 square feet minimum (on the western portion of the site) down to 7,200 square feet minimum (on the eastern portion of the site) lot sizes. Architecture for the Ironwood Village Project reflects the diversity of architectural styles found throughout California.

b. Architectural Design

The Ironwood Village Architectural Design Guidelines are intended to allow ultimate flexibility to the builder and are purely illustrative in character for the final buildout. The Design Guidelines provide the builder with a palette of options of design features and elements to be mixed and matched to create a comprehensive Project that has continuity of design throughout, but is not monotonous or repetitive. The actual detailed architectural design elements and details that will be used within the Ironwood Village community will be decided at time of buildout by the developer with approval by the City of Moreno Valley. While these design guidelines suggest architectural styles, the styles utilized should be authentic and distinct. Traditional styles typically have defining features that should be consistently implemented throughout the Ironwood Village development. The Design Guidelines allow for updated styles as long as the defining features can be identified and applied to the floor plans. The Design Guidelines allow for five different styles of architecture, including Monterey, Spanish Colonial, Santa Barbara, Napa, and Tuscan.

3. Circulation and Access

a. Project site Access

Vehicular access to the Project site is currently and would continue to be provided via Ironwood Avenue, Nason Street, and Oliver Street. As shown in Figure A-4 above, the primary driveway for the Project site would be located on Ironwood Avenue about mid-block between Nason Street and Oliver Street, immediately opposite from and north of Lantz Lane. Secondary site access would be provided by driveways on both Nason Street and Oliver Street just north of Ironwood Avenue.

b. On-Site Circulation

The internal streets within the "private" non-gated Ironwood Village community propose using privately maintained streets within the Project interior. The private roadway section is based on the City-Standard Street width of 36 feet from curb face to curb face. However, in order to maintain a unique feel to the community, the typical parkway landscape would be replaced with a dedicated, HOA-maintained, eight-foot lettered landscape lot containing a four-foot-wide concrete sidewalk along a single side of the roadway (see **Figure A-5**, *Trails and Open Space Plan*, below for an illustration of the proposed sidewalk location). The other side of the private road would have homeowner maintain yards to the back of the curb. The roadway section, including curb face, would be dedicated to, and maintained by, the Ironwood Village HOA. Separate easements for utilities would also be dedicated, as necessary, to provide proper services to the "private" non-gated community.

4. Open Space and Recreation

a. Open Space

(1) Natural Open Space

As noted above, the hillside natural open space areas would be left undeveloped or minimally developed on the northwest and northeastern areas along the northern most Project boundaries as shown on the Tract Map 31007. Please refer to Figure A-5 for an illustration of areas to be preserved as open space. These areas would be conserved as natural open space to help preserve the scenic views of the hillsides from the City of Moreno Valley. These areas would not be landscaped and/or watered the area would be maintained as is, unless otherwise required by the City of Moreno Valley. The hillside natural open space areas create a "natural" transition between the developed and undeveloped areas, and may include the fuel modification vegetation clearance zone and/or fire access or trails. The hillside areas would also help to buffer and transition the Project from the surrounding land uses. Preserving the hillside areas for scenic and transitional reasons allows for some of the natural rock outcroppings as well as the existing off-site trails to remain intact.

SOURCE: KTGY Group, Inc., 2016

Ironwood Village Project

Figure A-5

Trails and Open Space Plan

ESA PCR

(2) Community Open Space

The Ironwood Village open space areas that are not to remain as natural vegetation would be planted as appropriate to the Project's climate. The landscaping shall be where appropriate drought tolerant or native plants and utilize water-conserving equipment including the installation of bubblers, drip systems, low volume sprays and/or smart irrigation controls when feasible. No detailed plant palettes have been proposed within this document due to the currently evolving nature of the water conservation measures in the State of California. All landscaping within Ironwood Village shall comply with the City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code. Landscaping shall consist predominately of plant materials that include water efficient "drought tolerant" and native plants. Landscape areas shall be designed to promote water retention and allow runoff from impervious surfaces. Hardscape areas are recommended to be constructed with pervious surfaces where feasible to reduce run off and allow water percolation. Please also refer to Figure A-5.

b. Proposed Park

The Ironwood Village Park, which would be a private facility for exclusive use by Ironwood Village residents, would be located centrally within the projects site allowing residents to walk to the park safely using the Project-wide interconnected trails system. The park may include but is not limited to the following features and amenities: bench seating, an open play area, Bocce ball courts, picnic area and a tot lot "children's play equipment". The actual park amenities would be decided at time of buildout by the developer with approval from the City of Moreno Valley. Please refer to **Figure A-6**, *Conceptual Park Plan*, for a conceptual illustration of the proposed on-site park.

The park areas would be planted as appropriate to the Project's climate. The landscaping shall be where appropriate drought tolerant and utilize water-conserving equipment including the installation of bubblers, drip systems, low volume sprays and/or smart irrigation controls when feasible. Landscaping and water conservation features would be incorporated into the park as required by the City of Moreno Valley, as noted above.

c. Trails

The proposed Project would include multi-use trails that would interconnect the Ironwood Village Project neighborhoods to the interior open spaces and on-site park, as well as to the future City of Moreno Valley's off-site trails system, as illustrated below in **Figure A-7**, *Trail Connection Map*. There would be "nodes of interest" located along the central trail that leads from north to south to and from the proposed neighborhood park. There would also be trail connections onto the central trail from trails leading off the adjacent cul-de-sacs. The central trail would provide areas to rest and enjoy the outdoors within walking distance of on-site residents' homes. The combination of trails and fire access located to the rear of the houses on the northern portion of the development are to be a minimum of 20 to 24 feet wide per City of Moreno Valley standards.

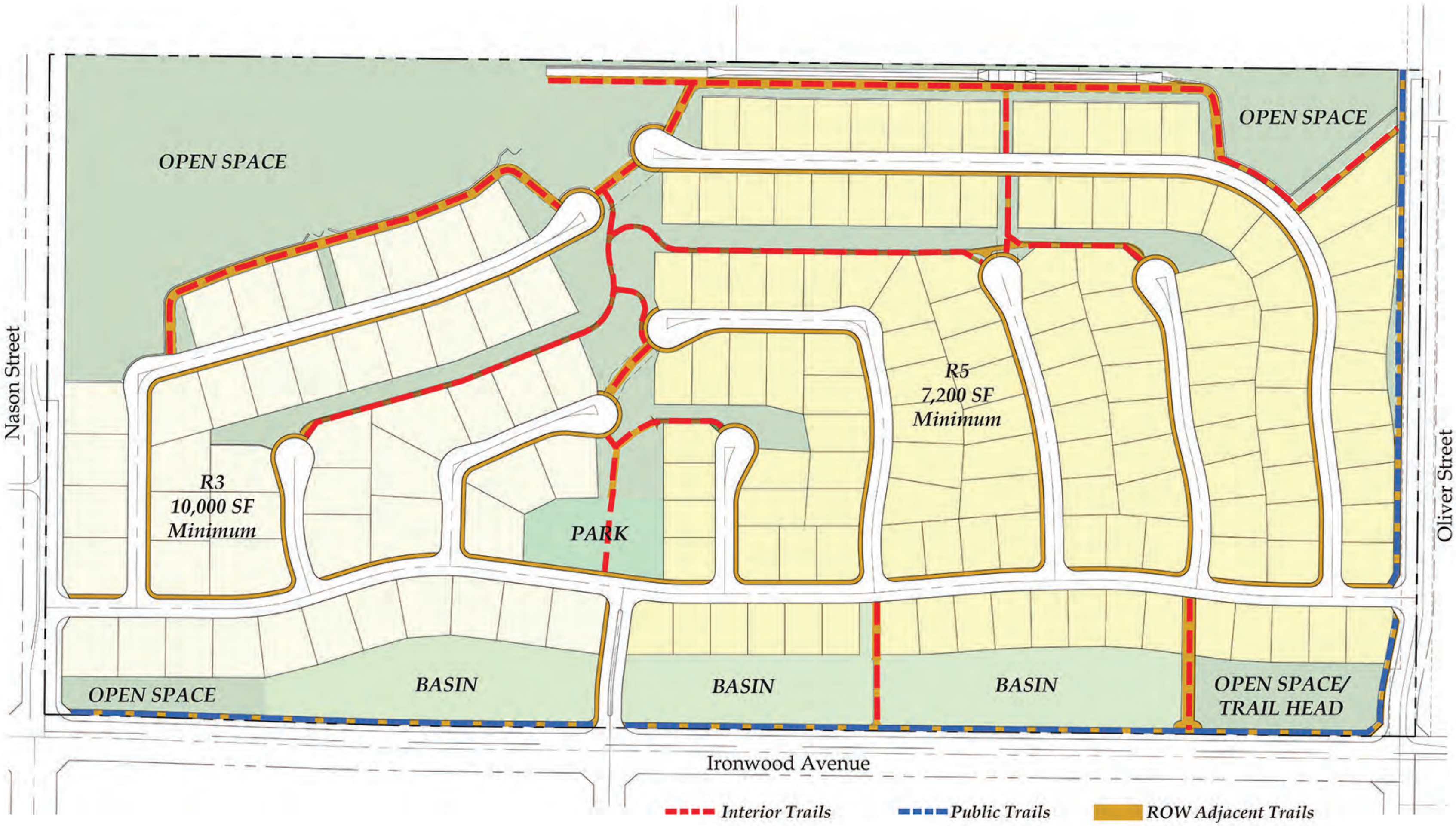
SOURCE: KTGY Group, Inc., 2016

Ironwood Village Project

Figure A-6

Conceptual Park Plan

ESA PCR



SOURCE: KTGY Group, Inc., 2016

Ironwood Village Project

Figure A-7

Trail Connection Map

ESA PCR

Trails would provide connections through the central open space area and would branch off east and west along the north-south-oriented open space area, with additional trails connecting to neighborhood streets, as well as other off-site trails. All the trails would loop throughout the Ironwood Village Project, which would allow pedestrian connections to the park and the proposed City Trails to the north, east and west of the Project site. The trails would be built per City of Moreno Valley Standards. Please refer **Figure A-8**, *Conceptual Trail Section*, below for an illustration of proposed trail design.

5. Landscaping

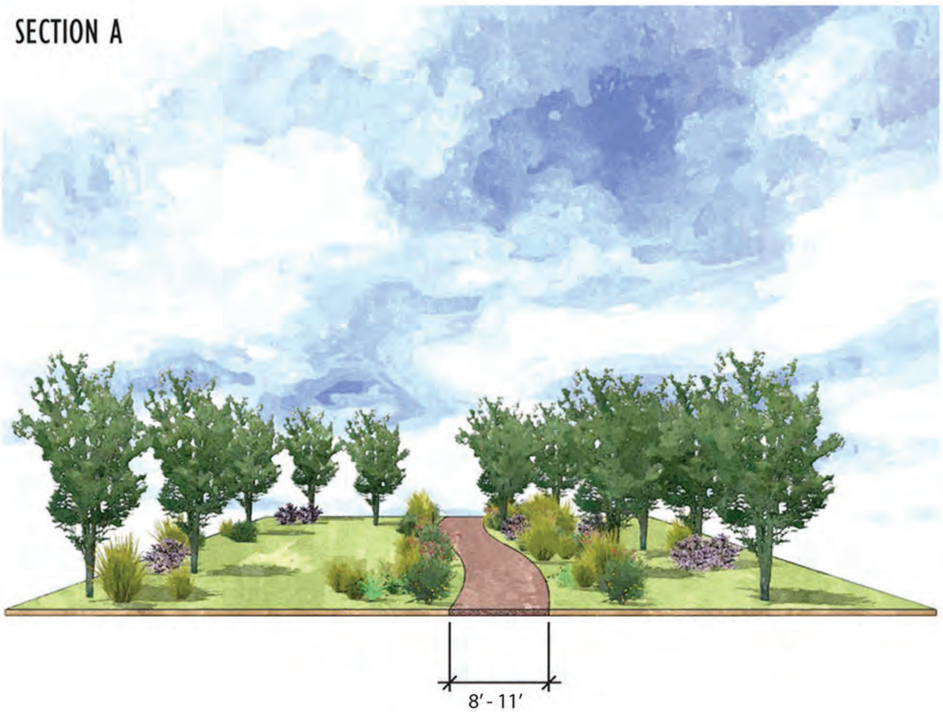
a. Landscape Concept

The conceptual landscape and planting design provides the identity to the Ironwood Village community that at time of buildout the developer shall comply with the City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code. The plant palette for Ironwood Village would be appropriate to the Project's climate. The landscaping shall be where appropriate drought tolerant/native vegetation and utilize water-conserving equipment including the installation of bubblers, drip systems, low volume sprays and/or smart irrigation controls when feasible. The landscape areas shall also be designed to promote water retention and allow runoff from impervious surfaces to permeable areas. Hardscape areas are recommended to be constructed with pervious surfaces where feasible to reduce run off and allow water percolation.

The landscape plan incorporates the water retention/detention/ water quality basins as well as the hillside areas that are to be conserved and the fuel modification areas as shown on TTM 37001. Project open space, fuel modification area, interior streets, interior trails and park would be maintained by the Ironwood Village Home Owners Association (HOA), this is a "private" non-gated Community. In addition, there are exterior multi-use trails along the roadways adjacent to the Project, connecting to future City of Moreno Valley Proposed off-site trails; these would be maintained by the City of Moreno Valley. The drainages would be maintained by the City of Moreno Valley, however the water basins would be jointly maintained by the Ironwood Village HOA (landscaping) and the City of Moreno Valley (structures/water quality). Please refer to **Figure A-9**, *Maintenance Responsibility*, below. The actual detailed landscape design and placement that would be used within the Ironwood Village community would be decided at time of buildout by the developer with approval by the City of Moreno Valley. As noted previously, all landscaping within Ironwood Village shall comply with the City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code.

b. Fuel Modification

On the north side of the Ironwood Village community are fuel modification zone areas. The removal and or preservation of plants/trees would be subject to review and approval by the City's fuel management officer. Maintenance of the fuel modification zone would be the responsibility of the Ironwood Village HOA. The 20 to 24-foot-wide fire access road and the multi-use trail that travels along the northern edge of the developed portion of the Project, has been incorporated into the fuel modification zone for the Project. As noted above, all landscaping within Ironwood Village shall comply with the City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code.



CONCEPTUAL TRAIL SECTION

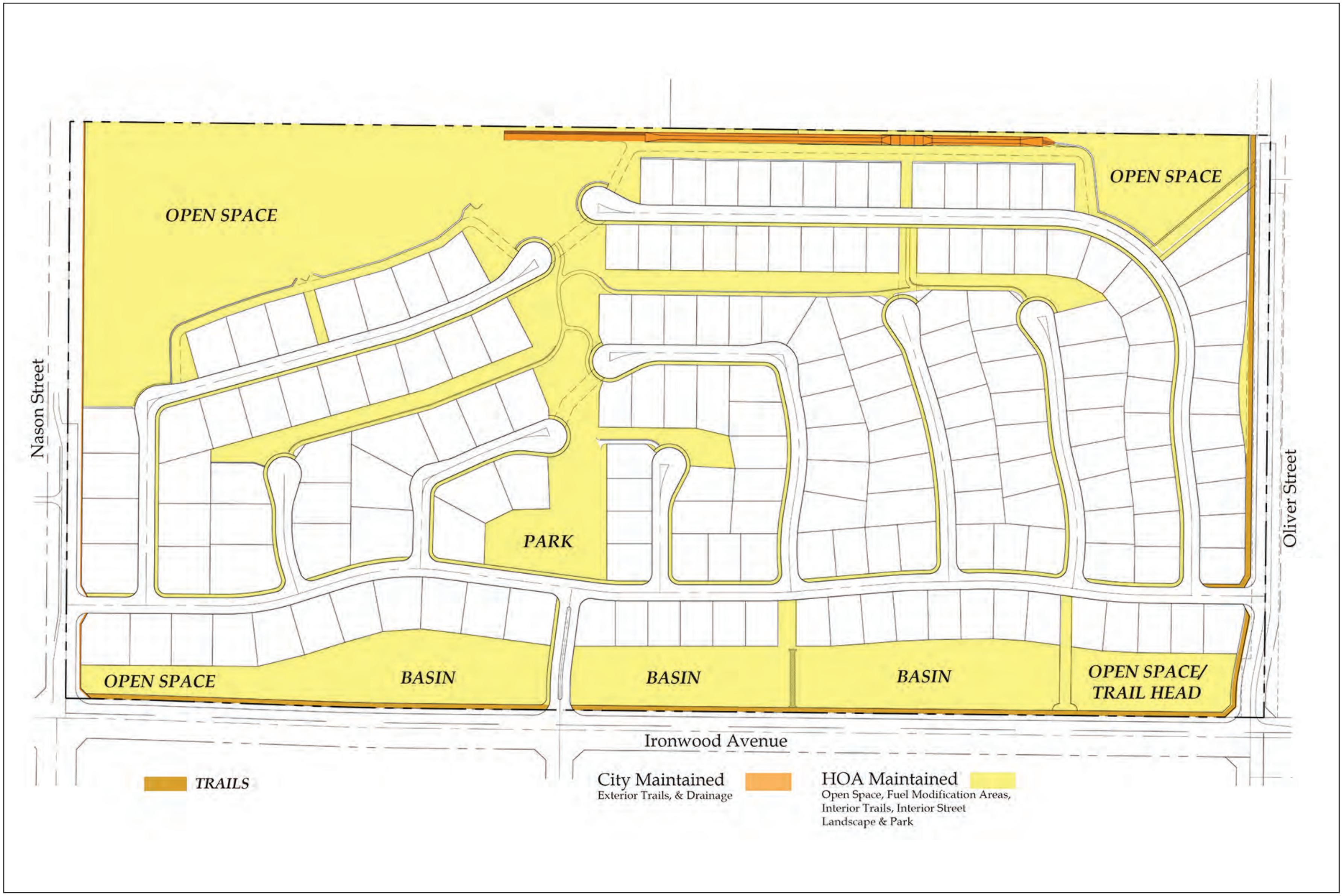
SOURCE: KTGY Group, Inc., 2016

Ironwood Village Project

Figure A-8

Conceptual Trail Section

ESA PCR



SOURCE: KTGY Group, Inc., 2016

Ironwood Village Project

Figure A-9
Maintenance Responsibility

ESA PCR

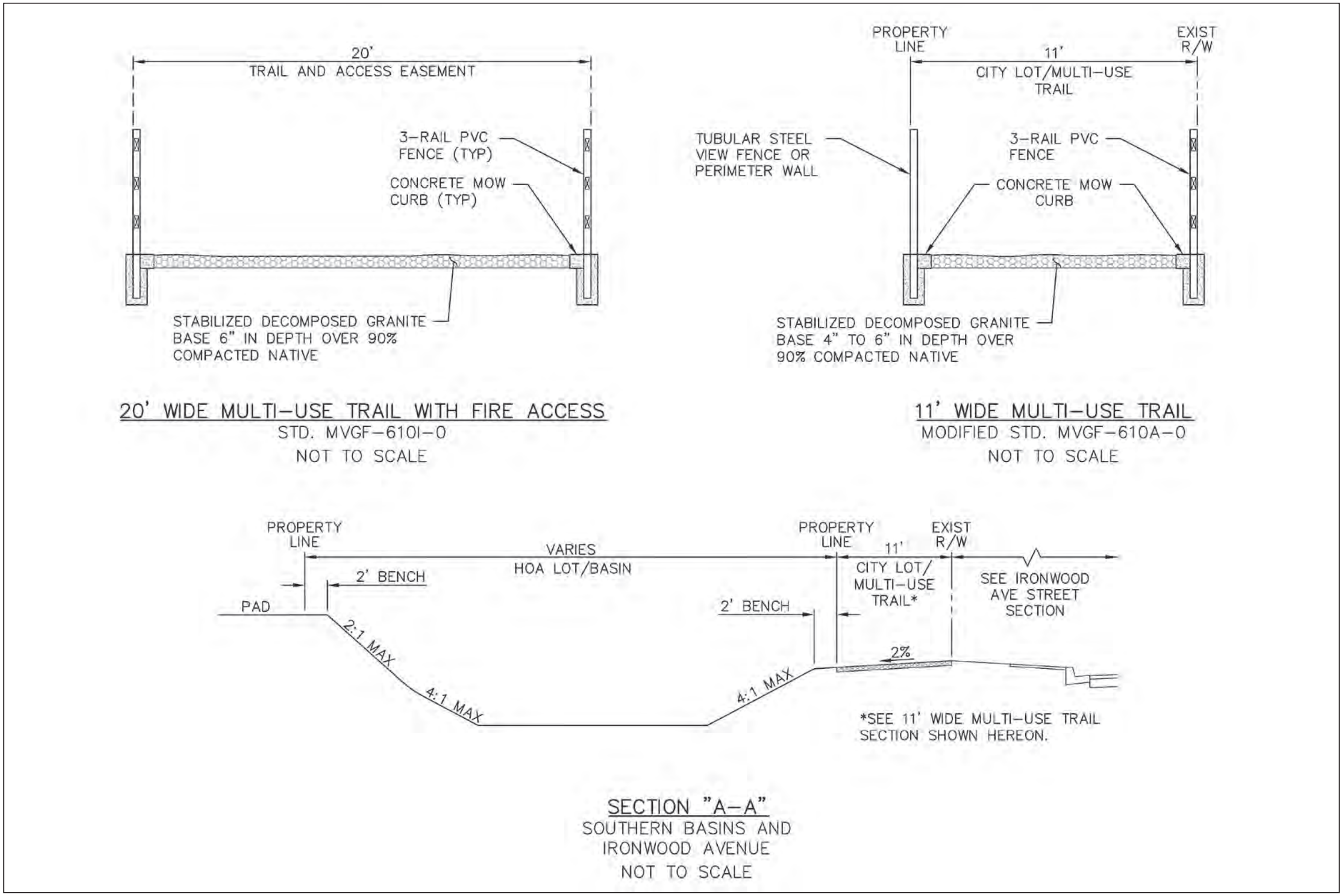
6. Stormwater Management

The proposed Project would include a number of stormwater detention basins, as well as other stormwater management features and facilities, as required by City of Moreno Valley and County of Riverside. The proposed stormwater basins within the Ironwood Village community would be located along the southern edge of the Project site as shown above in Figure A-5. The basins would not only provide a necessary function of retaining stormwater on-site to prevent run-off, but would also provide a transition and visual buffer to the existing residences south of Ironwood Avenue. The basins help make the transition softer and more visually appealing by having landscaping and open space, instead of walls and roof tops. The basins would be planted as appropriate to the Project site's climate and would incorporate drought-tolerant materials and irrigation systems, as noted previously for other aspects of the Project. Hardscape areas are recommended to be constructed with pervious surfaces where feasible to reduce run off and allow water percolation and minimize stormwater runoff volumes requiring on-site retention. Please refer to **Figure A-10**, *Conceptual Trail and Basin Sections*, for a depiction of proposed stormwater basin design.

7. Infrastructure and Utilities

The proposed Ironwood Village Project would be served by various public utilities, including water, sewer, and storm drains, as well as connections to electricity and natural gas services. Water service would be provided by an on-site distribution system with supply provided via two connections to existing Eastern Municipal Water District (EMWD) pipelines, one from the southeast near the intersection of Oliver Street and Ironwood Avenue, and the other from the north via a new pipeline connection along Oliver Street at the western terminus of Kalmia Avenue. The on-site sewer system, which would be owned and maintained by EMWD once constructed, would collect wastewater generated by the proposed residential units, which would be conveyed via a new sewer line extending from the Project site southward along Oliver Street to an existing sewer also owned and operated by EMWD located south of the SR-60 freeway near Eucalyptus Avenue. Stormwater, as noted above, would be collected by the proposed on-site storm drain system, which would be conveyed to the on-site detention basins (shown as Lots I and K in Figure A-4), and then to an existing storm drain located in Ironwood Avenue. Electrical and natural gas services would be provided by Southern California Edison (SCE) and Southern California Gas Company (SoCalGas), respectively, via existing distribution facilities in the Project area.

In addition, a number of off-site water and sewer improvements and limited off-site grading would be necessary to serve the proposed development, which would require earthmoving and/or construction of new pipelines or other facilities in one or more off-site locations. Although the specific location of future facilities has yet to be determined, the areas potentially affected by off-site improvements or off-site grading activities are illustrated below in **Figure A-11**, *Off-Site Improvements*.



SOURCE: Anderson Consulting Engineers, Inc., 2016

Ironwood Village Project

Figure A-10

Conceptual Trail and Basin Sections

ESA PCR

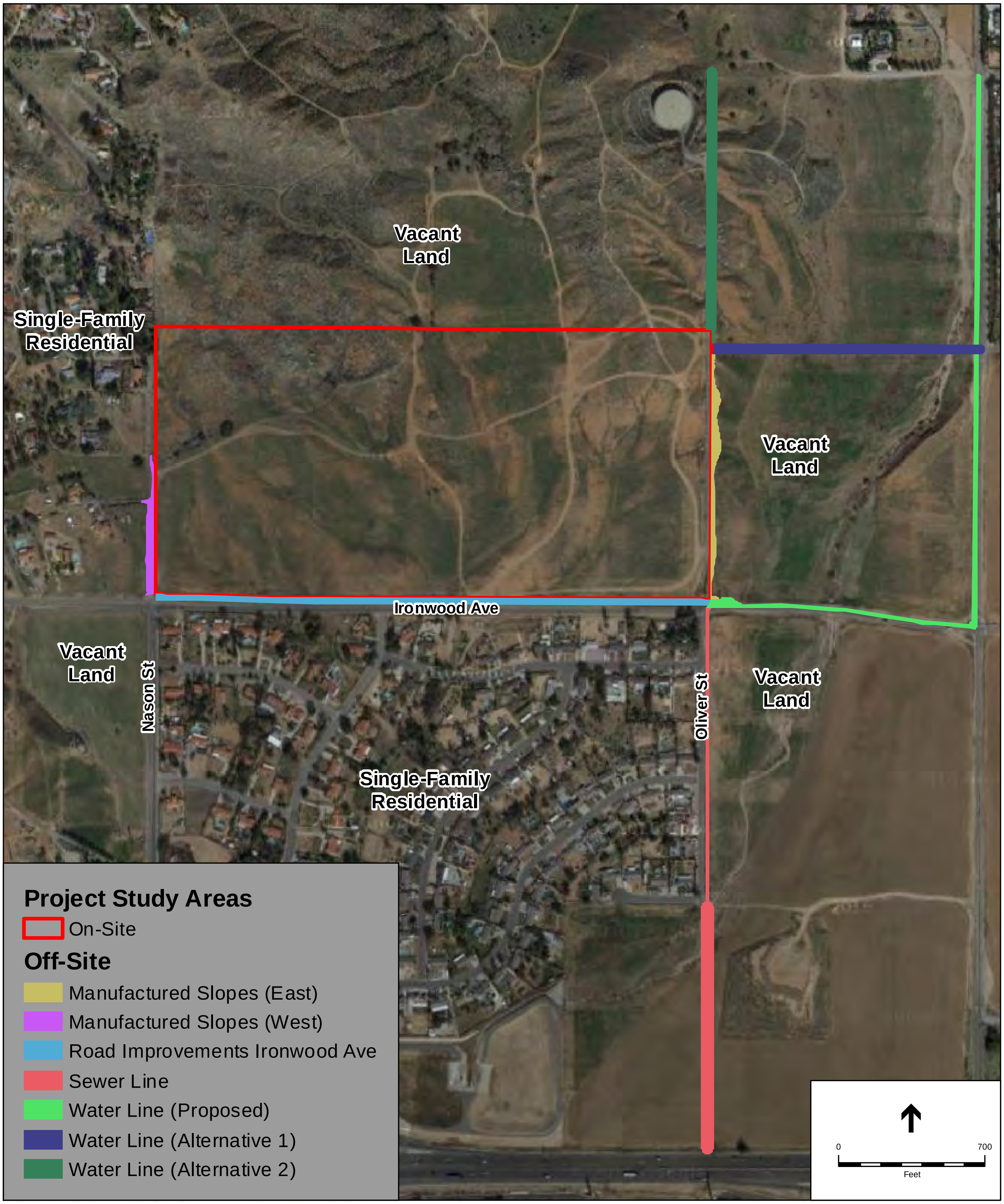
E. Construction Schedule

Construction activities associated with the Project are anticipated to occur for approximately 40 months, beginning in early 2017 with Project occupancy and operation expected by August 2020. The construction schedule includes grading and excavation activities (3.5 months), paving (2.5 months), building construction and application of architectural coatings (34 months). Haul trucks would be required to follow a prescribed haul route, which is expected to be from the Project site southbound down Nason Street to the SR-60 Freeway when leaving the site and the reverse when arriving at the site. The highest number of daily truck trips would occur during grading and soil excavation activities, which would occur for approximately 3.5 months of the overall 40-month construction effort.

F. Necessary Approvals

The discretionary actions for the Project may include, but are not limited to, the following:

- United States Army Corps of Engineers – Section 404 Permit
- California Department of Fish and Wildlife – Section 1602 Streambed Alteration Agreement
- Santa Ana Regional Water Quality Control Board – Section 401 Water Quality Certification
- City of Moreno Valley – Adoption of Mitigated Negative Declaration (MND)
- City of Moreno Valley – General Plan Amendment (change from R2 to R3/R5)
- City of Moreno Valley – Zone Change (change from RA2 to R3/R5)
- City of Moreno Valley – Approval of Ironwood Village Design Guidelines
- City of Moreno Valley – Grading, excavation, foundation, and/or associated building permits, as required, from the City of Moreno Valley; and
- Other permits and approvals by other agencies as deemed necessary.



SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project

Figure A-11

Off-Site Improvements

FSA PCR

Attachment B

Explanation of Checklist Determinations

ATTACHMENT B - EXPLANATION OF CHECKLIST DETERMINATIONS

I. Aesthetics

Would the Project:

a. Have a substantial adverse effect on a scenic vista?

Less Than Significant Impact. A scenic vista generally provides focal views of objects, settings, or features of visual interest; or panoramic views of large geographic areas of scenic quality, primarily from a given vantage point. Scenic vistas are generally associated with public vantages. A significant impact may occur if the Project introduced incompatible visual elements within a field of view containing a scenic vista or substantially altered a view of a scenic vista.

Moreno Valley Scenic Resources[1]

The City of Moreno Valley lies on a relatively flat valley floor surrounded by rugged hills and mountains. The topography of the study area is defined by the Box Springs Mountains and Reche Canyon area to the north, the "Badlands" to the east, and the Mount Russell area to the south. These features provide the City with outstanding vistas. The major aesthetic resources within the study area include views of the mountains and southerly views of the valley. The major scenic resources within the Moreno Valley study area are visible from State Route 60, the major transportation route in the area. Upon entering the Moreno Valley from the west, the dominant view is of the Box Springs Mountains to the immediate north and the Mount Russell foothills to the south. Moreno Peak is part of a prominent landform located south of State Route 60 along Moreno Beach Drive. This landform only rises a few hundred feet above the valley floor but has a unique location near the center of the valley. Moreno Beach Drive, the main route to Lake Perris from State Route 60, offers views of Moreno Peak and a panoramic view of Moreno Valley. Panoramic views of the valley can be seen from elevated segments of some local roads and from hillside residences. The views are particularly attractive on clear days and at night when the glow of city lights can be seen. As State Route 60 traverses east through Moreno Valley, it passes through the Badlands area. Characterized by steep and eroded hillsides, the Badlands form the eastern boundary of the study area and provide a sweeping range of hills that act as a visual backdrop to the valley. Expanses of open land are found throughout the eastern portion of the study area. These tracts of land allow for uninterrupted scenic vistas from State Route 60, Gilman Springs Road and other roadways and provide views of the San Jacinto Valley and the ephemeral Mystic Lake. Views of the San Bernardino and San Gabriel mountains are evident at times from the valley floor.

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1 Background information provided in Section 7.7, Scenic Resources, in Chapter 7 – Conservation, of the City's General Plan (2006). Page 7-12.

Project Site Conditions

Figure I-1, *Photo Location Map*, illustrates the viewpoint locations of photos of the existing Project site that are provided in **Figure I-2** through **Figure I-5**, *Existing Site Photos*. As shown in Figures I-1 through I-5, the Project site is part of an existing natural undulating slope that traverses in an east-west direction framed by Ironwood Avenue to the south and the vacant hillside areas to the north. Slopes descend southward across the site from the hills to the north, and also generally descend from the west to the east on the western portion of the site and then gently ascend moving eastward from the center of the property. Thus, the surrounding residential land uses to the west of the Project site are at higher elevations, while residential uses to the south are at lower elevations. Given the topography of the site and surroundings, as well as the presence of intervening urban development and landscaping, long-range views of the site from surrounding areas are limited to locations to the east of the Project site where land is predominantly vacant, though short- and mid-distance views of the Project site are currently available from adjacent residential areas at higher elevations and from vacant land to the north of the Project site. In addition, the Project site is visible from a number of public roadways in the area including Ironwood Avenue, Nason Street, Oliver Street, and Moreno Beach Drive. According to Figure 7-2, Major Scenic Resources, in Chapter 7 – Conservation, of the City's General Plan and as noted above, Moreno Beach Drive is a designated Scenic Route. Furthermore, as also shown in Figure 7-2 of the General Plan, the Project site is located within two designated View Corridors. The first designated View Corridor, as viewed from areas to the west of the Project site (i.e., west of approximately Lasselle Street), provides mid-distance views eastward toward noted scenic resources including the Reche Mountains to the north of the Project site, Moreno Peak to the south, and the San Timoteo Badlands to the northeast, as well as long-distance views of the San Jacinto Mountains and San Bernardino Mountains. The second, as viewed from areas east of the Project site (i.e., east of approximately Redlands Boulevard), provides mid-distance views westward of the Reche Mountains, Box Spring Mountains, and Moreno Peak, and long-distance views of the San Gabriel Mountains.

The proposed Project would be developed in accordance with all applicable development standards set forth in Section 9.03.040 of the Moreno Valley Municipal Code (MVMC) and in accordance with the Project's Design Guidelines document, which would be subject to review and approval by the City of Moreno Valley. Per the requirements of the MVMC the proposed residential structures would be limited to a maximum height of 35 feet, and would be designed, constructed, and landscaped in accordance with the approved Design Guidelines. As part of the Project, the Project site would be graded to establish developable building pads, roadways, detention basins, and other improvements, which would result in a sloping topography within the Project boundaries, with stepped terraces along proposed streets in the northern portion of the site where existing slopes are steeper and a relatively flatter slope in the southern portion of the site (refer to Figure A-4 in Attachment A of this Initial Study). As such, elevations on-site would decrease from the north to the south across the Project site, and the proposed improvements would generally conform to the current topography of the site but with a more consistent grade compared to existing conditions.

SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project

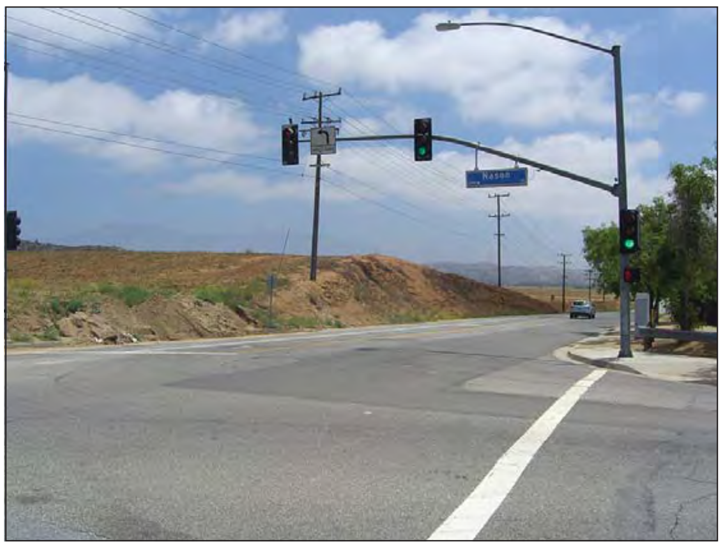
Figure I-1

Photo Location Map

ESA PCR

PHOTOGRAPH 1. View east northeast from Ironwood Ave west of Nason Street

PHOTOGRAPH 2. View northeast from Ironwood Avenue at Nason Street.



PHOTOGRAPH 3. View east northeast from Ironwood Avenue at Nason Street.

PHOTOGRAPH 4. View southeast from Nason north of Kaftan Way.

SOURCE: ESA PCR, 2016

Ironwood Village Project

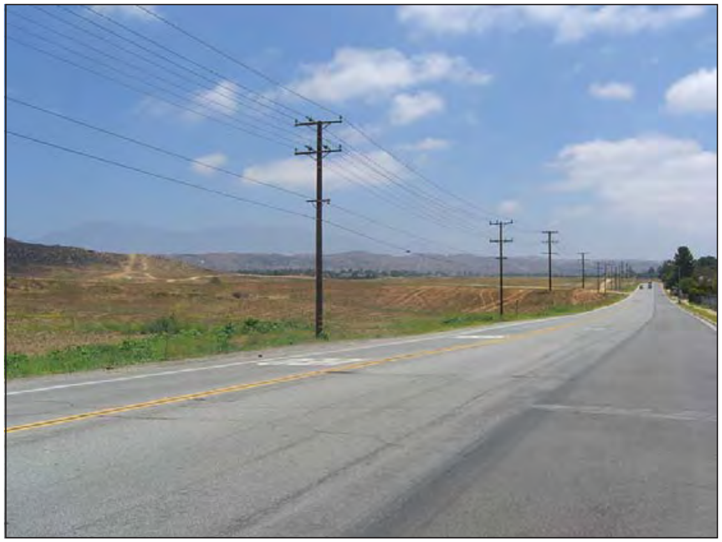
Figure I-2

Existing Site Photographs

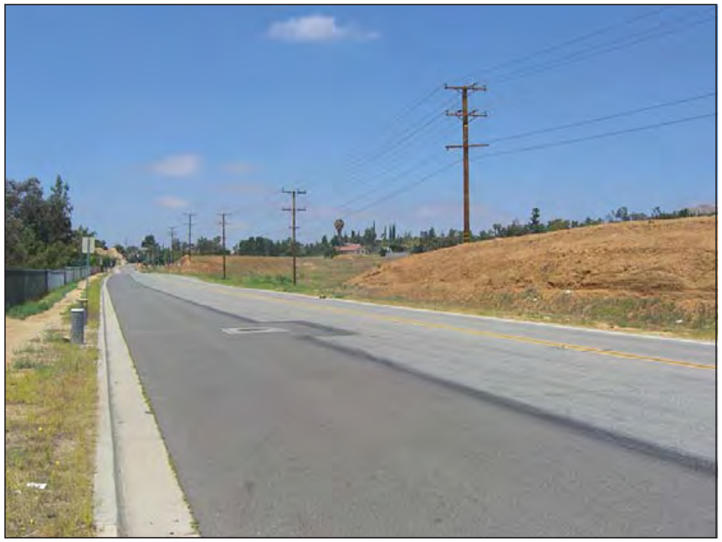
ESA PCR

PHOTOGRAPH 5. View southeast from Nason Street at Sandi Lane.

PHOTOGRAPH 6. View east across site from southeast portion of the property.



PHOTOGRAPH 7. View northeast from Ironwood Avenue east of Nason Street.



PHOTOGRAPH 8. View west northwest from Ironwood Avenue at Lantz Lane.

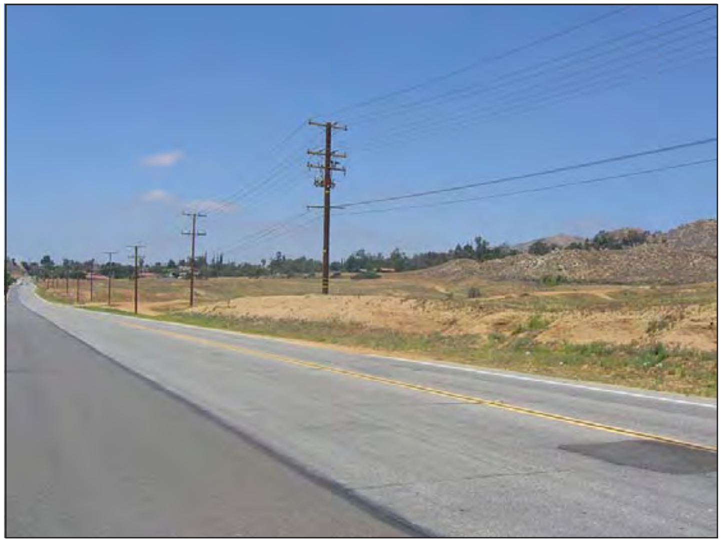
SOURCE: ESA PCR, 2016

Ironwood Village Project

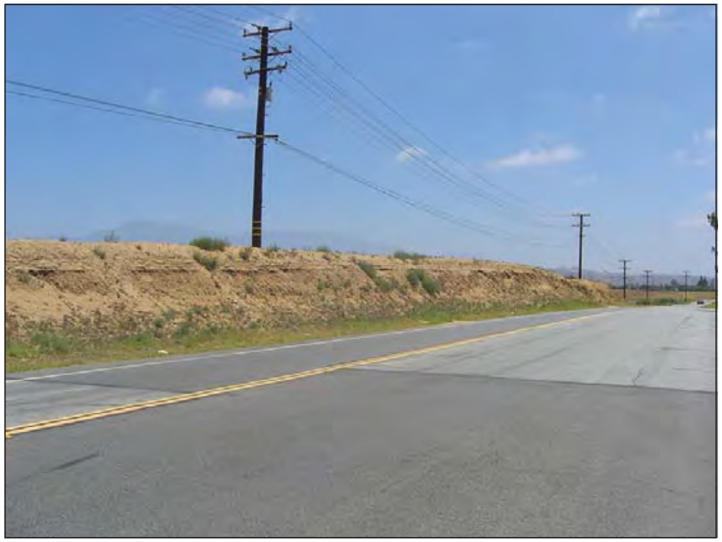
Figure I-3

Existing Site Photographs

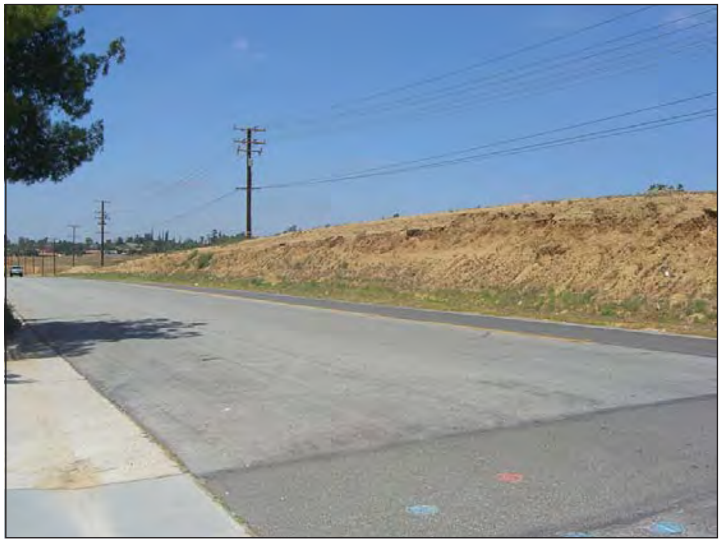
ESA PCR



PHOTOGRAPH 9. View west northwest from Ironwood Avenue east of Lantz Lane



PHOTOGRAPH 10. View northeast from Ironwood Avenue east of Lantz Lane.



PHOTOGRAPH 11. View northwest from Ironwood Avenue at Oliver Street.

PHOTOGRAPH 12. View north from Ironwood Avenue at Oliver Street.

SOURCE: ESA PCR, 2016

Ironwood Village Project

Figure I-4

Existing Site Photographs

ESA PCR

PHOTOGRAPH 13. View west from Oliver Street north of Ironwood Avenue.

PHOTOGRAPH 14. View west northwest from Ironwood Avenue at Moreno Beach Drive.

PHOTOGRAPH 15. View west from Moreno Beach Drive north of Ironwood Avenue.

PHOTOGRAPH 16. View west from Moreno Beach Drive at Juniper Avenue.

SOURCE: ESA PCR, 2016

Ironwood Village Project

Figure I-5

Existing Site Photographs

ESA PCR

Based on the limited height of the proposed structures and the location of the Project site relative to designated scenic resources including views of surrounding mountains as seen from Moreno Beach Drive (designated Scenic Route) and the designated View Corridors to the west and east of the Project site, it is anticipated that views of these resources would not be substantially affected by implementation of the proposed Project. Specifically, given the location of the Project site at a lower elevation than the foothills of the Reche Mountains to the north and the presence of existing single-family residential development to the west and south, views of and across the Project site from west of the Project site (i.e., within the designated View Corridors that provide views across the site) would not be notably affected by implementation of proposed two-story single-family residential uses.

As shown in Figure I-2, views to the east toward the San Timoteo Badlands (mid-distance views) and San Jacinto Mountains (long-distance views) and views to the north and northeast toward the Reche Mountains (mid-distance views) and San Bernardino Mountains (long-distance views) would not be substantially adversely affected based on the presence of intervening development and associated landscaping, as well as the relative topography of the area which currently obstructs direct views of the Project site from areas west of the Project site along Ironwood Avenue (i.e., west of the eastern terminus of Helga Lane). Similarly, as shown in Figure I-5, views to the west of the Reche Mountains and Box Spring Mountains (mid-distance views) and San Gabriel Mountains (long-distance views) would also not be substantially adversely affected by Project implementation. Thus, impacts to views from designated View Corridors would be less than significant.

With regard to views of and across the Project site from Moreno Beach Drive, as shown in Figure I-5, while the Project site would be visible from various locations along Moreno Beach Drive, the site does not represent a substantial portion of the view field given the distance of the site from the roadway, the presence of intervening topography and urban development, the elevation of the site relative to the backdrop of the hills immediately north of the site, and the limited height of proposed structures at a maximum of 35 feet above grade. As such, the construction of single-family residential uses up to two stories in height and associated landscaping on the graded Project site would not have the potential to substantially obstruct views of designated scenic resources identified above, most notably the Reche Mountains and San Bernardino Mountains. As such, impacts to scenic resources resulting from implementation of the proposed Project would be less than significant. It should be noted that although State Route 60 (Moreno Valley Freeway), which is located approximately ½-mile to the south of the Project site, is also designated as a Scenic Route in the City's General Plan; however, given the location of the freeway at a lower elevation than the Project site and the presence of existing development and vegetation, the development portions of the Project site are not visible from any location along the alignment. As such, the Project would have no potential to substantially adversely affect views of scenic resources as viewed from this designated Scenic Route.

b. Substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway?

Less Than Significant Impact. No State-designated scenic highways are located in the Project area, and thus the proposed Project would have no potential to affect scenic resources at viewed from such facilities. However, as noted in Response I.a, above, two City-designated Scenic Routes are located in the vicinity of the Project site, though impacts to scenic resources as viewed from these locations were determined to be less than significant. The Project site does not contain any notable tree specimens and is devoid of any structures (including historic buildings), but does contain rock outcroppings within the northern portion of the property, views of which could be affected by Project implementation. However, the Project has been designed to avoid substantial physical changes (i.e, grading) to these rock outcroppings, as illustrated in Figure A-4, and based on the proposed grading plan and maximum 35-foot structural heights, views of surrounding rock outcroppings would not be substantially obstructed by construction of the proposed single-family residential neighborhood. While views of the lower elevations of the rock outcroppings would be obscured by the proposed development and associated landscaping, the rock outcroppings would still be a prominent visual feature within the visual field, particularly mid-distance westward views of the Project site from Moreno Beach Drive. Given the scale and elevation of the rock outcroppings relative to the proposed structures, the lack of notable physical changes to the rock outcroppings, the lack of available mid- and long distance views of the Project site from areas to the north, south, and west of the property due to topography and existing development, and the limited potential for the proposed development to obstruct views of these features from surrounding locations, implementation of the proposed Project is not expected to substantially damage scenic resources, including, but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway. As such, impacts would be less than significant in this regard.

c. Substantially degrade the existing visual character or quality of the site and its surroundings?

Less Than Significant Impact. The Project site is currently undeveloped, vacant land. The Project site, which is considered moderately disturbed in some areas, consists mostly of ruderal/non-native grasslands and very limited areas of non-native trees and native vegetation in the lower elevations on the site (i.e., south of existing rock outcroppings). On-site vegetation also includes Riversidean sage scrub and brittlebush scrub, which is generally in the northwestern portion of the site, interspersed with the rock outcroppings at the higher elevations. Although the rock outcroppings in the northwest portion of the Project site are prominent visual features of the property, the portions of the site the Project site proposed for future development lack significant native vegetation or other visually distinct features that would improve the visual character and quality of the site. Thus, the visual quality of the site under existing conditions is considered low.

The Project would alter the existing visual character of the Project site by developing a single-family residential subdivision on the property. The native and non-native species of trees, shrubs, and grass located on the site would be removed and replaced with 181 single-family residences and associated infrastructure (i.e., streets, utilities), landscaping and other improvements. The Project would be designed and implemented in accordance with City-approved Design Guidelines, as noted previously, which would prescribe among other features, landscape design, architectural design, and architectural style, in order to provide a consistent and visually cohesive Project. The architectural theme for proposed residential neighborhood is typical traditional California styles of architecture (i.e., Monterey, Spanish Colonial, Santa Barbara, Napa, and Tuscan). While the Design Guidelines and the MVMC allow for two-story (or 35-foot) maximum building heights, the proposed Project would include single-story designs as well, in order to provide visual interest and variation in the rooflines of the development. In addition, the Design Guidelines require that the Project incorporate extensive landscaping throughout the development, as well as apply consistent design for all walls and fences in the subdivision. The proposed Project would also preserve a substantial portion of the site as open space, particularly the rock outcroppings in the northwest corner of the site, and would also provide an on-site community park with turf and landscaping, as well as stormwater detention basins along the southern Project site boundary, all of which would provide a visual buffer by creating view corridors across the site and providing additional vegetation and landscaping to soften the appearance of surrounding new structures on-site. Given the current low visual quality of the development portions of the Project site, adherence to and implementation of the City-approved Design Guidelines for the Project, which would provide for a consistent and visually cohesive development, and avoidance of the rock outcroppings on the property thereby preserving existing views of these visual features, the proposed Project would improve the visual quality of the Project site relative to existing conditions.

Furthermore, it should be noted that the overall architectural style of the homes and building materials, while more modern and cohesive in design, would not substantially contrast with the existing single-family residences that are in proximity to the Project site. While the proposed architectural styles would vary slightly from the surrounding developments, the proposed residences would not be in direct conflict with the overall character of the area.

Based on the above, the proposed Project would not substantially degrade the existing visual character or quality of the Project site and its surroundings and a less than significant impact would occur in this regard.

d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Less Than Significant Impact. The Project site is currently unlit, as it is vacant undeveloped land, as noted previously. The proposed Project would provide illumination due to the addition of security lighting, street lighting, lighting within the residences, as well as transient vehicular lighting from cars traveling on adjacent roadways. Lighting proposed on the site would be similar to that which currently exists in the surrounding area, but would be more concentrated on the Project site relative to surrounding uses given the relative increase in residential density. However, despite the additional potential sources of artificial light, all outdoor lighting would be required to comply with current City lighting requirements accordance with Section 9.08.100, Lighting, of the MVMC, which would include light shielding and wattage limitations to minimize light spill effects on adjacent properties. Additionally, it can be reasonably expected that most Project residents would use blinds or curtains for privacy, which would reduce the amount of light emanating from the residences. Further, the lighting would only be partially visible to the surrounding residential uses due to the topography of the site and the landscaping proposed to encompass the site. Also, the proposed residences would be set back from existing surrounding residential uses and proposed light sources would be shielded and directed on-site to preclude the nighttime illumination from spilling over onto the adjacent residential uses.

Transient sources of light associated with the proposed Project (i.e., automobile lights) would be similar to that which occurs on the adjacent streets. With regard to glare, the proposed Project is not expected to create unusual or isolated glare impacts since the buildings would be constructed of materials that provide for minimal glare potential. The use of neon or glare-generating materials is not proposed. Therefore, the proposed Project would not create a new source of substantial light or glare which would adversely affect day or nighttime views in the area. Impacts would be less than significant in this regard.

II. Agriculture and Forestry Resources

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire protection regarding the State's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and forest carbon measurements methodology provided in Forest Protocols adopted by the California Air Resources Board.

Would the Project:

a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency to non-agricultural use?

No Impact. The Project site is currently undeveloped though several unimproved trails/dirt roads traverse the property. There are no active agricultural uses or related operations on or near the Project site. According to the City of Moreno Valley General Plan Final Environmental Impact Report (2006) (GP FEIR), Figure 5.8-1, Important Farmlands, the eastern portion of the Project site contains farmland of local importance while the majority of the western portion of the Project site contains grazing land with urban and build-up land in the northwestern corner. Accordingly, the Project site is not located on designated Prime Farmland, Unique Farmland, or Farmland of Statewide Importance as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program.[2] Therefore, the Project would not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural uses. Thus, no impact would occur in this regard.

b. Conflict with the existing zoning for agricultural use, or a Williamson Act Contract?

No Impact. The Project site is currently zoned Residential Agriculture 2 (RA2) and Hillside Residential (HR). No portion of the Project or surrounding land uses are zoned primarily for agricultural uses and no nearby lands are enrolled under the Williamson Act. As such, the Project

2 State of California Department of Conservation, California Important Farmland Finder, http://maps.conservation.ca.gov/ciff/ciff.html, accessed May 2016.

would not conflict with existing zoning for agricultural use or a Williamson Act contract and no impact would occur in this regard.

c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 1220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?

No Impact. As discussed under Response II.b, the Project site is currently zoned Residential Agriculture 2 (RA2) and Hillside Residential (HR). No forest land or timberland zoning is present on the Project site or in the surrounding area. As such, the Project would not conflict with existing zoning for forest land or timberland and no impact would occur in this regard.

d. Result in the loss of forest land or conversion of forest land to non-forest use?

No Impact. No forest land exists on the Project site or in the surrounding area. As such, the Project would not result in the loss of forest land or conversion of forest land to non-forest use and no impact would occur in this regard.

e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

No Impact. The Project site is currently undeveloped though several unimproved trails/dirt roads traverse the property. Since there are no active agricultural uses or related operations on or near the Project site, the Project would not involve the conversion of farmland to other uses, either directly or indirectly. No impacts to agricultural land or uses would occur.

III. Air Quality

The following impact analysis pertaining to air quality impacts is based on information contained in the Ironwood Residential (TTM No. 37001), Air Quality Impact Analysis, City of Moreno Valley *(herein referred to as the "Air Quality Impact Analysis"), prepared by Urban Crossroads, dated August 31, 2015. The Air Quality Impact Analysis is provided in Appendix A.*

Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations.

Would the Project:

a) Conflict with or obstruct implementation of the applicable air quality plan?

Less Than Significant Impact. The Project site is located within the 6,745-square-mile South Coast Air Basin (SCAB). Air quality planning for the SCAB is under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). The Project would be subject to the SCAQMD's Air Quality Management Plan (AQMP), which contains a comprehensive list of pollution control strategies directed at reducing emissions and achieving ambient air quality standards. These strategies are developed, in part, based on regional population, housing, and employment projections prepared by the Southern California Association of Governments (SCAG). The 2012 AQMP was adopted by the AQMD Governing Board on December 7, 2012. The 2012 AQMP incorporates the latest scientific and technological information and planning assumptions including the 2012 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) and updated emission inventory methodologies for various source categories. Similar to the 2007 AQMP, the 2012 AQMP was based on assumptions provided by both the California Air Resources Board (CARB) and SCAG in the latest available EMFAC model for the most recent motor vehicle and demographics information, respectively. The air quality levels projected in the 2012 AQMP are based on several assumptions. For example, the 2012 AQMP has assumed that development associated with general plans, specific plans, residential projects, and wastewater facilities would be constructed in accordance with population growth projections identified by SCAG in its 2012 RTP. The 2012 AQMP has also assumed that such development projects would implement strategies to reduce emissions generated during the construction and operational phases of development. Criteria for determining consistency with the AQMP are defined in Chapter 12, Section 12.2 and Section 12.3 of the SCAQMD's CEQA Air Quality Handbook (1993). These indicators are discussed below:

Consistency Criterion No. 1: The proposed project will not result in an increase in the frequency or severity of existing air quality violations or cause or contribute to new violations, or delay the timely attainment of air quality standards or the interim emissions reductions specified in the AQMP.

Consistency Criterion No. 1 refers to violations of the California Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards (NAAQS). CAAQS and NAAQS violations would occur if Localized Significance Thresholds (LSTs) were exceeded. As evaluated as part of the Project LST analysis under Response III.b., below, the Project's localized construction-source emissions would not exceed applicable LSTs.

The Project regional analysis demonstrates that Project operational-source emissions would not exceed applicable thresholds, and would therefore not result in or cause violations of the CAAQS and NAAQS. On the basis of the preceding discussion, the Project is determined to be consistent with the first criterion.

Consistency Criterion No. 2: The proposed project will not exceed the assumptions in the AQMP based on the years of project build-out phase.

The 2012 AQMP demonstrates that the applicable ambient air quality standards can be achieved within the timeframes required under federal law. Growth projections from local general plans adopted by cities in the district are provided to SCAG, which develops regional growth forecasts, which are then used to develop future air quality forecasts for the AQMP. Development consistent with the growth projections in the City of Moreno Valley General Plan (2006) (General Plan) is considered to be consistent with the AQMP.

Peak day emissions generated by construction activities are largely independent of land use assignments, but rather are a function of development scope and maximum area of disturbance.

Irrespective of the site's land use designation, development of the site to its maximum potential would likely occur, with disturbance of the entire site occurring during construction activities.

The Project site is designated for low-density residential uses (R2 residential uses up to 2 units per acre) per the City's General Plan Land Use Map, and is zoned Residential Agriculture (RA2, up to 2 units per acre) and Hillside Residential (HR). In order to accommodate the proposed density on the Project site, which is currently zoned RA2 with a density of up to two units per acre, the Project applicant is requesting a change of zone to R3 (single-family residential up to 3 units per acre) on the western portion of the Project site, and R5 (single-family residential uses up to 5 units per acre) on the eastern portion of the site. Although the Project is proposing zone changes, it should be noted that the Project would not exceed regional thresholds for operational emissions. As such, a less than significant impact would occur in this regard. Therefore, the Project is generally consistent with the growth projections in the City's General Plan and is considered to be consistent with the 2012 AQMP. On the basis of the preceding discussion, the Project is determined to be consistent with the second criterion.

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?

Less Than Significant Impact. As indicated above, the Project site is located within the SCAB, which is characterized by relatively poor air quality. State and federal air quality standards are often exceeded in many parts of the SCAB, including those monitoring stations nearest to the Project site. The Project would contribute to local and regional air pollutant emissions during construction (short-term or temporary) and Project occupancy (long-term). However, based on the following analysis, construction and operation of the Project would result in less than significant impacts relative to the daily significance thresholds for criteria air pollutant emissions established by the SCAQMD for construction and operational phases.

On October 2, 2013, the SCAQMD in conjunction with the California Air Pollution Control Officers Association (CAPCOA) released the latest version of the California Emissions Estimator Model™ (CalEEMod™) v2013.2.2. The purpose of this model is to calculate construction-source and operational-source criteria pollutant (oxides of nitrogen [NOx], volatile organic compounds [VOC], particulate matter 10 microns in diameter or less [PM_{10}], particulate matter 2.5 microns in diameter or less [$PM_{2.5}$], sulfur oxides [SO_x], and carbon monoxide [CO]) and greenhouse gas (GHG) emissions from direct and indirect sources and quantify applicable air quality and GHG reductions achieved from mitigation measures. Accordingly, the latest version of CalEEMod™ has been used for the Project to determine construction and operational air quality emissions.

Construction Emissions

Construction activities associated with the Project would result in emissions of CO, VOCs, NO_x, SO_x, PM_{10}, and $PM_{2.5}$. Construction related emissions are expected from the grading, paving, building construction, architectural coatings, and construction worker commutes. Construction is expected to commence in March 2017 and would last through July 2020. Construction duration by phase is provided on **Table III-1**, *Construction Duration.* The construction schedule utilized in the Air Quality Impact Analysis represents a "worst-case" scenario should construction occur any time after the respective dates since emission factors for construction decrease as the analysis year increases. The duration of construction activity and associated equipment represents a reasonable approximation of the expected construction fleet as required per CEQA guidelines. Site specific construction fleet may vary due to specific Project needs at the time of construction. The duration of construction activity and associated construction equipment was estimated based on consultation with the Project applicant. A detailed summary of construction equipment assumptions by phase is provided in **Table III-2**, *Construction Equipment Assumptions*.

TABLE III-1
CONSTRUCTION DURATION

Activity	Start Date	End Date	Duration
Grading	3/1/2017	6/13/2017	75
Paving	6/14/2017	8/29/2017	55
Building Construction	8/30/2017	3/31/2020	675
Architectural Coatings	12/1/2017	7/2/2020	675

SOURCE: Ironwood Residential (TTM No. 37001), Air Quality Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

TABLE III-2
CONSTRUCTION EQUIPMENT ASSUMPTIONS

Activity	Equipment	Number	Hours Per Day
Grading	Excavators	2	8
	Graders	1	8
	Water Trucks	1	8
	Rubber Tired Dozers	1	8
	Scrapers	2	8
	Tractors/Loaders/Backhoes	2	8
Paving	Pavers	2	8
	Paving Equipment	2	8
	Rollers	2	8
Building Construction	Cranes	1	8
	Forklifts	3	8
	Generator Sets	1	8
	Tractors/Loaders/Backhoes	3	8
	Welders	1	8
Architectural Coatings	Air Compressors	1	8

SOURCE: Ironwood Residential (TTM No. 37001), Air Quality Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

Dust is typically a major concern during rough grading activities. As such emissions are not amenable to collection and discharge through a controlled source, they are referred to as "fugitive emissions". Fugitive dust emissions rates vary as a function of many parameters (soil silt, soil moisture, wind speed, area disturbed, number of vehicles, depth of disturbance or excavation, etc.). The CalEEMod model was utilized to calculate fugitive dust emissions resulting from this phase of activity. Construction emissions for construction worker vehicles traveling to and from the Project site, as well as vendor trips (construction materials delivered to the Project site) were estimated based on information from CalEEMod model defaults.

The estimated maximum daily construction emissions are summarized on **Table III-3**, *Emissions Summary of Overall Construction*. Under the assumed scenarios, emissions resulting from the Project construction would not exceed any criteria pollutant thresholds established by the SCAQMD. As such, a less than significant impact would occur in this regard.

TABLE III-3
EMISSIONS SUMMARY OF OVERALL CONSTRUCTION

Year	Emissions (pounds per day)					
	VOC	NOx	CO	SOx	PM10	PM2.5
2017	6.87	76.97	50.90	0.07	7.27	4.81
2018	5.87	19.94	18.26	0.03	1.45	1.15
2019	5.64	17.48	18.00	0.03	1.30	1.00
2020	5.50	16.12	17.89	0.03	1.20	0.91
Maximum Daily Emissions	**6.87**	**76.97**	**50.9**	**0.07**	**7.27**	**4.81**
SCAQMD Regional Threshold	75	100	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

SOURCE: Ironwood Residential (TTM No. 37001), Air Quality Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

Operational Emissions

Operational activities associated with the Project would result in emissions of reactive organic gases (ROG), NO_x, CO, So_x, PM_{10}, and $PM_{2.5}$. Operational emissions would be expected from area source emissions, energy source emissions, and mobile source emissions.

Area Source Emissions

Architectural Coatings: Over a period of time the proposed residential uses would be subject to emissions resulting from the evaporation of solvents contained in paints, varnishes, primers, and other surface coatings as part of Project maintenance. The emissions associated with architectural coatings were calculated using the CalEEMod model.

Consumer Products: Consumer products include, but are not limited to detergents, cleaning compounds, polishes, personal care products, and lawn and garden products. Many of these products contain organic compounds which when released in the atmosphere can react to form ozone and other photochemically reactive pollutants. The emissions associated with use of consumer products were calculated based on defaults provided within the CalEEMod model.

Hearths/Fireplaces: The emissions associated with use of hearths/fireplaces were calculated based on assumptions provided in the CalEEMod model. The Project is required to comply with SCAQMD Rule 445, which prohibits the use of wood burning stoves and fireplaces in new development. In order to account for the requirements of this Rule, the unmitigated CalEEMod model estimates were adjusted to remove wood burning stoves and fireplaces. As the Project is required to comply with SCAQMD Rule 445, the removal of wood burning stoves and fireplaces is not considered "mitigation" although it must be identified as such in CalEEMod in order to treat the case appropriately.

Landscape Maintenance Equipment: Landscape maintenance equipment would generate emissions from fuel combustion and evaporation of unburned fuel. Equipment in this category would include lawnmowers, shedders/grinders, blowers, trimmers, chain saws, and hedge trimmers used to maintain the landscaping of the Project. The emissions associated with landscape maintenance equipment were calculated based on assumptions provided in the CalEEMod model.

Area Source Emissions

Combustion Emissions Associated with Natural Gas and Electricity: Electricity and natural gas are used by almost every project. Criteria pollutant emissions are emitted through the generation of electricity and consumption of natural gas. However, as electrical generating facilities for the Project area are located either outside the region (State) or offset through the use of pollution credits (RECLAIM) for generation within the SCAB, criteria pollutant emissions from off-site generation of electricity is generally excluded from the evaluation of significance and only natural gas use is considered. The emissions associated with natural gas use were calculated using the CalEEMod model.

Mobile Source Emissions

Vehicles: Project operational (vehicular) impacts are dependent on both overall daily vehicle trip generation and the effect of the Project on peak hour traffic volumes and traffic operations in the vicinity of the Project. The Project related operational air quality impacts derive primarily from vehicle trips generated by the Project. Trip characteristics available from the Project's Traffic Impact Analysis, were utilized in this analysis. A vehicle fleet mix consistent with the Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol was used (i.e., light duty autos 69 percent, light duty trucks 19.4 percent, medium duty trucks 6.4 percent, heavy duty trucks 4.7 percent, and motorcycles 0.5 percent). This fleet mix was utilized as it is more appropriate than the CalEEMod default fleet mix for residential land uses.

Fugitive Dust Related to Vehicular Travel: Vehicles traveling on paved roads would be a source of fugitive emissions due to the generation of road dust inclusive of tire wear particulates. The emissions estimates for travel on paved roads were calculated using the CalEEMod model.

Overall, Project operational-source emissions would not exceed applicable SCAQMD regional thresholds of significance. Operational-source emissions are summarized in **Table III-4**, *Summary of Peak Operational Emissions*. As such, a less than significant impact would occur in this regard.

TABLE III-4
SUMMARY OF PEAK OPERATIONAL EMISSIONS

Operational Activities – Summer Scenario	Emissions (pounds per day)					
	VOC	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
Area Source	7.96	0.17	15.00	7.90E-04	0.33	0.33
Energy Source	0.17	1.46	0.62	0.01	0.12	0.12
Mobile	4.73	15.86	58.67	0.18	13.45	3.84
Total Maximum Daily Emissions	12.86	17.49	74.29	0.19	13.90	4.29
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	NO	NO	NO	NO	NO	NO
Operational Activities – Winter Scenario	**Emissions (pounds per day)**					
	VOC	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
Area Source	7.96	0.17	15	7.90E-04	0.33	0.33
Energy Source	0.17	1.46	0.62	9.32E-03	0.12	0.12
Mobile	4.63	16.37	50.7	0.17	13.45	3.85
Total Maximum Daily Emissions	12.76	18.00	66.32	0.18	13.90	4.30
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	NO	NO	NO	NO	NO	NO

SOURCE: Ironwood Residential (TTM No. 37001), Air Quality Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

Localized Significance – Construction Activity

Background on Localized Significance Threshold (LST) Development

The Air Quality Impact Analysis makes use of methodology included in the SCAQMD Final Localized Significance Threshold Methodology (Methodology). The SCAQMD has established that impacts to air quality are significant if there is a potential to contribute or cause localized exceedances of the federal and/or State ambient air quality standards (NAAQS/CAAQS). Collectively, these are referred to as Localized Significance Thresholds (LSTs).

The significance of localized emissions impacts depends on whether ambient levels in the vicinity of any given project are above or below State standards. In the case of CO and NO_2, if ambient levels are below the standards, a project is considered to have a significant impact if project emissions result in an exceedance of one or more of these standards. If ambient levels already exceed a state or federal standard, then project emissions are considered significant if they increase ambient concentrations by a measurable amount. This would apply to PM_{10} and $PM_{2.5}$, both of which are non-attainment pollutants.

The SCAQMD established LSTs in response to the SCAQMD Governing Board's Environmental Justice Initiative I-4. LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard at the nearest residence or sensitive receptor. The SCAQMD states that lead agencies can use the LSTs as another indicator of significance in its air quality impact analyses. LSTs were developed in response to environmental justice and health concerns raised by the public regarding exposure of individuals to criteria pollutants in local communities. To address the issue of localized significance, the SCAQMD adopted LSTs that show whether a project would cause or contribute to localized air quality impacts and thereby cause or contribute to potential localized adverse health effects. The Air Quality Impact Analysis makes use of methodology included in the SCAQMD Final Localized Significance Threshold Methodology (LST Methodology).

Applicability of LSTs for the Project

For the Project, the appropriate Source Receptor Area (SRA) for the LST is the Perris monitoring station (SRA 24). LSTs apply to CO, NO_2, PM_{10}, and $PM_{2.5}$. The SCAQMD produced look-up tables for projects less than or equal to five acres in size. In order to determine the appropriate methodology for determining localized impacts that could occur as a result of Project-related construction, the following process is undertaken:

The CalEEMod model is utilized to determine the maximum daily on-site emissions that would occur during construction activity;

The SCAQMD's Fact Sheet for Applying CalEEMod to Localized Significance Thresholds is used to determine the maximum site acreage that is actively disturbed based on the construction equipment fleet and equipment hours as estimated in CalEEMod;

If the total acreage disturbed is less than or equal to five acres per day, then the SCAQMD's screening look-up tables are utilized to determine if a Project has the potential to result in a significant impact (the SCAQMD recommends that Projects exceeding the screening look-up tables undergo dispersion modeling to determine actual impacts). The look-up tables establish a maximum daily emissions threshold in pounds per day that can be compared to CalEEMod outputs; and

If the total acreage disturbed is greater than five acres per day, then the SCAQMD recommends dispersion modeling to be conducted to determine the actual pollutant concentrations for applicable LSTs in the air. In other words, the maximum daily on-site emissions as calculated in CalEEMod are modeled via air dispersion modeling to calculate the actual concentration in the air (e.g., parts per million or micrograms per cubic meter) in order to determine if any applicable thresholds are exceeded.

Emissions Considered

SCAQMD's Methodology clearly states that "off-site mobile emissions from the Project should not be included in the emissions compared to LSTs." Therefore, for purposes of the construction LST analysis only emissions included in the CalEEMod "on-site" emissions outputs were considered

Maximum Daily Disturbed-Acreage

Table III-5, *Maximum Daily Disturbed-Acreage* is used to determine the maximum daily disturbed-acreage for use in determining the applicability of the SCAQMD's LST look-up tables. Based on Table III-5, the Project could actively disturb approximately four acres per day and thus would not exceed the five acre per day limit established by the SCAQMD's LST look-up tables. Site specific construction fleet may vary due to specific project needs at the time of construction. The SCAQMD produced look-up tables for projects less than or equal to five acres in size; since the Project does not exceed a disturbance area of five acres in size, SCAQMD LST look-up tables would be used to determine localized impacts consistent with SCAQMD protocol.

TABLE III-5
MAXIMUM DAILY DISTURBED-ACREAGE

Construction Phase	Equipment Type	Equipment Quantity	Acres grader per 8 hour day	Operating Hours per Day	Acres graded per day
Grading	Crawler Tractors	2	0.5	8	1
	Graders	1	0.5	8	0.5
	Rubber Tired Dozers	1	0.5	8	0.5
	Scrapers	2	1.0	8	2
Total acres graded per day					4.0
Applicable LST Mass Rate Look-up Table					4.0

SOURCE: Ironwood Residential (TTM No. 37001), Air Quality Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

Receptors

The nearest sensitive receptor is the residential uses located immediately west of the Project site. Notwithstanding, the Methodology explicitly states that "It is possible that a project may have receptors closer than 25 meters. Projects with boundaries located closer than 25 meters to the nearest receptor should use the LSTs for receptors located at 25 meters." Accordingly, LSTs for receptors at 25 meters are utilized in this analysis and provide for a conservative i.e. "health protective" standard of care.

Overall, emissions during construction activity would not exceed any of the SCAQMD's localized significance thresholds. **Table III-6**, *Localized Significance Summary Construction*, identifies the localized impacts at the nearest receptor location in the vicinity of the Project site. As such, a less than significant impact would occur in this regard.

TABLE III-6
LOCALIZED SIGNIFICANT SUMMARY CONSTRUCTION

On-Site Grading Emissions	Emissions (pounds per day)			
	NOx	**CO**	**PM10**	**PM2.5**
Maximum Daily Emissions	76.87	49.73	7.01	4.74
SCAQMD Localized Threshold	236	1,345.67	11	6.67
Threshold Exceeded?	NO	NO	NO	NO

SOURCE: Ironwood Residential (TTM No. 37001), Air Quality Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

Localized Significance – Long-Term Operational Activity

The Project involves the construction and operation of 181 single-family residential units. According to SCAQMD LST methodology, LSTs would apply to the operational phase of a proposed project, if the project includes stationary sources, or attracts mobile sources that may spend long periods queuing and idling at the site (e.g., warehouse or transfer facilities). The Project does not include such uses, and thus, due to the lack of stationary source emissions, no long-term localized significance threshold analysis is needed.

CO "Hot Spot" Analysis

As discussed below, the Project would not result in potentially adverse CO concentrations or "hot spots." Further, detailed modeling of Project-specific carbon monoxide (CO) "hot spots" is not needed to reach this conclusion.

It has long been recognized that adverse localized CO concentrations ("hot spots") are caused by vehicular emissions, primarily when idling at congested intersections. In response, vehicle emissions standards have become increasingly stringent in the last twenty years. Currently, the allowable CO emissions standard in California is a maximum of 3.4 grams/mile for passenger cars (there are requirements for certain vehicles that are more stringent). With the turnover of older vehicles, introduction of cleaner fuels, and implementation of increasingly sophisticated and efficient emissions control technologies, CO concentrations in the Project vicinity have steadily declined, as indicated by historical emissions data.

A CO "hot spot" would occur if an exceedance of the State one-hour standard of 20 parts per million (ppm) or the eight-hour standard of 9 ppm were to occur. At the time of the 1993 Handbook, the SCAB was designated nonattainment under the California AAQS and National AAQS for CO. As identified within SCAQMD's 2003 AQMP and the 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan), peak carbon monoxide concentrations in the SCAB were a result of unusual meteorological and topographical conditions and not a result of congestion at a particular intersection. To establish a more accurate record of baseline CO concentrations affecting the SCAB, a CO "hot spot" analysis was conducted in 2003 for four busy intersections in the City of Los Angeles at the peak morning and afternoon time periods. The hot spot analysis did not predict violations of CO standards, as indicated on **Table III-7**, *CO Model*

Results. Traffic volumes generating the CO concentrations for the analysis are indicated on **Table III-8**, *Traffic Volumes*. It can therefore be reasonably concluded that projects, including the proposed Project, that are not subject to the extremes in vehicle volumes and vehicle congestion that was evidenced in the 2003 Los Angeles hot spot analysis would similarly not create or result in CO hot spots. Similar considerations are also employed by other air districts when evaluating potential CO concentration impacts. More specifically, the Bay Area Air Quality Management District (BAAQMD) concludes that under existing and future vehicle emission rates, a given project would have to increase traffic volumes at a single intersection by more than 44,000 vehicles per hour, or 24,000 vehicles per hour where vertical and/or horizontal air does not mix, in order to generate a significant CO impact. The Project would not produce the volume of traffic required to generate a CO hotspot either in the context of the 2003 Los Angeles hot spot study, or based on representative BAAQMD CO threshold considerations; refer to **Table III-9**, *Project Peak Hour Traffic Volumes*. Therefore, CO hotspots are not an environmental impact of concern for the Project. As such, localized air quality impacts related to mobile-source emissions would be less than significant.

TABLE III-7
CO MODEL RESULTS

Intersection Location	Morning 1-hour	Afternoon 1-hour	8-hour
Wilshire-Veteran	4.6	3.5	4.2
Sunset-Highland	4	4.5	3.9
La Cienega-Century	3.7	3.1	5.8
Long Beach-Imperial	3	3.1	9.3

Notes: ppm: parts per million. Federal 1-hour standard is 35 ppm and the deferral 8-hour standard is 9.0 ppm.
SOURCE: 2003 AQMP; Ironwood Residential (TTM No. 37001), Air Quality Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

TABLE III-8
TRAFFIC VOLUMES

Intersection Location	Eastbound (AM/PM)	Westbound (AM/PM)	Southbound (AM/PM)	Northbound (AM/PM)	Total (AM/PM)
Wilshire-Veteran	4,954/2,069	1,830/3,317	721/1,400	560/933	8,062/7,710
Sunset-Highland	1,417/1,764	1,342/1,540	2,304/1,832	1,551/2,238	6,614/5,374
La Cienega-Century	2,540/2,243	1,890/2,728	1,384/2,029	821/1,674	6,634/8,674
Long Beach-Imperial	1,217/2,020	1,760/1,400	479/944	756/1,150	4,212/5,514

Notes: ppm: parts per million. Federal 1-hour standard is 35 ppm and the deferral 8-hour standard is 9.0 ppm.
SOURCE: 2003 AQMP; Ironwood Residential (TTM No. 37001), Air Quality Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

TABLE III-9
PROJECT PEAK HOUR TRAFFIC VOLUMES

Intersection Location	Northbound (AM/PM)	Southbound (AM/PM)	Eastbound (AM/PM)	Westbound (AM/PM)	Total (AM/PM)
Nason St & Ironwood Av	13/35	535/438	396/427	608/674	1,552/1,574
Nason St & SR-60 WB Ramps / Elder Av	419/578	773/693	710/676	113/197	2,015/2,144
Nason St & SR-60 EB Ramps	1,035/1,218	1,160/1,308	311/227	--/--	2,506/2,753
Lantz Ln & Ironwood Av	10/37	11/24	387/389	383/398	791/848

SOURCE: Ironwood Residential (TTM No. 37001), Air Quality Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?

Less Than Significant Impact. The SCAB is currently in extreme nonattainment for ozone and non-attainment PM_{10}, and $PM_{2.5}$. The SCAQMD's approach for assessing cumulative impacts related to operations is based on attainment of ambient air quality standards in accordance with the requirements of the federal and State Clean Air Acts. As discussed above, the SCAQMD has developed a comprehensive plan, the 2012 AQMP, which addresses the region's cumulative air quality condition.

A significant impact may occur if a project were to add a cumulatively considerable contribution of a federal or State non-attainment pollutant. Because the SCAB is currently in nonattainment for ozone, PM_{10} and $PM_{2.5}$, related projects could cause ambient concentrations to exceed an air quality standard or contribute to an existing or projected air quality exceedance. Cumulative impacts to air quality are evaluated under two sets of thresholds for CEQA and the SCAQMD. In particular, CEQA Guidelines Sections 15064(h)(3) provides guidance in determining the significance of cumulative impacts. Specifically, Section 15064(h)(3) states in part that:

"A lead agency may determine that a project's incremental contribution to a cumulative effect is not cumulatively considerable if the project will comply with the requirements in a previously approved plan or mitigation program which provides specific requirements that will avoid or substantially lessen the cumulative problem (e.g., water quality control plan, air quality plan, integrated waste management plan) within the geographic area in which the project is located. Such plans or programs must be specified in law or adopted by the public agency with jurisdiction over the affected resources through a public review process to implement, interpret, or make specific the law enforced or administered by the public agency…"

For purposes of the cumulative air quality analysis with respect to CEQA Guidelines Section 15064(h)(3), the Project's incremental contribution to cumulative air quality impacts is determined based on compliance with the SCAQMD adopted 2012 AQMP. The 2012 AQMP includes demographic growth forecasts for various socioeconomic categories (e.g. population, housing, employment), developed by SCAG for their 2012 Regional Transportation Plan (RTP). As discussed under Response III.a, above, the Project would be consistent with the 2012 AQMP.

As the Project is not part of an ongoing regulatory program, the SCAQMD also recommends that project-specific air quality impacts be used to determine the potential cumulative impacts to regional air quality. As discussed above, peak daily emissions of operation-related pollutants would not exceed SCAQMD regional significance thresholds. By applying SCAQMD's cumulative air quality impact methodology, implementation of the Project would not result in an addition of criteria pollutants such that cumulative impacts would occur, in conjunction with related projects in the region. In addition, as discussed in Response III.b, above, construction of the Project is not expected to result in a cumulatively considerable net increase of any criteria pollutant for which the SCAQMD has established a localized impact threshold. Therefore, the emissions of non-attainment pollutants and precursors generated by the Project in excess of the SCAQMD Project-level thresholds would be less than significant.

d) Expose sensitive receptors to substantial pollutant concentrations?

Less Than Significant Impact. Certain population groups are especially sensitive to air pollution and should be given special consideration when evaluating potential air quality impacts. These population groups include children, the elderly, persons with pre-existing respiratory or cardiovascular illness, and athletes and others would engage in frequent exercise. As defined in the SCAQMD CEQA Air Quality Handbook, a sensitive receptor to air quality is defined as any of the following land use categories: (1) long-term health care facilities; (2) rehabilitation centers; (3) convalescent centers; (4) retirement homes; (5) residences; (6) schools; (7) parks and playgrounds; (8) child care centers; and (9) athletic fields.

As discussed in Response III.b, above, results of the LST analysis indicate the Project would not exceed the SCAQMD localized significance thresholds during construction. Therefore, sensitive receptors would not be subject to a significant air quality impact during Project construction. As such, a less than significant impact would occur in this regard.

Results of the LST analysis indicate the Project would not exceed the SCAQMD localized significant thresholds during operational activity. The Project would not result in a CO "hotspot" or result in a significant adverse health impact as a result of Project related traffic during ongoing operations. As such, a less than significant impact would occur in this regard.

e) Create objectionable odors affecting a substantial number of people?

Less Than Significant Impact With Mitigation Incorporated. Potential sources that may emit odors during construction activities include construction equipment exhaust, the application of asphalt, and the use of architectural coatings and solvents. According to the SCAQMD CEQA Air Quality Handbook, construction equipment is not a typical source of odors. SCAQMD Rule 1113 limits the amount of VOCs from architectural coatings and solvents. Further, construction odor emissions would be temporary, short-term, and intermittent in nature and would cease upon completion of the completion of construction. Through adherence with mandatory compliance with SCAQMD Rules, no construction activities or materials are proposed which would create objectionable odors. The nearest existing sensitive receptors are residences located immediately west of the Project site. However, the Project's proposed uses would not typically generate nuisance odors at nearby sensitive receptors.

According to the SCAQMD CEQA Air Quality Handbook, land uses associated with odor complaints typically include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting operations, refineries, landfills, dairies, and fiberglass molding facilities. The Project would not involve elements related to these types of uses. It is expected the Project-generated refuse would be temporarily stored in covered containers and would be removed at regular intervals in compliance with the City's solid waste regulations. While there is a potential for odors to occur, compliance with industry standard odor control practices, SCAQMD Rule 402 (Nuisance), SCAQMD Best Available Control Technology Guidelines, and implementation of recommended mitigation measures ("MM") MM AQ-1 through MM AQ-3, would limit potential objectionable odor impacts to a less than significant level.

Mitigation Measures

MM AQ-1 The Project shall comply with the provisions of South Coast Air Quality Management District Rule 403, "Fugitive Dust." Rule 403 requires implementation of best available dust control measures during construction activities that generate fugitive dust, such as earth moving, grading, and equipment travel on unpaved roads. Prior to grading permit issuance, the City of Moreno Valley shall verify that the following notes are specified on the grading plan. Project construction contractors shall be required to ensure compliance with the notes and permit periodic inspection of the construction site by City of Moreno Valley staff or its designee to confirm compliance. These notes shall also be specified in bid documents issued to prospective construction contractors.

a) All clearing, grading, earth-moving, and excavation activities shall cease when winds exceed 25 miles per hour;

b) During grading and ground-disturbing construction activities, the construction contractor shall ensure that all unpaved roads, active soil stockpiles, and areas undergoing active ground disturbance within the Project site are watered at least three (3) times daily during dry weather. Watering, with complete coverage of disturbed areas by water truck, sprinkler system, or other comparable means, shall occur in the mid-morning, afternoon, and after work is done for the day;

c) Temporary signs shall be installed on the construction site along all unpaved roads indicating a maximum speed limit of 15 miles per hour (MPH). The signs shall be installed before construction activities commence and remain in place for the duration of construction activities that include vehicle activities on unpaved roads; and

d) The cargo area of all vehicles hauling soil, sand, or other loose earth materials shall be covered.

MM AQ-2 The Project shall comply with the provisions of South Coast Air Quality Management District Rule 1186 "PM10 Emissions from Paved and Unpaved Roads and Livestock Operations" and Rule 1186.1, "Less-Polluting Street Sweepers" by complying with the following requirements. To ensure and enforce compliance with these requirements and reduce the release of criteria pollutant emissions into the atmosphere during construction, prior to grading and building permit issuance, the City of Moreno Valley shall verify that the following notes are included on the grading and building plans. Project construction contractors shall be required to ensure compliance with the notes and permit periodic inspection of the construction site by City of Moreno Valley staff or its designee to confirm compliance. The notes also shall be specified in bid documents issued to prospective construction contractors.

a) If visible dirt or accumulated dust is carried onto paved roads during construction, the contractor shall remove such dirt and dust at the end of each work day by street cleaning and

b) Street sweepers shall be certified by the South Coast Air Quality Management District as meeting the Rule 1186 sweeper certification procedures and requirements for PM10-efficient sweepers. All street sweepers having a gross vehicle weight of 14,000 pounds or more shall be powered with alternative (non-diesel) fuel or otherwise comply with South Coast Air Quality Management District Rule 1186.1.

MM AQ-3 The Project is required to comply with the provisions of South Coast Air Quality Management District Rule 402 "Nuisance." To ensure and enforce compliance with this requirement, which applies to the release of odorous emissions into the atmosphere, prior to the issuance of grading and building permits, the City of Moreno Valley shall verify that the following note is included on grading and building plans. During Project construction, contractors shall be required to ensure compliance with Rule 402 and permit periodic inspection of the construction site by the City of Moreno Valley staff or its designee to confirm compliance.

IV. Biological Resources

The following impact analysis pertaining to biological resources is based on information contained in the *Ironwood Village Biological Resources Assessment* (herein referred to as the "Biological Resources Assessment" or "BRA"), prepared by ESA PCR, dated September 2016, as well as the *Determination of Biologically Equivalent or Superior Preservation* (referred to as the "DBESP" Report), also prepared by ESA PCR, dated September 2016. The scope of the BRA includes descriptions of Project-related improvements, methods of study, existing site conditions including vegetation communities and the potential for special-status biological resources, followed by an evaluation of impacts to special-status biological resources pursuant to CEQA thresholds and compliance with the Western Riverside County MSHCP. The BRA summarizes existing on- and off-site biological resources conditions within and around the Project site based on information compiled through field reconnaissance and appropriate reference materials. Surveys included a general biological survey and vegetation mapping; an investigation of jurisdictional waters; focused plant surveys; and focused burrowing owl surveys.

Avoidance, minimization, and/or mitigation measures are proposed to reduce any potential adverse effects to biological resources to less than significant under CEQA where appropriate.

The Biological Resources Assessment and DBESP Report are both provided in Appendix B of this Initial Study.

Existing Biological Resources Conditions

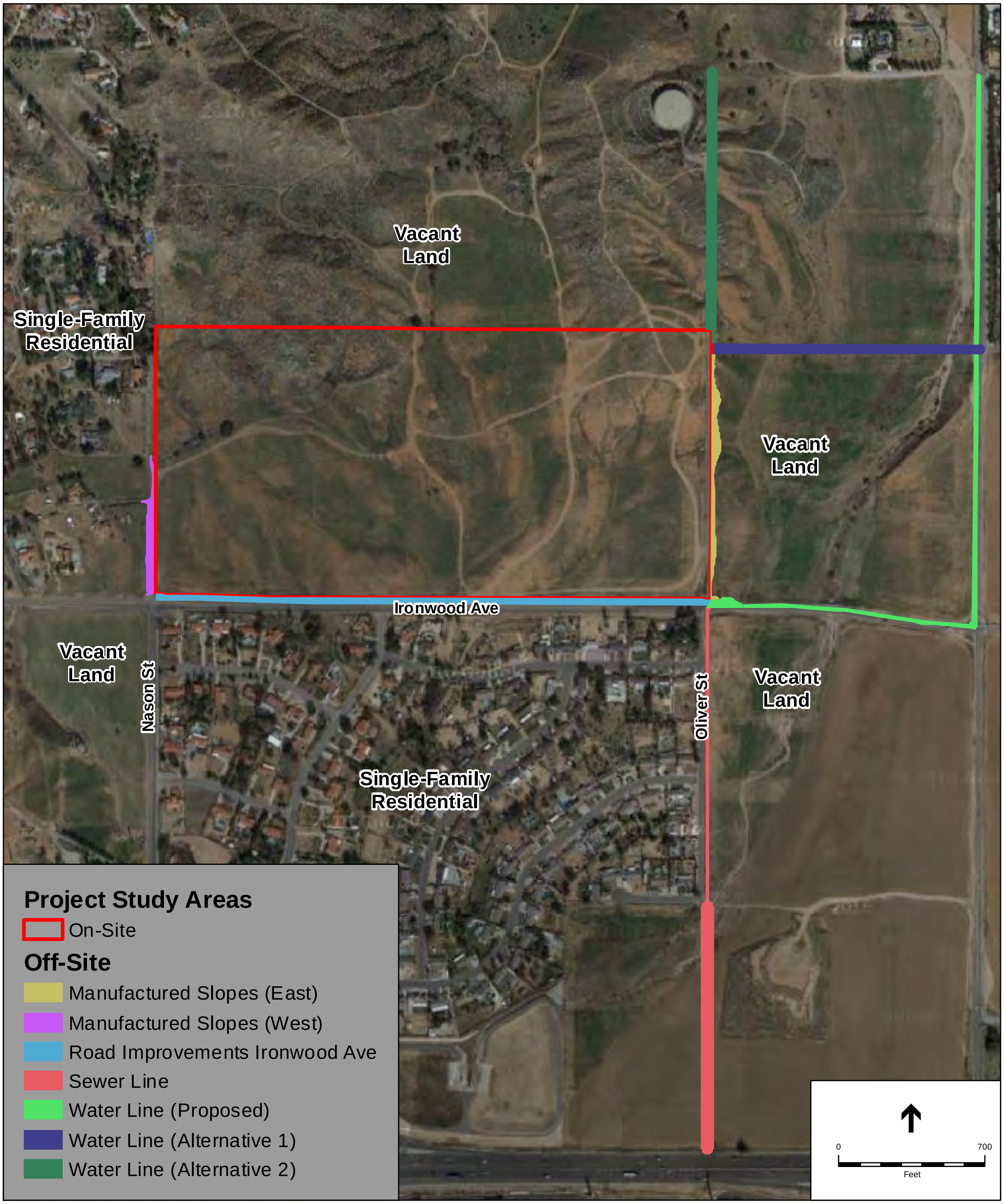
The study area for the BRA included the approximately 78.48-acre on-site study area (Project site) as well as approximately 10.57 acres of off-site study areas that could potentially be affected by off-site infrastructure improvements to serve future development on-site. The specific location of the study area is depicted below in **Figure IV-1**, *BRA Study Area*. Off-site study areas associated with four types of proposed Project improvements include manufactured slopes, road improvements, a sewer line extension, and water line extensions, as illustrated and indicated in Figure IV-1.

The Project study areas consist primarily of non-native vegetation characterized by ruderal vegetation and disturbed areas that consist of little to no vegetation. There are some areas that support native plant communities, such as Riversidean sage scrub and brittlebush scrub, which predominantly reside in the northwestern corner of the on-site study area. The Project proposes avoidance of the northwestern and northeastern corners of the on-site study area, which are located on hillsides that transition into the foothills of the Badlands mountain range located to the north of the Project site. These avoided areas will be maintained as natural open space, in part, to preserve the scenic views of the hillsides from the City of Moreno Valley. The Project on- and off-site study areas also support two drainage systems, which include Drainage A and Drainage Complex B (see discussion and exhibits below), approximately 40% of which will be avoided.

Characteristics of the Study Area and Surrounding Area

On-Site Characteristics

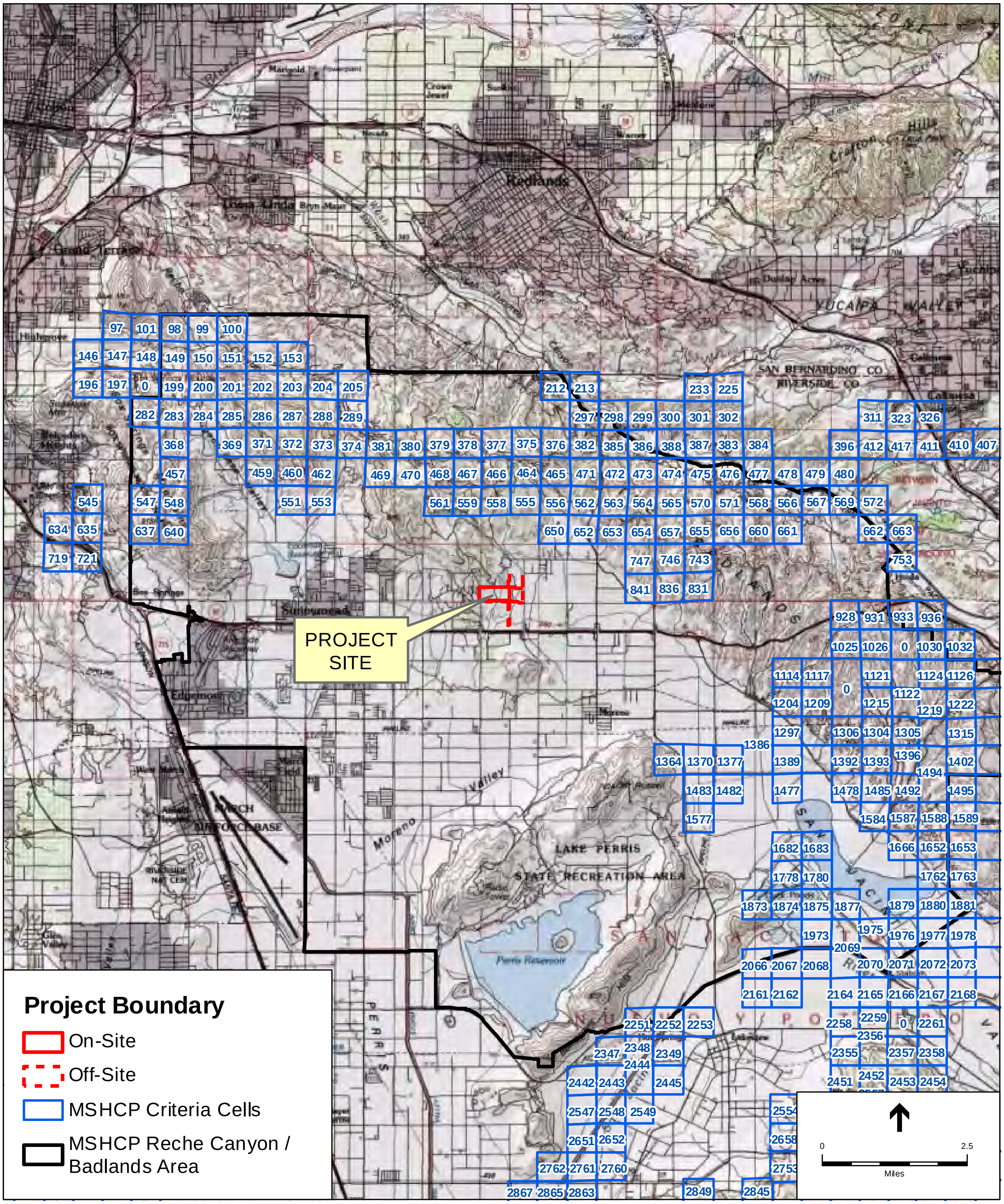
The approximately 79-acre Project site and the 10.57-acre off-site areas are located in the City of Moreno Valley in Riverside County. The Project site consists primarily of non-native vegetation characterized by ruderal vegetation and disturbed areas that consist of little to no vegetation. There are some areas that support native plant communities, such as Riversidean sage scrub and brittlebush scrub, which predominantly reside in the northwestern corner of the Project site. The study area supports two drainage systems observed to support field indicators associated with USACE, RWQCB, and CDFW (collectively “the resource agencies”) jurisdictional waters, referred to in this analysis as Drainage A and Drainage Complex B, although only Drainage A occurs on-site. The topography on-site is generally flat with gently rolling hills throughout the Project site and steeper rock outcrops on the northwest corner. On-site elevations range from the lowest of approximately 1,830 feet above mean sea level (MSL) along the southern boundary of the Project site to a high of approximately 1,975 feet above MSL along the northwest boundary of the site. The entire Project site is within the Reche Canyon/Badlands Area Plan of the MSHCP (see **Figure IV-2**, *Relationship to the MSHCP*, below).



SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project
Figure IV-1
BRA Study Area

FSA PCR



SOURCE: USGS Topographic Series; MSHCP.

Ironwood Village Project
Figure IV-2
Relationship to the MSHCP

ESA PCR

Off-Site Characteristics

The 10.57-acre off-site areas include the proposed manufactured slopes, road improvements, sewer line, and water line areas. The off-site areas are dominated by ruderal vegetation and disturbed areas with only a small acreage of native brittlebush scrub and Riversidean sage scrub. The off-site areas also support some areas of sparsely vegetated river wash areas. A portion of Drainage A and the entirety of Drainage Complex B occurs within the off-site area. The topography of the off-site areas is generally flat with the exception of the proposed northern water line area near an existing water tank, which consists of a fairly steep east-facing slope supporting some native vegetation and rocky outcrops. Elevations within the off-site areas range from the lowest of approximately 1,793 feet above MSL at the southern end of the proposed sewer line to a high of approximately 1,948 feet above MSL at the steepest portion of the proposed water line area.

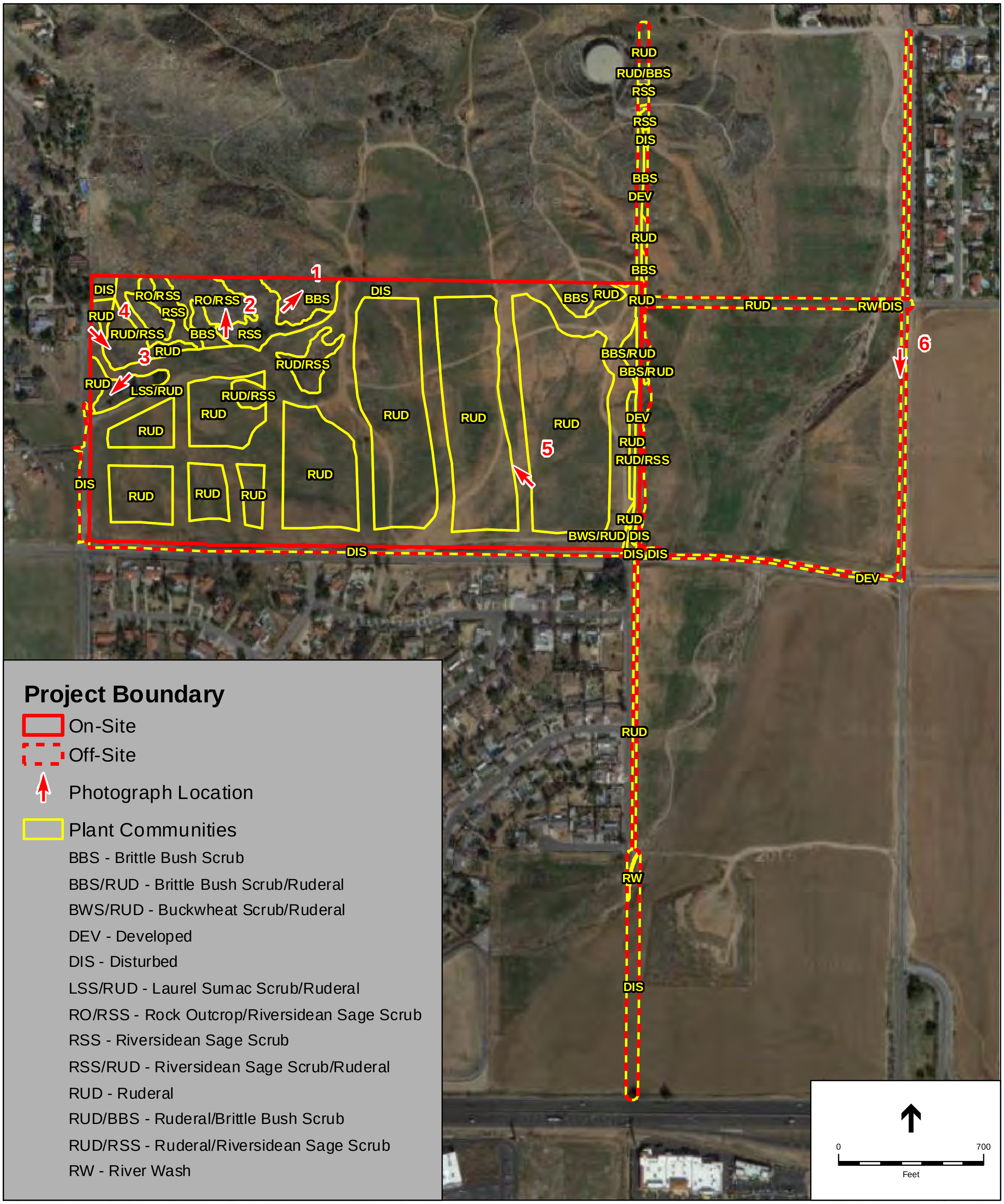
Plant Communities

Descriptions of each of the plant communities found within the study area are provided in Section 4.2 of the Project BRA. The locations of each of the plant communities are shown below in **Figure IV-3**, *Plant Communities*, while **Table IV-1**, *Plant Communities*, below, lists each of the plant communities observed, as well as the acreage within the study area.

TABLE IV-1
PLANT COMMUNITIES

Plant Communities	On-site (acres)	Off-site (acres)
Brittlebush Scrub	2.34	0.27
Brittlebush Scrub/Ruderal	0.31	0.21
Buckwheat Scrub/Ruderal	0.09	0.04
Laurel Sumac Scrub/Ruderal	0.78	-
Riversidean Sage Scrub	3.10	0.12
Riversidean Sage Scrub/Ruderal	-	0.07
Rock Outcrop/Riversidean Sage Scrub	2.15	-
River Wash	-	0.05
Ruderal	38.04	2.50
Ruderal/Brittlebush Scrub	-	0.04
Ruderal/Riversidean Sage Scrub	2.29	0.43
Disturbed	28.68	4.18
Developed	0.70	2.66
Total	**78.48**	**10.57**

SOURCE: ESA PCR, 2016



SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project
Figure IV-3
Plant Communities

ESA PCR

Attachment: Initial Study/Mitigated Negative Declaration (IS/MND) (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

General Plant Inventory

The plant communities discussed above are comprised of numerous plant species. Observations regarding the plant species present were made during the field visits to the study area, and a list of all plant species observed is provided in Appendix A, Floral and Faunal Compendium, of the BRA. Special-status plant species occurring or potentially occurring within the study area are discussed in Section 4.7.5, *Special-status Plant Species*, of the BRA.

General Wildlife Inventory

The plant communities discussed above provide habitat for common wildlife species. Observations regarding the wildlife species present were made during the field visits to the study area, and a list of all species observed is provided in Appendix A of the BRA. Special-status wildlife species occurring or potentially occurring are discussed in Section 4.7.6, *Special-status Wildlife Species*, of the BRA.

Wildlife Movement

Wildlife corridors link together areas of suitable habitat that are otherwise separated by rugged terrain, changes in vegetation, or human disturbance. The fragmentation of open space areas by urbanization creates isolated "islands" of wildlife habitat. In the absence of habitat linkages that allow movement to adjoining open space areas, various studies have concluded that some wildlife species, especially the larger and more mobile mammals, will not likely persist over time in fragmented or isolated habitat areas because they prohibit the infusion of new individuals and genetic material.

Corridors effectively act as links between different populations of a species. A group of smaller populations (termed "demes") linked together via a system of corridors is termed a "metapopulation." The long-term health of each deme within the metapopulation is dependent upon its size and the frequency of interchange of individuals (immigration vs. emigration). The smaller the deme, the more important immigration becomes, because prolonged inbreeding with the same individuals can reduce genetic variability. Immigrant individuals that move into the deme from adjoining demes mate with individuals and supply that deme with new genes and gene combinations that increases overall genetic diversity. An increase in a population's genetic variability is generally associated with an increase in a population's health and long-term viability.

Corridors mitigate the effects of habitat fragmentation by: (1) allowing animals to move between remaining habitats, which allows depleted populations to be replenished and promotes genetic diversity; (2) providing escape routes from fire, predators, and human disturbances, thus reducing the risk that catastrophic events (such as fires or disease) will result in population or local species extinction; and (3) serving as travel routes for individual animals as they move within their home ranges in search of food, water, mates, and other needs.

Wildlife movement activities usually fall into one of three movement categories: (1) dispersal (e.g., juvenile animals from natal areas, individuals extending range distributions); (2) seasonal migration; and, (3) movements related to home range activities (foraging for food or water, defending territories, searching for mates, breeding areas, or cover). Although the nature of each of these types of movement is species specific, large open spaces will generally support a diverse wildlife community representing all types of movement. Each type of movement may also be represented at a variety of scales from non-migratory movement of amphibians, reptiles, and some birds on a "local" level to home ranges encompassing many square-miles for large mammals moving on a "regional" level. A number of terms have been used in various wildlife movement studies, such as "wildlife corridor," "travel route," and "wildlife crossing" to refer to areas in which wildlife move from one area to another. To clarify the meaning of these terms and facilitate the discussion on wildlife movement in this analysis, these terms are defined as follows:

Travel Route: A landscape feature (such as a ridgeline, drainage, canyon, or riparian strip) within a larger natural habitat area that is used frequently by animals to facilitate movement and provide access to necessary resources (e.g., water, food, cover, den areas). The travel route is generally preferred because it provides the least amount of topographic resistance in moving from one area to another; it contains adequate food, water, and/or cover while moving between habitat areas; and provides a relatively direct link between target habitat areas.

Wildlife Corridor: A piece of habitat, usually linear in nature, that connects two or more habitat patches that would otherwise be fragmented or isolated from one another. Wildlife corridors are usually bounded by urban land areas or other areas unsuitable for wildlife. The corridor generally contains suitable cover, food, and/or water to support species and facilitate movement while in the corridor. Larger, landscape-level corridors (often referred to as "habitat or landscape linkages") can provide both transitory and resident habitat for a variety of species.

Wildlife Crossing: A small, narrow area, relatively short in length and generally constricted in nature, that allows wildlife to pass under or through an obstacle or barrier that otherwise hinders or prevents movement. Crossings typically are manmade and include culverts, underpasses, drainage pipes, and tunnels to provide access across or under roads, highways, pipelines, or other physical obstacles. These are often "choke points" along a movement corridor.

Wildlife Movement Within the Study Area

As previously described, wildlife movement activities occur at a variety of scales from a "local" level to a "regional" level. Regional movement through the study area is restricted due to the urbanization of the region and the proximity to a major freeway (SR-60) (refer to Figures A-1 and A-2 in Attachment A of this Initial Study). The study area is immediately surrounded by residential development to the south and west. Although there is vacant land directly to the north and east of the study area, the land to the east is highly disturbed and mostly cleared of natural vegetation and there are a number of residential communities adjacent to the eastern boundary of the vacant land. Additionally, the study area is located about 0.5 mile to north of the SR-60. Although regional movement through this area is likely limited, there is some potential for local movement through the study area via the open area directly to the north which comprises the foothills of the Badlands. Although the study area connects to the open area to the north, the study area is dominated by ruderal and disturbed areas with limited native vegetation.

The Project site only supports one ephemeral drainage that conveys minor road runoff from Ironwood Avenue with no associated vegetation (Drainage A), which is unlikely to facilitate wildlife movement. Additionally, Drainage A initiates on-site and meanders for approximately

396 linear feet before exiting the Project site via a culvert beneath Ironwood Avenue. Drainage Complex B occurs within the off-site areas and comprises the mainstem Drainage B, which is a USGS mapped blueline stream, and five small tributaries (Drainages B1 through B5). The mainstem Drainage B does support some ruderal and non-native vegetation (e.g. giant reed). Drainage B appears to initiate in the foothills of the Badlands to the north of the off-site areas and becomes channelized just west of the off-site sewer line area.

Due to the limited vegetation within Drainage B and lack of connection to suitable habitat downstream due to development, Drainage B is not expected to function as a wildlife movement corridor. The smaller tributaries (Drainages B1 through B5) are also ephemeral drainages with limited upland vegetation, which initiate at the peak of a small ridge upstream from the off-site water line area and appear to support little to no surface connection to the mainstem Drainage B likely due to decades of disturbance from agriculture and/or weed abatement activities. Drainage B5 does not appear to support any natural watershed and appears to be relict in nature. Vegetation within the drainage appears to be supported by artificial discharges from the water tank blow-off pipe observed at the headwaters of Drainage B5. Due to the limited vegetation and watershed, as well as the disturbed nature of the downstream areas off-site, the tributaries do not facilitate wildlife movement through the study area.

The study area is not within any Core or Linkage areas as identified by the MSHCP. There is one proposed linkage (Proposed Linkage 4) approximately 2.1 miles to the north of the study area and one existing core (Core H) roughly 4.0 miles to the south of the study area. Proposed Linkage 4 would include upland habitat within Reche Canyon and provide connection to Box Springs Reserve, the Badlands, and San Bernardino County. The open area directly to the north of the study area does directly connect to Proposed Linkage 4. Existing Core H includes Lake Perris State Recreation Area and San Jacinto Wildlife Area. There is no direct connection from the study area to Core H, which are separated by urban development. The study area is not within any linkages identified by the South Coast Missing Linkages report; the nearest linkage design identified is for the San Bernardino–San Jacinto Connection located approximately 3.5 miles to the east. Since the study area is not identified as a linkage by the MSHCP or South Coast Wildlands, and it does not support habitat that connects two or more habitat patches that would otherwise be fragmented or isolated from one another, the study area is not considered a wildlife corridor. The study area may provide limited opportunities for wildlife movement, more likely for local wildlife movement as described below.

Movement on a smaller or “local” scale could occur within the study area for species that are less restricted in movement pathway requirements or are adapted to urban areas (e.g., raccoon [*Procyon lotor*], stripped skunk [*Mephitis mephitis*], coyote [*Canis latrans*], and bird species in general). Habitat within the study area is dominated by ruderal and disturbed areas with some portions supporting native vegetation, including brittlebush scrub, buckwheat scrub, and Riversidean sage scrub. As such, it likely supports some wildlife movement within the study area and/or nearby areas for foraging and shelter. Data gathered from the biological survey indicates that the study area contains habitat that supports common species of invertebrates, reptiles, birds, and small mammals. The home range and average dispersal distance of many of these species may be entirely contained within the study area and immediate vicinity.

Populations of animals such as insects, reptiles, small mammals, and a few bird species may find all their resource requirements without moving far or outside of the study area at all. Occasionally, individuals expanding their home range or dispersing from their parental range could attempt to move outside of the study area, if feasible, based on the surrounding restrictions to movement from development (see above). Bird species may fly over the development and freeways to utilize the study area for foraging, although this is expected to be limited due to the high level of human activity in the region and higher quality foraging habitats in nearby open areas with less human disturbance, particularly the Badlands to the north.

In summary, the study area may support live-in and movement habitat for species on a local scale (i.e., some live-in and at least marginal movement habitat for invertebrates, reptiles, birds, and small mammal species). However, due to surrounding development, the proximity to the I-60 freeway, and the ephemeral nature and limited watershed of the drainages, the study area likely provides little to no function to facilitate movement for wildlife species on a regional scale and it is not identified as a regionally important dispersal or seasonal migration corridor by the MSHCP or by South Coast Wildlands.

Jurisdictional Waters

An investigation of on- and off-site jurisdictional waters was performed by ESA PCR Regulatory Services staff on September 19, 2014. An additional site visit was conducted on December 10, 2014 following a series of storm events that occurred on December 2, 3, and 4, 2014 totaling nearly two inches of rain in that period.[3] Based on the results of the investigation, Drainage A and Drainage Complex B (Drainages B & B1through B5) were determined to support a total of approximately 0.057 acre of USACE/RWQCB "waters of the U.S." and 0.165 acre of CDFW jurisdictional streambed (see **Figure IV-4**, *Jurisdictional Features*, below). A summary of jurisdictional features assessed within the study area is provided in **Table IV-2**, *Jurisdictional Features*, below.

The study area is located within rolling valley topography located southeast of Reche Canyon and south/southwest of The Badlands mountain range. The study area is located within the San Jacinto Watershed and generally drains toward the south, eventually reaching the Perris Valley Storm Drain which ultimately reaches the San Jacinto River and then Canyon Lake. The USGS Sunnymead topographic Quadrangle depicts a blueline stream originating in the foothills to the north with headwaters located approximately 2,000 linear feet from the on-site study area. The mapped blueline drainage feature enters the Project site near the center of the northern Project boundary and bisects the property. The property has been subjected to seasonal dry-farming and/or weed abatement activities for several decades. Based on the jurisdictional assessments performed by ESA PCR, no discernible streambed or indicators of flow were observed within the area historically mapped as a blueline drainage feature during the September 19, 2014 jurisdictional delineation.

3 Based on WeatherCurrents.com precipitation data accessed at http://weathercurrents.com/morenovalley/ArchiveDec2014.do obtained on July 26, 2016.

TABLE IV-2
JURISDICTIONAL FEATURES

Drainage (Study Area)	Length (ft)	USACE/ RWQCB (acres)	CDFW (acres)	Flow Classification
A (On-Site)	285	0.023	0.046	Ephemeral
A (Off-Site)	111	0.007	0.013	Ephemeral
Drainage A Subtotal	***396***	***0.030***	***0.059***	
B (Off-Site)	306	0.026	0.069	Ephemeral
B1 (Off-Site)[b]	0[a]	N/A	0.001	Ephemeral
B2 (Off-Site)[b]	32	N/A	0.001	Ephemeral
B3 (Off-Site)[b]	25	N/A	0.001	Ephemeral
B4 (Off-Site)[b]	34	N/A	0.001	Ephemeral
B5 (Off-Site)	35	0.002	0.033	Ephemeral
Drainage Complex B Subtotal	***432***	***0.028***	***0.106***	
Total	**828**	**0.058**	**0.165**	

[a] Less than one linear foot of jurisdiction occurs within Drainage B1 as the majority of the drainage within the off-site study area is associated with an existing corrugated metal pipe that was not quantified.

[b] Drainage did not support jurisdictional field indicators associated with "waters of the U.S" regulated by the USACE and RWQCB pursuant to the Clean Water Act.

SOURCE: ESA PCR, 2014

In order to determine if jurisdictional field indicators reestablish following moderate rain events, ESA PCR staff returned to investigate the site following a series of early December 2014 storm events yielding nearly 2-inches of rain over three consecutive days. In our experience, this amount of rain would have reestablished some evidence of flow capable of eroding a streambed and/or supporting some jurisdictional field indicators based on the USACE's arid delineation guidelines.

However, no ordinary water mark, sediment deposition/sorting, debris wracks, bed/bank, streambed associated vegetation, or other jurisdictional field indicators were observed immediately following the consecutive rain events. As a result, it was determined that no jurisdiction occurs within the area mapped as a blueline drainage feature within the study area.

It was noted that the USGS Sunnymead Quadrangle depicts a small water feature at the off-site headwaters, located approximately 2,000 linear feet north of the site where the blueline feature initiates. As such, it is feasible that the mapped water feature is associated with a historic stock pond, which may have supported a small drainage that ultimately extended to the Project study area when water was historically discharged from the feature and/or significant storm events caused it to overflow. However, based on review of current aerial imagery in Google Earth, no water feature appears to persist within the off-site headwaters in the current condition capable of supporting a discernible streambed. Consequently, the only jurisdictional feature identified within the on-site study area during the December 2014 site visit is a minor roadside ditch identified as Drainage A.

SOURCE: Google Maps, 2015.

Ironwood Village Project
Figure IV-4
Jurisdictional Features

ESA PCR

Jurisdiction within the off-site study areas is limited to a mainstem drainage identified as Drainage B, and Drainage Complex B which is comprised of tributary Drainages B1through B5. No riparian and/or hydrophytic vegetation communities were observed on the study area that would warrant the need for a formal wetland analysis. Therefore, no jurisdictional wetlands or special aquatic sites were determined to occur within the Project study areas. The following provides a summary of jurisdictional drainage features identified within the Project study areas:

Drainage A

Drainage A is an unvegetated roadside ditch that establishes only when rain events generate sufficient runoff from Ironwood Avenue to erode a small channel through sandy disturbed soils. The ephemeral ditch enters the Ironwood Avenue Right-of-Way within the off-site study area then enters the on-site study area along the southern Project boundary, extending for approximately 285 linear feet. The ditch then enters a corrugated metal pipe ("CMP") beneath Ironwood Avenue which is ultimately conveyed through the rural residential development to the south and into a water quality basin adjacent to SR-60. Drainage A ranged from 2 to 3 feet in jurisdictional channel width and contains sandy loam soils that are periodically disturbed by weed abatement activities. A photograph of Drainage A is provided in Figure 11a of the Project BRA.

Drainage A within the on-and off-site study area supports a total of approximately 396 linear feet of ephemeral unvegetated roadside ditch, containing 0.023 acre of on-site and 0.007 acre of off-site non-wetland USACE "waters of the U.S" totaling 0.030 acre, as well as 0.46 acre of on-site and 0.013 acre of off-site CDFW jurisdictional streambed totaling 0.059 acre.

Drainage Complex B

Drainage B

Drainage B is an ephemeral sandy wash that originates off-site approximately 2 miles to the northwest along Reche Canyon Road. The drainage meanders along the road until it reaches the valley floor extending across Trust Way, crossing Kalmia Avenue, and then conveys runoff along the west side of Moreno Beach Drive for approximately a quarter-mile prior to crossing the off-site Water Line Alternative 1. The drainage feature then extends south/southwest for another quarter-mile before entering a culvert beneath Ironwood Avenue and meandering for another quarter-mile prior to entering the off-site sewer line study area. Drainage B then continues for approximately 700 linear feet toward the southwest ultimately entering a detention basin located directly northeast of the Nason Street exit of SR-60. Drainage B within the off-site study areas ranges from approximately 4-10 feet in USACE/CDFW channel width and is entirely unvegetated. Soils within the wash are comprised of loamy sands of the Tujunga series consistent with the mapping by NRCS. Photographs of Drainage B are provided in Figure 11a of the Project BRA.

Drainage B within the off-site sewer line and Water Line Alternative 1 total approximately 306 linear feet of unvegetated ephemeral sandy wash totaling approximately 0.026 acre of non-wetland USACE/RWQCB "waters of the U.S." and 0.069 acre of CDFW jurisdictional streambed.

Drainages B1- B5

Drainages B1through B5 are minor ephemeral drainages that with the exception of Drainage B5 (which appears to accept flow from a water tank bypass pipe) function to drain a very limited watershed west of the existing water district road that runs parallel to the eastern boundary of the Project site. Drainage B5 appears to support flows from two small slope v-ditches as well as a pipe at its headwaters that appears to drain the existing water tank directly to the west, and was likely formed by controlled releases from the water tank structure. Otherwise, no natural watershed capable eroding such an incised drainage feature occurs upstream. Drainages B1 through B3 have small CMP culverts that convey limited runoff west of the water district road and support very weak indicators of flow and/or bed and bank. Drainage B4 does not support a pipe culvert rather a small pipe that drains surface flow from a small v-ditch directly west of the road. No discernible indicators associated with “waters of the U.S.” such as an ordinary high water mark, sediment deposition/sorting, debris wracks, streambed associated vegetation, or other USACE jurisdictional field indicators indicative of the arid southwest region were observed within Drainages B1-B4 immediately following the consecutive rain events of early December 2014. However, Drainages B1 through B4 do support topographic low points with banks typical of headwater swales. Drainage B5 was presumed to support USACE/RWQCB jurisdiction due to the presence of an ordinary high water mark, which ultimately became indiscernible after approximately 1,000 linear feet. Given the reasonable proximity to Drainage B5 observed in the field in light of periodic disturbance to the sandy soils from weed abatement activities, Drainage B5 was presumed to be regulated as “waters of the U.S.” Drainages B1through B5 were all presumed to support CDFW jurisdictional streambed.

Drainages B1 through B4 exhibit sparse upland scrub vegetation and ruderal grasses and are otherwise unvegetated. Drainage B5 supports a small patch of mule fat along approximately 15 linear feet of the headwaters directly downstream of the water tank pipe and mostly upland scrub vegetation beyond. Drainages B1through B5 contain CDFW jurisdictional channel widths ranging from 0.5 to 3 feet, while Drainage B5 exhibits USACE jurisdiction averaging approximately 2 feet in channel width and a CDFW channel width approximately averaging 10 feet. Drainage Complex B drainage features all were observed to support sandy loam soils. Photographs of Drainage Complex B are provided in Figures 11a and 11b of the Project BRA.

Drainage B5 within the Water Line Alternative 2 study area totals approximately 0.002-acre of non-wetland ephemeral “waters of the U.S.” regulated by the USACE/RWQCB. Drainage Complex B (Drainages B1 through B5) total approximately 0.037 acre of CDFW jurisdictional streambed and associated vegetation.

Special-status Biological Resources and Regulations

The following discussion describes the plant and wildlife species present, or potentially present, within the study area that have been afforded special recognition by Federal, State, or local resource conservation agencies and organizations. These species have declining or limited population sizes, usually resulting from habitat loss. Also discussed are habitats that are unique, of relatively limited distribution, or of particular value to wildlife. Protected special-status species are classified by either Federal or State resource management agencies, or both, as threatened or endangered, under provisions of the Federal and State Endangered Species Acts (FESA and CESA, respectively).

Federal Special-status Resource Protection and Classifications

Federal ESA

The FESA of 1973 defines an endangered species as "any species which is in danger of extinction throughout all or a significant portion of its range." A threatened species is defined as "any species which is likely to become an Endangered species within the foreseeable future throughout all or a significant portion of its range." Under provisions of Section 9(a)(1)(B) of the FESA, unless properly permitted, it is unlawful to "take" any listed species. "Take" is defined in Section 3(18) of FESA: "...harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Further, the USFWS, through regulation, has interpreted the terms "harm" and "harass" to include certain types of habitat modification as forms of "take." These interpretations, however, are generally considered and applied on a case-by-case basis and often vary from species to species. In a case where a property owner seeks permission from a federal agency for an action which could affect a federally listed plant or animal species, the property owner and agency are required to consult with USFWS pursuant to Section 7 of the ESA if there is a federal nexus, or pursuant to Section 10 of the ESA. Section 9(a)(2)(b) of the FESA addresses the protections afforded to listed plants.

All references to Federally-protected species herein and in the Project BRA include the most current published status or candidate category to which each species has been assigned by USFWS. For purposes of this assessment the following acronyms are used for Federal status species, as applicable:

- FE Federally-listed as Endangered
- FT Federally-listed as Threatened
- FPE Federally proposed for listing as Endangered
- FPT Federally proposed for listing as Threatened
- FPD Federally proposed for delisting
- FC Federal candidate species (former C1 species)

Some of the USFWS offices maintain a database of listed species within their jurisdiction, for example the Sacramento[4] and Carlsbad[5] offices. The Carlsbad USFWS Office jurisdiction encompasses the counties of Los Angeles, Orange, Riverside, San Bernardino, Imperial, and San Diego.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) protects individuals as well as any part, nest, or eggs of any bird listed as migratory. In practice, Federal permits issued for activities that potentially impact migratory birds typically have conditions that require pre-disturbance surveys for nesting

4 http://www.fws.gov/sacramento/ES_Species/Lists/es_species_lists-overview.htm
5 http://www.fws.gov/carlsbad/SpeciesStatusList/CFWO_Species_Status_List.htm

birds. In the event nesting is observed, a buffer area with a specified radius must be established, within which no disturbance or intrusion is allowed until the young have fledged and left the nest, or it has been determined that the nest has failed. If not otherwise specified in the permit, the size of the buffer area varies with species and local circumstances (e.g., presence of busy roads, intervening topography, etc.), and is based on the professional judgment of a monitoring biologist. A list of migratory bird species protected under the MBTA is published by USFWS.

Federal Clean Water Act, Section 404

Section 404 of the Clean Water Act (CWA) regulates the discharge of dredged or fill material into waters of the U.S. and authorizes the Secretary of the Army, through the Chief of Engineers, to issue permits for such actions. Implementing regulations for the CWA define waters of the U.S. as “rivers, creeks, streams, and lakes extending to their headwaters and any associated wetlands.” Wetlands are defined as “areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions.” The permit review process entails an assessment of potentially adverse impacts to USACE jurisdictional waters of the U.S.

Over the years, the USACE has modified its regulations, typically due to evolving policy or judicial decisions, through the issuance of Regulatory Guidance Letters, memorandums, or more expansive instruction guidebooks. These guidance documents help to update and define how jurisdiction is claimed, and how these waters of the U.S. will be regulated. The most recent, significant modification occurred on June 5, 2007, subsequently updated in December 2008, when the USACE and the U.S. Environmental Protection Agency (USEPA) issued a series of guidance documents outlining the requirements and procedures, effective immediately, to establish jurisdiction under Section 404 of the CWA and the Section 10 of the Rivers and Harbors Act of 1899. These documents are intended to be used for all jurisdictional delineations and provide specific guidance for the jurisdictional determination of potentially jurisdictional features affected by the U.S. Supreme Court rulings in *Rapanos v. the United States* and *Carabell v. the United States* 547 U.S. 715 (2006) (jointly referred to as *Rapanos*).

The *Rapanos* case outlines the conditions and criteria used by the USACE to assess and claim jurisdiction over non-isolated, non-navigable, ephemeral tributaries. Under a plurality ruling, the Court noted that certain “not relatively permanent” (i.e., ephemeral), non-navigable tributaries must have a “significant nexus” to downstream traditional navigable waters to be jurisdictional. An ephemeral tributary has a significant nexus to downstream navigable “waters” when it has “more than a speculative or an insubstantial effect on the chemical, physical, and/or biological integrity of a Traditional Navigable Water (TNW).” A significant nexus is established through the consideration of a variety of hydrologic, geologic and ecological factors specific to the particular drainage feature in question. For drainage features that do not meet the significant nexus criteria, a significant nexus determination is provided by the USACE to the USEPA for the final determination of federal jurisdiction. Drainage features that do not meet the significant nexus criteria based on completion of a jurisdictional delineation, and/or are determined to be isolated pursuant to the SWANCC ruling (see below), may still be regulated by California Department of Fish and Wildlife (CDFW) under Fish and Game Code Section 1600 or the Regional Water Quality Control Board (RWQCB) under the Porter-Cologne Water Quality Act.

On January 15, 2003, the USACE and USEPA issued a Joint Memorandum to provide clarifying guidance regarding the United States Supreme Court ruling in the *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers*, No. 99-1178 (January 9, 2001) ("the SWANCC ruling"), (Federal Register: Vol. 68, No. 10.). This ruling held that the CWA does not give the federal government regulatory authority over non-navigable, isolated, intrastate waters. As a result of this decision, some previously regulated depressional areas such as mudflats, sandflats, wetlands, prairie potholes, wet meadows, playa lakes, natural ponds, and vernal pools, which are not hydrologically connected to other intra- or inter-state "waters of the U.S.," are no longer regulated by the USACE.

Federal Clean Water Act, Section 401

The mission of the RWQCB is to develop and enforce water quality objectives and implement plans that will best protect the beneficial uses of the state's waters, recognizing local differences in climate, topography, geology, and hydrology. The California RWQCB is responsible for implementing compliance not only with state codes such as the California Water Code, but also some federal acts such as Section 401 of the CWA. Section 401 of the CWA requires that any applicant for a federal permit for activities that involve a discharge to waters of the state shall provide the federal permitting agency with a certification from the state in which the discharge is proposed that states that the discharge will comply with the applicable provisions under the federal CWA.[6] As such, before the USACE will issue a CWA Section 404 permit, applicants must apply for and receive a Section 401 water quality certification (WQC) from the RWQCB. The RWQCB regulates "discharging waste, or proposing to discharge waste, within any region that could affect "waters of the state" (Water Code § 13260 (a)), pursuant to provisions of the Porter-Cologne Water Quality Control Act which defines RWQCB jurisdictional "waters of the state" as "any surface water or groundwater, including saline waters, within the boundaries of the state" (Water Code § 13050 (e)).

With the exception of isolated waters and wetlands, most discharges of fill to waters of the state are also subject to a CWA Section 404 permit. If a CWA Section 404 permit is not required for the Project, the RWQCB may still require issuance of Waste Discharge Requirements (WDR) under the Porter-Cologne Water Quality Control Act. The RWQCB may regulate isolated waters that are not under jurisdiction of the USACE through issuance of WDR's. However, projects that obtain a Section 401 WQC are simultaneously enrolled in a statewide general WDR. Processing of Section 401 WQC's generally requires submittal of 1) a construction storm water pollution prevention plan (SWPPP), 2) a final water quality technical report that demonstrates that post-construction storm water Best Management Practices (BMPs) comply with the local design standards for municipal storm drain permits (MS4 permits) implemented by the State Water Resources Control Board effective January 1, 2011, and 3) a conceptual Habitat Mitigation and Monitoring Plan (HMMP) to compensate for permanent impacts to RWQCB waters, if any. In addition to submittal of a draft CEQA document, a WQC application typically requires a discussion of avoidance and minimization of impacts to RWQCB jurisdictional resources, and efforts to protect beneficial uses as defined by the local RWQCB basin plan for the Project. The

[6] 33 USC 1341 *(a) (1)*.

RWQCB cannot issue a Section 401 WQC until the Project CEQA document is certified by the lead agency.

State of California Special-status Resource Protection and Classifications

California ESA

California's Endangered Species Act (CESA) defines an endangered species as:

> *…a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease.*

The State defines a threatened species as:

> *…a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by this chapter. Any animal determined by the commission as rare on or before January 1, 1985 is a threatened species.*

Candidate species are defined as:

> *…a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that the commission has formally noticed as being under review by the department for addition to either the list of endangered species or the list of threatened species, or a species for which the commission has published a notice of proposed regulation to add the species to either list.*

Candidate species may be afforded temporary protection as though they were already listed as threatened or endangered at the discretion of the Fish and Wildlife Commission. Unlike the FESA, CESA does not include listing provisions for invertebrate species.

Article 3, Sections 2080 through 2085, of the CESA addresses the taking of threatened or endangered species by stating:

> *…no person shall import into this State, export out of this State, or take, possess, purchase, or sell within this State, any species, or any part or product thereof, that the commission determines to be an endangered species or a threatened species, or attempt any of those acts, except as otherwise provided.*

Under the CESA, "take" is defined as, "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

Additionally, some special-status mammals and birds are protected by the State as Fully Protected Mammals or Fully Protected Birds, as described in the California Fish and Wildlife Code, Sections 4700 and 3511, respectively.

California Species of Special Concern are species designated as vulnerable to extinction due to declining population levels, limited ranges, and/or continuing threats. Informally listed species are not protected per se, but warrant consideration in the preparation of biological assessments. For some species, the CNDDB is only concerned with specific portions of the life history, such as roosts, rookeries, or nest areas.

For the purposes of the BRA and this Initial Study, the following acronyms are used for State status species, as applicable:

- SE State-listed as Endangered
- ST State-listed as Threatened
- SR State-listed as Rare
- SCE State candidate for listing as Endangered
- SCT State candidate for listing as Threatened
- SFP State Fully Protected
- SSC California Species of Special Concern

Protection of Birds

Section 3503.5 of the California Fish and Game Code states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Activities that result in the abandonment of an active bird of prey nest may also be considered in violation of this code. In addition, California Fish and Game Code, Section 3511 prohibits the taking of any bird listed as fully protected, and California Fish and Game Code, Section 3515 states that is it unlawful to take any non-game migratory bird protected under the MBTA.

State of California Fish and Game Code, Section 1602

Section 1602 of the California Fish and Game Code requires any entity (e.g., person, state or local government agency, or public utility) who proposes a project that will substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake to notify the CDFW of the proposed project. In the course of this notification process, the CDFW will review the proposed project as it affects streambed habitats within the project area. The CDFW may then place conditions in the Section 1602 Streambed Alteration Agreement to avoid, minimize, and mitigate any potentially significant adverse impacts within CDFW jurisdictional limits.

California Native Plant Society

The CNPS is a private plant conservation organization dedicated to the monitoring and protection of special-status species in California. CNPS has compiled an inventory comprised of the information focusing on geographic distribution and qualitative characterization of Rare, Threatened, or Endangered vascular plant species of California. The list serves as the candidate list for listing as Threatened and Endangered by CDFW. CNPS has developed five categories of rarity, of which Ranks 1A, 1B, and 2 are particularly considered special-status:

- Rank 1A Presumed extinct in California.
- Rank 1B Plants Rare, Threatened, or Endangered in California and elsewhere.
- Rank 2 Plants Rare, Threatened, or Endangered in California, but more common elsewhere.
- Rank 3 Plants about which we need more information – a review list.
- Rank 4 Plants of limited distribution – a watch list.

The CNPS recently added "threat ranks" which parallel the ranks used by the CNDDB. These ranks are added as a decimal code after the CNPS List (e.g., Rank 1B.1). The threat codes are as follows:

- .1 – Seriously endangered in California (over 80% of occurrences threatened/high degree and immediacy of threat);
- .2 – Fairly endangered in California (20-80% occurrences threatened);
- .3 – Not very endangered in California (<20% of occurrences threatened or no current threats known).

Special-status species that occur or potentially could occur within the study area is based on one or more of the following: (1) the direct observation of the species within the study area during any field surveys; (2) a record reported in the CNDDB; and (3) the study area is within known distribution of a species and contains appropriate habitat.

Sensitive Plant Communities

Sensitive plant communities include those habitat types considered rare by resource agencies, namely the CDFW, due to their scarcity and/or their ability to support State and Federally-listed Endangered, Threatened, and Rare vascular plants, as well as several special-status bird and reptile species. CDFW maintains a natural plant community list, the *List of California Terrestrial Natural Communities*.[7] Special-status natural communities (also referred to by CDFW as 'rare' or 'special concern') are identified on the list by an asterisk and are considered high priority vegetation types.

Local Special-status Resource Protection and Classifications

Western Riverside County MSHCP

The study area is within the Western Riverside County MSHCP which was adopted by the Riverside County Board of Supervisors (June 17, 2003). The MSHCP functions as an Habitat Conservation Plan (HCP) pursuant to Section 10(a)(1)(B) of the FESA and as a Natural Communities Conservation Plan (NCCP) under the NCCP Act of 2001. The USFWS and CDFW have authorized the take of a number special-status plant and wildlife species (Covered Species) within the MSHCP Plan Area in exchange for the assembly and management of a coordinated MSHCP Conservation Area.

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7 Available online at: http://www.dfg.ca.gov/biogeodata/vegcamp/natural_comm_list.asp.

Stephens' Kangaroo Rat Habitat Conservation Plan

The Stephens' kangaroo rat (SKR) HCP provides Take Authorization for SKR within its boundaries as implemented by legal agreements executed among the Riverside County Habitat Conservation Agency (RCHCA), its member agencies, USFWS, CDFW, BLM , U.S. Department of Interior, State of California Resources Agency, and other agencies as appropriate.[8] The MSHCP provides Take Authorization for SKR outside the boundaries of the SKR HCP, but within the MSHCP Plan Area boundaries. The seven core reserves established by the SKR HCP will be managed as part of the MSHCP Conservation Area consistent with the SKR HCP.

The study area is within the boundaries of the SKR HCP but is not within any of the core reserves. As such, the Project would be required to pay a SKR mitigation fee for coverage under the SKR HCP.

Sensitive Plant Communities

The study area does not support any communities considered by CDFW as sensitive habitats.

Special-status Plant Species

Special-status plants include those listed, or candidates for listing, by the USFWS and CDFW; and species considered special-status by the CNPS (particularly Lists 1A, 1B, and 2). Several special-status plant species were reported in the vicinity based on CNDDB and CNPS, totaling 65 species within the 9-quadrangle search (as indicated in Appendix B, *Special-Status Plant Species*, of the BRA). A total of 12 species were identified as having a potential to occur within the study area based on the literature review and existing habitat on the study area, as listed in Appendix B of the BRA. Focused plant surveys were conducted in 2015 on the Project site and off-site road improvement and sewer line areas and in 2016 on the off-site water line areas; none of the species determined to have a potential to occur on the Project site and off-site water and sewer line areas were observed. A summer focused survey was conducted within the off-site eastern manufactured slope area in 2016; however, a spring survey has not yet been conducted within this area. The western manufactured slope areas do not support suitable habitat for special-status plant species.

Special-status Wildlife Species

Special-status wildlife includes those species listed as Endangered or Threatened under the FESA or CESA, candidates for listing by the USFWS or CDFW, and species of special concern to the CDFW. Several special-status wildlife species were reported in the vicinity based on CNDDB, totaling 43 species within the 9-quadrangle search. A total of 19 species were identified as having a potential to occur within or use the study area based on the literature review and habitat present on the study area, as listed in Appendix C, *Special-status Wildlife Species*, of the BRA.

In addition, focused surveys were conducted for the burrowing owl in accordance with recommended protocols and the potential for foraging and nesting migratory bird and raptor species were also analyzed due to known presence within the study area or within the vicinity (see Appendix C of the BRA). The species with a potential to occur on the study area are

8 *http://www.skrplan.org/index.html*

discussed in detail in the BRA, including the results of the burrowing owl surveys and the migratory birds and raptors assessment.

Migratory Birds and Raptors

The study area supports some potential nesting and foraging habitat for nesting birds and raptors, primarily in the northwestern corner of the study area where there are shrubs and some trees. Several species of birds were observed on-site (see Appendix A of the BRA) and were identified by CNDDB as potentially occurring within the 9-quadrangle search area (see Appendix C of the BRA). Raptors observed on-site include Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), and American kestrel (*Falco sparverius*). There is also a foraging potential for listed raptors within the 9-quadrangle search area according to CNDDB, such as golden eagle (State Fully Protected) and Swainson's hawk (Federally Threatened), though the potential of foraging is considered low and neither are expected to nest on-site (see Appendix C of the BRA).

Study Area's Relationship to the Western Riverside County MSHCP

This section provides a discussion of the study area's relationship to the MSHCP policies, including the location within the MSHCP Area Plan, Criteria Cells, and cores and linkages, and the presence of MSHCP protected biological resources.

Location of the Study Area within the MSHCP Area Plan and Criteria Cells

The entire study area is within the Reche Canyon/Badlands Area Plan (see Figure IV-2 above) of the MSHCP but is not within a Criteria Cell, a designated Cell Group, or a subunit within the Southwest Area Plan that requires conservation of land for inclusion in the MSHCP Conservation Area.

Location of the Study Area within MSHCP Cores and Linkages

As mentioned previously, the study area is not within any cores or linkages (i.e., Special Linkage Areas) as identified in the Reche Canyon/Badlands Area Plan.

Riparian/Riverine Areas and Vernal Pools

Section 6.1.2, *Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools*, of the MSHCP provides for the protection of Riparian/Riverine Areas and Vernal Pools within the MSHCP Plan Area. Riparian/Riverine areas are defined in the MSHCP as "lands which contain habitat dominated by trees, shrubs, persistent emergents, or emergent mosses and lichens, which occur close to or which depend upon soil moisture from a nearby fresh water source; or areas with fresh water flow during all or a portion of the year." Vernal pools are defined in the MSHCP as "seasonal wetlands that occur in depression areas that have wetlands indicators of all three parameters (soils, vegetation, and hydrology) during the wetter portion of the growing season but normally lack wetlands indicators of hydrology and/or vegetation during the drier portion of the growing season."

As shown below in **Figure IV-5**, *MSHCP Riverine Areas*, and summarized in **Table IV-3**, *MSHCP Riverine Areas*, the Project study areas support a total 0.165 acre of MSHCP Riverine Areas including 0.059 acre in Drainage A (0.046 acre on-site and 0.013 acre off-site), 0.070 acre in Drainage B, 0.001 acre in Drainage B1, 0.001 acre in Drainage B2, 0.001 acre in Drainage B3, 0.002 acre in Drainage B4, and 0.033 acre in Drainage B5.

SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project

Figure IV-5

MSHCP Riverine Areas

ESA PCR

Attachment: Initial Study/Mitigated Negative Declaration (IS/MND) (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

All drainages are considered MSHCP Riverine Areas (rather than MSHCP Riparian Areas) since they are supported by ephemeral[9] flows and do not support riparian vegetation communities. No vernal pools occur within the on- and off-site study areas. Due to the presence of MSHCP Riverine features, the Project will require a Determination of Biologically Equivalent or Superior Preservation (DBESP) analysis for any impacts proposed to these areas. The DBESP is required to provide details on any proposed impacts and compensatory mitigation for compliance with MSHCP requirements for submittal to the County of Riverside Environmental Programs Department (EPD), subject to approval by the County of Riverside Regional Conservation Authority (RCA) and the State and Federal Wildlife Agencies (CDFW and USFWS).

TABLE IV-3
MSHCP RIVERINE AREAS

Drainage (Study Area)	Length (ft)	Area (acres)	Riparian/Riverine Classification	Flow
A (On-Site)	285	0.046	Riverine	
A (Off-Site)	111	0.013	Riverine	
B (Off-Site)	306	0.069	Riverine	
B1 (Off-Site)	0*	0.001	Riverine	
B2 (Off-Site)	32	0.001	Riverine	
B3 (Off-Site)	25	0.001	Riverine	
B4 (Off-Site)	34	0.001	Riverine	
B5 (Off-Site)	35	0.033	Riverine	
Total	**828**	**0.165**		

** Less than one linear foot of jurisdiction occurs within Drainage B1 as the majority of the drainage within the off-site study area is associated with an existing corrugated metal pipe that was not quantified.*

Source: ESA PCR, 2014

The biological function and value of the on- and off-site Riverine Areas within Drainage A and Drainage Complex B include the transport of water, which is limited based on the ephemeral flows of the drainage and limited watershed. The function and value of the drainages are also limited since they are primarily unvegetated and support only some small patches of upland and/or ruderal vegetation. Other types of aquatic features that could provide suitable habitat for Riparian/Riverine species, such as fairy shrimp, are not present within the study area (i.e. vernal pools, swales, vernal pool-like ephemeral ponds, seasonal ponds, stock ponds, or other human-modified depressions such as tire ruts, etc.).

Riparian/Riverine Plant Species

A habitat assessment was conducted for species listed in Section 6.1.2, *Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools*, of the MSHCP. The results are presented below in **Table IV-4**, *MSHCP Riparian/Riverine Plant Species*. Only one

[9] Riparian drainages are streambeds that generally convey runoff during, and immediately after, a storm event.

Riparian/Riverine plant species was determined to have a potential to occur on the study area, namely smooth tarplant (*Centromadia pungens* ssp. *laevis*). This species was considered to have a potential to occur only within the riverine habitat associated with the on- and off-site drainages; however, smooth tarplant was not observed during any of the focused plant surveys and therefore was concluded to be absent from the Project site. The remaining MSHCP Riparian/Riverine plant species are not expected to occur within the study area due to the lack of suitable habitat or the location of the study area.

TABLE IV-4
MSHCP RIPARIAN/RIVERINE PLANT SPECIES

Species	Potential to Occur within the Study Area
Brand's phacelia *Phacelia stellaris*	Not expected to occur. This species has not been recorded in the Moreno Valley area. There is only one occurrence record in CNDDB within Riverside County, which was observed in 2000 in the City of Riverside near the Santa Ana River.
California Orcutt grass *Orcuttia californica*	Not expected to occur due to the lack of vernal pools.
Coulter's matilija poppy *Romneya coulteri*	Not expected to occur. This perennial plant has conspicuous flowers that would have been detected during the focused plant surveys if present.
Engelmann oak *Quercus engelmannii*	Not expected to occur. This is a conspicuous tree species that would have been detected during the focused plant surveys if present.
Fish's milkwort *Polygala cornuta* var. *fishiae*	Not expected to occur. The majority of occurrence records of this species on CNDDB are confined to the Santa Ana Mountains.
graceful tarplant *Holocarpha virgata* ssp. *Elongate*	Not expected to occur due to disturbance on-site. The study area is outside of the species' range; there are no known records of this species within the flatter agricultural areas east of the Santa Ana Mountains.
lemon lily *Lilium parryi*	Not expected to occur due to the lack of suitable habitat. Also, the study area is outside the species' range; this species is restricted to the San Jacinto Mountains. The study area is outside of species' elevation range.
Mojave tarplant *Deinandra mohavensis*	Not expected to occur. The study area is outside the species range; this species is restricted to the San Jacinto Mountains. The study area is outside of species' elevation range.
mud nama *Nama stenocarpum*	Not expected to occur due to the lack of wetlands. None were incidentally observed during any surveys (this species can occasionally occur in non-wetlands).
ocellated Humboldt lily *Lilium humboldtii* ssp. *ocellatum*	Not expected to occur due to high disturbance within the drainages and lack of shade. This species is typically found at higher elevations.
Orcutt's brodiaea *Brodiaea orcuttii*	Not expected to occur due to the lack of vernal pools.
Parish's meadowfoam *Limnanthes alba* ssp. *parishii*	Not expected to occur due to the lack of suitable habitat. Also, the study area is outside the species' range; this species is restricted to the Santa Rosa Plateau within the MSHCP Plan Area. The study area is outside of this species' elevation range.
prostrate navarretia *Navarretia prostrata*	Not expected to occur due to the lack of suitable habitat. Also, the study area is outside the species' range; this species is restricted to the Santa Rosa Plateau within the MSHCP Plan Area. The study area does not support suitable vernal pool habitat.
San Diego button-celery *Eryngium aristulatum* var. *parishii*	Not expected to occur. The study area is outside the species' range; this species is restricted to the Santa Rosa Plateau within the MSHCP Plan Area. The study area does not support suitable vernal pool habitat.

Species	Potential to Occur within the Study Area
San Jacinto Valley crownscale *Atriplex coronata* var. *notatior*	Not expected to occur due to the lack of suitable alkaline habitat.
San Miguel savory *Satureja chandleri*	Not expected to occur due to the lack of suitable metavolcanic substrate habitat.
Santa Ana River woollystar *Eriastrum densifolium* ssp. *sanctorum*	Not expected to occur due to lack of suitable habitat. The study area is outside the species range; this species is restricted to the Santa Ana River and alluvial fan sage scrub habitat.
slender-horned spineflower *Dodecahema leptoceras*	Not expected to occur due to the lack of alluvial fan habitat.
smooth tarplant *Centromadia pungens* ssp. *laevis*	Potential, but not observed. This species was not observed during the focused plant surveys.
southern California black walnut *Juglans californica*	Not expected to occur. This is a conspicuous tree species that would have been detected if present.
spreading navarretia *Navarretia fossalis*	Not expected to occur due to the lack of vernal pools.
thread-leaved brodiaea *Brodiaea filifolia*	Not expected to occur due to the lack of vernal pools.
vernal barley *Hordeum intercedens*	Not expected to occur due to the lack of vernal pools.

SOURCE: ESA PCR, 2016

Riparian/Riverine Wildlife Species

Habitat assessments were conducted for wildlife species listed in Section 6.1.2, *Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools*, of the MSHCP. The results are presented below in **Table IV-5**, *MSHCP Riparian/Riverine Wildlife Species*. No riparian/riverine wildlife species are expected to occur on the study area due to the lack of suitable habitat.

Narrow Endemic Plant Species Survey Area

The study area is not within the Narrow Endemic Plant Species Survey Area; therefore, no surveys were required for Narrow Endemic plant species.

Additional Survey Needs and Procedures

Section 6.3.2, *Additional Survey Needs and Procedures*, of the MSHCP provides for additional survey needs for the burrowing owl, as well as a number of special-status plant, amphibian, and mammal species.

TABLE IV-5
MSHCP RIPARIAN/RIVERINE WILDLIFE SPECIES

Species	Potential to Occur within the Study Area
arroyo toad *Anaxyrus californicus*	Not expected to occur due to the lack of suitable habitat (perennial streams).

Species	Potential to Occur within the Study Area
mountain yellow-legged frog *Rana muscosa*	Not expected to occur due to the lack of suitable habitat (perennial streams).
California red-legged frog *Rana aurora draytonii*	Not expected to occur due to the lack of suitable habitat (perennial streams).
bald eagle *Haliaeetus leucocephalus*	Not expected to occur due to the lack of suitable habitat for foraging and nesting.
least Bell's vireo *Vireo bellii pusillus*	Not expected to occur due to the lack of suitable habitat for foraging and nesting.
American peregrine falcon *Falco peregrinus anatum*	Not expected to occur due to the lack of suitable habitat for foraging and nesting (cliffs overlooking open areas or large bodies of water).
southwestern willow flycatcher *Empidonax traillii extimus*	Not expected to occur due to the lack of suitable habitat for foraging and nesting.
western yellow-billed cuckoo *Coccyzus americanus occidentalis*	Not expected to occur due to the lack of suitable habitat for foraging and nesting; outside of the species range.
Santa Ana sucker *Catostomus santaanae*	Not expected to occur due to the lack of suitable habitat (perennial streams).
Riverside fairy shrimp *Streptocephalus woottoni*	Not expected to occur due to the lack of suitable habitat (vernal pools).
vernal pool fairy shrimp *Branchinecta lynchi*	Not expected to occur due to the lack of suitable habitat (vernal pools).
Santa Rosa Plateau fairy shrimp *Linderiella santarosae*	Not expected to occur due to the lack of suitable habitat (vernal pools).

SOURCE: ESA PCR, 2016

Burrowing Owl Survey Area

The study area is within the Burrowing Owl Survey Area; therefore, in compliance with the Western Riverside County MSHCP, surveys are required for this species. As discussed in Section 4.7.6, *Special-status Wildlife Species*, of the Project BRA, Step I and Step II surveys conducted for the Project following Western Riverside County MSHCP protocol were negative. Although the site does not currently support burrowing owls, pre-construction surveys are required within 30 days of ground disturbance based on the presence of suitable habitat.

Criteria Area Species Survey Area

The study area is not within the Criteria Area Species Survey Area; therefore, no surveys were required for Criteria Area plant species.

Amphibian Species Survey Area

The study area is not within the Amphibian Species Survey Area; therefore, no surveys are required.

Mammal Species Survey Area

The study area is not within the Mammal Species Survey Area; therefore, no surveys are required.

Urban/Wildlands Interface

Section 6.1.4, *Guidelines Pertaining to the Urban/Wildlands Interface*, of the MSHCP presents a number of guidelines that are intended to address indirect effects associated with locating developments in proximity to a Western Riverside County MSHCP Conservation Area. These guidelines address the quantity and quality of any runoff generated by the development (i.e., drainage and toxics), night lighting, noise, non-native invasive plant species, barriers to humans and animal predators, and grading/land development encroachment.

The study area is not within or in the vicinity of any Criteria Cells (see Figure IV-2 above) and, as such, development of the site is not expected to result in indirect effects to MSHCP Conservation Areas related to night lighting, noise, and grading/land development, and barriers would not be necessary. Drainage A and Drainage Complex B ultimately drain to the San Jacinto River, which is a Constrained Linkage (19) and where Criteria Cells are located. Runoff from the site therefore has the potential to affect the quantity and quality of water downstream, in addition to the transport of plant seeds. Since the Project will be required to comply with flood and water quality standards[10], no indirect effects from the quantity and quality of run-off will occur to downstream areas. At minimum, no invasive, non-native plant species listed in Table 6-2 of the MSHCP, *Plants That Should Be Avoided Adjacent To The MSHCP Conservation Area*, will be utilized in the landscape plans. This will avoid dispersal of invasive plant seeds in the watershed. Despite the study area not being within any Criteria Cells or adjacent to any MSHCP Conservation Areas, it does support one on-site drainage and one off-site drainage complex that are considered Riverine Areas. The above measures will avoid indirect impacts to these drainages from runoff and invasive species.

Would the Project:

a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Less Than Significant Impact With Mitigation Incorporated.

1. Special-Status Plant Species

Development of the study area would result in the direct removal of numerous common plant species; a list of plant species observed within the study area is included in Appendix A of the Project BRA. Common plant species present within the study area occur in large numbers throughout the region and their removal does not meet the significance thresholds defined by CEQA. Therefore, impacts to common plant species would not be considered a significant impact and no mitigation measures are required.

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10 The project will be required to prepare a Water Quality Management Plan and Storm Water Pollution Prevention Plan consistent with Regional Water Quality Control Board and County requirements that will outline measures such as Best Management Practices (BMPS) to address water quantity and quality, and to address any potential flooding.

A total of 53 special-status plant species of the 65 species identified as occurring in the Project vicinity in available databases (see discussion above and Section 4.7.5 of the BRA for further details) are not expected to occur within the study area due to the lack of suitable habitat or because the site is outside the known distribution or elevation range for the species. These species are listed in Appendix B of the Project BRA. As discussed above, the remaining 12 special-status plant species were determined to have a potential to occur on the study area; however, these 12 species are not expected to occur within the Project site or off-site water and sewer line areas since focused surveys conducted within these areas were negative. As such, no impacts to special-status plant species would occur as a result development on the Project site and within the proposed off-site water and sewer lines and no mitigation is required.

Although a summer focused survey was performed within the off-site manufactured slope area to the east of the Project site, a spring focused survey has not been conducted within this off-site area. Of the 12 species with a potential to occur, seven (7) species are not expected to occur within the off-site manufactured slope area since these species were not detected during the summer focused survey or the area does not support suitable habitat, including California screw most (*Tortula californica*), smooth tarplant, San Bernardino aster (*Symphyotrichum defoliatum*), chaparral sand-verbena (*Abronia villosa* var. *aurita*), long-spined spineflower (*Chorizanthe polygonoides* var. *longispina*), salt spring checkerbloom (*Sidalcea neomexicana*), and mesa horkelia (*Horkelia cuneate* var. *puberula*). The blooming period of the remaining five (5) species with the potential to occur within the off-site manufactured slope area east of the Project boundary fall outside of the summer survey window, which include Nevin's barberry (*Berberis nevinii*), Jaeger's bush milk-vetch (*Astragalus pachypus* var. *jaegeri*), round-leaved filaree (*California macrophylla*), Parry's spineflower (*Chorizanthe parryi* var. *parryi*), and white-bracted spineflower (*Chorizanthe xanti* var. *leucotheca*). Of these five species, Nevin's barberry, Jaeger's bush milk-vetch, and round-leaved filaree are covered by the MSHCP. Parry's spineflower and white-bracted spineflower are not currently covered by the MSHCP and impacts to these individuals, if present, would be significant. As such, a MM BIO-1 is prescribed below, which requires a spring focused plant survey to be conducted within the off-site manufactured slope area located directly east of the site prior to ground disturbance in the appropriate blooming period (between April and June) to determine the presence/absence of Parry's spineflower and white-bracted spineflower. If either or both of these species are found within the off-site eastern manufactured slope area, MM BIO-1 outlines the necessary actions that are required to reduce impacts to the special-status plant species to less than significant.

2. Special-status Wildlife Species

Development of the study area would result in the disruption and removal of habitat and the loss and displacement of common wildlife species. A list of wildlife species observed within the study area is included in Appendix A of the Project BRA. Due to the limited amount of native habitat to be removed and the level of existing disturbance from human activity within the vicinity (e.g., nearby development), these impacts would not be expected to reduce the general wildlife populations below self-sustaining levels within the region and impacts to common wildlife species do not meet the significance thresholds defined in Section 5.0, *Thresholds of Significance*, of the BRA. Therefore, impacts to common wildlife species would not be considered a significant impact and no mitigation measures are required.

A total of 25 special-status wildlife species of the 43 species identified as occurring in the Project vicinity in available databases are not considered to have a potential to occur within the study area due to the lack of suitable habitat or because the site is outside the known distribution range for the species. These species are listed in Appendix C of the Project BRA. Since these species are not expected to be present on the study area, no impacts would occur as a result of Project development and no mitigation measures are required.

As discussed above, the remaining 19 special-status wildlife species were determined to have a potential to occur on the study area. Of these species, focused surveys were conducted for burrowing owl, which is conditionally covered by the MSHCP with additional surveys and mitigation required as discussed in further detail below. Of the remaining 17 potential special-status wildlife species, 12 species are covered by the MSHCP with no survey or conservation requirements for the study area, including coast horned lizard, orange-throated whiptail, red diamondback rattlesnake, golden eagle, Swainson's hawk, loggerhead shrike, coastal California gnatcatcher, northwestern San Diego pocket mouse, Stephens' kangaroo rat (covered by the SKR HCP), Los Angeles pocket mouse, San Diego black-tailed jackrabbit, and San Diego desert woodrat. Therefore, assuming payment of the applicable fees (the MSHCP Local Development Mitigation Fee and the SKR HCP fee for the Stephens' kangaroo rat) and compliance with required guidelines in the MSHCP, no additional mitigation is required for these species.

The remaining six (6) species, the southern grasshopper mouse, American badger, western mastiff bat, pocketed free-tailed bat, lesser long-nosed bat, and pallid bat are not covered by the MSHCP. These species are listed as species of special concern by the CDFW and do not carry a federal or state listing as threatened or endangered. These species are considered to have a low to very low potential to occur on the study area based on the limited habitat and/or quality of the habitat, and no significant impacts are anticipated to these species as described below. The study area also has the potential to support migratory birds and raptors that are discussed further in 6.2.4.2 of the Project BRA.

- No significant impact to southern grasshopper mouse since this species is only considered to have a low potential to occur as it has not been recorded on CNDDB within the vicinity of the study area since 1938.

- No significant impact to American badger since this species was considered to have low potential to occur. The majority of the site is surrounded by development and a large portion of suitable habitat is disturbed. Additionally, this species has not been recorded on CNDDB within the vicinity of the study area since 1908.

- No significant impact to western mastiff bat since this species was only considered to have a low potential to occur for foraging with no suitable roosting habitat on the study area. Although bats in this family are known to be strong fliers and can fly long distances to forage, there is only a low probability that these species will travel to the study area based on the disturbance present on the study area and presence of surrounding development. The nearest CNDDB occurrence record of this species was recorded in 1990 approximately 3.0 miles to the southwest of the study area.

- No significant impact to pocketed free-tailed bat since this species was only considered to have a very low potential to occur for roost with no suitable roosting habitat on the study area. The potential for roosting was considered very low since this species typically prefers steeper cliffs for roosting habitat. Although little is known regarding home range for this species, the potential for roosting is also unlikely since the study area does not support adjacent foraging habitat.[11] There are only two CNDDB occurrence records in the vicinity. The nearest record is from 1985 approximately 6.5 miles to the southwest of the study area near March Air Force Base.

- No significant impact to lesser long-nosed bat since this species was only considered to have a very low potential to roost and forage on the study area. The potential was considered low since this species is not typically found in California. Records in California are typically vagrant migrants. This species has only been recorded once on CNDDB within the vicinity of the study area, which was in 1993 approximately 9.5 miles to the northeast in a residential neighborhood of Yucaipa.

- No significant impact to pallid bat since this species was only considered to have a very low potential to roost and forage on the study area. The potential was considered very low because of evidence of disturbance on the study area and the presence of surrounding development to the south, northeast, and west; this species is highly sensitive to disturbance. Additionally, this species has not been recorded on CNDDB within the vicinity since 1929.

The above six species were not considered for coverage under the MSHCP, indicating that regionally significant populations of these species do not exist within the MSHCP boundaries. Based on the above discussion, the study area is not capable of supporting large populations of these species and a loss of a few individuals, if present, would not expect to reduce regional population numbers. Therefore, any impacts to these species would be less than significant and no mitigation measures are considered required.

Burrowing Owl

The study area supports potentially suitable burrowing owl (Species of Special Concern) habitat, but no active burrowing owl burrows, signs, or individuals were found on-site during the Step I and Step II surveys.

Although the study area does not currently support burrowing owls, a pre-construction survey is required in compliance with the MSHCP. Specifically, in accordance with the County of Riverside's *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area* (County of Riverside, 2006), a pre-construction survey for burrowing owl within the study area is required within 30 days prior to ground disturbance to avoid potential direct take of burrowing owls in the future. A Project Design Feature, Condition of Approval ("COA") BIO-1, requiring this survey is provided below, in addition to recommended MM BIO-2, should burrowing owls be present in the future. Mitigation is proposed consistent with the burrowing owl mitigation guidelines published by CDFW.

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[11] CDFW. 2000. California Wildlife Habitat Relationships System: Pocketed Free-tailed Bat. State of California, The Resources Agency. May 2000.

Project Design Features (Conditions of Approval)

COA BIO-1 Due to the presence of suitable habitat and in compliance with the MSHCP, a pre-construction survey for burrowing owl is required within 30 days prior to ground disturbance to determine the presence of burrowing owls and avoid potential direct take of burrowing owls if present.

Mitigation Measures

MM BIO-1 Due to the presence of suitable habitat within the proposed off-site manufactured slope area located directly east of the Project boundary, a spring focused plant survey to determine the presence/absence of Parry's spineflower and white-bracted spineflower is required to be conducted during the appropriate blooming periods of the two species (between April and June) prior to ground disturbance. If individuals are found, significant impacts would occur as a result of implementation of the Project and unless mitigation is implemented to reduce impacts to less than significant. Mitigation includes seed collection of individuals that would be significantly impacted by the Project at the end of the growing season and prior to ground disturbance. Collected seeds will be planted within an appropriate on-site or off-site mitigation area, which will be conserved as open space in perpetuity. Mitigation for significant impacts to Parry's spineflower and white-bracted spineflower will be implemented in consultation with the City of Moreno Valley and CDFW.

MM BIO-2 If burrowing owls are determined present during the 30-day pre-construction survey, occupied burrows shall be avoided to the greatest extent feasible, following the guidelines in the Staff Report on Burrowing Owl Mitigation published by Department of Fish and Wildlife including, but not limited to, conducting pre-construction surveys, avoiding occupied burrows during the nesting and non-breeding seasons, implementing a worker awareness program, biological monitoring, establishing avoidance buffers, and flagging burrows for avoidance with visible markers. If occupied burrows cannot be avoided, acceptable methods may be used to exclude burrowing owl either temporarily or permanently, pursuant to a Burrowing Owl Exclusion Plan that shall be prepared and approved by the County of Riverside Environmental Programs Department (EPD), in coordination with the CDFW. The Burrowing Owl Exclusion Plan shall be prepared in accordance with the guidelines in the Staff Report on Burrowing Owl Mitigation and the MSHCP.

b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in the local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

Less Than Significant Impact.

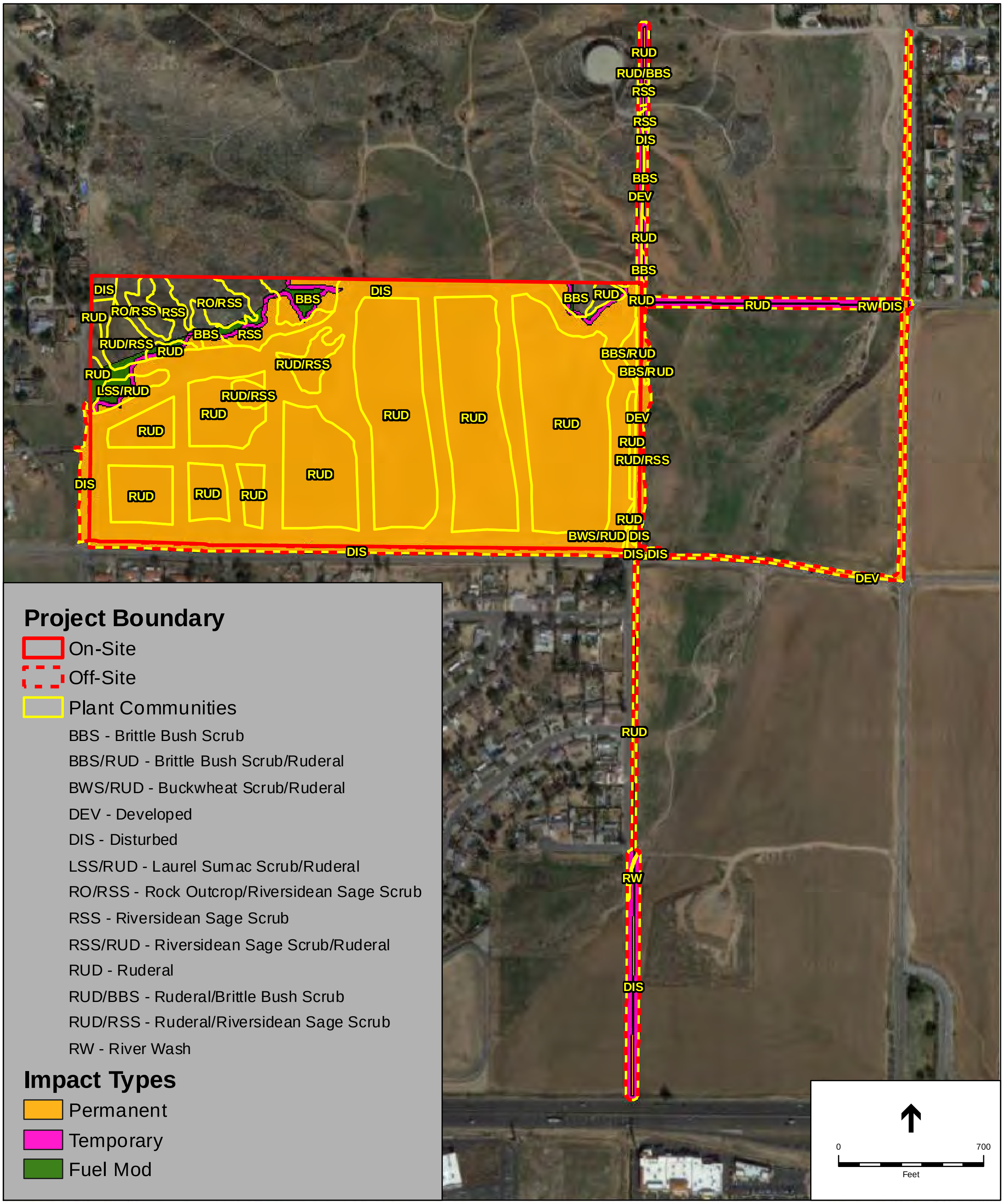
1. Sensitive Plant Communities

Sensitive plant communities were not observed within the study area; therefore, no impacts would occur. There are seven native communities on the study area that total 9.48 acres, including brittlebush scrub, brittlebush scrub/ruderal, buckwheat scrub/ruderal, laurel sumac scrub/ruderal, Riversidean sage scrub, Riversidean sage scrub/ruderal, and rock outcrop/Riversidean sage scrub. Permanent impacts are proposed to 2.91 acres on-site, which is only 3.8 percent of the total proposed permanent impacts (75.81 acres) to plant communities. The majority of permanent impacts are proposed to ruderal (37.66 acres) and disturbed (30.54 acres) areas, which are dominated by non-native species. Impacts to these areas comprise 90% of the total impacts to communities on-site. In addition to permanent impacts, 0.83 acres of fuel modification and 1.25 acres of temporary impacts are proposed to native communities on the study area. Impacts to plant communities are shown in **Figure IV-6**, *Impacts to Plant Communities* and **Table IV-6**, *Existing and Proposed Impacts to Plant Communities*.

TABLE IV-6
EXISTING AND PROPOSED IMPACTS TO PLANT COMMUNITIES

Plant Communities	Existing (acres)	Permanent Impacts (acres)	Fuel Modification Impacts (acres)	Temporary Impacts (acres)
Brittlebush Scrub	2.61	0.92	0.32	0.69
Brittlebush Scrub/Ruderal	0.52	0.51	0.00	0.01
Buckwheat Scrub/Ruderal	0.13	0.13	0.00	0.00
Laurel Sumac Scrub/Ruderal	0.78	0.36	0.26	0.16
Riversidean Sage Scrub	3.22	0.98	0.19	0.33
Riversidean Sage Scrub/Ruderal	0.07	0.01	0.00	0.06
Rock Outcrop/Riversidean Sage Scrub	2.15	0.00	0.06	0.00
River Wash	0.05	0.01	0.00	0.04
Ruderal	40.54	37.66	0.35	1.92
Ruderal/Brittlebush Scrub	0.04	0.01	0.00	0.03
Ruderal/Riversidean Sage Scrub	2.72	1.75	0.13	0.03
Disturbed	32.86	30.54	0.19	1.52
Developed	3.36	2.93	0.00	0.43
Total	**89.05**	**75.81**	**1.50**	**5.22**

SOURCE: ESA PCR, 2016



SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project

Figure IV-6

Impacts to Plant Communities

FSA PCR

2. CDFW Jurisdiction

The Project study areas support drainages that are considered CDFW jurisdictional streambeds pursuant to Section 1602 of the California Fish and Game Code and are proposed for impacts. Drainage A and Drainage Complex B are all jurisdictional, of which permanent impacts are proposed to Drainages A, B, B2, B3, B4, and B5 totaling 0.077 acre of permanent impacts (including 0.046 acre on-site and 0.031 acre off-site), as shown on **Figure IV-7**, *Impacts to Jurisdictional Features and MSHCP Riverine Areas*. Existing and impact acreages are summarized in **Table IV-7**, *Permanent Impacts to CDFW Jurisdictional Features and MSHCP Riverine Areas*. The permanent impacts total approximately 47 percent of the total 0.165 acre of CDFW jurisdiction identified within the on-site and off-site study areas. It should be noted that this analysis presumes combined impacts associated with the proposed water line alignment and two alternative alignments will occur. However, only one water line alignment will ultimately be implemented. Therefore, permanent and temporary impacts to CDFW jurisdictional waters will be slightly reduced once the final water line alignment is determined. Compensatory mitigation for permanent impacts to CDFW jurisdictional waters will be required for the Project based only on impacts associated with the final water line alignment as part of subsequent CDFW Section 1602 permitting requirements. Temporarily impacted CDFW jurisdictional areas will be restored to pre-Project conditions following completion of construction.

TABLE IV-7
IMPACTS TO CDFW JURISDICTIONAL FEATURES AND MSHCP RIVERINE AREAS[A]

Drainage (Study Area)	Existing (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)
Drainage A (On-Site)	0.046	0.046	-
Drainage A (Off-Site)	0.013	0.013	-
Drainage B (Off-Site)	0.069	0.011	0.058
Drainage B1 (Off-Site)	0.001	0.000	0.001
Drainage B2 (Off-Site)	0.001	0.000[b]	0.001
Drainage B3 (Off-Site)	0.001	0.000[c]	0.001
Drainage B4 (Off-Site)	0.001	0.000[d]	0.001
Drainage B5 (Off-Site)	0.033	0.007	0.026
Total	**0.165**	**0.077**	**0.088**

NOTES:
[a] MSHCP Riverine Areas are presumed equivalent to CDFW jurisdiction.
[b] Impacts are considered negligible; actual acreage of impacts to four decimal places is 0.0003 acre.
[c] Impacts are considered negligible; actual acreage of impacts to four decimal places is 0.0001 acre.
[d] Impacts are considered negligible; actual acreage of impacts to four decimal places is 0.0004 acre.

SOURCE: ESA PCR, 2016.

Impacts to CDFW jurisdictional features would be required to comply with Section 1602 of the California Fish and Game Code, including applying for a permit and providing compensatory streambed mitigation as stated above. COA BIO-2/MM BIO-3, below, are proposed in order to comply with the compensatory mitigation requirement of this regulation, subject to approval by

CDFW. Compliance with Section 1602 of the California Fish and Game Code would reduce impacts to a less than significant level.

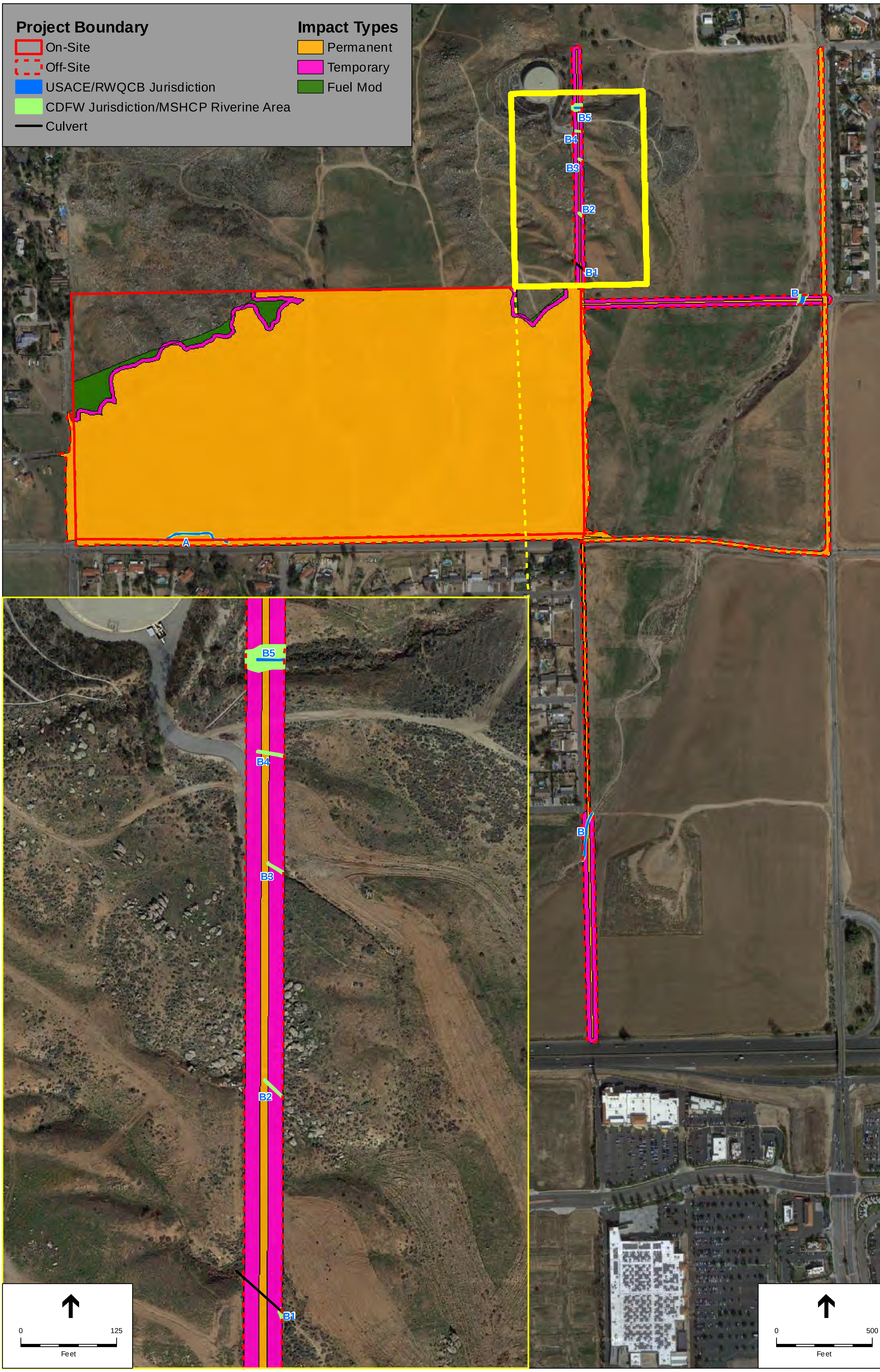
Project Design Features (Conditions of Approval)/Mitigation Measures

COA BIO-2/MM BIO-3 Prior to the issuance of any grading permit for permanent impacts in the areas designated as jurisdictional features, the Project applicant shall obtain regulatory permits from the USACE, RWQCB, and CDFW. The following shall be incorporated into the permitting, subject to approval by the regulatory agencies:

i. On-site or off-site creation, restoration and/or enhancement of USACE/RWQCB jurisdictional "waters of the U.S." within the San Jacinto watershed at a ratio no less than 1:1 or within an adjacent watershed at a ratio no less than 2:1 for permanent impacts, and for any temporary impacts to restore the impact area to pre-Project conditions (i.e. pre-Project contours). Off-site mitigation may occur on land acquired for the purpose of in-perpetuity preservation as approved by the resource agencies, or through the purchase of mitigation credits at a resource agency-approved off-site mitigation bank or in-lieu fee program.

ii. On-site or off-site creation, restoration, and/or enhancement of CDFW jurisdictional streambed within the San Jacinto watershed at a ratio no less than 1:1 or within an adjacent watershed at a ratio no less than 2:1 for permanent impacts, and for any temporary impacts to restore the impact area to pre-Project conditions (i.e. pre-Project contours). Off-site mitigation may occur on land acquired for the purpose of in-perpetuity preservation as approved by the resource agencies, or through the purchase of mitigation credits at a resource agency-approved off-site mitigation bank or in-lieu fee program.

Purchase of any mitigation credits through an agency-approved mitigation bank or in-lieu fee program should occur prior to any impacts to jurisdictional drainages. Any mitigation proposed on land acquired for the purpose of in-perpetuity mitigation that is not part of an agency-approved mitigation bank or in-lieu fee program shall include the creation, restoration, and/or enhancement of similar streambed habitat pursuant to a resource agency-approved Habitat Mitigation and Monitoring Plan (HMMP). The HMMP shall be prepared prior to any impacts to jurisdictional features, and shall provide details as to the implementation of the mitigation, maintenance, and future monitoring of mitigation areas. The goal of the mitigation shall be to create, restore, and/or enhance similar habitat with equal or greater function and value than the impacted habitat.



SOURCE: Google Maps, 2015.

Ironwood Village Project

Figure IV-7

Impacts to Jurisdictional Features and MSHCP Riverine Areas

ESA PCR

c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Less Than Significant Impact.

The Project study areas do not support wetlands as defined by Section 404 of the Clean Water Act. However, the Project study areas do support USACE/RWQCB ephemeral non-wetland jurisdictional streambeds regulated under Sections 404/401 of the Clean Water Act (CWA) that are proposed for impacts. Drainage A and Drainage B5 are considered jurisdictional "waters of the U.S.", of which permanent impacts are proposed totaling 0.034 acre (0.023 acre on-site and 0.011 acre off-site), as shown on Figure IV-7 above. Existing and permanent impact acreages are summarized in **Table IV-8**, *Permanent Impacts to USACE/RWQCB Jurisdictional Features*. The permanent impacts total less than 60 percent of the total 0.058 acre of USACE/RWQCB jurisdiction on-site and off-site. Temporarily impacted areas will be restored to pre-Project conditions.

TABLE IV-8
IMPACTS TO USACE/RWQCB JURISDICTIONAL FEATURES

Drainage	Existing (acres)		Permanent Impacts (acres)		Temporary Impacts (acres)	
	Length (ft)	Area (acres)	Length (ft)	Area (acres)	Length (ft)	Area (acres)
Drainage A	285	0.023	285	0.023	0	0.000
Drainage A (off-site)	111	0.007	111	0.007	0	0.000
Drainage B (off-site)	306	0.026	40	0.004	266	0.022
Drainage B5 (off-site)	35	0.002	10	0.001	25	0.001
Total	**737**	**0.058**	**436**	**0.034**	**366**	**0.023**

SOURCE: ESA PCR, 2016

Impacts to USACE and RWQCB jurisdictional "waters of the U.S." would be required to comply with Sections 404 and 401 of the CWA, respectively, including applying for a permit and mitigation subject to approval by USACE and/or RWQCB. COA BIO-2 is proposed in order to comply with the compensatory mitigation requirement of these regulations, subject to approval by USACE and RWQCB. Compliance with Sections 404 and 401 of the CWA is intended to reduce impacts to a less than significant level.

d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Less Than Significant Impact With Mitigation Incorporated.

1. Wildlife Movement

As described above and in greater detail in Section 4.5.2 of the Project BRA, the study area supports potential live-in and movement habitat for species on a local scale (i.e., some limited live-in and at least marginal movement habitat for reptile, bird, and mammal species), but it likely provides little to no function to facilitate wildlife movement for wildlife species on a regional scale, and is not identified as a regionally important dispersal or seasonal migration corridor. Movement on a local scale likely occurs with species adapted to urban environments due to the development and disturbances in the vicinity of the study area. Although implementation of the Project would result in disturbances to local wildlife movement within the study area, those species adapted to urban areas would be expected to persist on-site following construction, particularly within the open space areas. As such, impacts would be less than significant and no mitigation measures would be required. Since the study area does not function as a regional wildlife corridor and are not known to support wildlife nursery area(s), no impacts would occur and no mitigation measures would be required.

2. Migratory Species

Migratory Birds and Raptors

As discussed in Section 4.7.6, *Special-status Wildlife Species*, of the Project BRA, the site supports potential nesting and foraging habitat for migratory birds, in addition to potential foraging habitat for raptors. Based on the disturbed nature of the site from agriculture and ongoing maintenance activities, the quality of foraging habitat is considered to be low. Higher quality foraging habitat is considered to occur in less developed areas with larger expanses of open space. The loss of a relatively small acreage of low quality foraging habitat as a result of the Project would not be expected to impact the foraging of these species. Therefore, impacts to foraging habitat would be considered less than significant and no mitigation measures are considered required.

The study area has the potential to support songbird and raptor nests due to the presence of shrubs, ground cover, and limited trees on-site. Nesting activity typically occurs from February 15 to August 31. Disturbing or destroying active nests is a violation of the MBTA (16 U.S.C. 703 et seq.). In addition, nests and eggs are protected under Fish and Wildlife Code Section 3503. As such direct impacts to breeding birds (e.g. through nest removal) or indirect impacts (e.g. by noise causing abandonment of the nest) is considered a potentially significant impact as defined by CEQA. Compliance with the MBTA, which is required by MM BIO-4 below, would reduce impacts to a less than significant level.

Mitigation Measures

> **MM BIO-4** Prior to the issuance of any grading permit that would remove potentially suitable nesting habitat for raptors or songbirds, the Project applicant shall demonstrate

to the satisfaction of the City of Moreno Valley that either of the following have been or will be accomplished:

1. Vegetation removal activities shall be scheduled outside the nesting season (September 1 to February 14 for songbirds; September 1 to January 14 for raptors) to avoid potential impacts to nesting birds.

2. Any construction activities that occur during the nesting season (February 15 to August 31 for songbirds; January 15 to August 31 for raptors) will require that all suitable habitat be thoroughly surveyed for the presence of nesting birds by a qualified biologist before commencement of clearing. If any active nests are detected a buffer of 300 feet (500 feet for raptors) around the nest adjacent to construction will be delineated, flagged, and avoided until the nesting cycle is complete. The buffer may be modified and/or other recommendations proposed as determined appropriate by the biological monitor to minimize impacts.

e. Conflict with any local policies or ordinances protecting biological resources, such as tree preservation policy or ordinance?

No Impact. The Project would not conflict with any local policies or ordinances protecting biological resources, such as tree preservations or ordinances. As such, no impact would occur in this regard.

f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

Less Than Significant Impact With Mitigation Incorporated.

The study area is within the Western Riverside County MSHCP and requires payment of the Local Development Mitigation Fee, compliance with requirements of the MSHCP including the Burrowing Owl Survey Area guidelines (Section 6.3.2 of the MSHCP), and the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools (Section 6.1.2 of the MSHCP). The study area is not within a cell, a designated cell group, or a subunit within the Reche Canyon/Badlands Area Plan; therefore, conservation of land on the study area is not required pursuant to the MSHCP. The study area is also not within the survey overlays for Criteria Area Species, Narrow Endemic Plant Species, Amphibian Species, or Mammal Species (Section 6.3.2 of the MSHCP). Since the study area is not within or in the vicinity of any Criteria Cells, the Project will not result in edge effects that will adversely and directly affect biological resources within the MSHCP Conservation Area. As such, the Project will not be subject to certain requirements outlined in the Guidelines Pertaining to the Urban/Wildlands Interface (Section 6.1.3 of the MSHCP) including those for the treatment and management of edge factors including night lighting, noise, barriers for public access and predators, and grading/land development limits. However, runoff from the site has the potential to indirectly affect MSHCP Conservation Areas downstream through the quantity and quality of water discharged from the site, in addition to the transport of plant seeds. Therefore compliance with the drainage, toxics, and invasive requirements outlined in Section 6.1.3 of the MSHCP would be required. COA

BIO-3 is proposed below, which requires the Project to comply with all provisions of the MSHCP prior to issuance of a grading permit. Compliance with COA BIO-3 would reduce impacts to a less than significant level.

Project compliance with the MSHCP pertaining to Burrowing Owl, Riparian/Riverine, and Urban/Wildlands Interface requirements for drainage, toxics and invasives are summarized below:

- The study area is within the Burrowing Owl Survey Area of the MSHCP. Focused burrowing owl surveys were conducted within all portions of the study area that support potentially suitable habitat for this species. No burrowing owls were observed on the study area. However, due to the presence of potentially suitable habitat, a 30-day pre-construction survey for burrowing owl is required pursuant to the MSHCP. If burrowing owls are found within the study area during the 30-day pre-construction survey, impacts to this species would be potentially significant. COA BIO-1 and MM BIO-2 would reduce this impact to a less than significant level and ensure consistency with the MSHCP.

- Drainage A and Drainage Complex B on the study area meet the definition of Riverine Areas pursuant to the MSHCP. The Project will result in permanent impacts to 0.078 acre of Riverine Areas, including 0.046 acre within the on-site portion of Drainage A, 0.013 acre in the off-site portion of Drainage A, and 0.018 acre within Drainage Complex B. The permanent impacts are equivalent to approximately 47 percent of the total 0.165 acre of Riverine Areas within the Project study areas. The proposed Riverine Areas impacts are summarized in Table IV-7 above.

- The biological function and value of the on- and off-site Riverine Areas within Drainage A and Drainage Complex B include the transport of water, which is restricted based on the ephemeral flows of the drainage and limited watershed. The function and value of the drainages are also limited since they support only small patches of upland and/or ruderal vegetation and are primarily unvegetated. Other types of aquatic features that could provide suitable habitat for Riparian/Riverine species, such as fairy shrimp, are not present within the study area (i.e. vernal pools, swales, vernal pool-like ephemeral ponds, seasonal ponds, stock ponds, or other human-modified depressions such as tire ruts, etc.).

- Impacts to Riverine Areas would be potentially significant based on requirements of the MSHCP. According to Section 6.1.2 of the MSHCP, if an avoidance alternative is not feasible a Determination of Biologically Equivalent or Superior Preservation (DBESP) shall be made by the Project applicant to ensure the replacement of any lost functions and values of habitat as it relates to MSHCP Covered Species. The condition of approval prescribed in this Initial Study and in Section 7.2.3 of the BRA pertaining to jurisdictional drainages ensures consistency with the MSHCP. The DBESP would be submitted to the Wildlife Agencies (CDFW & USFWS) for approval prior to issuance of a grading permit.

- The Project has the potential to affect the quantity and quality of water in downstream MSHCP Conservation Areas or Riverine areas via Drainage A and Drainage Complex B through runoff generated by the development and transport of invasive, non-native plants species from Project landscaping. Since the Project will be required to comply with flood and water quality standards[12], no indirect effects from the quantity and quality of run-off will occur to downstream areas. In addition, no invasive, non-native plant species listed in Table 6-2 of the MSHCP, *Plants That Should Be Avoided Adjacent To The MSHCP Conservation Area*, will be utilized in the landscape plans. These measures will avoid impacts to water quality and the dispersal of invasive plant seeds in the watershed and are outlined in the Conditions of Approval recommended in this Initial Study and in Section 7.2.5 of the Project BRA.

Project Design Features (Conditions of Approval)

COA BIO-3 Prior to the issuance of any grading permit the Project applicant shall comply with all of the provisions of the MSHCP, including payment of the MSHCP Local Development Mitigation Fee, compliance with Section 6.1.2 of the MSHCP pertaining to Riparian/Riverine Areas, implementation of drainage, toxics and non-native species guidelines pertaining to the Urban/Wildlands Interface in Section 6.1.4 of the MSHCP, and compliance with Section 6.3.2 of the MSHCP pertaining to Burrowing Owl Survey Area requirements. Compliance with Section 6.1.2 of the MSHCP will require approval of the project Determination of Biologically Equivalent or Superior Preservation (DBESP) analysis outlining the impacts and proposed compensatory mitigation for impacts to the Riparian/Riverine Areas for approval by the wildlife agencies prior to issuance of a grading permit. The DBESP will be submitted to the wildlife agencies concurrent to the processing of regulatory permits for jurisdictional streambed impacts, in order to ensure that mitigation requirements proposed under the DBESP are commensurate with the preferences of the resource agencies (USACE, CDFW, and RWQCB) as part of subsequent regulatory permit conditions to be issued following adoption of the project MND.

V. Cultural Resources

The following impact analysis pertaining to cultural resources is based on information contained in the *Phase I Cultural Resources Assessment of the Proposed Ironwood Residential Project; City of Moreno Valley, County of Riverside, California* (herein referred to as the "Cultural Resources Assessment"), prepared by ESA PCR, dated June 2016. The Cultural Resources Assessment is provided in Appendix C.

Would the Project:

a. Cause a substantial adverse change in significance of a historical resource as defined in §15064.5?

No Impact. A historical resource is defined in Section 15064.5(a)(3) of the CEQA Guidelines as any object, building, structure, site, area, place, record, or manuscript determined to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California. Historical

[12] The project will be required to prepare a Water Quality Management Plan and Storm Water Pollution Prevention Plan consistent with Regional Water Quality Control Board and County requirements that will outline measures such as Best Management Practices (BMPS) to address water quantity and quality, and to address any potential flooding.

resources are further defined as being associated with significant events, important persons, or distinctive characteristics of a type, period or method of construction; representing the work of an important creative individual; or possessing high artistic values. Resources listed in or determined eligible for the California Register, included in a local register, or identified as significant in a historic resource survey are also considered historical resources under CEQA.

A project with an effect that may cause substantial adverse change in the significance of a resource is a project that may have a significant impact on the environment. Substantial adverse change is defined as physical demolition, relocation, or alteration of a resource or its immediate surroundings such that the significance of an historical resource would be materially impaired. Direct impacts are those that cause substantial adverse physical change to a historic property. Indirect impacts are those that cause substantial adverse change to the immediate surroundings of a historic property such that the significance of a historical resource would be materially impaired.

The *Secretary of the Interior's Standards for Rehabilitation* (Standards) are codified at 36 Code of Federal Regulations (CFR) Section 67.7. In most circumstances, the Standards are relevant in assessing whether there is a substantial adverse change under CEQA. Section 15064.5b(3) of the CEQA Guidelines states in part that ". . . a project that follows the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings or the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* (1995), Weeks and Grimmer, shall be considered as mitigated to a level of less than a significant impact on the historic resource," and therefore may be considered categorically exempt.

The Cultural Resources Assessment included a records search through the California Historical Resources Information System-Eastern Information Center (CHRIS-EIC). Results from the CHRIS-EIC indicated that there were no previously recorded historical (or built environment) resources within the Study Area and no historical resources were identified during the pedestrian survey; therefore, no impact analysis of historical resources is necessary.

b. Cause a substantial adverse change in significance of an archaeological resource pursuant to §15064.5?

Less Than Significant Impact With Mitigation Incorporated. The results of the Cultural Resources Assessment revealed that two prehistoric cultural resources ((P-33-024882/CA-RIV-12,333 and P-33-024883) are located within the Study Area. Resource P-33-024882/CA-RIV-12,333 is a prehistoric archaeological resource that was previously recorded in the northwestern portion of the Study Area and was revisited by ESA PCR during the pedestrian survey. It consists of one boulder with one milling slick and one boulder with three milling slicks and measures 25 meters (north/south) x 6 meters (east-west). The Applicant has designed the Project to avoid this resource and it is located in an area that is planned for open space; therefore no additional work or mitigation would be warranted. Since the resource would be avoided by the proposed Project, no formal evaluation of the resource was performed by ESA PCR. Resource P-33-024883 was identified in a disturbed and isolated context and therefore the potential for intact subsurface archaeological deposits in the area where it was recorded by ESA PCR is low. As a result of these factors, P-33-024883 does not yield, or have the potential to yield information important to prehistory (Criterion 4 of the California Register) and therefore recommend as not eligible for listing in the California Register and does not qualify as a unique archaeological resource pursuant to CEQA. No additional work is necessary at this resource and impacts to it from the proposed Project are not considered a significant impact on the environment.

These findings, however, do not preclude the existence of undiscovered archaeological resources located below the ground surface and lacking surface manifestation, which may be encountered during construction excavations associated with the proposed Project. It is possible to encounter buried archaeological resources given the proven prehistoric occupation of the region, the identification of multiple surface archaeological resources within the vicinity of the Study Area (including two archaeological resources within the Study Area and numerous resources recorded in the Reche Hills Complex – see Section 4.1.5 of the Project Cultural Resources Assessment), and the favorable natural conditions (e.g., ephemeral drainages, natural spring, and vegetation communities) that would have attracted prehistoric inhabitants to the area. Therefore, despite the heavy disturbances of the Study Area that may have displaced archaeological resources on the surface, it is possible that intact archaeological resources exist at depth. As a result, MM CULT-1 through MM CULT-9 have been prescribed to reduce potentially significant impacts to previously undiscovered archaeological resources that may be accidentally encountered during Project implementation to a less than significant level.

Mitigation Measures

MM CULT 1: Archaeologist Retained/CRMP Prepared. Prior to the issuance of a grading permit, the Project Applicant shall provide evidence to the City of Moreno Valley that a professional archaeological monitor has been retained by the Applicant to conduct monitoring of all mass grading and trenching activities and that the monitor has the authority to temporarily halt and redirect earthmoving activities in the event that suspected archaeological resources are unearthed during Project construction. The Project archaeologist, in coordination with the Consulting Tribes that have requested monitoring, shall prepare a Cultural Resources Monitoring Plan (CRMP) to document protocols for inadvertent finds, to determine potential protection measures from further damage and destruction for any identified archaeological resource(s)/ tribal cultural resources (TCRs), outline the process for monitoring and for completion of the final Phase IV Monitoring Report. If any archaeological and/or TCRs are identified during monitoring, these will also be documented and addressed per standard archaeological protocols in the Phase IV report, with the exception of human remains which will be addressed per MM CULT-13. The Project Archaeologist shall attend the pre-grading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.

MM CULT 2: Tribal Monitor Retained. At least 30 days prior to the issuance of a Grading permit the Applicant shall contact the consulting Tribe(s) that have requested monitoring, to develop Monitoring Agreement(s) for all mass grading and trenching activities and shall provide evidence of the agreement to the City of Moreno Valley. The Tribal representative(s) shall attend the pre-grading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.

MM CULT 3: Grading Plans. Prior to grading permit issuance, the City shall verify that the following note is included on the Grading Plan:

"If any suspected archaeological resources are discovered during ground-disturbing activities and the archaeological monitor or Tribal representatives are not present, the construction supervisor is obligated to halt work in a 100-foot radius around the find and call the project archaeologist and the Tribal representatives to the site to assess the significance of the find."

MM CULT 4: Preservation Plan for CA-RIV-12,333. Prior to building permit issuance, the Project Applicant and the Consulting Tribe(s) shall prepare a Preservation and Maintenance Plan for the long-term care and maintenance of CA-RIV-12,333 and, if any, all new features identified during mass grading activities. The Plan shall indicate, at a minimum, the specific areas to be included in and excluded from long-term maintenance; prohibited activities; methods of preservation to be employed (fencing, vegetative deterrence, etc.); the entity(s) responsible for the long-term maintenance; maintenance scheduling and notification; appropriate avoidance protocols; monitoring by the Tribe and compensation for services if applicable; and necessary emergency protocols. The Project Applicant/Landowner shall submit a fully executed copy of the Preservation and Maintenance Plan to the City to ensure compliance with this mitigation measure.

MM CULT 5: Conduct Archaeological Sensitivity Training for Construction Personnel. The Applicant shall retain a qualified professional archaeologist who shall conduct an Archaeological Sensitivity Training for construction personnel prior to commencement of excavation activities, along with representatives from Tribes that have requested monitoring. The training session, shall be carried out by a cultural resources professional with expertise in archaeology, will focus on how to identify archaeological/cultural resources that may be encountered during earthmoving activities, and the procedures to be followed in such an event. The training session will include a Power Point presentation and/or handouts for all attendees. The basic topics to be addressed in the session include: a brief cultural and archaeological history of the area and the Applicant's and City's cultural resource compliance obligations; training in potential resources that may be encountered through the use of photographs or other illustrations; the duties of archaeological monitors; notification and other procedures to follow upon discovery of resources; and, the general steps that would be followed to conduct a salvage investigation if one is necessary. A sign-in sheet shall be compiled to track attendance and shall be submitted to the City with the Archaeological Monitoring Report.

MM CULT 6: Monitor Construction Excavations for Archeological Resources in Younger Alluvial Sediments. The Applicant shall retain a qualified archaeological monitor, who will work under the direction and guidance of a qualified professional archaeologist. The archaeological monitor shall be present during all construction excavations (e.g., grading, trenching, or clearing/grubbing) into non-fill younger Pleistocene alluvial sediments. Multiple earth-moving construction activities may require multiple archaeological monitors. The frequency of monitoring shall be based on the rate of excavation and grading activities, proximity to known archaeological resources, the materials being excavated (native versus artificial fill soils), and the depth of excavation, and if found, the abundance and type of archaeological resources encountered. Full-time monitoring can be reduced to part-time inspections, or ceased entirely, if determined adequate by the Project archaeologist.

MM CULT 7: Inadvertent Finds. If, during mass grading and trenching activities, the Archaeologist or Tribal representatives/monitors suspect that an archaeological resource and/or TCR may have been unearthed, the monitor identifying the potential resources, in consultation with the other monitor as appropriate, shall immediately halt and redirect grading operations in a 100-foot radius around the find to allow identification and evaluation of the suspected resource. The Native American monitor(s) or appropriate representative(s) and the archaeological monitor shall evaluate the suspected resource and make a determination of significance pursuant to California Public Resources Code Section 21083.2. The archaeological monitor and tribal monitor(s) or appropriate representative(s), the Project Applicant, and the City Planning Division shall confer regarding mitigation of the discovered resource(s). All sacred sites, should they be encountered within the project area, shall be avoided and preserved as the preferred mitigation, if feasible. If preservation in place is not feasible, steps for treatment and disposition shall be carried out in accordance as set forth in per MM CULT-9.

MM CULT 8: Final Phase IV Monitoring Report. Prior to building permit issuance, the Project archaeologist shall prepare a final Phase IV Monitoring Report as outlined in the CRMP, which shall be submitted to the City Planning Division, the appropriate Native American tribe(s), and the Eastern Information Center at the University of California, Riverside. The report shall document project impacts to CA-RIV-857, CA-RIV-3159 and CA-RIV-3341, including the relocation area and protection measures taken for CA-RIV-3341.

MM CULT 9: Treatment and Disposition of Discoveries. In the event that Native American cultural resources are inadvertently discovered during the course of grading for this Project. The following procedures will be carried out for treatment and disposition of the discoveries:

1. **Treatment and Final Disposition**: The landowner(s) shall relinquish ownership of all cultural resources, including sacred items, burial goods, and all archaeological artifacts and non-human remains as part of the required mitigation for impacts to cultural resources. The applicant shall relinquish the artifacts through one or more of the following methods and provide the City of Moreno Valley Planning Department with evidence of same:

    a. Accommodate the process for Preservation In Place/Onsite reburial of the discovered items with the consulting Native American tribes or bands. This shall include measures and provisions to protect the future reburial area from any future impacts. Reburial shall not occur until all cataloguing and basic recordation have been completed;

    b. A curation agreement with an appropriate qualified repository within Riverside County that meets federal standards per 36 CFR Part 79 and therefore would be professionally curated and made available to other archaeologists/researchers for further study. The collections and associated records shall be transferred, including title, to an appropriate curation facility within Riverside County, to be accompanied by payment of the fees necessary for permanent curation:

    c. For purposes of conflict resolution, if more than one Native American tribe or band is involved with the project and cannot come to an agreement as to the disposition of cultural materials, they shall be curated at the Western Science Center by default.

c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Less Than Significant Impact With Mitigation Incorporated. The Cultural Resources Assessment included a records search through the San Bernardino County Museum (SBCM). Results of the paleontological resources records search through SBCM indicate that no vertebrate fossil localities from the SBCM records have been previously recorded within the Study Area or within a one-mile radius. Moreover, no paleontological resources were identified by ESA PCR during the pedestrian survey. These findings; however, do not preclude the existence of undiscovered paleontological resources located below the ground surface and lacking surface manifestation, which may be encountered during construction excavations associated with the proposed Project. The Study Area has been previously mapped geologically as containing surface exposures of early Pleistocene-aged fan deposits, overlain across much of the Study Area by a thin sedimentary veneer of recent Holocene-aged alluvium. The northwestern portion of the Study Area is mapped as Cretaceous-aged tonalite. The tonalite and the surficial Holocene-aged alluvium have very limited to no potential to be conducive to retaining paleontological resources; however, the Pleistocene-aged fan deposits may have high a paleontological sensitivity, depending upon their lithology, as these sediments have yielded significant fossils of extinct animals from the Ice Age throughout the Inland Empire (Scott 2014). As a result, MM CULT-10 through MM CULT-12 have been prescribed to reduce potentially significant impacts to previously undiscovered paleontological resources and/or unique geological features that may be accidentally encountered during Project implementation to a less than significant level.

Mitigation Measures

MM CULT 10: Conduct Paleontological Sensitivity Training for Construction Personnel. The Applicant shall retain a qualified paleontologist who shall conduct a Paleontological Sensitivity Training for construction personnel prior to commencement of excavation activities. The training session, shall be carried out by a cultural resources professional with expertise in paleontology, will focus on how to identify paleontological resources that may be encountered during earthmoving activities, and the procedures to be followed in such an event. The training session will include a Power Point presentation and/or handouts for all attendees. The basic topics to be addressed in the session include: a brief cultural and geologic history of the area and the City cultural resource compliance obligations; training in potential resources that may be encountered through the use of photographs or other illustrations; the duties of paleontological monitors; notification and other procedures to follow upon discovery of resources; and, the general steps that would be followed to conduct a salvage investigation if one is necessary.

MM CULT 11: Monitor Construction Excavations for Paleontological Resources in Older Pleistocene Alluvial Deposits. The Applicant shall retain a qualified paleontological monitor, who will work under the guidance and direction of a qualified professional paleontologist. The paleontological monitor shall be present during all construction excavations (e.g., grading, trenching, or clearing/grubbing) into non-fill older Pleistocene alluvial deposits. Multiple earth-moving construction activities may require multiple paleontological monitors. The frequency of monitoring shall be based on the rate of excavation and grading activities, proximity to known paleontological resources and/or unique geological features, the materials being excavated (native versus artificial fill soils), and the depth of excavation, and if found, the abundance and type of paleontological resources and/or unique geological features encountered. Full-time monitoring can be reduced to part-time inspections if determined adequate by the qualified professional paleontologist.

MM CULT 12: Cease Ground-Disturbing Activities and Implement Treatment Plan if Paleontological Resources Are Encountered. In the event that paleontological resources and or unique geological features are unearthed during ground-disturbing activities, ground-disturbing activities shall be halted or diverted away from the vicinity of the find so that the find can be evaluated. A buffer area of at least 25 feet shall be established around the find where construction activities shall not be allowed to continue. Work shall be allowed to continue outside of the buffer area. The Applicant and City shall coordinate with a qualified professional paleontologist to develop an appropriate treatment plan for the resources. Treatment may include implementation of paleontological salvage excavations to remove the resource along with subsequent laboratory processing and analysis or preservation in place. At the paleontologist's discretion and to reduce any construction delay, the grading and excavation contractor shall assist in removing rock samples for initial processing. Any fossils encountered and recovered shall be prepared to the point of taxonomic identification and catalogued and curated to a suitable museum or other repository with a research interest in the materials, such as the San Bernardino County Museum or Western Science Center. If no institution accepts the fossil collection, they shall be donated to a local school in the area for educational purposes. Accompanying notes, maps, and photographs shall also be filed at the repository and/or school.

d. Disturb any human remains, including those interred outside of formal cemeteries?

Less Than Significant Impact With Mitigation Incorporated. No known human remains have been identified from the CHRIS-EIC database within a half-mile radius of the Study Area. No human remains were identified during the pedestrian survey of the Study Area. However, these findings do not preclude the existence of previously unknown human remains located below the ground surface, which may be encountered during construction excavations associated with the proposed Project. Similar to the discussion regarding archaeological resources above, it is also possible to encounter buried human remains during construction given the proven prehistoric occupation of the region, the identification of multiple surface archaeological resources within a half-mile of the Study Area, and the favorable natural conditions that would have attracted prehistoric inhabitants to the area. As a result, MM CULT-13 has been prescribed to reduce potentially significant impacts to previously unknown human remains that may be unexpectedly discovered during Project implementation to a less than significant level.

Mitigation Measures

MM CULT 13: Cease Ground-Disturbing Activities and Notify County Coroner If Human Remains Are Encountered. If human remains are unearthed during implementation of the Proposed Project, the City shall comply with State Health and Safety Code Section 7050.5. The City shall immediately notify the County Coroner and no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to PRC Section 5097.98. If the remains are determined to be of Native American descent, the coroner has 24 hours to notify the Native American Heritage Commission (NAHC). The NAHC shall then identify the person(s) thought to be the Most Likely Descendent (MLD). The MLD may, with the permission of the landowner, inspect the site of the discovery of the Native American remains and may recommend to the landowner means for treating or disposing, with appropriate dignity, the human remains and any associated funerary objects. The MLD shall complete their inspection and make their recommendation within 48 hours of being granted access by the landowner to inspect the discovery. The recommendation may include the scientific removal and nondestructive analysis of human remains and cultural items associated with Native American burials. Upon the discovery of the Native American remains, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located, is not damaged or disturbed by further development activity until the landowner has discussed and conferred, as prescribed in this mitigation measure, with the MLD regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. The landowner shall discuss and confer with the descendants all reasonable options regarding the descendants' preferences for treatment. MLDs in the region typically recommend reburial of the remains as close to the original burial location as feasible accompanied by a ceremony. The MLD shall file a record of the reburial with the NAHC and the Project archaeologist shall file a record of the reburial with the CHRIS-EIC.

If the NAHC is unable to identify a MLD, or the MLD identified fails to make a recommendation, or the landowner rejects the recommendation of the MLD and the mediation provided for in Subdivision (k) of Section 5097.94, if invoked, fails to provide measures acceptable to the landowner, the landowner or his or her authorized representative shall inter the human remains and items associated with Native American human remains with appropriate dignity on the facility property in a location not subject to further and future subsurface disturbance. A record of the reburial shall be filed with the NAHC and the CHRIS-EIC.

VI. Geology and Soils

The following impact analysis pertaining to the site's underlying geology and soils is based on information contained in the Due Diligence Level Preliminary Geotechnical Evaluation, Proposed Residential Development NWC Ironwood Avenue and Oliver Street, Moreno Valley, Riverside County, California *(herein referred to as the "Preliminary Geotechnical Evaluation"), prepared by EEI Geotechnical & Environmental Solutions, dated November 25, 2014; the* Supplemental Geotechnical Evaluation, Proposed Residential Development NWC Ironwood Avenue and Oliver Street & Tract No. 31556 Off-site Sewer Oliver Street Extension/60 Freeway Undercrossing Moreno Valley, Riverside County, California *(herein referred to as the "Supplemental Geotechnical Evaluation"), prepared by EEI Geotechnical & Environmental Solutions, dated May 18, 2005; and the* Moreno Valley Ironwood Rockfall Investigation City of Moreno Valley, Riverside County, California *(herein referred to as the "Rockfall Investigation"), prepared by KANE GeoTech, Inc, dated March 15, 2016. The Preliminary Geotechnical Evaluation, Supplemental Geotechnical Evaluation, and the Rockfall Investigation are provided in Appendix D.*

Would the Project:

a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

Less Than Significant Impact. Fault rupture is the displacement that occurs along the surface of a fault during an earthquake. Based on criteria established by the California Geological Survey (CGS), faults may be categorized as active, potentially active, or inactive. Active faults are those which show evidence of surface displacement within the last 11,000 years (Holocene-age). Potentially active faults are those that show evidence of most recent surface displacement within the last 1.6 million years (Quaternary-age). Faults showing no evidence of surface displacement within the last 1.6 million years are considered inactive. In addition, there are buried thrust faults, which are low angle reverse faults with no surface exposure. Due to their buried nature, the existence of buried thrust faults is usually not known until they produce an earthquake.

The CGS has established earthquake fault zones known as Alquist-Priolo Earthquake Fault Zones around the surface traces of active faults to assist cities and counties in planning, zoning, and building regulation functions. These zones, which extend from 200 to 500 feet on each side of a known active fault, identify areas where potential surface rupture along an active fault could prove hazardous and identify where special studies are required to characterize hazards to habitable structures.

The Project site is located in the seismically active Southern California region and could be subject to moderate to strong ground shaking in the event of an earthquake on one of the many active Southern California faults. The Preliminary Geotechnical Evaluation conducted for the Project indicates that no currently known active or potentially active surface faults traverse the Project site, and the site is not located within a designated Alquist-Priolo Earthquake Fault Zone. The faults in the vicinity of the Project site include the San Jacinto-San Jacinto Valley Fault and the San Jacinto-San Bernardino Fault, located approximately 1.5 miles and 5.8 miles of the site, respectively. As such, the potential for surface rupture due to faulting occurring on the Project site during the design life of the Project is considered low. Furthermore, Project buildings would be designed and constructed to resist the effects of seismic ground motions as provided in the City's Building Code and the 2013 California Building Code (CBC). Thus, a less than significant impact would occur in this regard.

ii. Strong seismic ground shaking?

Less Than Significant Impact With Mitigation Incorporated. Seismicity is the geographic and historical distribution of earthquakes, including their frequency, intensity, and distribution. The level of ground shaking at a given location depends on many factors, including the size and type of earthquake, distance `from the earthquake, and subsurface geologic conditions. The type of construction also affects how particular structures and improvements perform during ground shaking. A common measure of ground motion is the peak ground acceleration (PGA). It is not a measure of total energy of an earthquake, such as the Richter and moment magnitude scales, but rather of how hard the ground shakes in given geographic area. PGA is expressed as the percentage of the acceleration due to gravity (G), which is approximately 980 centimeters per second squared. According to the United States Geological Survey (USGS), the following chart provides the extent of perceived shaking and potential damage associated with a given acceleration:

Per the CBC, an estimated PGA is determined for a site of proposed construction based on the mapping by the USGS along with detailed analysis as an estimate of anticipated ground shaking for use by the Project structural engineer in design of the proposed structures to resist. There is potential for significant ground shaking at the Project site during a strong seismic event on the San Jacinto-San Jacinto Valley Fault and the San Jacinto-San Bernardino Fault, as well as on the other large active faults in the Southern California region. According to the Preliminary Geotechnical Evaluation, a maximum probable event could produce a PGA value at the Project site of 0.837g. This is a relatively high acceleration do to the proximity of the San Jacinto-San Jacinto Valley Fault and the San Jacinto-San Bernardino Fault. If this relatively high ground acceleration was not considered in the design and construction phase, ground shaking at this intensity could result in significant damage to buildings and improvements associated with Project implementation.

Acceleration (g)	Perceived Shaking	Potential Damage
< 0.0017	Not felt	None
0.0017 - 0.014	Weak None	None
0.014 - 0.039	Light	None
0.039 - 0.092	Moderate	Very Light
0.092 - 0.18	Strong	Light
0.18 - 0.34	Very Strong	Moderate
0.34 - 0.65	Severe	Moderate to Heavy
0.65 - 1.24	Violent	Heavy
> 1.24	Extreme	Very Heavy

SOURCE: United States Geological Survey. Accessed from website at: http://en.wikipedia.org/wiki/Peak_ground_acceleration, accessed August 2015.

The City requires that all new construction meet or exceed the City's Building Code and the latest standards of the 2013 CBC for construction which requires structural design that can accommodate maximum ground accelerations expected from known faults. Furthermore, the Project would comply with the CGS Special Publications 117, Guidelines for Evaluating and Mitigating Seismic Hazards in California, which provides guidance for evaluation and mitigation of earthquake-related hazards. While the Project would be required to comply with applicable seismic-related regulatory requirements, implementation of the site-specific structural and seismic design parameters and recommendations for foundations, retaining walls/shoring, and excavation of the both the Preliminary Geotechnical Evaluation and the Supplemental Geotechnical Evaluation per MM GEO-1 would further ensure that seismic-related ground shaking impacts would be less than significant.

Mitigation Measures

MM GEO-1: Site-specific structural and seismic design parameters and recommendations for foundations, retaining walls/shoring, and excavation shall be implemented per the Project's Preliminary Geotechnical Evaluation and the Supplemental Geotechnical Evaluation, subject to review and approval by the City of Moreno Valley Building Safety Department.

iii. Seismic-related ground failure, including liquefaction?

Less Than Significant Impact With Mitigation Incorporated. Liquefaction is a phenomenon in which saturated silty to cohesionless soils below the groundwater table are subject to a temporary loss of strength due to the buildup of excess pore pressure during cyclic loading conditions such as those induced by an earthquake. Liquefaction effects include loss of bearing strength, amplified ground oscillations, lateral spreading, and flow failures. Liquefaction typically occurs in areas where groundwater is less than 50 feet from the surface, and where the soils are composed of poorly consolidated, fine to medium-grained sand. In addition to the necessary soil conditions, the ground acceleration and duration of the earthquake must also be of a sufficient level to initiate liquefaction.

According to the Preliminary Geotechnical Evaluation, a seismic hazard zone map and report for the Sunnymead Quadrangle has not been issued by the CGS. As such, the depth to the historic high groundwater is not known and therefore; the Project site is not situated within a mapped liquefaction zone. Static groundwater is not expected and groundwater was not encountered in any of the exploratory borings or trenches excavated to a maximum explored depth of 50.5 feet below the existing ground surface at the Project site. The majority of the Project site is underlain by generally loose to medium dense alluvial and colluvial deposits that overlie relatively shallow granitic bedrock. The alluvial and colluvial soils are subject to removal and recompaction during Project grading. Due to the presence of shallow bedrock and the lack of shallow groundwater, the Project site is considered as having a low susceptibility to liquefaction. While the Project would be required to comply with applicable seismic-related regulatory requirements of the City's Building Code and the 2013 CBC, implementation of the site-specific design parameters and recommendations of the Preliminary Geotechnical Evaluation and the Supplemental Geotechnical Evaluation per MM GEO-1 to be implemented during construction would ensure that seismic-related ground failure impacts, including liquefaction, would be less than significant.

Mitigation Measures

Refer to MM GEO-1. No additional mitigation measures are necessary.

iv. Landslides?

Less Than Significant Impact. Elevations on-site range from approximately 1,840 feet above mean sea level (MSL) in the south-central portion of the site to approximately 1,980 feet above MSL in the northwestern portion of the site. From east to west across the site is a series of north-south-oriented ridges and alternating drainage gullies in the lower, southern portion of the site. The intervening ridges are generally about 5 to 10 feet higher in elevation them the adjacent drainage gullies. The overall surface gradient across the Project site is gently to moderately south or south-southeast.

A few of the planned residences are proposed on a flat area at the base of a rocky outcrop, which could potentially result in rockfall hazards. This slope adjacent to the proposed residences contains spheroidally weathered, large, rounded boulders. These boulders are comprised of biotite-hornblende tonalite. The tonalite is grey, medium-grained and in some areas contains mafic inclusions. The boulders are heavily weathered and when broken down, form the sandy soil present at the Project site. The majority of these boulders are embedded in the sediment or are actually exposed bedrock. There are some areas of exposed bedrock indicating the depth to bedrock, although varies, is shallow. According to the Rockfall Investigation, the rockfall source would continue to weather and erode and potentially produce rockfall onto the slope. However, based on the observations and modeling of the Rockfall Investigation, the proposed locations of these planned residences should not be impacted by potential rockfall hazards. Further, the Rockfall Investigation indicated rockfall mitigation would not be necessary, but would be beneficial to construct reinforced concrete or block privacy walls on Lots 36, 37, 38, 39, and 40 to provide supplementary protection and to prevent small, nuisance rockfall from accumulating in proposed residential areas (Project Design Feature GEO-1). As such, the Project site is located in an area with low potential for rockfall or landslides. Thus, based on the above design consideration and Project Design Feature GEO-1, a less than significant impact would occur in this regard.

Project Design Feature

> **PDF-GEO-1:** The Project applicant would construct reinforced concrete or block privacy walls on Lots 36, 37, 38, 39, and 40 to provide supplementary protection and to prevent small, nuisance rockfall from accumulating in proposed residential areas.

b. Result in substantial soil erosion or the loss of topsoil?

Less Than Significant Impact. Soil erosion refers to the process by which soil or earth material is loosened or dissolved and removed from its original location. Erosion can occur by varying processes and may occur in a Project area where bare soil is exposed to wind or moving water (both rainfall and surface runoff). The processes of erosion are generally a function of material type, terrain steepness, rainfall or irrigation levels, surface drainage conditions, and general land uses. Topsoil is used to cover surface areas for the establishment and maintenance of vegetation due to its high concentrations of organic matter and microorganisms.

The Project site is currently undeveloped though several unimproved trails/dirt roads traverse the property. Surrounding land uses include vacant land to the north and east with residential uses to the south and west. As the Project site is undeveloped, a majority of the site would include native topsoil. Project construction would result in ground surface disruption during excavation, grading, and trenching that would create the potential for erosion to occur. Wind erosion would be minimized through soil stabilization measures required by the SCAQMD Rule 403 (Fugitive Dust), such as daily watering. Potential for water erosion would be reduced by implementation of standard erosion control measures imposed during site preparation and grading activities. As discussed in more detail under Section IX, *Hydrology and Water Quality*, the Project would be subject to all existing regulations associated with the protection of water quality. Construction activities would be carried out in accordance with applicable City standard erosion control practices required pursuant to the California Building Code and the requirements of the National

Pollutant Discharge Elimination System (NPDES) General Construction Permit issued by the Santa Ana Regional Water Quality Control Board (RWQCB), as applicable. Consistent with these requirements, a Stormwater Pollution Prevention Plan (SWPPP) would be prepared that incorporates Best Management Practices (BMPs) to control water erosion during the Project's construction period. Thus, impacts due to erosion of topsoil would be less than significant with compliance to applicable regulatory requirements.

c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potential result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

Less Than Significant Impact With Mitigation Incorporated. According to the Preliminary Geotechnical Evaluation, the Project site is underlain by weathered Cretaceous-age plutonic rocks composed of tonalite. This material was observed to extend beyond the maximum depth of 50.5 feet below existing grades of the exploratory borings and test pits. Alluvial soils up to 30 feet thick were observed to mantle the weathered tonalite bedrock within the lower lying channel/drainage areas. On the higher, elevated ridge areas of the Project site, colluvial soils were observed to mantle the weathered tonalite bedrock with a thickness varying between 3 and 14 feet. The weathered tonalite bedrock can generally be described as gray, white or black speckled or orange to dark grayish-orange with a granitic or phaneritic texture and was generally unweathered to highly weathered. Outcroppings of the weathered tonalite bedrock are exposed in the northwestern and northeastern portions of the Project site. Over the remainder of the Project site, the tonalite bedrock was found to be weathering into a medium dense to very dense silty sand soil with a decomposed granite texture at depth in the exploratory borings and test pits. The alluvial and colluvial soils are generally comprised of orange-brown or red-brown, medium brown or light gray brown, fine to coarse, damp to moist, loose to dense silty sand. The Project site is relatively undeveloped and artificial fill was not encountered during the field exploration.

Impacts related to liquefaction and landslides are discussed above in Responses VI.a.iii. and VI.a.iv. Lateral spreading is the downslope movement of surface sediment due to liquefaction in a subsurface layer. The downslope movement is due to the combination of gravity and earthquake shaking. Such movement can occur on slope gradients of as little as one degree. Lateral spreading typically damages pipelines, utilities, bridges, and structures. Lateral spreading of the ground surface during a seismic activity usually occurs along the weak shear zones within a liquefiable soil layer and has been observed to generally take place toward a free face (i.e. retaining wall, slope, or channel) and to a lesser extent on ground surfaces with a very gentle slope. As stated in Response VI.a.iii., due to the presence of shallow bedrock and the lack of shallow groundwater, the Project site is considered as having a low susceptibility to liquefaction. Further, due to the absence of any channel, slope, or river within or near the Project site, the potential for lateral spreading occurring on or off the site is considered to be negligible. No large-scale extraction of groundwater, gas, oil, or geothermal energy is occurring or planned at the Project site. Thus, there appears to be little or no potential for ground subsidence due to withdrawal of fluids or gases at the Project site.

While the Project construction and design would be required to comply with the 2013 CBC, which is designed to assure safe construction, implementation of the site-specific design measures including foundation design recommendations of the Preliminary Geotechnical Evaluation and the Supplemental Geotechnical Evaluation per MM GEO-1 would ensure that ground and soil stability hazards would be less than significant.

Mitigation Measures

Refer to MM GEO-1. No additional mitigation measures are necessary.

d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?

Less Than Significant Impact With Mitigation Incorporated. Soils with shrink-swell or expansive properties typically occur in fine-grained sediments and cause damage through volume changes as a result of a wetting and drying process. Structural damage may occur over a long period of time, usually the result of inadequate soil and foundation engineering or the placement of structures directly on expansive soils. According to the Preliminary Geotechnical Evaluation, the results of the laboratory expansion index testing indicated an expansion index of 0 and 2 for the tested soils which represents a very low expansion potential. Expansive soils, if encountered within the Project site, would be removed and/or replaced as part of standard construction practices pursuant to the City and/or 2013 CBC building requirements, as applicable. Furthermore, with incorporation of the site-specific design measures including foundation design slabs on grade recommendations of the Preliminary Geotechnical Evaluation and the Supplemental Geotechnical Evaluation per MM GEO-1, a less than significant impact would occur in this regard.

Mitigation Measures

Refer MM GEO-1. No additional mitigation measures are necessary.

e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

No Impact. The Project would not involve the use of septic tanks or alternative wastewater disposal systems. As such, no impact would occur in this regard.

VII. Greenhouse Gas Emissions

The following impact analysis pertaining to greenhouse gas emissions (GHGs) is based on information contained in the Ironwood Residential (TTM No. 37001), Greenhouse Gas Analysis, City of Moreno Valley *(herein referred to as the "GHG Analysis"), prepared by Urban Crossroads, dated August 31, 2015. The GHG Analysis is provided in Appendix E.*

Would the Project:

a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Less Than Significant Impact. Global Climate Change (GCC) is defined as the change in average meteorological conditions on the earth with respect to temperature, precipitation, and storms. GCC is currently one of the most controversial environmental issues in the United States, and much debate exists within the scientific community about whether or not GCC is occurring naturally or as a result of human activity. Some data suggests that GCC has occurred in the past over the course of thousands or millions of years. These historical changes to the Earth's climate have occurred naturally without human influence, as in the case of an ice age. However, many scientists believe that the climate shift taking place since the industrial revolution (1900) is occurring at a quicker rate and magnitude than in the past. Scientific evidence suggests that GCC is the result of increased concentrations of greenhouse gases in the earth's atmosphere, including carbon dioxide (CO_2), methane (CH_4), NO_x, and fluorinated gases. Many scientists believe that this increased rate of climate change is the result of greenhouse gases resulting from human activity and industrialization over the past 200 years.

An individual project like the proposed Project evaluated in this GHG Analysis would not generate enough greenhouse gas emissions to effect a discernible change in global climate. However, the Project may participate in the potential for GCC by its incremental contribution of greenhouse gasses combined with the cumulative increase of all other sources of greenhouse gases, which when taken together constitute potential influences on GCC. Because these changes may have serious environmental consequences, the GHG Analysis evaluated the potential for the Project to have a significant effect upon the environment as a result of its potential contribution to the greenhouse effect.

GCC refers to the change in average meteorological conditions on the earth with respect to temperature, wind patterns, precipitation and storms. Global temperatures are regulated by naturally occurring atmospheric gases such as water vapor, CO_2, N2O (Nitrous Oxide), CH_4, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride. These particular gases are important due to their residence time (duration they stay) in the atmosphere, which ranges from 10 years to more than 100 years. These gases allow solar radiation into the Earth's atmosphere, but prevent radioactive heat from escaping, thus warming the Earth's atmosphere. GCC can occur naturally as it has in the past with the previous ice ages. According to CARB, the climate change since the industrial revolution differs from previous climate changes in both rate and magnitude.

Gases that trap heat in the atmosphere are often referred to as greenhouse gases. Greenhouse gases are released into the atmosphere by both natural and anthropogenic (human) activity. Without the natural greenhouse gas effect, the Earth's average temperature would be approximately 61° Fahrenheit (F) cooler than it is currently. The cumulative accumulation of these gases in the earth's atmosphere is considered to be the cause for the observed increase in the earth's temperature. Although California's rate of growth of greenhouse gas emissions is slowing, the State is still a substantial contributor to the United States emissions inventory total. In 2004, California is estimated to have produced 492 million gross metric tons of carbon dioxide equivalent ($CO2_e$) greenhouse gas emissions. Despite a population increase of 16 percent between 1990 and 2004, California has significantly slowed the rate of growth of greenhouse gas emissions due to the implementation of energy efficiency programs as well as adoption of strict emission controls.

The City has not adopted a threshold of significant for GHG emissions. As such, a screening threshold of 3,000 metric ton of carbon dioxide equivalent ($MTCO2_e$) per year for residential land uses is applied herein, which is a widely accepted screening threshold used by the County of Riverside and numerous jurisdictions in the SCAB and based on the SCAQMD staff's proposed GHG screening threshold for stationary source emissions for non-industrial projects, as described in the SCAQMD's *Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans* ("SCAQMD Interim GHG Threshold"). The SCAQMD Interim GHG Threshold identifies a screening threshold to determine whether additional analysis is required. As noted by the SCAQMD:

"…the…screening level for stationary sources is based on an emission capture rate of 90 percent for all new or modified projects…the policy objective of [SCAQMD's] recommended interim GHG significance threshold proposal is to achieve an emission capture rate of 90 percent of all new or modified stationary source projects. A GHG significance threshold based on a 90 percent emission capture rate may be more appropriate to address the long-term adverse impacts associated with global climate change because most projects will be required to implement GHG reduction measures. Further, a 90 percent emission capture rate sets the emission threshold low enough to capture a substantial fraction of future stationary source projects that will be constructed to accommodate future statewide population and economic growth, while setting the emission threshold high enough to exclude small projects that will in aggregate contribute a relatively small fraction of the cumulative statewide GHG emissions. This assertion is based on the fact that [SCAQMD] staff estimates that these GHG emissions would account for slightly less than one percent of future 2050 statewide GHG emissions target (85 [$MMTCO2_e$/yr]). In addition, these small projects may be subject to future applicable GHG control regulations that would further reduce their overall future contribution to the statewide GHG inventory. Finally, these small sources are already subject to [Best Available Control Technology] (BACT) for criteria pollutants and are more likely to be single-permit facilities, so they are more likely to have few opportunities readily available to reduce GHG emissions from other parts of their facility."

Thus, based on guidance from the SCAQMD, if a residential project would emit GHGs less than 3,000 $MTCO2_e$ per year, the project is not considered a substantial GHG emitter and the GHG impact is less than significant, requiring no additional analysis and no mitigation. On the other hand, if a residential project would emit GHGs in excess of 3,000 $MTCO2_e$ per year, then the project could be considered a substantial GHG emitter, requiring additional analysis and potential mitigation.

CEQA Guidelines 15064.4 (b)(1) states that a lead agency may use a model or methodology to quantify *GHGs* associated with a project. On October 2, 2013, the SCAQMD in conjunction with CAPCOA released the latest version of the CalEEMod™ v2013.2.2. The purpose of this model is to more accurately calculate construction-source and operational-source criteria pollutants (NO_X, VOC, PM_{10}, $PM_{2.5}$, SO_X, and CO) and *GHGs* from direct and indirect sources; and quantify applicable air quality and GHG reductions achieved from mitigation measures. Accordingly, th*e latest version of* CalEEMod™ has been used for this Project to determine construction and operational air quality impacts.

Construction Emissions

Construction activities associated with the Project would result in emissions of CO2 and CH4. For construction phase Project emissions, GHGs are quantified and amortized over the life of the Project. To amortize the emissions over the life of the Project, the SCAQMD recommends calculating the total greenhouse gas emissions for the construction activities, dividing it by the 30-year Project life, and then adding that number to the annual operational phase GHG emissions. As such, construction emissions were amortized over a 30-year period and added to the annual operational GHG emissions.

Operational Emissions

Operational activities associated with the Project would result in emissions of CO2, CH4, and nitrogen dioxide (N20). Operational emissions would be expected from area source emissions, energy source emissions, mobile source emissions, solid waste, and water supply, treatment, and distribution. Refer to Response III.b., above, for defining area source emissions, energy source emissions, and mobile source emissions.

Solid Waste

Residential land uses would result in the generation and disposal of solid waste. A large percentage of this waste would be diverted from landfills by a variety of means, such as reducing the amount of waste generated, recycling, and/or composting. The remainder of the waste not diverted would be disposed of at a landfill. GHG emissions from landfills are associated with the anaerobic breakdown of material. GHG emissions associated with the disposal of solid waste associated with the Project were calculated by the CalEEMod™ model using default parameters.

Water Supply, Treatment and Distribution

Indirect GHG emissions result from the production of electricity used to convey, treat and distribute water and wastewater. The amount of electricity required to convey, treat and distribute water depends on the volume of water as well as the sources of the water. Unless otherwise noted, CalEEMod™ default parameters were used.

Emissions Summary

The annual GHG emissions associated with the operation of the Project are estimated to be 2,905.71 $MTCO2_e$ per year as summarized in **Table VII-1**, *Total Project Greenhouse Gas Emissions (Annual).* Direct and indirect operational emissions associated with the Project are compared with the SCAQMD threshold of significance for residential use projects, which is 3,000 $MTCO2_e$. As shown in Table VII-1, the Project would result in a less than significant impact with respect to GHG emissions.

TABLE VII-1
TOTAL PROJECT GREENHOUSE GAS EMISSIONS (ANNUAL)

Emission Source	Emissions (metric tons per year)			
	CO2	CH4	N2O	Total $CO2_e$
Annual construction-related emissions amortized over 30 years	40.79	4.06E-03	--	41.01
Area	46.51	3.81E-03	8.00E-04	46.84
Energy	589.38	2.00E-02	9.27E-03	592.75
Mobile Sources	2,197.25	0.07	--	2,063.59
Waste	43.11	2.55	--	96.62
Water Usage	53.76	0.39	9.70E-03	64.9
Total CO_2E (All Sources)	2,905.71			
SCAQMD Threshold	3,000			
Significant?	NO			

Note: Totals obtained from CalEEMod™ and may not total 100% due to rounding.
Table results include scientific notation. e is used to represent times ten raised to the power of (which would be written as x 10b") and is followed by the value of the exponent
a Includes emissions of landscape maintenance equipment and architectural coatings emissions
b Includes emissions of natural gas consumption
c Includes emissions of vehicle emissions and fugitive dust related to vehicular travel

SOURCE: CalEEMod™ model output, See Appendix 3.1 for detailed model outputs; Ironwood Residential (TTM No. 37001), Greenhouse Gas Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

b. Conflict with any applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Less Than Significant Impact. Although the City's General Plan does not identify specific GHG or climate change policies or goals, a number of measures identified in the General Plan's Air Quality Element act to reduce or control criteria pollutant emissions and peripherally reduce GHG emissions. The Project has been evaluated for consistency with the City's General Plan Air Quality Element as shown in **Table VII-2**, *City of Moreno Valley General Plan Consistency*. According to Table VII-2, the Project is consistent with the City's General Plan Air Quality Element.

TABLE VII-2
CITY OF MORENO VALLEY GENERAL PLAN CONSISTENCY

General Plan Objective/Policy	Consistency Analysis
Objective 6.6: Promote land use patterns that reduce daily automotive trips and reduce trip distance for work, shopping, school, and recreation.	**Consistent.** The Project site is developed approximately 0.50 miles north of a regional shopping center (Stoneridge Towne Center).
Objective 6.7: Reduce mobile and stationary source air pollutant emissions.	**Consistent.** The Project site is located proximate to existing and proposed major roadways, acting to generally reduce vehicle trip lengths, thereby reducing mobile source emissions.
Policy 6.7.5: Require grading activities to comply with South Coast Air Quality Management District's Rule 403 regarding the control of fugitive dust.	**Consistent.** The Project would be required to implement fugitive dust control measures consistent with SCAQMD Rule 403.

General Plan Objective/Policy	Consistency Analysis
Policy 6.7.6: Require building construction to comply with the energy conservation requirements of Title 24 of the California Administrative Code (California Code of Regulations).	**Consistent.** Pursuant to City and State Building Code requirements, the Project would meet or surpass applicable CCR Title 24 energy conservation requirements.

SOURCE: City of Moreno Valley General Plan, Safety Element; Ironwood Residential (TTM No. 37001), Greenhouse Gas Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

The City released an Energy Efficiency and Climate Action Strategy (CAS) and a Greenhous Gas Analysis for public review on May 8, 2012. The documents were approved on October 9, 2012. The CAS identifies ways that the City can reduce energy and water consumption and greenhouse gas emissions as an organization (its employees and the operation of its facilities) and outlines the actions that the City can encourage and community members can employ to reduce their own energy and water consumption and greenhouse gas emissions. The policies in the document are to reduce greenhouse gas emissions in 2010 by 15 percent by 2020. The Project has been evaluated for consistency with the City's Energy Efficiency and CAS as described in **Table VII-3**, *City of Moreno Valley Energy Efficiency and CAS Consistency.* According to Table VII-3, the Project is consistent with the applicable measures of the City's Energy Efficiency and CAS.

TABLE VII-3
CITY OF MORENO VALLEY ENERGY EFFICIENCY AND CAS CONSISTENCY

Energy Efficiency	Consistency Analysis
R2-T1: Land Use Based Trips and VMT Reduction Policies. Encourage the development of Transit Priority Projects along High Quality Transit Corridors identified in the SCAG Sustainable Communities Plan, to allow a reduction in vehicle miles traveled.	**Project Consistency:** Not applicable.
R2-T3: Employment-Based Trip Reductions. Require a Transportation Demand Management (TDM) program for new development to reduce automobile travel by encouraging ride-sharing, carpooling, and alternative modes of transportation.	**Project Consistency:** Not applicable.
R2-E1: New Construction Residential Energy Efficiency Requirements. Require energy efficient design for all new residential buildings to be 10 percent beyond the current Title 24 standards (Reach Code).	**Project Consistency:** Consistent. The Project would comply with this measure if adopted by the City.
R2-E2: New Construction Residential Renewable Energy. Facilitate the use of renewable energy (such as solar [photovoltaic] panels or small wind turbines) for new residential developments. Alternative approach would be the purchase of renewable energy resources off-site.	**Project Consistency:** Consistent. The Project would comply with this measure if adopted by the City.
R2-E5: New Construction Commercial Energy Efficiency Requirements. Require energy efficient design for all new commercial buildings to be 10 percent beyond the current Title 24 standards (Reach Code).	**Project Consistency**: Not applicable.
R3-E1: Energy Efficient Development, and Renewable Energy Deployment Facilitation and Streamlining. Updating of codes and zoning requirements and guidelines to further implement green building practices. This could include incentives for energy efficient projects.	**Project Consistency**: Not applicable.

Energy Efficiency	Consistency Analysis
R3-L2: Heat Island Plan. Develop measures that address "heat islands." Potential measures include using strategically placed shade trees, using paving materials with a Solar Reflective Index of at least 29, an open grid pavement system, or covered parking.	**Project Consistency:** Consistent. The Project would comply with the City of Moreno Valley's landscaping requirements.
R2-W1: Water Use Reduction Initiative. Consider adopting a per capita water use reduction goal, which mandates the reduction of water use of 20 percent per capita with requirements applicable to new development and with cooperative support of the water agencies.	**Project Consistency**: Consistent. California Green Building Standards Code, Chapter 5, Division 5.3, Section 5.3030.2 requires that indoor water use be reduced by 20 percent. The Project would be consistent with this measure.
R3-W1: Water Efficiency Training and Education. Work with EMWS and local water companies to implement a public information and education program that promotes water conservation.	**Project Consistency:** Not applicable.
R2-S1: City Diversion Program. For Solid Waste, consider a target of increasing the waste diverted from the landfill to a total of 75 percent by 2020.	**Project Consistency:** Consistent. The Project would comply with the City of Moreno Valley's citywide goal of solid waste reduction. Additionally, the Project would be compliant with the MVMC Section 8.80.030 by implementing a waste management plan.

SOURCE: Ironwood Residential (TTM No. 37001), Greenhouse Gas Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

Overall, as the Project is consistent with the City's General Plan Air Quality Element and the City's Energy Efficiency and CAS, the Project would not conflict with any applicable plan, policy, or regulation to reduce GHG emissions. As such, a less than significant impact would occur.

VIII. Hazards and Hazardous Materials

The following impact analysis pertaining to hazards and hazardous materials impacts is based on information contained in the Phase I Environmental Site Assessment Ironwood Avenue Property – 75.1-Acres Northwest of Ironwood Avenue and Oliver Street APN 473-160-004-5 City of Moreno Valley, Riverside County, California 92555 *(herein referred to as the "Phase I ESA"), prepared by EEI Geotechnical & Environmental Solutions, dated October 15, 2014. The Phase I ESA is provided in Appendix F.*

Would the Project:

a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Less Than Significant Impact. Hazardous materials may be used during the construction phase of the Project. Hazardous materials that may be used include, but are not limited to, fuels (gasoline and diesel), paints and paint thinner, adhesives, surface coatings and possibly herbicides and pesticides. Generally, these materials would be used in concentrations that would not pose significant threats during the transport, use and storage of such materials. Furthermore, it is assumed that potentially hazardous materials would be contained, stored, and used in accordance with manufacturers' instructions and handled in compliance with applicable standards and regulations, including California Occupational Safety and Health Administration (OSHA) requirements, and Title 8 and Title 22 of the Code of California Regulations. Accordingly, risks associated with hazards to the public or environment posed by the transport, use or disposal of hazardous materials during construction are considered less than significant due to compliance with applicable and required standards and regulations.

Operation of the residential uses would involve the use and storage of small quantities of potentially hazardous materials in the form of cleaning solvents, painting supplies, pesticides for landscaping, and pool maintenance. These hazardous materials are regulated by stringent federal and State laws mandating the proper transport, use, and storage of hazardous materials in accordance with product labeling. The use and storage of these substances is not considered to present a health risk when used in accordance with manufacturer specifications and with compliance to applicable regulations.

Overall, based on the above, construction and operation of the Project would result in a less than significant impact with regard to routine transport, use, or disposal of hazardous materials relative to the safety of the public or the environment.

b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Less Than Significant Impact. The main objective of the Phase I ESA was to identify the presence, or likely presence, use, or release of hazardous substances or petroleum products as defined in the American Testing and Materials Practice E 1527 as a "recognized environmental condition" (REC). RECs include property uses that may indicate the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. In order to identify RECs at the Project site, the Phase I included: (1) a review of readily available documents which included topographic, geologic, and hydrogeologic conditions associated with the Project site; (2) a review of readily available maps, aerial photographs and other documents relative to historical Project site usage and development; (3) a review of readily available federal, State, County, and City documents and database files concerning hazardous material storage, generation and disposal, active and inactive landfills, existing environmental concerns, and associated permits related to the Project site and/or immediately adjacent sites; (4) a site reconnaissance to ascertain current conditions of the Project site; interviews with persons(s) knowledgeable of the Project site; and (5) the preparation of the Phase I ESA which presents the findings, conclusions, and recommendations. The findings of the Phase I ESA are listed below.

According to the Phase I ESA and based on the historical use review, with the exception of several unimproved roadways, the Project site has been historically undeveloped. Residential and agricultural development likely began in the site vicinity during the 1930s. Sanborn Fire Insurance maps were not available for the Project site indicating little or no development on the Project site or vicinity occurred prior to 1950. The City's Building and Safety Department, County of Riverside Department of Environmental Health, the California Department of Toxic Substances Control (DTSC), and the State Water Resources Control Board (SWRCB) were contacted as well as State and federal databases reviewed to determine if the Project site, or any adjacent properties, were listed as hazardous waste generators, underground storage tank (UST) releases, or as having other environmental concerns (i.e., spill, leak, or aboveground storage tank [AST]). Neither the Project site nor adjacent properties were listed on any of the databases researched. As the Project site is currently undeveloped land, the presence of asbestos-containing materials or lead-based paint are not considered environmental concerns. On October 6, 2014, a site reconnaissance was conducted to physically observe the Project site and adjoining properties for conditions indicating a potential environmental concern. No evidence of an environmental concern was recorded during the site reconnaissance. A Vapor Encroachment Screen (VES) was performed on the Project site as part of the Phase I ESA. The purpose was to evaluate if the Project site or adjacent properties store of dispose potential chemicals of concern or has documented releases that may migrate as vapors onto the Project site, as a result of contaminated soil and/or groundwater which may be present on or near the site (i.e., a vapor encroachment condition [VEC]). Based on the VES, the Phase I ESA concluded that a VEC for the Project site could be ruled out as a VEC does not, or is not, likely to exist due to the lack of known or suspected contaminated properties within the area of concern. In summary, the Phase I ESA has revealed no evidence of RECs in connection with the Project site.

Overall, based on the above, the Project would result in a less than significant impact with regard to reasonably foreseeable upset and accident conditions involving the release of hazardous materials relative to the safety of the public or the environment into the environment.

c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

Less Than Significant Impact. The Cloverdale Elementary School, located at 12050 Kitching Street, is located approximately 1.5 miles west of the Project site. The Palm Middle School, located at 11900 Swanson Avenue, is located approximately 1.25 miles west of the Project site. The Valley View High School, located at 13135 Nason Street, is located approximately 1.2 miles south of the Project site. As such, the Project site is not located within one-quarter mile of an existing or proposed school. Construction of the Project would involve the temporary use of hazardous substances in the form of paint, adhesives, surface coatings and other finishing materials, and cleaning agents, fuels, and oils. All materials would be used, stored, and disposed of in accordance with applicable laws and regulations and manufacturers' instructions.

Operation of the Project would not create a significant risk of exposure to hazardous materials for the public or the environment, including the schools. Occupancy of the residential uses would not cause hazardous substance emissions or generate hazardous waste. Types of hazardous materials to be used in association with the Project such as small quantities of potentially hazardous materials in the form of cleaning solvents, painting supplies, pesticides for landscaping, and pool maintenance would be contained, stored, and used in accordance with manufacturers' instructions and handled in compliance with applicable standards and regulations. Further, as discussed in Response VIII.b, the Phase I ESA has revealed no evidence of RECs in connection with the Project site. As such, the potential for creation of a significant hazard through handling or routine transport of hazardous materials or the release of hazardous materials into the environment within one-quarter mile of an existing or proposed school is considered less than significant.

d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

Less Than Significant Impact. Government Code Section 65962.5, amended in 1992, requires the California Environmental Protection Agency (CalEPA) to develop and update annually the Cortese List, which is a list of hazardous waste sites and other contaminated sites. While Government Code Section 65962.5 makes reference to the preparation of a list, many changes have occurred related to web-based information access since 1992 and information regarding the Cortese List is now compiled on the websites of the DTSC, the State Water Board, and CalEPA. The DTSC maintains the EnviroStor database, which includes sites on the Cortese List and also identifies potentially hazardous sites where cleanup actions (such as a removal action) or extensive investigations are planned or have occurred. The database provides a listing of Federal Superfund sites [National Priorities List (NPL)]; State Response sites; Voluntary Cleanup sites; and School Cleanup sites. Geotracker is the State Water Resources Control Board's data management system for managing sites that impact groundwater, especially those that require groundwater cleanup [USTs, Department of Defense, Site Cleanup Program] as well as permitted facilities such as operating USTs and land disposal sites. CalEPA's database includes lists of sites with active Cease and Desist Orders (CDO) or Cleanup and Abatement Orders (CAO) from the State Water Board.

As part of the Phase I ESA, a search was conducted for available federal, State, and local environmental database records for the Project site and where practicable, adjoining properties and nearby properties or surrounding areas within approximate minimum search distances from the Project site. The site's property records were also reviewed by the City's Building and Safety Department, County of Riverside Department of Environmental Health, DTSC, and SWRCB. According to the Phase I ESA, the Project site was not listed on any of the databases reviewed as having an environmental concern. As such, a less than significant impact would occur in this regard.

e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

f. For a project within the vicinity of a private airstrip, would the project result in a safety hazard for the people residing or working in the area?

No Impact (e and f). The Project site is not located within an airport land use plan or within two miles of a public or private airport. The nearest airport is the March Inland Port, a joint-use military and public airport, located approximately 5.15 miles southwest of the Project site. Therefore, the Project would not result in an airport-related safety hazard for people residing or working in the Project area, and no impact would occur in this regard.

g. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

Less Than Significant Impact. The Project site is located in an established rural area that is well served by the surrounding roadway network. While it is expected that the majority of construction activities for the Project would be confined on-site, construction activities may temporarily affect access on portions of adjacent streets during certain periods of the day. However, through-access for drivers, including emergency personnel, along all roads would still be provided. In these instances, the Project would implement traffic control measures (e.g., construction flagmen, signage, etc.) to maintain flow and access. Furthermore, in accordance with the City, the Project would develop a Construction Management Plan, which includes designation of a haul route, to ensure that adequate emergency access is maintained during construction. Therefore, construction is not expected to result in inadequate emergency access.

Project operation would generate traffic in the Project vicinity and would result in some modifications to access (i.e., street widening, new curb cuts for Project driveways) from the streets that surround the Project site. However, emergency access to the Project site and surrounding area would continue to be provided similar to existing conditions. Emergency vehicles and fire access would be provided from the primary driveway for the Project site located on Ironwood Avenue about mid-block between Nason Street and Oliver Street, immediately opposite from and north of Lantz Lane. Secondary site access would be provided by driveways on both Nason Street and Oliver Street just north of Ironwood Avenue. Future street widening, driveway, and building configurations would comply with applicable fire code requirements for emergency evacuation. Subject to review and approval of Project site access and circulation plans by the Moreno Valley Fire Department (MVFD), the Project would not impair implementation or physically interfere with adopted emergency response or emergency evacuation plans. Since the Project would not cause significant impediments along a designated emergency evacuation route, and the proposed residential uses would not impair implementation of the City's emergency response plan, the Project would have a less than significant impact with respect to these issues.

h. Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

Less Than Significant Impact With Mitigation Incorporated. According to Figure 5.5-2, Floodplains and High Fire Hazard Areas, of the GP FEIR, the Project site is located in a very high fire hazard severity zone (VHFHSZ). Section XIV, *Public Services*, Response XIV.a, below, describes fire protection services and facilities that serve the Project site and evaluates the ability of the service providers to provide fire protection service to the Project site. The analysis below focuses on the potential for the Project to expose people and structures to wildland fire hazards. This impact is considered potentially significant given the site's designation and location adjacent to wildlands.

Development of the Project would require compliance with development designs, applicable provisions, and safety requirements of Title 8, Buildings and Construction, Chapter 8.36, International Fire Code (herein referred to as the "Fire Code").[13] Fuel modification zone areas are proposed on the north side of the Project site, which would be implemented pursuant to the Project-specific Fuel Modification Plan prepared for the Project in accordance with the *General Guidelines for Creating Defensible Space* prepared by the California Department of Forestry and Fire Protection (CDFFP).[14] The conceptual fuel modification zones for the Project are illustrated below in **Figure VIII-1**, *Preliminary Fuel* Modification *Plan*, which also specifies the applicable guidelines for vegetation removal, establishment of fire breaks, types of plantings, and the spacing, clearance, and maintenance of the fuel modification zones. In addition, it should be noted that the removal and/or preservation of plants and trees as part of the Project's Fuel Modification Plan would be subject to review and approval by the City's Fuel Management Officer and/or the Moreno Valley Fire Department (MVFD). Maintenance of the fuel modification zones pursuant to the approved Fuel Modification Plan would be the responsibility of the Ironwood Village HOA(s). The 20-foot-wide fire access road/multi-use trail that traverses along the northern edge of the developed portion of the Project would be incorporated into the final Fuel Modification Plan for the Project.

All landscaping within the Project would comply with the City's Landscape and Irrigation Standards Section 9.17.030 of the MVMC. Given implementation of an approved final Fuel Modification Plan, as required by MM HAZ-1 below, impacts related to wildland fire hazards would be reduced to less than significant.

Mitigation Measures

> **MM HAZ-1:** The Project applicant shall implement a Project-specific Fuel Modification Plan based on the *General Guidelines for Creating Defensible Space* prepared by the California Department of Forestry and Fire Protection (2006). The Fuel Modification Plan shall be subject to review and approval by the Moreno Valley Fire Department.

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[13] Per Title 8, Buildings and Construction, Chapter 8.36, International Fire Code, Section 8.36.020, Adoption of the International Fire Code, the City adopted the 2012 Edition of the International Fire Code, California Fire Code 2013 Edition, California Code of Regulations Title 24, Part 9, Appendices Chapter 4, A, B, BB, C, CC, E, F, G, and H, the California Fire Code Standards and the body of code in its entirety, with the exception of Appendices D, I, and J of the California Fire Code as compiled and adopted by the International Code Council.

[14] State Board of Forestry and Fire Protection (BOF) California Department of Forestry and Fire Protection, "General Guidelines for Creating Defensible Space", Adopted by BOF on February 8, 2006, Approved by Office of Administrative Law on May 8, 2006.

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FUEL TREATMENT GUIDELINES

THE FOLLOWING FUEL TREATMENT GUIDELINES COMPLY WITH THE REQUIREMENTS OF 14 CCR 1299 AND PRC 4291. ALL PERSONS USING THESE GUIDELINES TO COMPLY WITH CCR 1299 AND PRC 4291 SHALL IMPLEMENT GENERAL GUIDELINES 1., 2., 3., AND EITHER 4A OR 4B., AS DESCRIBED BELOW.

GENERAL GUIDELINES:

1. MAINTAIN A FIREBREAK BY REMOVING AND CLEARING AWAY ALL FLAMMABLE VEGETATION AND OTHER COMBUSTIBLE GROWTH WITHIN 30 FEET OF EACH BUILDING OR STRUCTURE, WITH CERTAIN EXCEPTIONS PURSUANT TO PRC §4291(A). SINGLE SPECIMENS OF TREES OR OTHER VEGETATION MAY BE RETAINED PROVIDED THEY ARE WELL-SPACED, WELL-PRUNED, AND CREATE A CONDITION THAT AVOIDS SPREAD OF FIRE TO OTHER VEGETATION OR TO A BUILDING OR STRUCTURE.
2. DEAD AND DYING WOODY SURFACE FUELS AND AERIAL FUELS WITHIN THE REDUCED FUEL ZONE SHALL BE REMOVED. LOOSE SURFACE LITTER, NORMALLY CONSISTING OF FALLEN LEAVES OR NEEDLES, TWIGS, BARK, CONES, AND SMALL BRANCHES, SHALL BE PERMITTED TO A DEPTH OF 3 INCHES. THIS GUIDELINE IS PRIMARILY INTENDED TO ELIMINATE TREES, BUSHES, SHRUBS AND SURFACE DEBRIS THAT ARE COMPLETELY DEAD OR WITH SUBSTANTIAL AMOUNTS OF DEAD BRANCHES OR LEAVES/NEEDLES THAT WOULD READILY BURN.
3. DOWN LOGS OR STUMPS ANYWHERE WITHIN 100 FEET FROM THE BUILDING OR STRUCTURE, WHEN EMBEDDED IN THE SOIL, MAY BE RETAINED WHEN ISOLATED FROM OTHER VEGETATION. OCCASIONAL (APPROXIMATELY ONE PER ACRE) STANDING DEAD TREES (SNAGS) THAT ARE WELL-SPACE FROM OTHER VEGETATION AND WHICH WILL NOT FALL ON BUILDINGS OR STRUCTURES OR ON ROADWAYS/DRIVEWAYS MAY BE RETAINED.
4. WITHIN THE REDUCED FUEL ZONE, ONE OF THE FOLLOWING FUEL TREATMENTS (4A. OR 4B.) SHALL BE IMPLEMENTED. PROPERTIES WITH GREATER FIRE HAZARDS WILL REQUIRE GREATER CLEARING TREATMENTS. COMBINATIONS OF THE METHODS MAY BE ACCEPTABLE UNDER §1299(C) AS LONG AS THE INTENT OF THESE GUIDELINES IS MET.

4A. REDUCED FUEL ZONE: FUEL SEPARATION

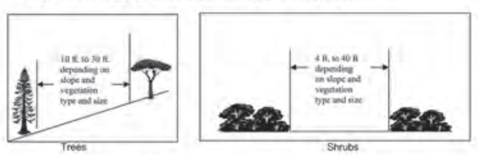
IN CONJUNCTION WITH GENERAL GUIDELINES 1., 2., AND 3., ABOVE, MINIMUM CLEARANCE BETWEEN FUELS SURROUNDING EACH BUILDING OR STRUCTURE WILL RANGE FROM 4 FEET TO 40 FEET IN ALL DIRECTIONS, BOTH HORIZONTALLY AND VERTICALLY.

CLEARANCE DISTANCES BETWEEN VEGETATION WILL DEPEND ON THE SLOPE, VEGETATION SIZE, VEGETATION TYPE (BRUSH, GRASS, TREES), AND OTHER FUEL CHARACTERISTICS (FUEL COMPACTION, CHEMICAL CONTENT ETC.). PROPERTIES WITH GREATER FIRE HAZARDS WILL REQUIRE GREATER SEPARATION BETWEEN FUELS. FOR EXAMPLE, PROPERTIES ON STEEP SLOPES HAVING LARGE SIZED VEGETATION WILL REQUIRE GREATER SPACING BETWEEN INDIVIDUAL TREES AND BUSHES (SEE PLANT SPACING GUIDELINES AND CASE EXAMPLES BELOW). GROUPS OF VEGETATION (NUMEROUS PLANTS GROWING TOGETHER LESS THAN 10 FEET IN TOTAL FOLIAGE WIDTH) MAY BE TREATED AS A SINGLE PLANT. FOR EXAMPLE, THREE INDIVIDUAL MANZANITA PLANTS GROWING TOGETHER WITH A TOTAL FOLIAGE WIDTH OF EIGHT FEET CAN BE "GROUPED" AND CONSIDERED AS ONE PLANT AND SPACED ACCORDING TO THE PLANT SPACING GUIDELINES IN THIS DOCUMENT.

GRASS GENERALLY SHOULD NOT EXCEED 4 INCHES IN HEIGHT. HOWEVER, HOMEOWNERS MAY KEEP GRASS AND OTHER FORBS LESS THAN 18 INCHES IN HEIGHT ABOVE THE GROUND WHEN THESE GRASSES ARE ISOLATED FROM OTHER FUELS OR WHERE NECESSARY TO STABILIZE THE SOIL AND PREVENT EROSION.

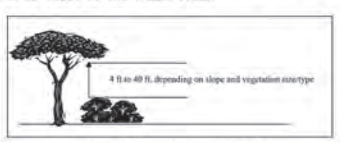
CLEARANCE REQUIREMENTS INCLUDE:

- HORIZONTAL CLEARANCE BETWEEN AERIAL FUELS, SUCH AS THE OUTSIDE EDGE OF THE TREE CROWNS OR HIGH BRUSH. HORIZONTAL CLEARANCE HELPS STOP THE SPREAD OF FIRE FROM ONE FUEL TO THE NEXT.



Horizontal clearance between aerial fuels

- VERTICAL CLEARANCE BETWEEN LOWER LIMBS OF AERIAL FUELS AND THE NEAREST SURFACE FUELS AND GRASS/WEEDS. VERTICAL CLEARANCE REMOVES LADDER FUELS AND HELPS PREVENT A FIRE FROM MOVING FROM THE SHORTER FUELS TO THE TALLER FUELS.



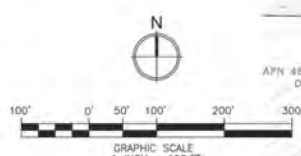
Vertical clearance between aerial fuels

Plant Spacing Guidelines

Guidelines are designed to break the continuity of fuels and be used as a "rule of thumb" for achieving compliance with Regulation 14 CCR 1299.

Trees	**Minimum horizontal space from edge of one tree canopy to the edge of the next**	
	Slope	Spacing
	0% to 20 %	10 feet
	20% to 40%	20 feet
	Greater than 40%	30 feet
Shrubs	**Minimum horizontal space between edges of shrub**	
	Slope	Spacing
	0% to 20 %	2 times the height of the shrub
	20% to 40%	4 times the height of the shrub
	Greater than 40%	6 times the height of the shrub
Vertical Space	**Minimum vertical space between top of shrub and bottom of lower tree branches:** 3 times the height of the shrub	

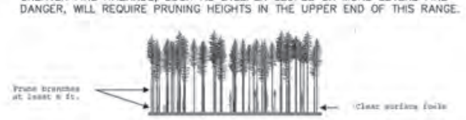
Adapted from: Gilmer, M. 1994. California Wildfire Landscaping



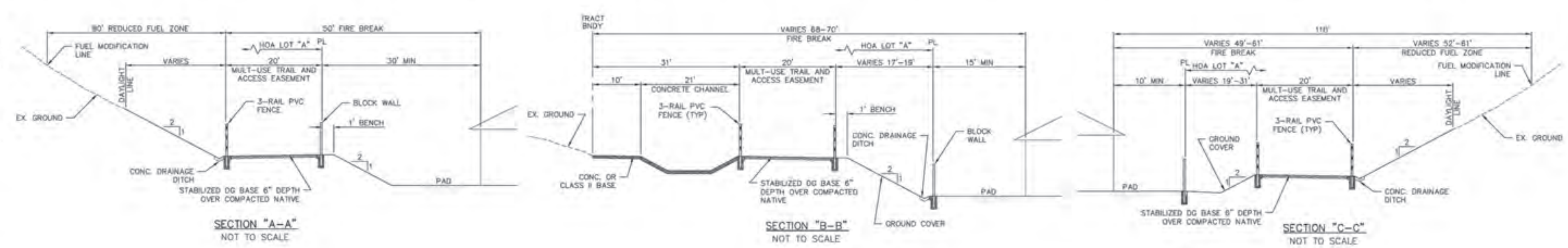
4B. REDUCED FUEL ZONE: DEFENSIBLE SPACE WITH CONTINUOUS TREE CANOPY TO ACHIEVE DEFENSIBLE SPACE WHILE RETAINING A STAND OF LARGER TREES WITH CONTINUOUS TREE CANOPY APPLY THE FOLLOWING TREATMENTS:

GENERALLY, REMOVE ALL SURFACE FUELS GREATER THAN 4 INCHES IN HEIGHT. SINGLE SPECIMENS OF TREES OR OTHER VEGETATION MAY BE RETAINED PROVIDED THEY ARE WELL-SPACED, WELL-PRUNED, AND CREATE A CONDITION THAT AVOIDS SPREAD OF FIRE TO OTHER VEGETATION OR TO A BUILDING OR STRUCTURE.

REMOVE LOWER LIMBS OF TREES ("PRUNE") TO AT LEAST 6 FEET UP TO 15 FEET (OR THE LOWER 1/3 BRANCHES FOR SMALL TREES). PROPERTIES WITH GREATER FIRE HAZARDS, SUCH AS STEEPER SLOPES OR MORE SEVERE FIRE DANGER, WILL REQUIRE PRUNING HEIGHTS IN THE UPPER END OF THIS RANGE.



Defensible Space retaining continuous trees



SOURCE: Anderson Consulting Engineers, Inc., 2016

Ironwood Village Project
Figure VIII-1
Preliminary Fuel Modification Plan

ESA PCR

IX. Hydrology and Water Quality

The following impact analysis pertaining to hydrology and water quality is based on information contained in the Preliminary Hydrology and Hydraulic Study for Tentative Tract Map 37001 Ironwood *(herein referred to as the "Preliminary Hydrology Study"), prepared by JLC Engineering & Consulting, Inc., dated June 17, 2016 and the* Project Specific Water Quality Management Plan *(herein referred to as the "WQMP"), prepared by JLC Engineering & Consulting, Inc., dated September 29, 2015. The Preliminary Hydrology Study and WQMP are provided in Appendix G of this Initial Study.*

Preliminary Hydrology Study Summary

The purpose of the Preliminary Hydrology Study was to determine the preliminary drainage improvements required to provide flood protection to the on-site area from the flows emanating from the on-site and off-site areas that drain into or across the Project site. Additionally, the study determined the preliminary drainage improvements required to convey the on-site flows to the two proposed on-site stormwater detention basins. The scope of the study includes the following: (1) determine the peak 100-year and 10-year flow rates for the existing condition watershed using the Riverside County Flood Control and Water Conservation District (RCFC & WCD) Rational Method; (2) determine the 100-year and 10-year flow rates for the post-Project condition on-site and off-site areas using the RCFC & WCD Rational Method; (3) determine the 2-year, 24-hour storm duration peak flow rates for the pre-Project and post-Project areas tributary to each basin using the RCFC & WCD Unit Hydrograph Method; (4) determine the 100-year, 1-hour peak flow rate for the on-site and off-site areas tributary to the basins using the RCFC & WCD Unit Hydrograph Method; (5) determine the existing condition flow rates tributary to the existing culverts, and perform a Hydrologic Engineering Center's River Analysis System ("HEC-RAS") analysis for the existing conditions regarding flooding; (6) determine the post-Project condition flow rates tributary to the existing culverts and streams based upon the proposed basin mitigation, and perform HEC-RAS analyses for the post-Project condition; (7) develop preliminary storm drain alignments and sizes required to flood protect the Project site from off-site and on-site flows; and (8) determine the required water quality volume to be treated and the required storage volume of the basins to address the hydrologic conditions of concern ("HCOCs") addressed in the Project WQMP.

Project Site Stormwater Drainage Overview

The Project proposes to collect all on-site and off-site stormwater flows via a subsurface storm drain system. A portion of the northerly Project boundary would enter the off-site storm drain system for the peak 100-year flow rate only. Low-flow pipes would be provided to divert the flow up to the 2-year, 24-hour flow rate into the basin prior to comingling with off-site flows for water quality treatment and mitigation of the HCOCs. The majority of the off-site flows would be conveyed to one of the two downstream culverts located at Ironwood Avenue. Flow-by structures would be utilized within the basins that allow for a certain flow rate to bypass downstream to the existing culvert crossing Ironwood Avenue, and the remaining flow to overtop into the basins for retention. This would ensure that the Project does not adversely impact downstream existing properties and streams. Analyses have been performed to demonstrate that flows leaving the Project site would not increase relative to existing conditions, and would actually decrease in the post-Project condition. Detailed basin routing analyses would be performed during final engineering.

The majority of the flows westerly off-site area would be conveyed directly to an existing culvert without passing through one of the basins. The flows in excess of the existing downstream culvert capacity would be collected within a storm drain system along Nason Street, which would allow flows to bubble out into Nason Street south of Ironwood Avenue.

The Project site is tributary to three existing culverts crossing Ironwood Avenue. Per a meeting with the City of Moreno Valley, the Project must mitigate the peak 100-year flow rates tributary to these three existing culverts to a maximum flow rate equal to the existing capacity of these culverts. Therefore, the basins would also serve to mitigate the 100-year storm event so that the existing culvert capacities are not exceeded.

Hydrology Analysis

Pre-Project Hydrology

The pre-Project condition rational method analysis has been included in Appendix A of the Preliminary Hydrology Study, and the pre-Project condition rational method hydrology map has been included as **Figure IX-1**, *Existing Hydrology Map*, below. The off-site areas were analyzed for the existing land use as undeveloped, poor cover, as recommended by the Riverside County Hydrology Manual.

The existing watershed areas were designated as Areas A, B, C, and D, as shown below in Figure IX-1. Area “A” is tributary to the existing 42-inch culvert westerly along Ironwood Avenue (Culvert A1), Area “B” is tributary to the existing 42-inch culvert midway between Nason Street and Oliver Street along Ironwood Avenue (Culvert B1), and Area C is tributary to the easterly 24-inch culvert along Ironwood Avenue (Culvert C1, see Figure IX-1 below for existing culvert locations). Downstream of Ironwood Avenue, Areas A, B, and C confluence within the natural channel. Area D consists of the most easterly area within the watershed boundary, and is tributary to an existing culvert east of Oliver Street.

SOURCE: JLC Engineering & Consulting, Inc., 2016

Ironwood Village Project

Figure IX-1
Existing Hydrology Map

ESA PCR

Post-Project Hydrology

The rational method hydrology calculations for the post-Project condition have been included in Appendix B of the Preliminary Hydrology Study, and the post-Project condition hydrology maps have been included as **Figure IX-2**, *Proposed On-Site Hydrology Map*, and **Figure IX-3**, *Proposed Off-Site Hydrology Map*. The post-Project condition on-site and off-site rational method hydrology analyses were performed for five watershed areas designated as Areas A, B, C, D and E. As shown in Figures IX-2 and IX-3, Area A is the area tributary to Basin A1 and A2, Area B is tributary to Basin B, Areas C and D are tributary to the west side of Oliver Street, and Area E is tributary to the intersection of Nason Street and Ironwood Avenue.

The unit hydrograph calculations analyzed five different areas (as shown on Exhibit C and Exhibit D of the Preliminary Hydrology Study):

- Off-site Area "A" – Off-site Area A (30.79 acres) is the area tributary to the flow-by structure located within Basin A1, and discharges into Culvert B1. Off-site Area A was analyzed for the 100-year storm events only.

- Off-site Area "B" – Off-site Area B (73.03 acres) is tributary to the flow-by structure located in Basin A2, and discharges into Culvert B1. Off-site Area B was analyzed for the 100-year storm events only.

- On-site Area "A1" – On-site Area A1 (17.86 acres for the 100-year storm event and 25.15 acres for the Water Quality Area and 2-year, 24-hour storm event) is tributary to Basin A1. The areas differ between the 100-year and 2-year storm events due to the low-flow storm drain systems incorporated at Node 118 and node 121. These systems would be designed to by-pass the low-flows up to the 2-year, 24-hour storm duration so that the flows would not enter the off-site storm drain system, and rather be collected by the on-site systems that discharge the entire flow rate directly into Basin A. This would ensure that the entire on-site area is treated for water quality purposes and mitigated for the HCOCs.

- On-site Area "A2" - On-site Area A2 (23.24 acres for the 100-year storm event and 29.70 acres for the Water Quality Area and 2-year, 24-hour storm event) is tributary to Basin A2. The areas differ between the 100-year and 2-year storm events due to the low-flow storm drain systems incorporated at Node 145 and node 148 (see Figure IX-1). These systems would be designed to by-pass the low-flows up to the 2-year, 24-hour storm duration so that the flows would not enter the off-site storm drain system, and rather be collected by the on-site systems that discharge the entire flow rate directly into Basin A2. This would ensure that the entire on-site area is treated for water quality purposes and mitigated for the HCOCs.

- On-site Area "B" – On-site Area B is the area tributary to Basin B (15.65 acres), and includes the total rational method Area B watershed. This area was used for the water quality analysis for Basin B and for the 2-year, 24-hour unit hydrograph analysis for Basin B. The area for the water quality, 2-year, 24-hour unit hydrograph and the 100-year unit hydrograph are the same.

The unit hydrograph hydrology maps for the 100-year storm events and the 2-year, 24-hour storm duration have been included as Exhibits C and D, respectively, of the Preliminary Hydrology Study. The 100-year unit hydrograph calculations have been included in Appendix D of the

Preliminary Hydrology Study, while the pre-Project and post-Project 2-year, 24-hour unit hydrograph calculations have been included in Appendix C of the Preliminary Hydrology Study.

HEC-RAS Analyses

HEC-RAS analyses were performed for the existing condition flow rates and the post-Project condition flow rates to determine the flooding limits for both conditions. Two streams were identified in the HEC-RAS analysis, which are depicted in Exhibits K and L in the Preliminary Hydrology Study, and have been designated as the Main Channel and the Westerly Channel. The Main Channel collects flows from Culverts B1 and C1, and the Westerly Channel collects flows from A1.

Existing Condition Results

The existing condition HEC-RAS modeled the streams to four sections upstream of Ironwood Avenue to a point where flows enter a culvert at Darlene Drive. The flows were then modeled through the culverts traversing Ironwood Avenue. Based upon the HEC-RAS results, the flows would overtop the roadway at Culvert B1 (with 111.1 cubic feet per second [cfs] overtopping the roadway and the remaining 131.3 cfs passing through Culvert B1).

The flows would also overtop the roadway at the culvert crossing Walfred Way (with 149.5 cfs overtopping the roadway and the remaining 167.9 cfs passing through the culvert). Therefore the capacity for Culvert B1 is 131.3 cfs, and would be utilized as the maximum allowable flow rate that can be discharged from the Project site into Culvert B1.

The culvert crossing Lantz Lane does not have capacity to convey the tributary flow of 87.2 cfs. Based upon iterations with the HEC-RAS analyses, a total of 46.0 cfs can be conveyed through the culvert, and 41.2 cfs overtops Lantz Lane and is conveyed southerly within Lantz Lane.

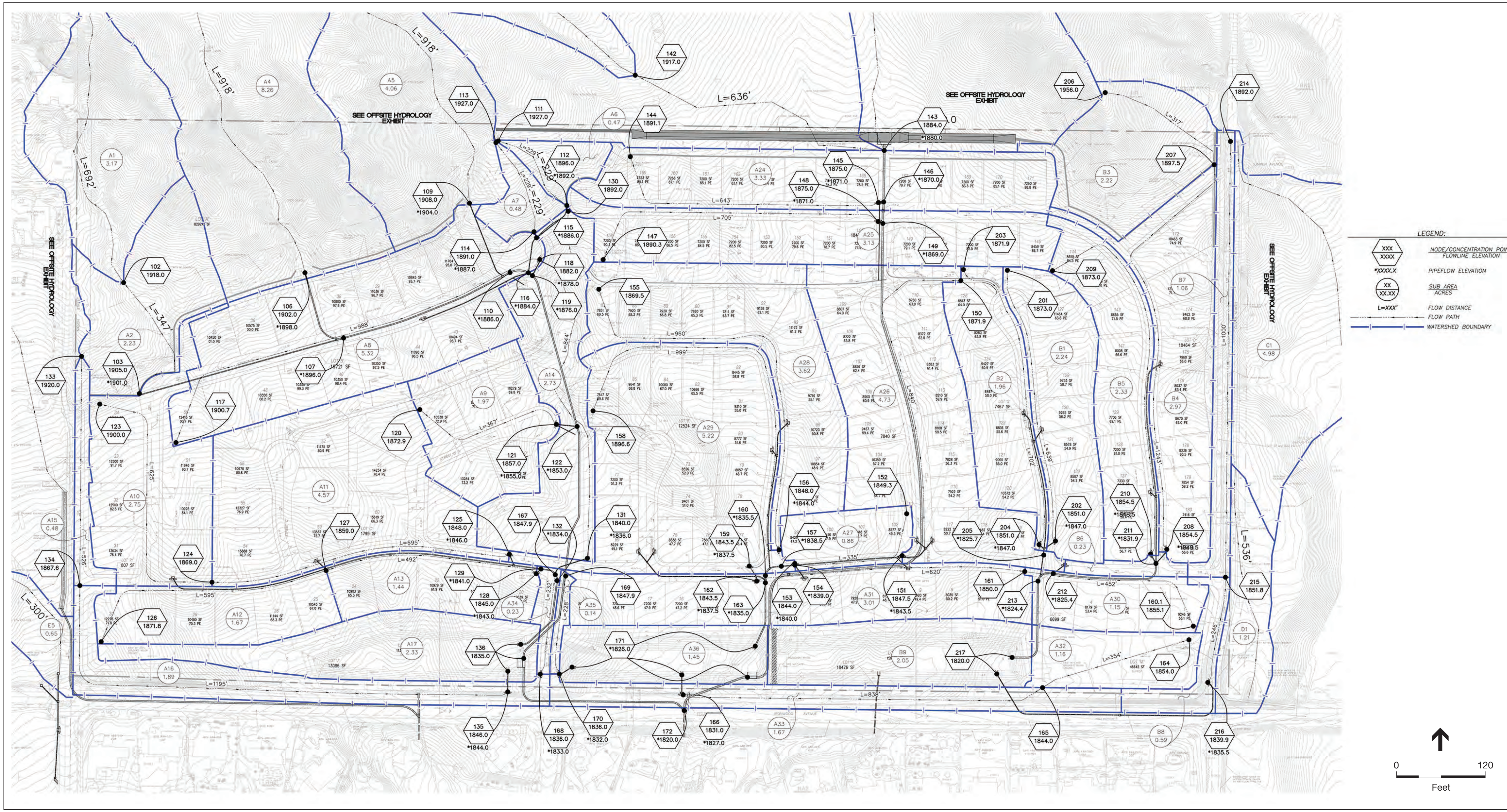
The existing condition HEC-RAS flood plain has been delineated on Exhibit K of the Preliminary Hydrology Study, and the existing condition HEC-RAS calculations has been included in Appendix H of the study.

Post-Project Condition Results

The post-Project condition HEC-RAS modeled the streams from Ironwood Avenue to a point where flows enter a culvert at Darlene Drive. The starting flow rates for the post-Project condition are equal to the flows discharging from Culverts A1 and B1. A detailed discussion for the post-Project flow rates used in the HEC-RAS analyses has been provided in Section VI of the Preliminary Hydrology Study.

Based upon the HEC-RAS results, the flows at Walfred Lane would overtop the roadway, with 1.1 cfs overtopping the roadway and the remaining 150.5 cfs passing through the culvert.

The HEC-RAS results indicate that flows would break out at the culvert crossing Lantz Lane, as also determined in the existing condition HEC-RAS. The flow rate was decreased from 87.2 cfs until the flows no longer overtopped the roadway. The flow rate that would be conveyed through the culvert and not overtop the roadway is 46.0 cfs, and the remaining 41.2 cfs would be conveyed southerly down Lantz Lane.



SOURCE: JLC Engineering & Consulting, Inc., 2016

Ironwood Village Project

Figure IX-2

Proposed On-Site Hydrology Map

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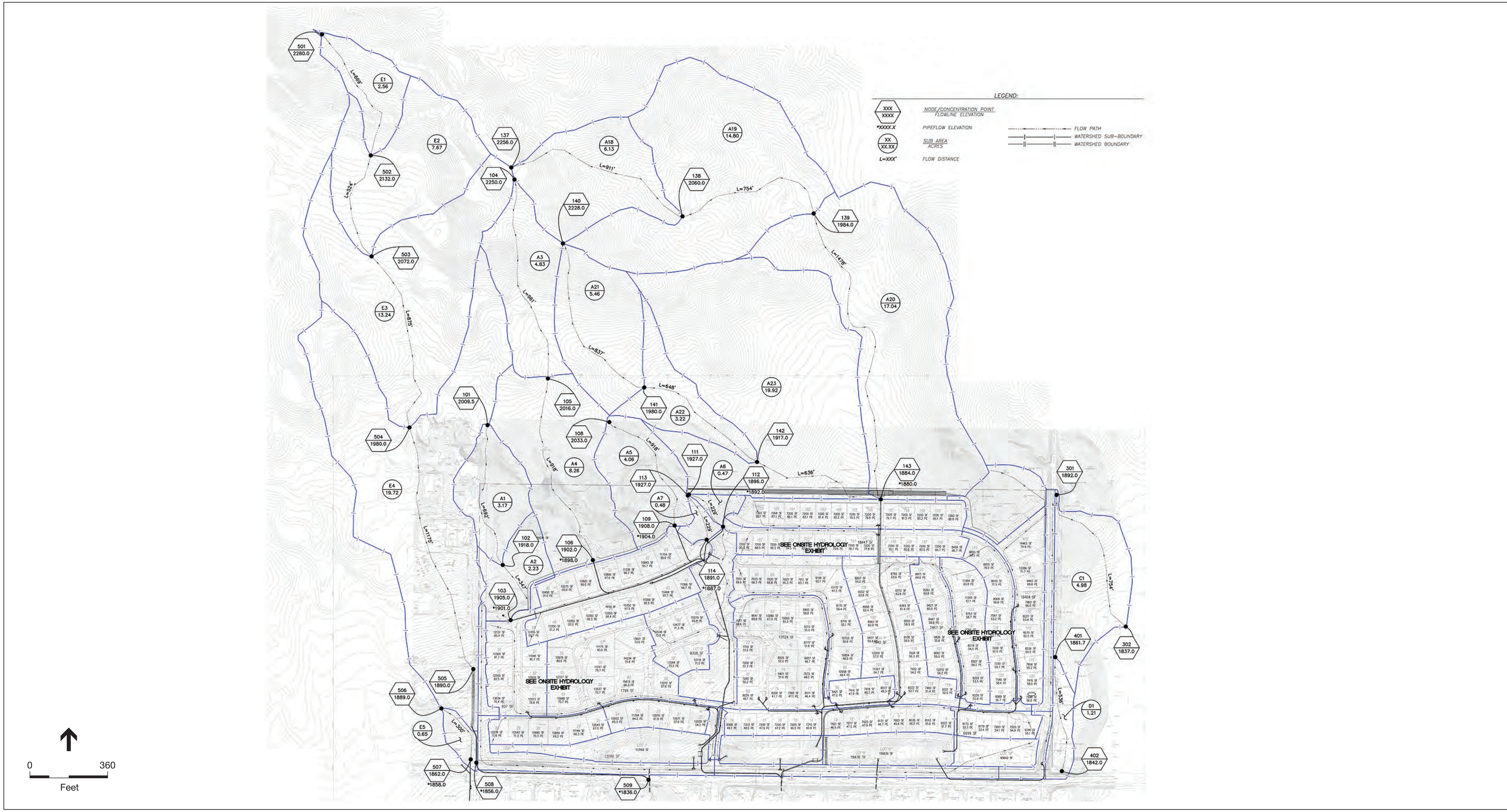


SOURCE: JLC Engineering & Consulting, Inc., 2016

Ironwood Village Project

Figure IX-3

Proposed Off-Site Hydrology Map

ESA PCR

The HEC-RAS calculations have been included in Appendix H of the Preliminary Hydrology Study and the flood plain delineation has been shown on Exhibit L of the report.

Existing Flooding Analysis

An existing condition rational method hydrology was performed for the area tributary to the natural streams upstream and downstream of Ironwood Avenue. Currently, as shown in Figure IX-1 above, there are three culverts crossing Ironwood Avenue, designated as Culvert A1 (the westerly 42-inch CMP Culvert), Culvert B1 (the easterly 42-inch CMP Culver) and Culvert C1 (the easterly 24-inch CMP Culvert). **Figure IX-4**, *Flow Rate Analyses*, below, summarizes the flow rate analyses, and the following paragraphs provide detailed descriptions of the analyses.

Point 1 is located at the intersection of Ironwood Avenue and Nason Street. The existing condition flow rate is 89.7 cfs per the existing condition rational method calculations at node 104 to 108 (see Figure IX-1 above). Capacity calculations were performed for the north and south sides of Ironwood Avenue to determine the amount of flow that would be conveyed to the east within Ironwood Avenue. The north side of Ironwood Avenue would discharge into the natural stream tributary to Culvert A1, and has a capacity of 33.6 cfs. The south side of Ironwood Avenue would discharge at the low-point on the south side of Culvert B1, and has a capacity of 21.6 cfs. The remaining 34.5 cfs, which overtops the Ironwood Avenue Centerline, would be conveyed in a southerly direction along Nason Street.

Point 2 is the upstream end of Culvert A1, and has a flow rate of 75.8 cfs. This flow rate was determined by taking the existing condition flow rate from the rational method calculations at nodes 107 to 108 of 42.2 cfs, and adding the 33.6 cfs from the north side of Ironwood Avenue. This flow rate would be conveyed to the south side of Ironwood, as the capacity of Culvert A1 based upon the nomographs is 78.0 cfs.

Point 3 is located downstream of Culvert A1, and has a flow rate equal to the existing condition flow rate at nodes 109-215 of 142.1 cfs, minus the 21.6 cfs conveyed easterly in the southerly half of Ironwood Avenue to the low-point on Ironwood Avenue and minus the 33.4 cfs splitting to the south along Nason Street, for a total flow rate within this channel of 87.2 cfs.

Point 4 is located downstream of the culvert crossing Lantz Lane. Based upon iterations with the HEC-RAS model, a total of 46.0 cfs can be conveyed through the culvert, and the remaining 41.2 cfs would overtop and split to the south along Lantz Lane.

Point 5 is the upstream point of Cuvert B1 which has a tributary flow rate of 241.6 cfs per the existing condition rational method calculations at Node 212 (see Figure IX-1). However, Culvert B1 has a capacity of 131.3 cfs per the HEC-RAS calculations, therefore the remaining flows would overtop the roadway. Since Ironwood Avenue is a low point at the Culvert B1 crossing, all flows overtopping Ironwood Avenue would enter the stream downstream of Culvert B1.

Point 6 is the upstream point of Culvert C1, which has an existing condition flow rate of 39.2 cfs at node 303. The capacity of Culvert C1 based upon the nomograph is 40.0 cfs, therefore all 39.2 cfs would be conveyed through the culvert. Both Culverts B1 and C1 are tributary to Point 7.

The flow rate at **Point 7**, which is the location upstream of the culvert crossing Walfred Way, was determined by taking the flow rate from the existing condition rational method calculations at node 214 of 295.8 cfs (which is the confluence point for Culvert B1 and C1 flows), and adding the flows from the south side of Ironwood Avenue of 21.6 cfs, resulting in a total tributary flow rate of 317.4 cfs.

This flow rate is conveyed to **Point 8**, which is downstream of the culvert crossing Walfred Way. Based upon the HEC-RAS analyses, the flows at this culvert would overtop the roadway, however, the roadway incorporates a low point at this location, and therefore all flows would continue to the south side of the culvert crossing.

Point 9 is the location where Point 4 and Point 8 flows confluence. The flow rate at this location was determined by taking the existing condition flow rate at node 216 of 489.0 cfs, and subtracting the 33.4 cfs that splits southerly along Nason Avenue and the 41.2 cfs that splits southerly along Lantz Lane, resulting in a total flow rate of 414.5 cfs at Point 9.

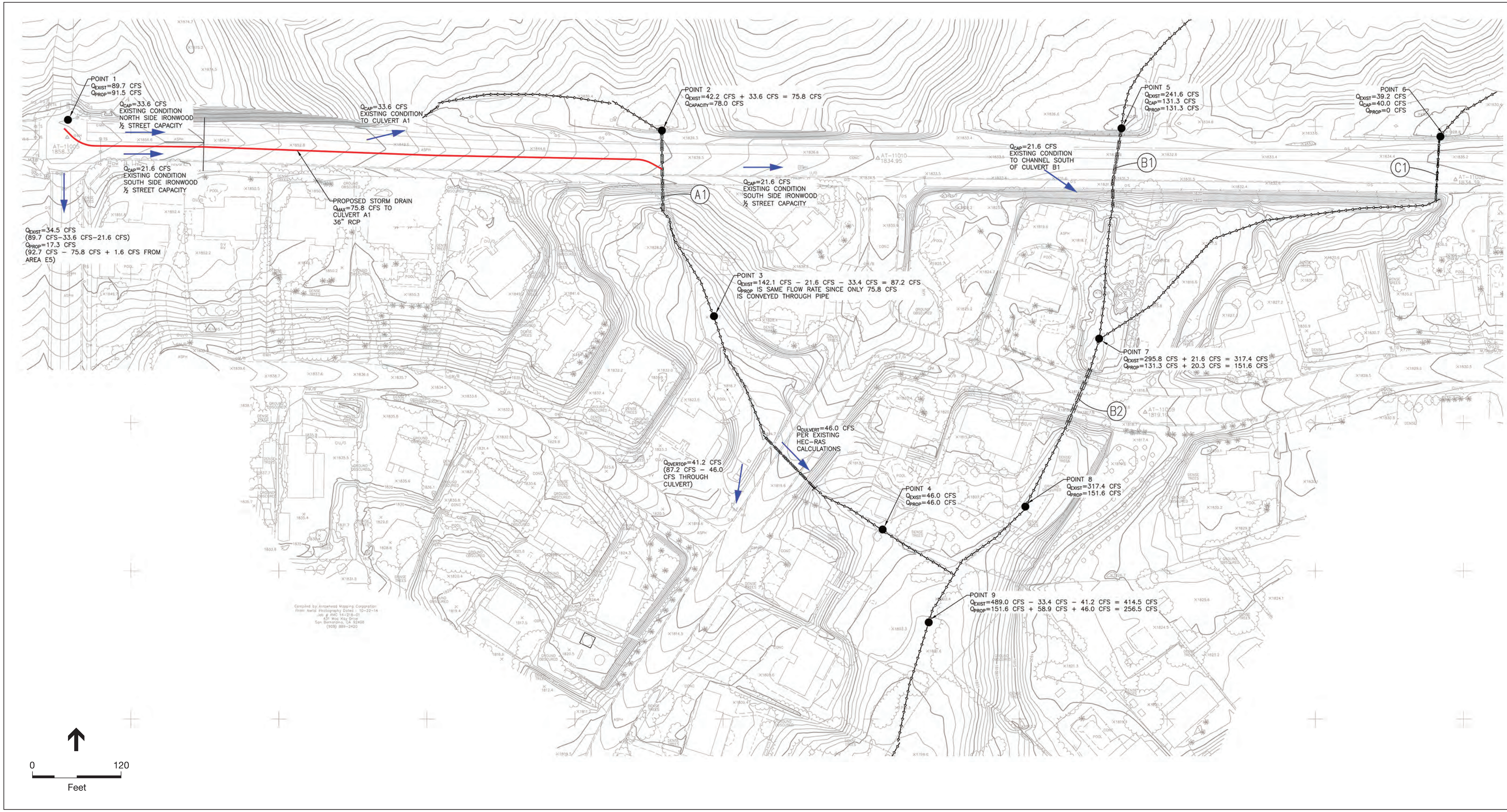
These flow rates were utilized in the HEC-RAS analyses for the existing condition, which is discussed in the HEC-RAS section below. The normal depth calculations for the street capacities of Ironwood Avenue have been included in Appendix I of the Preliminary Hydrology Study.

Post-Project Condition Flow Rate and Mitigation Analyses

Since the post-Project condition would implement basins and flow-by structures to mitigate runoff, unit hydrograph calculations were required in order to appropriately size the basins. The rational method calculations are utilized for the sizing of storm drain and for the HEC-RAS flood plain analyses.

Based upon the HEC-RAS analyses for the existing condition, the post-Project condition sends 75.8 cfs through Culvert A1, which is the existing condition flow rate for Culvert A1 and Culvert B1 can convey a total of 131.3 cfs. These flow rates are based upon the rational method hydrology analyses. In order to determine the rational method flow rate for each storm drain discharging from the splitter structure, the ratio of the two peak flow rates to each basin was determined. The 67.5 cfs tributary to the splitter structure within Basin A1 is 31.4% of the total flow rate tributary to Culvert B1 (67.5 cfs ÷ 215.3 cfs). The Basin A2 splitter structure has 68.6% of the total tributary flow rate. Therefore, each basin would contribute this percentage of the allowable flow rate. Basin A1 would discharge 31.4% of the allowable flow rate tributary to Culvert B1 and Basin A2 would discharge 68.6% of the allowable flow rate tributary to Culvert B1, resulting in 41.2 cfs for Basin A1 and 90.1 cfs for Basin A2.

Off-site Area E has a total flow rate at node 505 of 91.5 cfs in the post-Project condition. Since Culvert A1 has an existing condition flow rate of 75.8 cfs, a structure would be designed at Node 505 such that 75.8 cfs would enter the storm drain system and the remaining 15.7 cfs would overtop to inlets provided at the intersection of Nason Street and Ironwood Avenue.



SOURCE: JLC Engineering & Consulting, Inc., 2016

Ironwood Village Project

Figure IX-4

Flow Rate Analyses

ESA PCR

Culvert B1 (Basins A2 an A1) has a total 100-year rational method tributary flow rate of 67.5 cfs from Off-site Area A at node 122 and 147.8 cfs from Off-site Area B at node 149, for a total tributary flow rate of 215.3 cfs, which is greater than the 131.3 cfs allowable for Culvert B1. Therefore, two flow-by structures would be required within Basins A1 and A2 to allow a limited amount of flow to bypass, and the remaining flow and volume to overtop into the basins. To determine the volume required to be stored in order to mitigate the flows, unit hydrograph calculations were required. In order to more appropriately compare the unit hydrograph flow rates and the rational method flow rates for the area, the ratio of the allowable rational method flow rate out (131.3 cfs) compared to the inflow rational method flow rate (215.3 cfs) was determined, and is equal to 61.0%. This percentage was multiplied by the peak unit hydrograph flow rates for the 100-year, 1-hour storm duration to determine the equivalent allowable flow rate to by-pass for the unit hydrograph calculations. The 100-year, 1-hour unit hydrograph for off-site area A resulted in a peak flow rate of 74.7 cfs and off-site area B resulted in a peak flow rate of 159.9 cfs. Taking 61.0% of these flows results in 45.6 cfs allowable to discharge from Basin A1, and 97.5 cfs to discharge from Basin A2. When comparing these allowable flow rates to the different durations for the 100-year storm event, the 1-hour storm duration for Basin A1 and the 1-hour and 3-hour durations for Basin A2 would require storage within Basins.

In order to determine the volume required to be stored for the applicable durations, corresponding flow rates were found within the unit hydrograph calculations on the rising and recess limbs of the hydrograph. The corresponding volumes for these flow rates were subtracted to obtain the volume that must overtop the splitter structure and be stored within the basin. The following tables summarizes the results:

Basin A1 – Area A1 Off-site Unit Hydrograph

100-Year, 1-hour Flow Rate	Maximum Allowable Flow Rate	Corresponding Flow Rates on limbs of hydrograph	Corresponding Volumes	Volume Required to Be Retained
74.7 cfs	45.6 cfs	31.08 cfs	1.0008 ac-ft	1.3661 ac-ft
		27.49 cfs	2.3669 ac-ft	

Basin A2 – Area A2 Off-site Unit Hydrograph

100-Year, 1-hour Flow Rate	Maximum Allowable Flow Rate	Corresponding Flow Rates on limbs of hydrograph	Corresponding Volumes	Volume Required to Be Retained
159.9 cfs	97.5 cfs	66.16 cfs	2.0783 ac-ft	3.1096 ac-ft
		69.92 cfs	5.1879 ac-ft	

100-Year, 3-hour Flow Rate	Maximum Allowable Flow Rate	Corresponding Flow Rates on limbs of hydrograph	Corresponding Volumes	Volume Required to Be Retained
98.6 cfs	97.5 cfs	89.63 cfs	5.3343 ac-ft	1.2671 ac-ft
		85.37 cfs	6.6014 ac-ft	

These additional volumes would be stored within the basin. A discussion and summary Table of the basin volumes and outflows has been provided in the following paragraphs.

Basin A1 (Unit Hydrograph Summary)

	100-Year Storm Events			
	1-Hour	3-Hour	6-Hour	24-Hour
On-site Flow Rate	41.6 cfs	25.5 cfs	21.8 cfs	8.1 cfs
Off-site Flow Rate	74.7 cfs	44.0 cfs	34.4 cfs	16.2 cfs
Allowable Off-site Flow-By	45.6 cfs	45.6 cfs	45.6 cfs	45.6 cfs
On-site Volume Generated	1.3901 ac-ft	1.8294 ac-ft	2.2213 ac-ft	3.9417 ac-ft
Off-site Volume Generated	2.6284 ac-ft	3.5390 ac-ft	3.828 ac-ft	6.3263 ac-ft
Basin Storage Volume	3.0960 ac-ft	3.0960 ac-ft	3.0960 ac-ft	3.0960 ac-ft
On-site Volume Retained [1]	1.3901 ac-ft	1.8294 ac-ft	2.2213 ac-ft	3.0960 ac-ft
Off-site Volume Retained [2]	1.3661 ac-ft	0 ac-ft	0 ac-ft	0 ac-ft
Total Volume Retained	2.7892 ac-ft	1.8294 ac-ft	2.2213 ac-ft	3.0960 ac-ft
Maximum Basin Outflow [3]	45.6 cfs	44.0 cfs	34.4 cfs	21.7 cfs

Notes:

1 – The onsite volume retained equals the total onsite volume generated, with the exception of the 24-hour storm duration. This duration resulted in a larger volume than available to store within the basin, therefore a corresponding flow rate was calculated on the recess limb of the hydrograph where the calculations reached 3.0960 ac-ft of volume generated, equaling 5.53 cfs of outflow.
2 – The offsite Volume retained for the basin was determined in the previous summary tables by taking the delta volume difference between the rising a recess limbs of the hydrograph where approximately 45.6 cfs occurs. The 3-hour, 6-hour and 24-hour durations have peak flows less than the 45.6 cfs allowable, therefore the entire flow rates for these durations will flow-by.
3 – The maximum basin outflow equals the maximum flow-by for the 1-hour storm duration, the peak flow rate for the offsite 3-hour and 6-hour storm duration, and the peak offsite flow rate plus the Basin A1 onsite outflow of 5.5 cfs, which is discussed in detail in the following paragraphs.

Since the on-site 24-hour storm duration volume generates more volume than the proposed basin can store, the corresponding flow rate that would discharge from the basin had to be determined. The basin storage volume is 3.096 ac-ft. The On-site Area A1 unit hydrograph calculations for the 100-year, 24-hour storm duration have a flow rate of 5.5 cfs at a volume of 3.0646 ac-ft, which is the closest volume to the basin volume without going over. Therefore this is the maximum flow rate that would discharge from the basin for the 100-year, 24-hour storm duration from the on-site area is 5.5 cfs. Adding this to the flow-by for the 100-year, 24-hour storm duration for the off-site area of 16.2 cfs results in a total outflow for the 24-hour storm duration of 21.7 cfs.

Basin A2 and Basin B (Unit Hydrograph Summary)

	100-Year Storm Events			
	1-Hour	3-Hour	6-Hour	24-Hour
On-site Flow Rate [4]	96.7 cfs	56.5 cfs	48.4 cfs	17.7 cfs
Off-site Flow Rate	159.9 cfs	98.6 cfs	82.6 cfs	36.0 cfs
Allowable Off-site Flow-By	97.5 cfs	97.5 cfs	97.5 cfs	97.5 cfs

	100-Year Storm Events			
	1-Hour	3-Hour	6-Hour	24-Hour
On-site Volume Generated [4]	3.0274 ac-ft	3.9614 ac-ft	4.7718 ac-ft	8.4048 ac-ft
Off-site Volume Generated	6.0253 ac-ft	7.7868 ac-ft	8.0310 ac-ft	12.9052 ac-ft
Basin Storage Volume	7.9900 ac-ft	7.9900 ac-ft	7.9900 ac-ft`	7.9900 ac-ft
On-site Volume Retained [1]	3.0274 ac-ft	3.9614 ac-ft	4.7718 ac-ft	7.9900 ac-ft
Off-site Volume Retained [2]	3.1096 ac-ft	1.2671 ac-ft	0 ac-ft	0 ac-ft
Total Volume Retained	6.1370 ac-ft	5.2285 ac-ft	4.7718 ac-ft	7.9900 ac-ft
Maximum Basin Outflow [3]	97.5 cfs	97.5 cfs	82.6 cfs	38.9 cfs

Notes:

1 – The onsite volume retained equals the total onsite volume generated, with the exception of the 24-hour storm duration. This duration resulted in a larger volume than available to store within the basin, therefore a corresponding flow rate was calculated on the recess limb of the hydrograph where the calculations reached 7.9900 ac-ft of volume generated, equaling 2.9 cfs of outflow. A detailed discussion on this is provided in the following paragraphs.
2 – The offsite volume retained for the basin was determined in the previous summary tables by taking the delta volume difference between the rising and recess limbs of the hydrograph where approximately 97.5 cfs occurs. The 6-hour and 24-hour durations have peak flows less than the 97.5 cfs allowable, therefore the entire flow rates for these durations will flow-by.
3 – The maximum basin outflow equals the maximum flow-by for the 1-hour and 3-hour storm durations, the peak flow rate for the 6-hour storm duration, and the peak offsite flow rate plus the Basin A2 and Basin B onsite outflow of 2.9 cfs, which is discussed in detail in the following paragraphs.
4 – The onsite flow rate and volume is equal to the summation of On-site Area A1 and On-site Area B flow rates and volumes.

Since the on-site 24-hour storm duration volume generates more volume than the proposed basin can store, the corresponding flow rate that would discharge from the basin had to be determined. The basin storage volume is 7.9900 ac-ft, and the summation of the volumes generated from both on-site Area A2 and B is 8.4048 ac-ft, resulting in a net excess volume of 0.4148 cfs. Since this basin has two tributary unit hydrographs that would equalize, this value was divided by two (equaling 0.2074 ac-ft) and subtracted from each on-site 100-year, 24-hour storm duration unit hydrograph total generated volume, which was 4.8091 ac-ft for Basin A2 and 3.1809 ac-ft for Basin B. The corresponding flow rates at these volumes for each hydrograph was utilized as the peak flow rate for the on-site areas that would leave the basins, 0.8 cfs and 2.1 cfs, respectively, totaling 2.9 cfs that would discharge into Culvert B1 from the on-site areas. Adding this to the 100-year, 24-hour peak flow rate for the off-site area results in a total flow rate of 38.9 cfs discharging into Culvert B1 for the 100-year, 24-hour storm duration.

At Point 1, the post-Project condition flow rate is 91.5 cfs per the post-Project rational method hydrology calculations at node 509 (see Exhibit B). A pipe and inlet would be designed to intercept 75.8 cfs of this flow rate, and discharge into Culvert A1. This would ensure that flows discharging from Culvert A1 would not exceed the pre-Project flow rates in the post-Project condition. The remaining 15.7 cfs would be intercepted on the north side and south sides of Ironwood Avenue on Nason Street, in addition to 1.6 cfs that is generated from Area E5. A special system would be constructed so that the flows intercepted by these catch basins would be allowed to bubble out of a parkway drain within Nason Street south of Ironwood Avenue.

There would be no flows at Point 2 entering the culvert system, since the maximum allowable flow for Culvert A1 would be collected at Nason Street and Ironwood Avenue via the proposed storm drain connecting to Culvert A1. Points 3 and 4 would have the same flow rates in the post-Project condition since the same flow rate would be discharging from Culvert A1.

Point 5 would collect the off-site flows from Area A and B. Area A has a 100-year, 1-hour flow rate of 41.2 cfs leaving the splitter structure within Basin A1, and Area B has a 100-year, 1-hour flow rate of 90.1 cfs leaving the splitter structure within Basin A2, which is a total of 131.3 cfs. It should be noted that the storm drain system collecting the flows from Off-site Area A also collects a portion of the on-site areas 100-year flow rate. The storm drain would convey the flows to a structure at Basin A1 in which 41.2 cfs would bypass to Culvert B1, and the remaining 100-year flows would overtop into Basin A1. It should also be noted that during the preliminary stages, no flows would be sent to Culvert C1. Should this culvert be required during final engineering, no more than 39.2 cfs would be tributary to this culvert, which is the existing condition tributary flow rate.

By sending a total flow rate of 75.8 cfs to Culvert A1, 131.3 cfs to Culvert B1, and nothing to Culvert C1, the flows leaving TTM 37001 would be less than the pre-Project condition and therefore improve the existing flooding downstream of Ironwood Avenue.

Based upon the analyses, Point 7 would have a post-Project flow rate of 151.6 cfs, which was determined by taking the 131.3 cfs discharging form Culvert B1, and adding 20.3 cfs generate by the existing Area B12 (node 214 to 215). This flow rate is conveyed to Point 8.

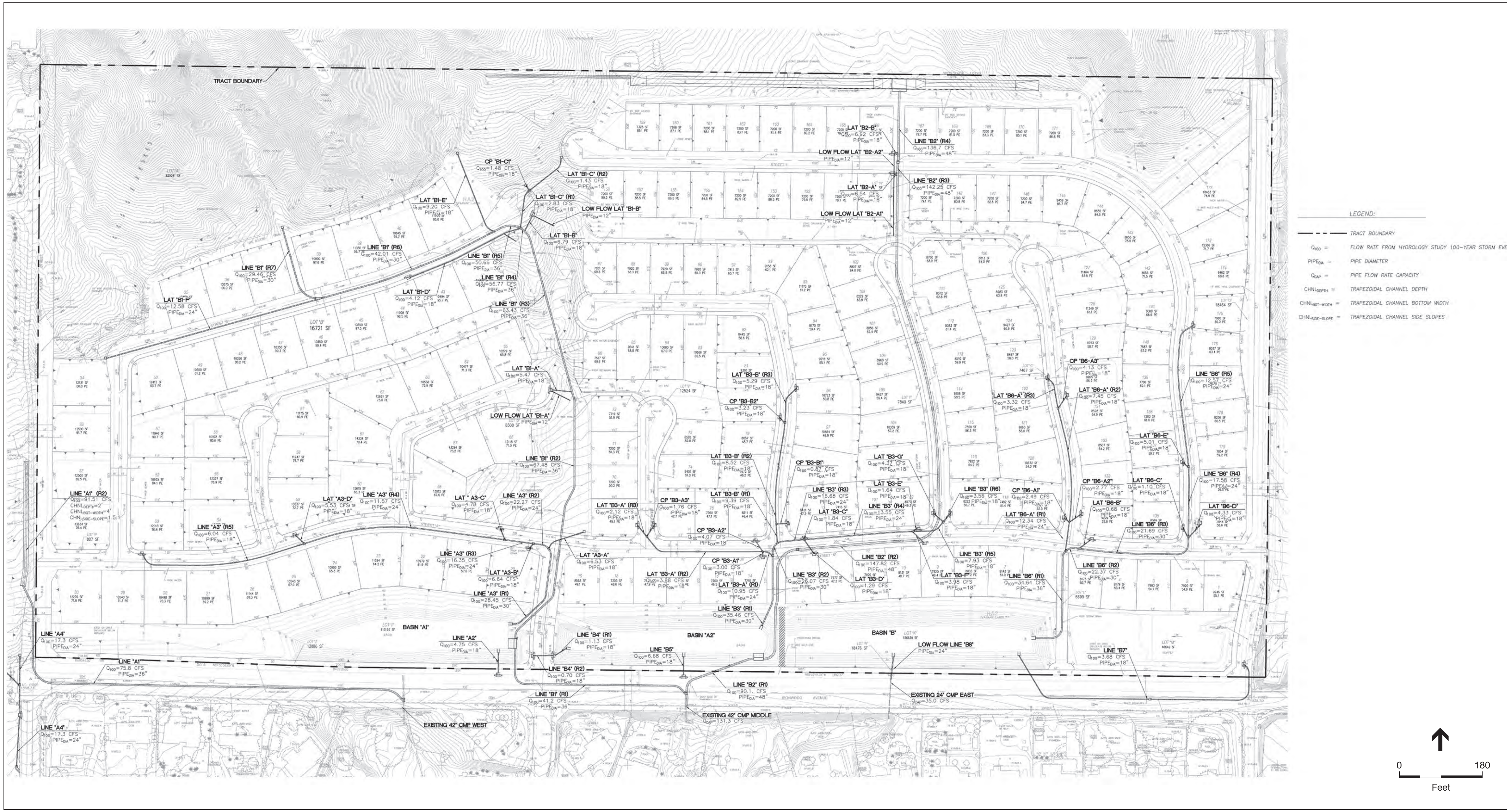
Point 9 has a post-Project flow rate of 256.5 cfs, which is the sum of the 151.6 cfs from Point 7, the 46.0 cfs from Point 4, and the existing condition flow rate for Area B13 (node 215 to 216) of 58.9 cfs.

These flow rates were utilized in the Post-Project Condition HEC-RAS analyses discussed previously. Summary tables for the increased runoff mitigation analyses have been provided in Appendix G of the Preliminary Hydrology Study.

Hydraulic Analysis

The proposed Project consists of subsurface storm drain systems and detention basins, as illustrated below in **Figure IX-5**, *Proposed Drainage Facilities Map*. The facilities would be utilized to flood protect the Project site, treat on-site flows for water quality purposes, and mitigate flows for increased runoff/address the HCOCs. During the preliminary stages, the storm drain systems were sized using normal depth.

The sizing of the preliminary storm drain systems utilized a minimum 1% slope, since this is the minimum slope of the in-tract streets. The off-site storm drain system Line A1 utilized a minimum slope of 1.5% due to the steepness of the terrain. The off-site systems utilized the adjacent roadway slope where applicable, and a 1%-2% slope in other locations.



SOURCE: JLC Engineering & Consulting, Inc., 2016

Ironwood Village Project
Figure IX-5
Proposed Drainage Facilities Map

ESA PCR

In order to collect off-site flows tributary to the westerly Project boundary, a trapezoidal channel would be constructed adjacent to Nason Street north of Ironwood Avenue. This channel would collect the off-site flows, and discharge 75.8 cfs into Line A1. The remaining flows would be collected within one of two inlets provided at the intersection of Nason Street and Ironwood Avenue. The flows would be conveyed across Ironwood Avenue, and would bubble out of a proposed catch basin and 12-inch low-flow drain connected to a parkway drain. This modified design was provided at the request of the City of Moreno Valley to alleviate flooding at the intersection of Ironwood Avenue and Nason Street. Details for this design would be provided during final engineering.

Due to the requirement to provide a minimum 12-foot dry travel lane within the private streets for the 100-year storm event per the City of Moreno Valley Design Policy, Standard Plan MVSI-160A-0, catch basins were required in excess of those provided to meet the typical street flooding design criteria of:

- 10-year storm flows contained within the top-of-curb elevation
- 100-year storm flows contained within the right-of-way elevation

Since the hydrology calculations were based upon the 100-year storm event being contained within the top of curb elevation (which is the right-of-way), additional yield calculations and street capacity calculations were performed to determine the limits of storm drain in order to provide the 12-foot dry lane on-site. Figure IX-5, above, delineates the areas and summarizes the yield calculations. A spreadsheet has also been provided in Appendix J of the Preliminary Hydrology Study that summaries the yield calculations.

Water Quality and Hydrologic Conditions of Concern

The Project site would utilize three extended detention basins to treat for water quality purposes and to address the Hydrologic Conditions of Concern (“HCOCs”) and increased runoff mitigation.

The required water quality volume was determined by using the Santa Ana Watershed BMP Design Volume Spreadsheets. The effective impervious fraction utilized the impervious area determined by the rational method calculations for the on-site area, and multiplied the impervious fraction by 1.0 and the pervious fraction by 0.1 (which corresponds to landscaped area per the LID manual). The results are 0.55 effective impervious fraction for Area A1, 0.55 effective impervious fraction for Area A2, and 0.486 for Area B. Area B resulted in a slightly lower value due to the tributary open space area from the north easterly Project boundary.

The water quality volume, per the LID Manual, must be stored within a depth equal to or less than six inches above the surface of the soil media (which includes the voids within the soil media and gravel layer). The table below provides the required water quality volume and the volume provided within six inches of depth above the soil media:

Area	Water Quality Volume	Volume Provided with 6 Inches Above Soil Media
A1	23,805 ft^3/s	45,932 ft^3/s
A2	28,112 ft^3/s	35,159 ft^3/s
B	13,140 ft^3/s	50,949 ft^3/s

Areas A1 and A2 are greater than the maximum allowable tributary area of 25 acres, however, per meetings with the City of Moreno Valley, this additional area (0.15 acres for Area A1 and 4.7 acres for Area A2) is acceptable.

Pre-Project and Post-Project Unit hydrograph calculations were performed for the 2-year, 24-hour storm duration to determine the required storage volume to address the HCOCs. During the preliminary stages, the required volume to address the HCOCs was determined by taking the entire 2-year, 24-hour volume and retaining the volume within the basins. During final engineering, the mitigation would be validated using basin routing calculations. The following tables summarize the unit hydrograph results:

Area	Pre-Project 2-Year, 24-Hour Volume	Post-Project 2-Year, 24-Hour Volume	Basin Volume Provided
A1	**0.4191 ac-ft**	**2.0957 ac-ft**	**3.0960 ac-ft**
A2	**0.4950 ac-ft**	**2.4749 ac-ft**	**7.9900 ac-ft** [1]
B	**0.2608 ac-ft**	**1.1560 ac-ft**	**7.9900 ac-ft** [1]

Notes:

1 – Area A2 and B would be mitigated within Basins A2 and B, which would function together for addressing the hydrologic conditions of concern and increased runoff mitigation. The total 2-year, 24-hour volume to both basins from Areas A2 and B is 3.6309 ac-ft, and the basin has a total available volume of 7.9900 ac-ft, therefore the basins have sufficient volume to address the hydrologic conditions of concern.

The water quality calculations and the hydrologic conditions of concern mitigation have been included in Appendix G of the Preliminary Hydrology Study.

Hydrology and Drainage Conclusions

Drainage analyses were prepared for the Project site in order to determine the pre-Project and post-Project conditions, the required storm drain infrastructure to flood protect the Project site, and the required mitigation measures for the Project site. The following conclusions were derived from the hydrology and hydraulic results:

2. The proposed storm drain alignments would provide flood protection to the Project site for the 100-year storm events as well as provide a minimum 12-foot dry lane within the local streets during the 100-year storm event.

3. The proposed extended detention basins would adequately treat for water quality purposes and mitigate the 2-year, 24-hour storm duration post-Project condition to pre-Project levels.

4. The Project would discharge flows equal to the existing culvert capacities or existing tributary flow rates, whichever is less, for the 100-year storm event. During final engineering, detailed basin routing calculations would be performed to validate the basin and flow-by structure designs.

5. The Project site would not adversely impact downstream properties by mitigating increased flows to less than or equal to pre-Project levels.

Would the Project:

a. Violate any water quality standards or waste discharge requirements?

Less Than Significant Impact. During construction, the Project would be required to implement an approved Stormwater Pollution Prevention Plan (SWPPP) throughout all grading and building activities in accordance with the requirements of the National Pollutant Discharge Elimination System (NPDES) General Construction Permit. The SWPPP would prescribe various stormwater Best Management Practices ("BMPs") to be implemented on and around the Project site that would minimize the potential for adverse water quality impacts to downstream receiving water bodies. Given implementation of a Project-specific SWPPP during construction activities, as required by the City and the Santa Ana Regional Water Quality Control Board (RWQCB), Project-related construction activities would not violate any water quality standards or waste discharge requirements of the RWQCB and water quality-related impacts in this regard would be less than significant.

With regard to long-term operations, as discussed above, the proposed Project would be required to implement an approved WQMP that requires various stormwater features, most notably the proposed on-site detention basins, which are designed to address both hydrology/flooding and water quality issues. The proposed on-site stormwater facilities illustrated above in Figure IX-5 include catch basins, local storm drains, lateral drains, and Basins A1, A2, and B, all of which would be owned and maintained in perpetuity by the on-site Homeowners' Association(s). The Project-specific WQMP, which is included in Appendix G of this Initial Study, concludes that the provision of Basins A1, A2, and B, which are sized to accommodate stormwater flows from a 2-year, 24-hour event, would mitigate any HCOCs regarding stormwater volumes affecting downstream drainage areas. No HCOCs or other water quality-related issues are cited in the WQMP, and thus with implementation of the Project-specific WQMP, as approved by the City and/or the RWQCB, the Project would not violate any water quality standards or waste discharge requirements and water quality-related impacts in this regard would be less than significant.

b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned land uses for which permits have been granted)?

Less Than Significant Impact. As discussed in the Phase I Environmental Site Assessment (ESA) prepared for the Project, and included as Appendix F of this Initial Study, the California Department of Water Resources Water Data Library website does not indicate the presence of water supply wells located on the subject property (Township 02 South, Range 03 West, Section 34); however, two wells were indicated within one-mile of the subject property. Data indicated depth to groundwater in Well No. EMWD12003, located approximately three-quarter miles northeast, was 239 feet as measured in 2014. Data from the second nearby well, state Well No. 002S03W34C001S, located approximately eight-tenths of a mile north-northwest, indicated depth to groundwater was 240 feet, as measured in 2014. Based on these considerations, groundwater is neither expected to be encountered during construction, nor have a detrimental effect on the Project. Therefore, construction activities would not substantially deplete groundwater supplies or interfere with groundwater recharge.

No known aquifer conditions exist on the Project site or in the surrounding area which could be intercepted by excavation or development of the Project. The Project would not install any groundwater wells or otherwise directly withdraw groundwater. As discussed further below in Section XVII, Utilities and Service Systems, of this Initial Study, the Project would connect to the existing water supply system owned and operated by Eastern Municipal Water District ("EMWD"), which serves the Project site and surrounding areas. While the EMWD receives some its supply from groundwater, a significant portion of the water supply is imported water from the Metropolitan Water District ("MWD"). Under normal operation, the Project would use approximately 41,268 gpd, or 15,062,820 gallons per year (approximately 46 AFY) when fully occupied. The proposed water usage would be negligible in comparison to the overall water service provided by the EMWD and would not result in significant impacts from depletion of groundwater supplies. Compliance with water conservation measures such as those required by Titles 20 and 24 of the California Administrative Code and the City of Moreno Valley Energy Efficiency and Climate Action Strategy would help to reduce this projected water demand. Further, the Project does not propose to extract groundwater and therefore would not deplete groundwater supplies. As such, construction and operation of the Project would not substantially deplete groundwater supplies or result in a substantial net deficit in the aquifer volume or lowering of the local groundwater table. Thus, less than significant impacts would occur in this regard.

c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?

Less Than Significant Impact. As noted above, Project construction activities would be required to implement a Project-specific SWPPP, which addresses, among other issues, temporary erosion and sedimentation effects. As such, with implementation of an approved SWPPP for the Project, construction-related erosion and sedimentation impacts would be less than significant. In addition, the Project would permanently modify the existing drainage pattern of the Project site and surrounding area through development of a residential subdivision on the property. However, as discussed in detail above under Preliminary Hydrology Study Summary, the Project has been designed to include various on- and off-site stormwater facilities, most notably the on-site extended detention basins (Basins A1, A2, and B), which would retain stormwater flows for an extended period of time and also limit stormwater flows leaving the Project site to pre-Project levels. The proposed on- and off-site stormwater improvements and detention basins depicted above in Figure IX-5, which are required as part of the Project's

WQMP, would effectively preclude the potential for the Project to result in increased on- or off-site erosion or sedimentation during long-term Project operation. Thus, with implementation of the Project-specific WQMP, operation of the Project would not result in substantial erosion or siltation on- or off-site and impacts in this regard would be less than significant.

d. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off site?

Less Than Significant Impact. As discussed in Response IX.c., above, the Project would implement a Project-specific WQMP that requires construction of on-site extended detention basins to limit the volume and rate of stormwater flows leaving the Project site to pre-Project conditions. Thus, with implementation of the Project-specific WQMP, the amount of stormwater generated on-site or otherwise flowing from the site to downstream areas, most notably the residential neighborhood immediately south of the Project site across Ironwood Avenue, would not be increased relative to existing conditions. As such, implementation of the proposed Project and associated WQMP would not increase the rate or amount of surface runoff in a manner which would result in flooding on- or off site, and impacts would be less than significant.

e. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

Less Than Significant Impact. As discussed previously, the Project would implement a Project-specific WQMP and construct various stormwater facilities as shown in Figure IX-5 above that have been designed and sized to meet or exceed projected stormwater volumes during major storm events. The Project's detention basins would retain all stormwater in excess of existing flow volumes on-site and drain the excess volume into the City's storm drain system at a steady rate in a manner that does not exceed the capacity of these off-site facilities. Thus, the Project would not have the potential to exceed the capacity of existing or planned stormwater drainage systems. The proposed Project would involve the development of a single-family residential neighborhood on a currently vacant, undeveloped site, and thus the proposed development would not include land uses that would be expected to generate substantial pollutants that could potentially affect stormwater quality. Further, as noted above, the Project-specific WQMP would be implemented throughout Project operation and therefore would minimize the potential for the Project to generate substantial additional sources of polluted runoff. Therefore, impacts in this regard would be less than significant.

f. Otherwise substantially degrade water quality?

Less Than Significant Impact. The Project would not generate substantial pollutant volumes based on the nature of single-family residential developments and the lack of any known on-site hazardous materials conditions that could potentially result in increase pollutant loads in stormwater flows leaving the site. In addition, the Project would implement an approved WQMP and maintain required BMPs, including the on-site detention basins and other facilities, in perpetuity in order to ensure that the proposed development does not adversely affect water quality in stormwater runoff. As such, the Project would have little potential to otherwise substantially degrade water quality and impacts would be less than significant.

g. Place housing within a 100-year flood hazard area as mapped on federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

No Impact. According to the Federal Emergency Management Agency (FEMA) National Flood Hazard Map data[15], the Project site is not located within the boundaries of a 100-year flood hazard area. Thus, the development of housing within the Project site would not result in a flood risk for people or property within the Project boundaries. As such, no impact would occur.

h. Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

No Impact. As noted above, the Project site is not located within the boundaries of a 100-year flood hazard area. Thus, implementation of the proposed residential Project would not place structures which would impede or redirect flood flows within a 100-year flood hazard area. As such, no impact would occur.

i. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

No Impact. The Project site is not located in an area subject to flooding, and there are no reservoirs, lakes, or other water bodies, nor any dams or levees upstream of the Project site that could potentially result in flooding at this location. As such, the Project would not expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam, and no impact would occur in this regard.

j. Inundation by seiche, tsunami, or mudflow?

No Impact. A seiche is an oscillation of a body of water in an enclosed or semi-enclosed basin, such as a reservoir, harbor, lake, or storage tank. A tsunami is a great sea wave, commonly referred to as a tidal wave, produced by a significant undersea disturbance such as tectonic displacement of the sea floor associated with large, shallow earthquakes. Mudflows result from the downslope movement of soil and/or rock under the influence of gravity. The Project site is not located in a coastal area or near any inland bodies of water, and thus there would be no potential for the Project to affect or be affected by seiches or tsunamis.

As mentioned above in Section VII, Geology and Soils, of this Initial Study, the Project site is not located within an area identified as having a potential for mass slope instability such that sizeable landslides or mudflows could occur. Despite the incidental rock fall hazards along the rock outcroppings in the northwest portion of the property, there are no known landslides near the

[15] Federal Emergency Management Agency. *FEMA Flood Map Service Center*, https://msc.fema.gov/portal. Panels 06065C0755G and 06065C0760G. Accessed August 17, 2016.

Project site, nor is the site in the path of any known or potential landslides. Thus, no impact associated with inundation by seiche, tsunami, or mudflows would occur.

X. Land Use and Planning

Would the Project:

a. Physically divide an established community?

No Impact. The Project site is located on vacant land surrounded by existing single-family residential neighborhoods to the west and south and vacant land to the north and east. The proposed single-family homes would be consistent with the existing land use pattern in the area and would be designed to be compatible with the surrounding land uses. While the proposed Project would introduce new single-family residential uses to the currently undeveloped Project site, such development would be consistent with existing lower density residential development in the northern portion of the City of Moreno Valley and would be similar to future residential uses planned for surrounding parcels in the area. Thus, the proposed Project would not physically divide an established community and no impact would occur in this regard.

b. Conflict with applicable land use plan, policy or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

Less Than Significant Impact. The City of Moreno Valley General Plan designates the Project site as Residential 2, which is intended for low density land uses with a maximum of two dwelling units per acre, while the site is zoned RA2 which also limits single-family development density to a maximum density of two units per acre. As discussed in Attachment A, Project Description, of this Initial Study, the proposed Project would entail the construction of a new, 181-unit single-family residential development on the currently undeveloped approximately 75-acre Project site. Lot sizes for the proposed single-family homes would range from a minimum of 7,200 square feet to over 17,200 square feet, with an average lot size of approximately 9,260 square feet. In order to accommodate the proposed density on the Project site, which is currently zoned RA2 with a density of up to two units per acre, the applicant is requesting a General Plan Amendment to change the land use designation from Residential 2 to a mix of Residential 3 and Residential 5 (see Figure A-3 in Attachment A, Project Description, of this Initial Study), and similarly, a change of zone from RA2 to R3 (single-family residential up to 3 units per acre) on the western portion of the Project site and R5 (single-family residential uses up to 5 units per acre) on the eastern portion of the site. As such, the residential density would be lower on the western side of the Project site, to the west of a proposed open space and recreation corridor that would bisect the property in a north-south orientation, while higher density development would be located east of the of this corridor. According to Chapter 9, Goals and Objectives, of the City's 2006 General Plan, the primary purpose of areas designated Residential 3 is to provide a transition between rural and urban density development areas, and to provide for a suburban lifestyle on residential lots larger than those commonly found in suburban subdivisions (Policy 2.2.6), while the primary purpose of areas designated Residential 5 is to provide for single-family detached housing on standard sized suburban lots (Policy 2.2.7). The shift in density on-site under the proposed Project is intended to serve a transition between existing lower density R1 residential uses immediately to the west of the Project site across Nason Street and existing R2 residential uses to the south and farther to the east across Moreno Beach Drive, as well as R2 or potentially higher density residential uses immediately to the east of the Project site, and thus would be consistent with the intent of Policies 2.2.6 and 2.2.7 as relates to providing single-family residential uses that transition from lower density neighborhoods to higher density developments.

The proposed Project is proposed to be implemented in accordance with the Ironwood Village Design Guidelines (Design Guidelines), which would serve as a guide for implementation of the residential development. The Design Guidelines, which would be subject to review and approval by the City, would include site development regulations in order to provide cohesive design throughout the Ironwood Village Project, and would be consistent with Section 9.03.040 (Residential site development standards) of the Moreno Valley Municipal Code (MVMC). The Ironwood Village Project would conserve the northwestern hillside areas of the Project site and would not build any physical improvements in that area. The proposed Project is designed to respect the existing topography, maintain rock outcroppings where feasible and provide a transition into the hillside areas.

The land use and zoning designations for the site permit residential uses such as those proposed by the Project, albeit at a lower density. As such, the Project would require approval of a The proposed single-family residences would be a maximum of two-stories and up to 35 feet in height relative to lot grade, which is consistent with the two-story, 35-foot height limit for single-family residential uses within the R3 and R5 zones per Section 9.03.040 of the MVMC. Overall, by proposing 181 single-family residences and associated change of zone from R2 to R3 and R5 on the Project site, the Project would be consistent with the allowable uses set forth in the City's general plan and zoning code and would provide a logical extension of existing single-family residential development along Ironwood Avenue in the northern portion of the City of Moreno Valley. Thus, based on the preceding discussion, the proposed Project would not conflict with the City's General Plan or MVMC. It should be noted that because the Project proposes the construction of up to 181 new single-family homes on land already designated for similar uses, it is not considered regionally significant[16] and thus analysis of the Project's consistency with various Southern California Association of Governments (SCAG) plans and programs is not required. Therefore, less than significant land use impacts relative to consistency with plans, policies, or regulations of agencies with jurisdiction over the Project site would occur.

c. Conflict with any applicable habitat conservation plan or natural community conservation plan?

Less Than Significant Impact With Mitigation Incorporated. Refer to Response IV.f. above, under Section IV, *Biological Resources*, of this Initial Study.

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16 Per California Environmental Quality Act Section 15206(b)(2)(A), Projects of Statewide, Regional, or Areawide Significance include proposed residential developments of more than 500 dwelling units.

XI. Mineral Resources

Would the Project:

a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

No Impact (a-b). Minerals are defined as any naturally occurring chemical elements or compounds formed from inorganic processes and organic substances. The California Surface Mining and Reclamation Act of 1975 (SMARA) requires that all cities address significant mineral resources, classified by the State Geologist and designated by the State Mining and Geology Board, in their General Plans. According to the GP FEIR, no regionally or statewide significant mineral resources are located within the City. As such, the potential of uncovering mineral resources during Project construction is considered low. Therefore, the Project would not result in the loss of availability of a known mineral resource delineated on a local general plan, specific plan, or other land use plan as there are no known mineral resources or mineral resource recovery sites on or near the Project site. No impact would occur in this regard.

XII. Noise

The following impact analysis pertaining to noise impacts is based on information contained in the Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley *(herein referred to as the "Noise Impact Analysis"), prepared by Urban Crossroads, dated August 31, 2015. The Noise Impact Analysis is provided in Appendix H.*

Would the Project result in:

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Less Than Significant Impact With Mitigation Incorporated.

Applicable Noise and Vibration Regulations

City of Moreno Valley General Plan Safety Element

The City's General Plan does not include a noise element or specific transportation-related noise standards. Rather, noise is considered in Section 6.4 of the Environmental Safety section of the General Plan Safety Element. While the General Plan provides background and noise fundamentals, it does not identify criteria to assess the impacts associated with off-site transportation-related noise impacts. Instead, the General Plan includes policies associated with each element in Chapter 9, Goals and Objectives. The objectives identified in Chapter 9 of the General Plan to address potential noise impacts are listed below:

Objective 6.3: Provide noise compatible land use relationships by establishing noise standards utilized for design and siting purposes.

Objective 6.4: Review noise issues during the planning process and require noise attenuation measures to minimize acoustic impacts to existing and future surrounding land uses.

Objective 6.5: Minimize noise impacts from significant noise generators such as, but not limited to, motor vehicles, trains, aircraft, commercial, industrial, construction, and other activities.

The General Plan's policies act to ensure that when exterior noise levels exceed 65 A-weighted decibels (dBA) community noise-equivalent level (CNEL) at sensitive land uses, mitigation is provided to ensure that interior noise levels of 45 dBA CNEL are maintained. The General Plan's policies in this regard are consistent with, and support, the California Building Code interior noise standards.

City of Moreno Valley Municipal Code Noise Standards

The most effective method to control community noise impacts from non-transportation noise sources (such as playgrounds, trash compactors, air-conditioning units, etc.) is through the application of a noise control ordinance. For the purpose of Noise Impact Analysis, the potential non-transportation noise impacts include Project-related short-term construction activities during the permitted hours of construction established in the MVMC. As a subset of its stationary-source noise regulations, the MVMC establishes restrictions on construction-source noise. More specifically, MVMC Section 11.80.030(D)(7), Construction and Demolition, provides the following:

No person shall operate or cause operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of eight p.m. and seven a.m. the following day such that the sound there from creates a noise disturbance, except for emergency work by public service utilities or for other work approved by the City manager or designee.

The City defines a "noise disturbance" as any sound which:

Disturbs a reasonable person of normal sensitivities; exceeds the sound level limits set forth in this chapter [Section 11.80.030(C)]; or is plainly audible as defined in this section. Where no specific distance is set forth for the determination of audibility, references to noise disturbance shall be deemed to mean plainly audible at a distance of two (200) feet from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right of way, public space or other publicly owned property.

Therefore, Project construction shall be limited to the hours of 7:00 AM to 8:00 PM on any day and may not generate a noise level at 200 feet from the property line which exceeds the noise standards provided in the Noise Ordinance, Section 11.80.030(C), Non-impulsive Sound Decibel Limits, which states the following:

No person shall maintain, create, operate or cause to be operated on private property any source of sound in such a manner as to create any non-impulsive sound which exceeds the limits set forth for the source land use category in Table 11.80.030-2 when measured at a distance of two hundred (200) feet or more from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right-of-way, public space or other publicly owned property. Any source of sound in violation of this subsection shall be deemed prima facie to be a noise disturbance.

Even though the MVMC does not identify specific construction noise limits, the Code does provide noise level limits for the source land use category when measured at a distance of 200 feet. For the purpose of Noise Impact Analysis, the Project is considered a residential land use since it is land primarily for dwelling units, as defined by the MVMC. For residential land uses, the City's 60 dBA equivalent continuous (average) sound level (Leq) noise level standard at a distance of 200 feet is used as the limit for this analysis to assess the construction noise level impacts at sensitive receivers in the Project study area. Therefore, to conform to the applicable provisions of the MVMC, the maximum allowable noise generated by on-site construction activities when measured at 200 feet from any property line, shall not exceed 60 dBA Leq.

Construction Vibration Standards

To analyze the vibration impacts originating from the construction of a project, vibration from construction activities are typically evaluated against standards established under a city's municipal code. The MVMC, however, does not identify specific vibration standards for construction. Therefore, the construction-related vibration standards provided by the United States Department of Transportation Federal Transit Administration (FTA) are used in this analysis to assess the potential vibration impacts due to Project construction.

FTA Vibration Standards

The FTA identifies guidelines for maximum-acceptable vibration criteria for different types of land uses. These guidelines allow 80 vibration decibels (VdB) for residential uses and buildings where people normally sleep. Construction activity can result in varying degrees of ground-borne vibration, depending on the equipment and methods used, distance to the affected structures and soil type. Construction vibration is generally associated with pile driving and rock blasting. Other construction equipment such as air compressors, light trucks, hydraulic loaders, etc., generates little to no ground vibration. Occasionally large bulldozers and loaded trucks can cause perceptible vibration levels at close proximity. While not enforceable regulations within the City, the FTA guidelines of 80 VdB for sensitive land uses provide the basis for determining the relative significance of potential Project-related vibration impacts. For this analysis, the FTA-provided 80 VdB vibration standard represents residential annoyance as perceived by the nearby sensitive receivers in the Project study area.

Thresholds of Significance

The following significance thresholds evaluate potential noise and vibration impacts of the Project based on the regulatory framework described above; refer to **Table XII-1**, *Significance*

Criteria Summary. The Project would result in potentially significant impacts under the following circumstances:

TABLE XII-1
SIGNIFICANCE CRITERIA SUMMARY

Analysis	Condition(s)	Significance Criteria Daytime	Significance Criteria Nighttime
Off-Site[a]	if ambient is < 60 dBA CNEL	≥ 5 dBA CNEL Project increase	
	if ambient is 60 - 65 dBA CNEL	≥ 3 dBA CNEL Project increase	
	if ambient is > 65 dBA CNEL	≥ 1.5 dBA CNEL Project increase	
On-Site[b]	Exterior residential land use	65 dBA CNEL	
	Interior residential land use	45 dBA CNEL	
Construction[c]	Permitted hours of 7:00 a.m. to 8:00 p.m. on any day.		
	Noise Level Threshold	60 dBA Leq @ 200[a]	n/a
	Vibration Level Threshold[d]	80 VdB	n/a

a Source: FICON, 1992.
b Source: City of Moreno Valley General Noise Element, Policy 6.3.1.
c Source: City of Moreno Valley Municipal Code Section 11.80.030(D)(7) (Appendix 3.1).
d Source: FTA Transit Noise and Vibration Impact Assessment, May 2006.
"Daytime" = 8:00 a.m. to 10:00 p.m.; "Nighttime" = 10:01 p.m. to 7:59 a.m.; "n/a" = No nighttime construction activity is permitted and therefore, no nighttime construction noise and vibration thresholds are identified.

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

Off-Site Traffic Noise

If the off-site traffic noise levels at nearby noise-sensitive land uses adjacent to roadways conveying Project traffic:

- are less than 60 dBA CNEL and the Project creates a *readily perceptible* 5 dBA CNEL or greater Project related noise level increase; or
- range from 60 to 65 dBA CNEL and the Project creates a *barely perceptible* 3 dBA CNEL or greater Project noise level increase; or
- already exceeds 65 dBA CNEL, and the Project creates a community noise level impact of greater than 1.5 dBA CNEL.

On-Site Traffic Noise

If the on-site exterior noise levels exceed 65 dBA CNEL at the residential land uses within the Project site. Interior noise levels shall not exceed 45 dBA CNEL for residential land uses.

Construction Noise and Vibration

If Project-related construction activities:

- occur anytime other than between the permitted hours of 7:00 AM and 8:00 PM on any day; or
- create noise levels at sensitive residential receivers in the City of Moreno Valley which exceed the short-term construction noise level limit of 60 dBA Leq at 200 feet from the Project site; or
- if short-term Project generated construction vibration levels exceed the FTA maximum acceptable vibration standard of 80 VdB at sensitive receiver locations.

Existing Conditions.

To assess the existing noise level environment, five 24-hour noise level measurements were taken at sensitive receiver locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. **Figure XII-1**, *Noise Measurement Locations*, provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected on Wednesday, January 28, 2015. The noise measurements presented below focus on the Leq which represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. **Table XII-2**, *24-Hour Ambient Noise Level Measurements*, identifies the hourly daytime (8:00 AM to 10:00 PM) and nighttime (10:01 PM to 7:59 AM) noise levels at each noise level measurement location.

Location L1: represents the noise levels at the northeastern corner of Ironwood Avenue and Nason Street near existing residential homes across Ironwood Avenue. The noise level measurements collected show an overall 24-hour exterior noise level of 63.6 dBA CNEL. The hourly noise levels measured at location L1 ranged from 55.5 to 61.9 dBA Leq during the daytime hours and from 45.3 to 62.8 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 60.1 dBA Leq with an average nighttime noise level of 57.1 dBA Leq.

Location L2: represents the noise levels in the northwestern portion of the Project site, east of existing residential homes across Nason Street. The noise level measurements collected show an overall 24-hour exterior noise level of 55.4 dBA CNEL. The hourly noise levels measured at location L2 ranged from 45.4 to 50.2 dBA Leq during the daytime hours and from 44.2 to 52.8 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 48.7 dBA Leq with an average nighttime noise level of 49.0 dBA Leq.

SOURCE: Urban Crossroads, 2015

Ironwood Village Project

Figure XII-1
Noise Measurement Locations

ESA PCR

TABLE XII-2
24-HOUR AMBIENT NOISE LEVEL MEASUREMENTS

Location [a]	Distance from Project Site (Feet)	Description	Hourly Noise Level (dBA Leq)[b]		CNEL
			Daytime	Nighttime	
L1	0'	Located at the northeastern corner of Ironwood Avenue and Nason Street near existing residential homes across Ironwood Avenue.	0.1	57.1	63.6
L2	0'	Located in the northwestern portion of the Project site, east of existing residential homes across Nason Street.	48.7	49.0	55.4
L3	96'	Located at the southwestern corner of Ironwood Avenue and Oliver Street adjacent to an existing residential home.	59.7	56.1	63.0
L4	0'	Located north of Ironwood Avenue on the eastern Project site boundary.	49.7	49.1	55.5
L5	81'	Located south of the Project site across Ironwood Avenue adjacent to existing residential homes.	69.9	66.8	73.2

a See Exhibit 5-A for the location of the noise level measurement locations.
b Energy (logarithmic) average hourly levels. The long-term 24-hour measurement printouts are included in Appendix 5.2. "Daytime" = 8:00 a.m. to 10:00 p.m.; "Nighttime" = 10:01 p.m. to 7:59 a.m.

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

Location L3: represents the noise levels at the southwestern corner of Ironwood Avenue and Oliver Street adjacent to an existing residential home. The 24-hour CNEL indicates that the overall exterior noise level is 63.0 dBA CNEL. At location L3 the background ambient noise levels ranged from 56.2 to 61.9 dBA Leq during the daytime hours to levels of 46.8 to 61.0 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 59.7 dBA Leq with an average nighttime noise level of 56.1 dBA Leq.

Location L4: located on the eastern Project site boundary, represents the noise levels north of Ironwood Avenue at the Project site. The noise level measurements collected show an overall 24-hour exterior noise level of 55.5 dBA CNEL. The hourly noise levels measured at location L4 ranged from 46.7 to 51.2 dBA Leq during the daytime hours and from 43.6 to 53.2 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 49.7 dBA Leq with an average nighttime noise level of 49.1 dBA Leq.

Location L5: represents the noise levels south of the Project site across Ironwood Avenue adjacent to existing residential homes. The 24-hour CNEL indicates that the overall exterior noise level is 73.2 dBA CNEL. At location L5 the background ambient noise levels ranged from 66.7 to 71.6 dBA Leq during the daytime hours to levels of 58.2 to 72.2 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 69.9 dBA Leq with an average nighttime noise level of 66.8 dBA Leq,

Table XII-2, provides the (energy average) noise levels used to describe the daytime and nighttime ambient conditions. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. The background ambient noise levels in the Project study area dominated by transportation related noise associated with the arterial roadway network. This includes the automobile and heavy truck activities near the noise level measurement locations. The 24-hour existing noise level measurements shown in Table XII-2 presents the worst-case existing unmitigated ambient noise conditions.

Sensitive Receivers

To assess the potential for short-term construction noise impacts, the following nine receiver locations, as shown on **Figure XII-2**, *Receiver Locations*, were identified as representative locations for the analysis. Sensitive receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land. Noise-sensitive land uses are generally considered to include: schools, hospitals, single-family dwellings, mobile home parks, churches, libraries, and recreation areas. Moderately noise-sensitive land uses typically include: multi-family dwellings, hotels, motels, dormitories, out-patient clinics, cemeteries, golf courses, country clubs, athletic/tennis clubs, and equestrian clubs. Land uses that are considered relatively insensitive to noise include business, commercial, and professional developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, natural open space, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

Representative sensitive receivers in the vicinity of the Project site include existing residential homes represented by receiver locations R1 to R9. The nearest sensitive receiver is represented by location R1 where an existing residential home is located approximately 40 feet west of the Project site.

R1: Located approximately 40 west of the Project site, R1 represents existing residential homes at the northwest corner of Nason Street and Sandi Lane.

R2: Location R2 represents the existing single-family residential home located approximately 86 feet west of the Project site across Nason Street.

R3: Location R3 represents the existing residential homes situated west of the Project site across Nason Street at a distance of approximately 208 feet.

R4: Location R4 represents the existing residential home situated approximately 168 feet south of the Project site across Ironwood Avenue.

R5: At a distance of approximately 141 feet, location R5 represents single-family residential homes south of the Project site across Ironwood Avenue.

R6: At a distance of approximately145 feet south of the Project site, R6 describes the residential homes located at the southwest corner of Ironwood Avenue and Lantz Lane.

CITY OF MORENO VALLEY, STATE OF CALIFORNIA

TENTATIVE TRACT MAP NO. 37001

PRELIMINARY FUEL MODIFICATION PLAN

AUGUST, 2016

FUEL TREATMENT GUIDELINES

THE FOLLOWING FUEL TREATMENT GUIDELINES COMPLY WITH THE REQUIREMENTS OF 14 CCR 1299 AND PRC 4291. ALL PERSONS USING THESE GUIDELINES TO COMPLY WITH CCR 1299 AND PRC 4291 SHALL IMPLEMENT GENERAL GUIDELINES 1., 2., 3., AND EITHER 4A OR 4B., AS DESCRIBED BELOW.

GENERAL GUIDELINES:

1. MAINTAIN A FIREBREAK BY REMOVING AND CLEARING AWAY ALL FLAMMABLE VEGETATION AND OTHER COMBUSTIBLE GROWTH WITHIN 30 FEET OF EACH BUILDING OR STRUCTURE, WITH CERTAIN EXCEPTIONS PURSUANT TO PRC §4291(A). SINGLE SPECIMENS OF TREES OR OTHER VEGETATION MAY BE RETAINED PROVIDED THEY ARE WELL-SPACED, WELL-PRUNED, AND CREATE A CONDITION THAT AVOIDS SPREAD OF FIRE TO OTHER VEGETATION OR TO A BUILDING OR STRUCTURE.
2. DEAD AND DYING WOODY SURFACE FUELS AND AERIAL FUELS WITHIN THE REDUCED FUEL ZONE SHALL BE REMOVED. LOOSE SURFACE LITTER, NORMALLY CONSISTING OF FALLEN LEAVES OR NEEDLES, TWIGS, BARK, CONES, AND SMALL BRANCHES, SHALL BE PERMITTED TO A DEPTH OF 3 INCHES. THIS GUIDELINE IS PRIMARILY INTENDED TO ELIMINATE TREES, BUSHES, SHRUBS AND SURFACE DEBRIS THAT ARE COMPLETELY DEAD OR WITH SUBSTANTIAL AMOUNTS OF DEAD BRANCHES OR LEAVES/NEEDLES THAT WOULD READILY BURN.
3. DOWN LOGS OR STUMPS ANYWHERE WITHIN 100 FEET FROM THE BUILDING OR STRUCTURE, WHEN EMBEDDED IN THE SOIL, MAY BE RETAINED WHEN ISOLATED FROM OTHER VEGETATION. OCCASIONAL (APPROXIMATELY ONE PER ACRE) STANDING DEAD TREES (SNAGS) THAT ARE WELL-SPACE FROM OTHER VEGETATION AND WHICH WILL NOT FALL ON BUILDINGS OR STRUCTURES OR ON ROADWAYS/DRIVEWAYS MAY BE RETAINED.
4. WITHIN THE REDUCED FUEL ZONE, ONE OF THE FOLLOWING FUEL TREATMENTS (4A. OR 4B.) SHALL BE IMPLEMENTED. PROPERTIES WITH GREATER FIRE HAZARDS WILL REQUIRE GREATER CLEARING TREATMENTS. COMBINATIONS OF THE METHODS MAY BE ACCEPTABLE UNDER §1299(C) AS LONG AS THE INTENT OF THESE GUIDELINES IS MET.

4A. REDUCED FUEL ZONE: FUEL SEPARATION

IN CONJUNCTION WITH GENERAL GUIDELINES 1., 2., AND 3., ABOVE, MINIMUM CLEARANCE BETWEEN FUELS SURROUNDING EACH BUILDING OR STRUCTURE WILL RANGE FROM 4 FEET TO 40 FEET IN ALL DIRECTIONS, BOTH HORIZONTALLY AND VERTICALLY.

CLEARANCE DISTANCES BETWEEN VEGETATION WILL DEPEND ON THE SLOPE, VEGETATION SIZE, VEGETATION TYPE (BRUSH, GRASS, TREES), AND OTHER FUEL CHARACTERISTICS (FUEL COMPACTION, CHEMICAL CONTENT ETC.). PROPERTIES WITH GREATER FIRE HAZARDS WILL REQUIRE GREATER SEPARATION BETWEEN FUELS. FOR EXAMPLE, PROPERTIES ON STEEP SLOPES HAVING LARGE SIZED VEGETATION WILL REQUIRE GREATER SPACING BETWEEN INDIVIDUAL TREES AND BUSHES (SEE PLANT SPACING GUIDELINES AND CASE EXAMPLES BELOW). GROUPS OF VEGETATION (NUMEROUS PLANTS GROWING TOGETHER LESS THAN 10 FEET IN TOTAL FOLIAGE WIDTH) MAY BE TREATED AS A SINGLE PLANT. FOR EXAMPLE, THREE INDIVIDUAL MANZANITA PLANTS GROWING TOGETHER WITH A TOTAL FOLIAGE WIDTH OF EIGHT FEET CAN BE "GROUPED" AND CONSIDERED AS ONE PLANT AND SPACED ACCORDING TO THE PLANT SPACING GUIDELINES IN THIS DOCUMENT.

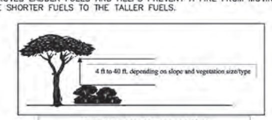
GRASS GENERALLY SHOULD NOT EXCEED 4 INCHES IN HEIGHT. HOWEVER, HOMEOWNERS MAY KEEP GRASS AND OTHER FORBS LESS THAN 18 INCHES IN HEIGHT ABOVE THE GROUND WHEN THESE GRASSES ARE ISOLATED FROM OTHER FUELS OR WHERE NECESSARY TO STABILIZE THE SOIL AND PREVENT EROSION.

CLEARANCE REQUIREMENTS INCLUDE:

- HORIZONTAL CLEARANCE BETWEEN AERIAL FUELS, SUCH AS THE OUTSIDE EDGE OF THE TREE CROWNS OR HIGH BRUSH. HORIZONTAL CLEARANCE HELPS STOP THE SPREAD OF FIRE FROM ONE FUEL TO THE NEXT.

Horizontal clearnce between aerial fuels

- VERTICAL CLEARANCE BETWEEN LOWER LIMBS OF AERIAL FUELS AND THE NEAREST SURFACE FUELS AND GRASS/WEEDS. VERTICAL CLEARANCE REMOVES LADDER FUELS AND HELPS PREVENT A FIRE FROM MOVING FROM THE SHORTER FUELS TO THE TALLER FUELS.



Vertical clearance between aerial fuels

Plant Spacing Guidelines

Guidelines are designed to break the continuity of fuels and be used as a "rule of thumb" for achieving compliance with Regulation 14 CCR 1299.

Trees	**Minimum horizontal space from edge of one tree canopy to the edge of the next**	
	Slope	Spacing
	0% to 20 %	10 feet
	20% to 40%	20 feet
	Greater than 40%	30 feet
Shrubs	**Minimum horizontal space between edges of shrub**	
	Slope	Spacing
	0% to 20 %	2 times the height of the shrub
	20% to 40%	4 times the height of the shrub
	Greater than 40%	6 times the height of the shrub
Vertical Space	**Minimum vertical space between top of shrub and bottom of lower tree branches:** 3 times the height of the shrub	

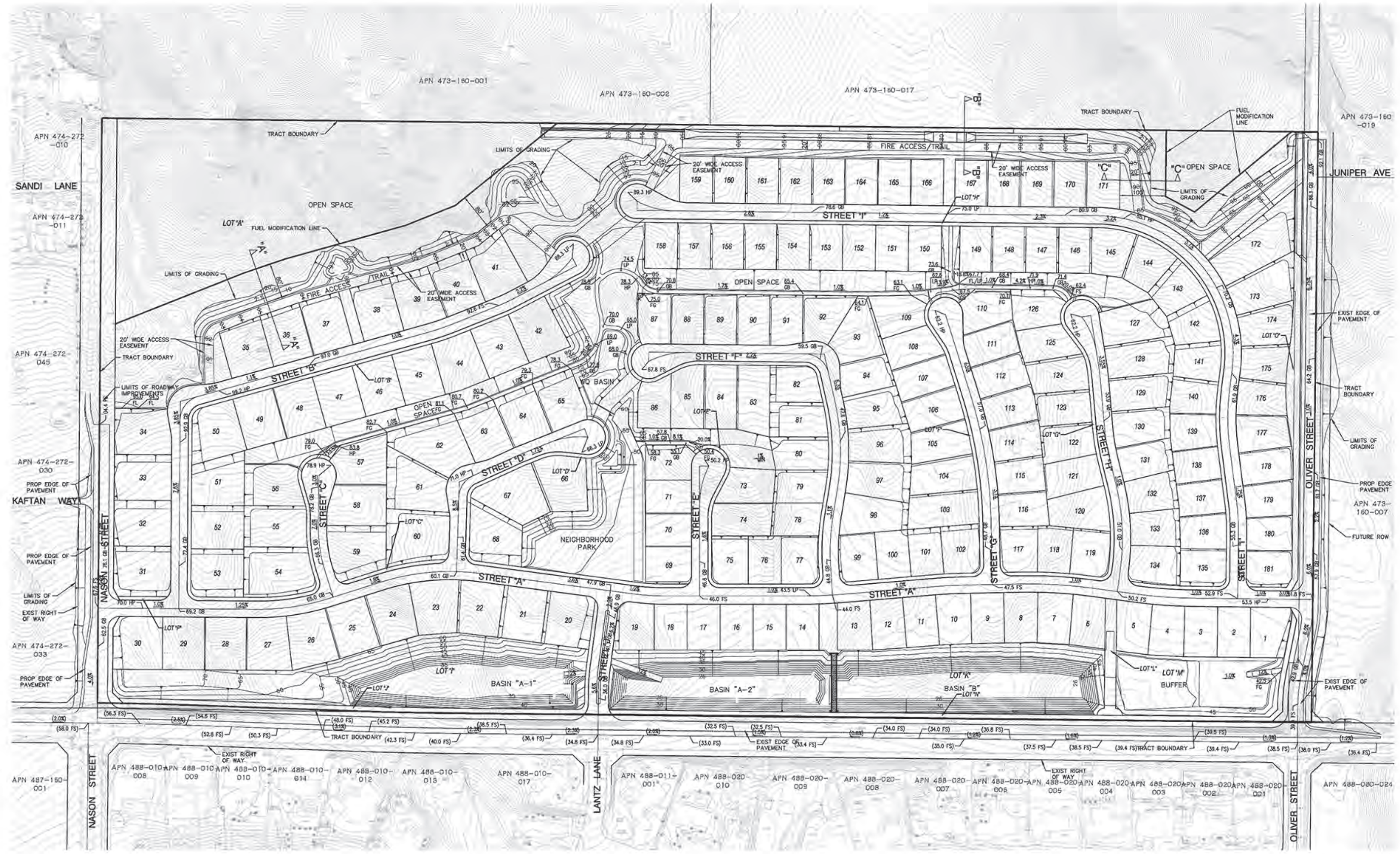
Adapted from: Gilmer, M. 1994. California Wildfire Landscaping

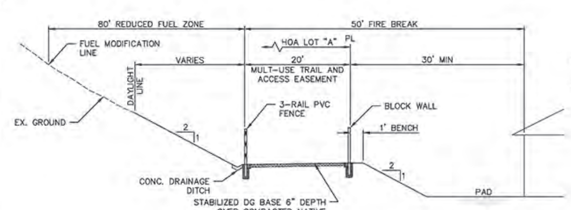
4B. REDUCED FUEL ZONE: DEFENSIBLE SPACE WITH CONTINUOUS TREE CANOPY TO ACHIEVE DEFENSIBLE SPACE WHILE RETAINING A STAND OF LARGER TREES WITH CONTINUOUS TREE CANOPY APPLY THE FOLLOWING TREATMENTS:

GENERALLY, REMOVE ALL SURFACE FUELS GREATER THAN 4 INCHES IN HEIGHT. SINGLE SPECIMENS OF TREES OR OTHER VEGETATION MAY BE RETAINED PROVIDED THEY ARE WELL-SPACED, WELL-PRUNED, AND CREATE A CONDITION THAT AVOIDS SPREAD OF FIRE TO OTHER VEGETATION OR TO A BUILDING OR STRUCTURE.

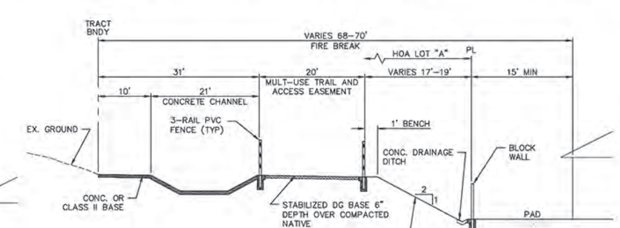
REMOVE LOWER LIMBS OF TREES ("PRUNE") TO AT LEAST 6 FEET UP TO 15 FEET (OR THE LOWER 1/3 BRANCHES FOR SMALL TREES). PROPERTIES WITH GREATER FIRE HAZARDS, SUCH AS STEEPER SLOPES OR MORE SEVERE FIRE DANGER, WILL REQUIRE PRUNING HEIGHTS IN THE UPPER END OF THIS RANGE.

Defensible Space retaining continuous trees





SECTION "A-A"
NOT TO SCALE



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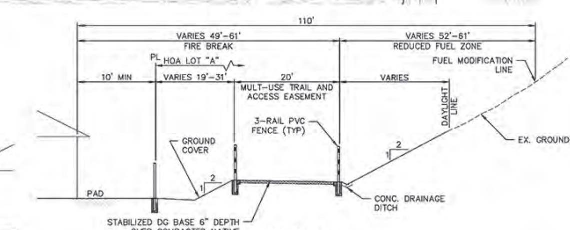


SECTION "C-C"
NOT TO SCALE

ANDERSON CONSULTING ENGINEERS, INC.
12526 HIGH BLUFF DR., SUITE 300
SAN DIEGO, CA 92130
(858) 925-7918

TENTATIVE TRACT MAP NO. 37001
CITY OF MORENO VALLEY, STATE OF CALIFORNIA
PRELIMINARY FUEL MODIFICATION PLAN

SUBMITTALS:
DESIGNED BY: JAA
DRAWN BY: IMC
CHECKED BY: JAA
SHEET 1 OF 1

SOURCE: Anderson Consulting Engineers, Inc., 2016

Ironwood Village Project
Figure VIII-1
Preliminary Fuel Modification Plan

ESA PCR

R7: Location R7 represents existing single-family residential homes located south of the Project at a distance of approximately 227 feet on Walfred Way.

R8: Location R8 represents the existing residential home situated approximately 216 feet south of the Project site at the northwest corner of Walfred Way and Oliver Street.

R9: Location R9 represents the existing residential community located approximately 1,369 feet east of the Project site.

Short-Term Construction Noise

Noise generated by the Project construction equipment would include a combination of trucks, power tools, concrete mixers and portable generators that when combined, can reach high levels. The number and mix of construction equipment is expected to occur during grading, paving, building construction, and architectural coating. Noise levels generated by heavy construction equipment can range from approximately 62 dBA to 76 dBA when measured at 200 feet. However, these noise levels diminish with distance from the construction site at a rate of 6 dBA per doubling of distance. **Table XII-3**, *Grading Equipment Noise Levels*, **Table XII-4**, *Paving Equipment Noise Levels*, **Table XII-5**, *Building Construction Equipment Noise Levels*, and **Table XII-6**, *Architectural Coating Equipment Noise Levels*, present the short-term construction noise levels at a distance of 200 feet from the center of construction activity for each stage of construction. **Table XII-7**, *Unmitigated Construction Equipment Noise Level Summary*, provides a summary of the construction noise levels by phase at the nine noise receiver locations. Based on the four stages of construction, the noise impacts associated with the Project are expected to create temporary high noise levels at the nearby receiver locations. To assess the construction noise levels at each receiver location, this analysis shows the construction noise levels by phase when all heavy equipment is operating simultaneously at a distance of roughly 100 feet from the Project site boundary. Figure XII-2 displays the receiver locations and construction activity locations used in this analysis.

Construction activities are estimated to occur during the permitted hours of 7:00 AM to 8:00 PM on any day, based on the MVMC. As shown in Table XII-7, the unmitigated peak construction noise levels are expected to range from 46.2 dBA Leq to 66.6 dBA Leq. Based on the construction noise standards described above, the potential short-term unmitigated construction noise level impacts are expected to exceed the acceptable construction noise level threshold of 60 dBA Leq at nearby sensitive receiver locations R1, R2, R4, and R6 during the permitted hours of construction activity. Therefore, temporary noise abatement would be needed to reduce the potential construction noise impacts. With the installation of temporary exterior noise control barriers providing a minimum attenuation of 10 dBA, construction noise levels at the nearby residential receivers would be reduced, but not eliminated.

TABLE XII-3
GRADING EQUIPMENT NOISE LEVELS

Equipment Type[a]	**Quantity**	**Usage Factor**[b]	**Hours Of Operation**[c]	**Reference Noise Level @50 Feet (dBA Lmax)**	**Combined Level @ 200 Feet (dBA Leq)**
Excavators	2	40%	3.2	81.0	68.0
Graders	1	40%	3.2	85.0	69.0
Water Trucks	1	40%	3.2	76.0	60.0
Rubber Tired Dozers	1	40%	3.2	82.0	66.0
Scrapers	2	40%	3.2	84.0	71.0
Tractor/Loader/Backhoes	2	40%	3.2	79.0	66.0
Combined Hourly Noise Levels 200 Feet (dBA Leq)					75.5
Distance to 65 dBA Leq Contour (Feet)					672'
Construction Noise Reference Distance	Distance To Construction Activity (Feet)[d]		Distance Attenuation (dBA Leq)[e]	Estimated Existing Barrier Attenuation (dBA Leq)[f]	Construction Noise Level (dBA Leq)
R1	140'		-8.9	0.0	66.6
R2	186'		-11.4	0.0	64.1
R3	308'		-15.8	0.0	59.7
R4	269'		-14.6	0.0	60.9
R5	241'		-13.7	-5.0	56.9
R6	245'		-13.8	0.0	61.7
R7	327'		-16.3	0.0	59.2
R8	316'		-16.0	-5.0	54.5
R9	1,469'		-29.4	0.0	46.2

[a] Source: FHWA's Roadway Construction Noise Model, January 2006.
[b] Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.
[c] Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.
[d] Distance from the nearest point of construction activity to the nearest receiver.
[e] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[f] Estimated barrier attenuation provided by the existing barriers in the Project study area.

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

TABLE XII-4
PAVING EQUIPMENT NOISE LEVELS

Equipment Type[a]	Quantity	Usage Factor[b]	Hours Of Operation[c]	Reference Noise Level @ 50 Feet (dBA Lmax)	Combined Level @ 200 Feet (dBA Leq)
Pavers	2	50%	4.0	77.0	65.0
Paving Equipment	2	40%	3.2	76.0	63.0
Rollers	2	20%	1.6	80.0	64.0
Combined Hourly Noise Levels 200 Feet (dBA Leq)					68.8
Distance to 65 dBA Leq Contour (Feet)					311'
Construction Noise Reference Distance	**Distance To Construction Activity (Feet)[d]**		**Distance Attenuation (dBA Leq)[e]**	**Estimated Existing Barrier Attenuation (dBA Leq)[f]**	**Construction Noise Level (dBA Leq)**
R1	140'		-8.9	0.0	59.9
R2	186'		-11.4	0.0	57.4
R3	308'		-15.8	0.0	53.0
R4	269'		-14.6	0.0	54.2
R5	241'		-13.7	-5.0	50.2
R6	245'		-13.8	0.0	55.0
R7	327'		-16.3	0.0	52.5
R8	316'		-16.0	-5.0	47.8
R9	1,469'		-29.4	0.0	39.5

[a] Source: FHWA's Roadway Construction Noise Model, January 2006.
[b] Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.
[c] Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.
[d] Distance from the nearest point of construction activity to the nearest receiver.
[e] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[f] Estimated barrier attenuation provided by the existing barriers in the Project study area.

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

TABLE XII-5
BUILDING CONSTRUCTION EQUIPMENT NOISE LEVELS

Equipment Type[a]	Quantity	Usage Factor[b]	Hours Of Operation[c]	Reference Noise Level @ 50 Feet (dBA Lmax)	Combined Level @ 200 Feet (dBA Leq)
Cranes	1	16%	1.3	81.0	61.0
Forklifts	3	20%	1.6	75.0	60.7
Generator Sets	1	50%	4.0	81.0	65.9
Tractor/Loader/Backhoes	3	40%	3.2	79.0	67.8
Welders	1	40%	3.2	74.0	58.0
Combined Hourly Noise Levels 200 Feet (dBA Leq)					71.1
Distance to 65 dBA Leq Contour (Feet)					405'
Construction Noise Reference Distance	**Distance To Construction Activity (Feet)[d]**		**Distance Attenuation (dBA Leq)[e]**	**Estimated Existing Barrier Attenuation (dBA Leq)[f]**	**Construction Noise Level (dBA Leq)**
R1	140'		-8.9	0.0	62.2
R2	186'		-11.4	0.0	59.7
R3	308'		-15.8	0.0	55.3
R4	269'		-14.6	0.0	56.5
R5	241'		-13.7	-5.0	52.5
R6	245'		-13.8	0.0	57.3
R7	327'		-16.3	0.0	54.8
R8	316'		-16.0	-5.0	50.1
R9	1,469'		-29.4	0.0	41.8

[a] Source: FHWA's Roadway Construction Noise Model, January 2006.
[b] Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.
[c] Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.
[d] Distance from the nearest point of construction activity to the nearest receiver.
[e] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[f] Estimated barrier attenuation provided by the existing barriers in the Project study area.

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

TABLE XII-6
ARCHITECTURAL COATING EQUIPMENT NOISE LEVELS

Equipment Type[a]	Quantity	Usage Factor[b]	Hours Of Operation[c]	Reference Noise Level @ 50 Feet (dBA Lmax)	Combined Level @ 200 Feet (dBA Leq)
Air Compressors	1	40%	3.2	78.0	62.0
Combined Hourly Noise Levels 200 Feet (dBA Leq)					62.0
Distance to 65 dBA Leq Contour (Feet)					141'
Construction Noise Reference Distance	**Distance To Construction Activity (Feet)[d]**		**Distance Attenuation (dBA Leq)[e]**	**Estimated Existing Barrier Attenuation (dBA Leq)[f]**	**Construction Noise Level (dBA Leq)**
R1	140'		-8.9	0.0	53.0
R2	186'		-11.4	0.0	50.6
R3	308'		-15.8	0.0	46.2
R4	269'		-14.6	0.0	47.4
R5	241'		-13.7	-5.0	43.3
R6	245'		-13.8	0.0	48.2
R7	327'		-16.3	0.0	45.7
R8	316'		-16.0	-5.0	41.0
R9	1,469'		-29.4	0.0	32.6

[a] Source: FHWA's Roadway Construction Noise Model, January 2006.
[b] Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.
[c] Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.
[d] Distance from the nearest point of construction activity to the nearest receiver.
[e] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[f] Estimated barrier attenuation provided by the existing barriers in the Project study area.

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

While noise attenuation of greater than 10 dBA may be possible to achieve with the use of temporary barriers, the noise barrier costs are expected to increase exponentially in relation to additional attenuation provided above 10 dBA. This suggests a point of diminishing return of noise attenuation for temporary noise barriers beyond 10 dBA. While a 10 dBA reduction in sound level is considered attainable, a reduction of 15 dBA is very difficult and a 20 dBA reduction is nearly impossible. Further noise attenuation strategies include the installation of temporary barriers or window inserts and treatments at each receiver location to reduce the noise levels and block the line of sight to the source. However, the ability to install such measures at the approval of nearby homeowners may not be feasible and will vary depending on each homeowner's willingness to allow for installation. Further, noise abatement at the receiver is usually only cost-effective if fewer residences are involved as each home may require different materials based on each home's specifications. Therefore, an attainable attenuation of 10 dBA through the use of temporary construction noise barriers is recommended to reduce construction noise levels at the nearby residential receivers.

TABLE XII-7
UNMITIGATED CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Noise Receiver[a]	Distance To Construction Activity (Feet)	Construction Phase Hourly Noise Level (dBA Leq)					Potential Significant Impact c
		Grading	Paving	Building Const.	Arch. Coating	Peakb	
R1	140'	66.6	59.9	62.2	53.0	66.6	Yes
R2	186'	64.1	57.4	59.7	50.6	64.1	Yes
R3	308'	59.7	53.0	55.3	46.2	59.7	No
R4	269'	60.9	54.2	56.5	47.4	60.9	Yes
R5	241'	56.9	50.2	52.5	43.3	56.9	No
R6	245'	61.7	55.0	57.3	48.2	61.7	Yes
R7	327'	59.2	52.5	54.8	45.7	59.2	No
R8	316'	54.5	47.8	50.1	41.0	54.5	No
R9	1,469'	46.2	39.5	41.8	32.6	46.2	No

[a] Noise receiver locations are shown on Exhibit 10-A.
[b] Estimated construction noise levels during peak operating conditions.
[c] Do the peak construction noise levels exceed the City of Moreno Valley 60 dBA Leq threshold?

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

Table XII-8, *Mitigated Construction Equipment Noise Level Summary*, indicates the peak construction noise levels are expected to range from 46.2 to 56.6 dBA Leq with the attenuation provided by the temporary construction noise barriers. With the temporary noise control barrier providing a minimum attenuation of 10 dBA, the construction noise levels will satisfy the 60 dBA Leq construction noise level threshold. Although construction noise is temporary, intermittent and of short duration, and would not present any long-term impacts, MM NOISE-1 through MM NOISE-5 would reduce any noise level increases produced by the construction equipment to nearby noise-sensitive residential uses. Therefore, with incorporation of the prescribed mitigation measures, Project construction would result in a less than significant impact.

TABLE XII-8
MITIGATED CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Noise Receiver[a]	Distance To Const. Activity (Feet)	Without Temporary Noise Barriers			With Temporary Noise Barriers		
		Const. Noise (dBA Leq)[b]	Threshold Level(dBA Leq)[c]	Compliance With [d]	Attenuation	Const. Noise Levels With [e]	Compliance With [d]
R1	140'	66.6	60	No	-10.0	56.6	Yes
R2	186'	64.1	60	No	-10.0	54.1	Yes
R3	308'	59.7	60	Yes	n/a	n/a	n/a
R4	269'	60.9	60	No	-10.0	50.9	Yes
R5	241'	56.9	60	Yes	-10.0	46.9	Yes
R6	245'	61.7	60	No	-10.0	51.7	Yes
R7	327'	59.2	60	Yes	n/a	n/a	n/a

Noise Receiver[a]	Distance To Const. Activity (Feet)	Without Temporary Noise Barriers			With Temporary Noise Barriers		
		Const. Noise Level (dBA Leq)[b]	Threshold Level (dBA Leq)[c]	Compliance With[d]	Attenuation	Const. Noise Levels With[e]	Compliance With[d]
R8	316'	54.5	60	Yes	n/a	n/a	n/a
R9	1,469'	46.2	60	Yes	n/a	n/a	n/a

[a] Noise receiver locations are shown on Exhibit 10-A.
[b] Estimated construction noise levels during peak operating conditions, as shown on Table 10-5.
[c] Source: City of Moreno Valley Municipal Code, Section 11.80.030 (D) (7) (Appendix 3.1)
[d] Do the estimated Project construction noise levels meet the threshold of 60 dBA Leq?
[e] Peak construction noise levels with the recommended minimum temporary noise barrier attenuation of 10 dBA when operating near sensitive receiver locations.

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

Mitigation Measures

MM NOISE-1: Prior to approval of the grading plans and/or issuance of building permits, plans shall include a note indicating that noise-generating Project construction activities shall only occur between the hours of 7:00 AM and 7:00 PM, Monday through Friday, excluding holidays, and from 8:00 AM and 4:00 PM on Saturday, unless written approval is obtained from the City's building official or city engineer. The Project construction supervisor shall ensure compliance with the note and the City shall conduct periodic inspection at its discretion.

MM NOISE-2: The Project applicant shall install temporary noise control barriers that provide a minimum noise level attenuation of 10 dBA when Project construction occurs near existing noise-sensitive structures. The noise control barrier must present a solid face from top to bottom. The noise control barrier must be designed with appropriate height and length to block the view of the noise source. Unnecessary openings shall not be made.

The noise barrier may be constructed using an acoustical blanket (e.g. vinyl acoustic curtains or quilted blankets) attached to the construction site perimeter fence or equivalent temporary fence posts.

The noise barriers must be maintained and any damage promptly repaired. Gaps, holes, or weaknesses in the barrier or openings between the barrier and the ground shall be promptly repaired.

The noise control barriers and associated elements shall be completely removed and the site appropriately restored upon the conclusion of the construction activity.

MM NOISE-3: During all Project site construction, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise sensitive receptors nearest the Project site.

MM NOISE-4: The construction contractor shall locate equipment staging in areas that would create the greatest distance between construction-related noise sources and noise-sensitive receivers nearest the Project site (i.e., to the northern center) during all Project construction.

> **MM NOISE-5**: The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment (between the hours of 7:00 AM and 7:00 PM, Monday through Friday, excluding holidays, and from 8:00 AM and 4:00 PM on Saturday, unless written approval is obtained from the City's building official or city engineer). The contractor shall design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.

Off-Site Traffic Noise

Traffic generated by the Project would influence the traffic noise levels in surrounding off-site areas. To quantify the off-site traffic noise increases on the surrounding off-site areas, the changes in traffic noise levels on nine roadways segments surrounding the Project site were estimated based on the change in the average daily traffic (ADT) volumes. The traffic noise levels provided in this analysis are based on the traffic forecasts of the Project's Traffic Impact Analysis. To assess the off-site transportation CNEL noise level impacts associated with the Project, noise contours were developed based on the Project's Traffic Impact Analysis. Noise contour boundaries represent the equal levels of noise exposure and are measured in CNEL from the center of the roadway. Noise contour boundaries represent the equal levels of noise exposure and are measured in CNEL from the center of the roadway. Noise contours were developed for the following traffic scenarios:

<u>Existing Without/With Project</u>: This scenario refers to the existing present-day noise conditions, without the Project, and with the construction of the Project.

<u>Year 2020 Without/With Project</u>: This scenario refers to the background noise conditions at future year 2020 with and without the Project. The With Project scenario corresponds to Year 2020 conditions and includes all cumulative projects identified in the Traffic Impact Analysis.

<u>Year 2035 Without/With Project</u>: This scenario refers to the background noise conditions at Future Year 2035 With and Without the Project. The With Project scenario corresponds to Year 2035 conditions and includes all cumulative projects identified in the Traffic Impact Analysis.

Noise contours represent the distance to noise levels of a constant value and are measured from the center of the roadway for the 70, 65, and 60 dBA noise levels. The noise contours do not take into account the effect of any existing noise barriers or topography that may affect ambient noise levels. In addition, since the noise contours reflect modeling of vehicular noise on area roadways, the contours do not appropriately reflect noise contributions from any nearby stationary noise sources within the Project study area. **Table XII-9**, *Existing Without Project Conditions Noise Contours*, **Table XII-10**, *Existing With Project Conditions Noise Contours*, **Table XII-11**, *Year 2020 Without Project Conditions Noise Contours*, **Table XII-12**, *Year 2020 With Project Conditions Noise Contours*, **Table XII-13**, *Year 2035 Without Project Conditions Noise Contours*, **Tabled XII-14**, *Year 2035 With Project Conditions Noise Contours*, present a summary of the unmitigated exterior traffic noise levels for the nine study area roadway segments analyzed from the Without Project to the With Project conditions in each of the three timeframes: Existing, Year 2020, and Year 2035 conditions.

TABLE XII-9
EXISTING WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use [a]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet) [b]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	64.9	RW	RW	93
2	Nason St.	n/o SR-60 WB Ramps	Residential	65.3	RW	46	100
3	Nason St.	n/o SR-60 WB Fwy	Open Space	69.6	RW	89	191
4	Nason St.	s/o SR-60 EB Ramps	Commercial	71.0	52	111	239
5	Ironwood Av.	w/o Nason St.	Residential	66.8	RW	58	126
6	Ironwood Av.	e/o Nason St.	Residential	67.4	RW	63	136
7	Ironwood Av.	e/o Lantz Ln.	Residential	67.1	RW	60	130
8	Ironwood Av.	e/o Oliver St.	Residential	67.1	RW	60	130

[a] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[b] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

TABLE XII-10
EXISTING WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use [a]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet) [b]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	65.8	RW	49	107
2	Nason St.	n/o SR-60 WB Ramps	Residential	66.1	RW	52	112
3	Nason St.	n/o SR-60 WB Fwy	Open Space	69.8	RW	91	197
4	Nason St.	s/o SR-60 EB Ramps	Commercial	71.1	52	113	243
5	Ironwood Av.	w/o Nason St.	Residential	67.0	RW	60	130
6	Ironwood Av.	e/o Nason St.	Residential	68.0	RW	69	149
7	Ironwood Av.	e/o Lantz Ln.	Residential	67.3	RW	62	134
8	Ironwood Av.	e/o Oliver St.	Residential	67.5	RW	65	140

[a] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[b] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

TABLE XII-11
YEAR 2020 WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use [a]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet) [b]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	68.1	RW	70	152
2	Nason St.	n/o SR-60 WB Ramps	Residential	68.3	RW	73	157
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.2	53	115	247
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.5	64	139	299
5	Ironwood Av.	w/o Nason St.	Residential	69.4	RW	86	186
6	Ironwood Av.	e/o Nason St.	Residential	69.6	RW	90	193
7	Ironwood Av.	e/o Lantz Ln.	Residential	69.4	RW	87	187
8	Ironwood Av.	e/o Oliver St.	Residential	69.4	RW	87	187

[a] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[b] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

TABLE XII-12
YEAR 2020 WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use [a]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet) [b]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	68.5	RW	75	162
2	Nason St.	n/o SR-60 WB Ramps	Residential	68.7	RW	78	167
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.4	55	118	253
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.5	65	140	302
5	Ironwood Av.	w/o Nason St.	Residential	69.5	RW	88	189
6	Ironwood Av.	e/o Nason St.	Residential	70.1	44	96	206
7	Ironwood Av.	e/o Lantz Ln.	Residential	69.6	RW	89	192
8	Ironwood Av.	e/o Oliver St.	Residential	69.6	RW	90	193

[a] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[b] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

TABLE XII-13
YEAR 2035 WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use [a]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet) [b]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	68.5	RW	75	162
2	Nason St.	n/o SR-60 WB Ramps	Residential	68.7	RW	78	167
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.7	57	122	264
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.9	69	148	319
5	Ironwood Av.	w/o Nason St.	Residential	69.8	RW	92	198
6	Ironwood Av.	e/o Nason St.	Residential	70.1	44	96	206
7	Ironwood Av.	e/o Lantz Ln.	Residential	69.8	RW	92	198
8	Ironwood Av.	e/o Oliver St.	Residential	69.8	RW	92	198

[a] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[b] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

TABLE XII-14
YEAR 2035 WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use [a]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet) [b]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	68.9	RW	80	171
2	Nason St.	n/o SR-60 WB Ramps	Residential	69.1	RW	82	178
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.8	58	125	270
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.9	69	149	321
5	Ironwood Av.	w/o Nason St.	Residential	69.9	RW	93	201
6	Ironwood Av.	e/o Nason St.	Residential	70.5	47	102	219
7	Ironwood Av.	e/o Lantz Ln.	Residential	70.0	44	94	203
8	Ironwood Av.	e/o Oliver St.	Residential	70.0	44	95	205

[a] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[b] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

Existing Condition Project Traffic Noise Level Contributions

Table XII-15, *Existing Project-Related Traffic Noise Impacts*, presents a comparison of the Existing Without and With Project conditions CNEL noise levels. Table XII-9, indicates that the exterior noise levels are expected to range from 64.9 to 71.0 dBA CNEL for Existing Without Project conditions. Table XII-10 presents the Existing With Project conditions noise level contours that are expected to range from 65.8 to 71.1 dBA CNEL. As shown on Table XII-15 the Project is expected to generate an exterior noise level increase of up to 0.9 dBA CNEL. Based on the significance criteria discussed in Table XII-1, the Project-related off-site traffic noise level increases are considered a less than significant impact for all roadway segments under Existing conditions.

TABLE XII-15
EXISTING PROJECT-RELATED TRAFFIC NOISES IMPACTS

ID	Road	Segment	Adjacent Land Use [a]	CNEL at Adjacent Land Use(dBA)			Potential Significant Impact? [b]
				Without Project	With Project	Project Addition	
1	Nason St.	s/o Ironwood Av.	Residential	64.9	65.8	0.9	No
2	Nason St.	n/o SR-60 WB Ramps	Residential	65.3	66.1	0.8	No
3	Nason St.	n/o SR-60 WB Fwy	Open Space	69.6	69.8	0.2	No
4	Nason St.	s/o SR-60 EB Ramps	Commercial	71.0	71.1	0.1	No
5	Ironwood Av.	w/o Nason St.	Residential	66.8	67.0	0.2	No
6	Ironwood Av.	e/o Nason St.	Residential	67.4	68.0	0.6	No
7	Ironwood Av.	e/o Lantz Ln.	Residential	67.1	67.3	0.2	No
8	Ironwood Av.	e/o Oliver St.	Residential	67.1	67.5	0.4	No

[a] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[b] Significance Criteria (Section 4, Table 4-1).

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

Year 2020 Project Traffic Noise Level Contributions

Table XII-16, *Year 2020 Project-Related Traffic Noise Impacts*, presents a comparison of the Year 2020 Without and With Project conditions CNEL noise levels. Table XII-11 indicates that the exterior noise levels are expected to range from 68.1 to 72.5 dBA CNEL for Year 2020 Without Project conditions. Table XII-12 presents the Year 2020 With Project conditions noise level contours that are expected to range from 68.5 to 72.5 dBA CNEL. As shown on Table XII-16, the Project is expected to generate an exterior noise level increase of up to 0.5 dBA CNEL. Based on the significance criterion discussed in Table XII-1, the Project-related off-site traffic noise level increases are considered a less than significant impact for all roadway segments under Year 2020 conditions.

TABLE XII-16
YEAR 2020 PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use [a]	CNEL at Adjacent Land Use(dBA)			Potential Significant Impact? [b]
				Without Project	With Project	Project Addition	
1	Nason St.	s/o Ironwood Av.	Residential	68.1	68.5	0.4	No
2	Nason St.	n/o SR-60 WB Ramps	Residential	68.3	68.7	0.4	No
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.2	71.4	0.2	No
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.5	72.5	0.0	No
5	Ironwood Av.	w/o Nason St.	Residential	69.4	69.5	0.1	No
6	Ironwood Av.	e/o Nason St.	Residential	69.6	70.1	0.5	No
7	Ironwood Av.	e/o Lantz Ln.	Residential	69.4	69.6	0.2	No
8	Ironwood Av.	e/o Oliver St.	Residential	69.4	69.6	0.2	No

[a] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[b] Significance Criteria (Section 4, Table 4-1).

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

Year 2035 Project Traffic Noise Level Contributions

Table XII-17, *Year 2035 Project-Related Traffic Noise Impacts*, presents a comparison of the Year 2035 Without and With Project conditions CNEL noise levels. Table XII-13 indicates that the exterior noise levels are expected to range from 68.5 to 72.9 dBA CNEL for Year 2035 Without Project conditions. Table XII-14 presents the Year 2035 With Project conditions noise level contours that are expected to range from 68.9 to 72.9 dBA CNEL. As shown on Table XII-17, the Project is expected to generate an exterior noise level increase of up to 0.4 dBA CNEL. Based on the significance criterion discussed in Table XII-1, the Project-related off-site traffic noise level increases are considered a less than significant impact for all roadway segments under Year 2035 conditions.

Project Traffic Noise Level Contributions

The off-site traffic noise analysis identifies that the greatest Project-related noise level contribution of 0.9 dBA CNEL under Existing conditions would decrease 0.4 dBA CNEL under Year 2035 conditions. This shows that the Project's incremental traffic-related noise level increases at land uses adjacent to roadways conveying Project traffic would diminish over time. This occurs as the background traffic on the study area roadway segments increases and the Project represents a smaller percentage of the overall traffic volume. The off-site traffic noise analysis indicates that the Project's contributions to roadway noise levels would be less than significant.

TABLE XII-17
YEAR 2035 PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use [a]	CNEL at Adjacent Land Use(dBA)			Potential Significant Impact? [b]
				Without Project	With Project	Project Addition	
1	Nason St.	s/o Ironwood Av.	Residential	68.5	68.9	0.4	No
2	Nason St.	n/o SR-60 WB Ramps	Residential	68.7	69.1	0.4	No
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.7	71.8	0.1	No
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.9	72.9	0.0	No
5	Ironwood Av.	w/o Nason St.	Residential	69.8	69.9	0.1	No
6	Ironwood Av.	e/o Nason St.	Residential	70.1	70.5	0.4	No
7	Ironwood Av.	e/o Lantz Ln.	Residential	69.8	70.0	0.2	No
8	Ironwood Av.	e/o Oliver St.	Residential	69.8	70.0	0.2	No

[a] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[b] Significance Criteria (Section 4, Table 4-1).

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

On-Site Traffic Noise

An on-site exterior noise impact analysis has been completed to determine the traffic noise exposure and to identify potential necessary noise abatement measures for the Project. It is expected that the primary source of noise impacts to the Project site would be traffic noise from Ironwood Avenue. The Project would also experience some background traffic noise impacts from Nason Street, Oliver Street, and the Project's internal streets. However, due to the distance, topography and low traffic volume/speed, traffic noise from these roads would not make a significant contribution to the noise environment.

On-Site Exterior Noise Analysis

Table XII-18, *Exterior Noise Levels (CNEL)*, presents a summary of future exterior noise level impacts in the outdoor living areas (backyards) for the lots within the Project site. The on-site traffic noise level impacts indicate the lots adjacent to Ironwood Avenue would experience unmitigated exterior noise levels ranging from 63.3 to 67.0 dBA CNEL. To satisfy the City of Moreno Valley 65 dBA CNEL exterior noise level standards for residential land use, the construction of 4-foot high noise barriers for the outdoor living areas of lots 26 to 30 are required (MM NOISE-6). With the recommended noise barriers illustrated on **Figure XII-3**, *Summary of Recommendations*, the mitigated future exterior noise levels would range from 61.5 to 63.3 dBA CNEL. The Noise Impact Analysis states that the recommended noise barriers would satisfy the City of Moreno Valley 65 dBA CNEL exterior noise level standards. As such, with incorporation of MM NOISE-6, a less than significant impact to on-site exterior noise would occur.

TABLE XII-18
EXTERIOR NOISE LEVELS (CNEL)

Lot Number	Roadway	Unmitigated Noise Level (dBA CNEL)	Mitigated Noise Level (dBA CNEL)	Recommended Barrier Height (Feet)	Top of Barrier Elevation (Feet)
1	Ironwood Av.	64.5	_a	_a	_a
5	Ironwood Av.	64.4	_a	_a	_a
12	Ironwood Av.	64.4	_a	_a	_a
19	Ironwood Av.	64.4	_a	_a	_a
20	Ironwood Av.	64.3	_a	_a	_a
23	Ironwood Av.	63.3	_a	_a	_a
25	Ironwood Av.	64.6	_a	_a	_a
27	Ironwood Av.	66.6	61.5	4'	1876'
30	Ironwood Av.	67.0	61.6	4'	1882'

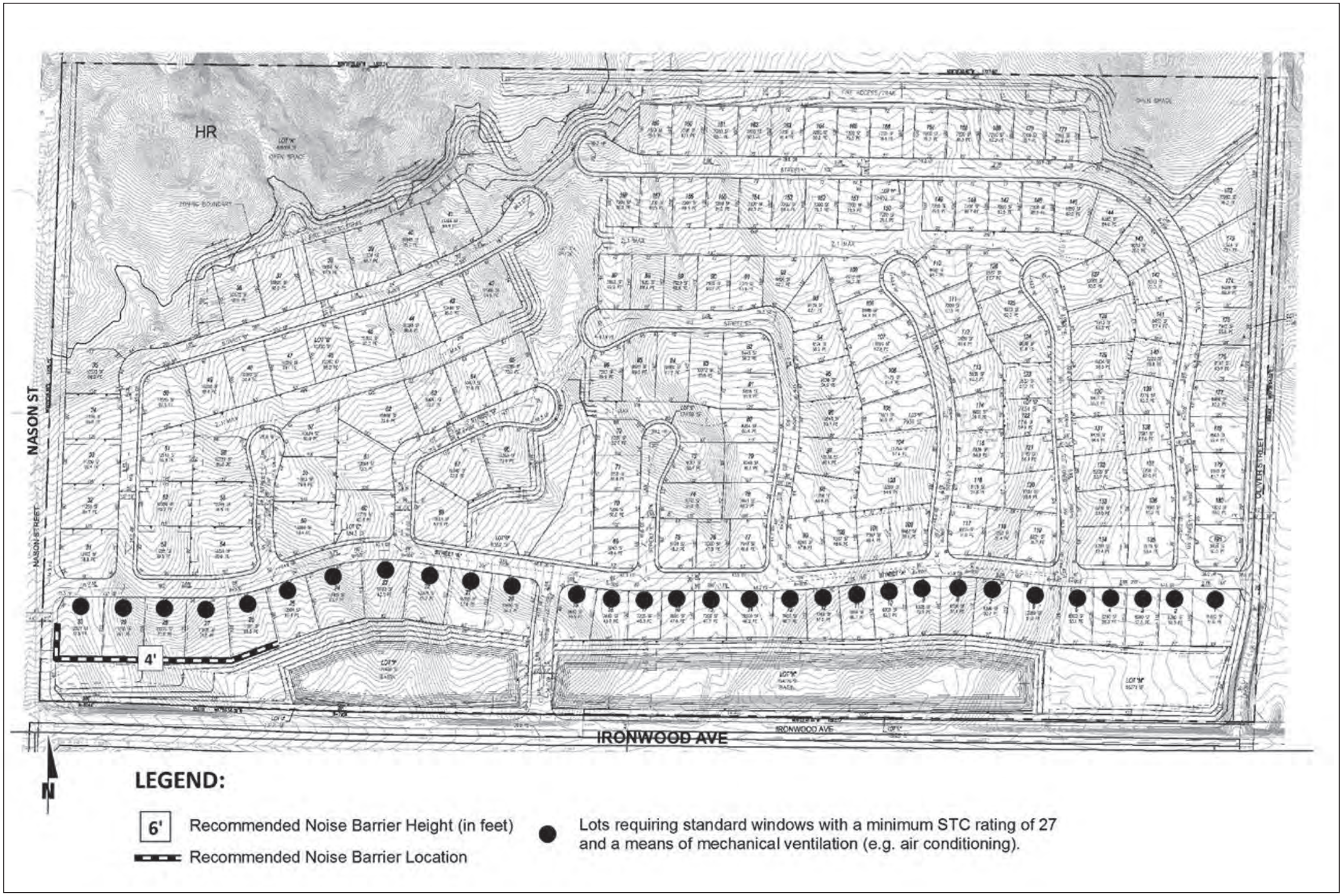
[a] No exterior noise mitigation required to meet the City of Moreno Valley exterior noise standards.

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

On-Site Interior Noise Analysis

The interior noise level is the difference between the predicted exterior noise level at the building façade and the noise reduction of the structure. Typical building construction would provide a Noise Reduction (NR) of approximately 12 dBA with "windows open" and a minimum 25 dBA NR with "windows closed." However, sound leaks, cracks and openings within the window assembly could greatly diminish its effectiveness in reducing noise. Several methods are used to improve interior NR, including weather-stripped solid core exterior doors; upgraded dual glazed windows; mechanical ventilation/air conditions; and exterior wall/roof assembles free of cut outs or openings.

To ensure the interior noise levels comply with the City of Moreno Valley 45 dBA CNEL interior noise standards, future noise levels were calculated at the first and second floor building facades. As such, a NR of up to 21.4 dBA and a windows closed condition requiring a means of mechanical ventilation (e.g. air conditions) are required for lots adjacent to Ironwood Avenue (MM NOISE-7). **Table XII-19**, *First Floor Interior Noise Impacts (CNEL)*, indicates that the future unmitigated noise levels at the first floor building façade are expected to range from 60.1 to 64.3 dBA CNEL. The first floor interior noise level analysis indicates the City of Moreno Valley 45 dBA CNEL interior noise level standards for the residential land uses could be satisfied using standard windows with a minimum sound transmission class (STC) rating of 27 for all lots adjacent to Ironwood Avenue. **Table XII-20**, *Second Floor Interior Noise Impacts (CNEL)*, indicates that the future unmitigated noise levels at the second floor building façade are expected to range from 63.0 to 66.4 dBA CNEL.



SOURCE: Urban Crossroads, 2015

Ironwood Village Project

Figure XII-3

Summary of Recommendations

ESA PCR

TABLE XII-19
FIRST FLOOR INTERIOR NOISE IMPACTS (CNEL)

Lot Number	Noise Level at Façade[a]	Required Interior Noise Reduction[b]	Estimated Interior Noise Reduction[c]	Upgraded Windows[d]	Interior Noise Level[e]
1	64.1	19.1	25.0	No	39.1
5	64.1	19.1	25.0	No	39.1
12	64.1	19.1	25.0	No	39.1
19	64.1	19.1	25.0	No	39.1
20	64.0	19.0	25.0	No	39.0
23	63.0	18.0	25.0	No	38.0
25	64.3	19.3	25.0	No	39.3
27	60.2	15.2	25.0	No	35.2
30	60.1	15.1	25.0	No	35.1

a Exterior noise level at the facade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
b Noise reduction required to satisfy the 45 dBA CNEL interior noise standards.
c A minimum 25 dBA noise reduction is assumed with standard building construction.
d Does the required interior noise reduction trigger upgraded with a minimum STC rating of greater than 27?
e Estimated interior noise level with minimum STC rating for all windows.

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

TABLE XII-20
SECOND FLOOR INTERIOR NOISE IMPACTS (CNEL)

Lot Number	Noise Level at Façade[a]	Required Interior Noise Reduction[b]	Estimated Interior Noise Reduction[c]	Upgraded Windows[d]	Interior Noise Level[e]
1	64.1	19.1	25.0	No	39.1
5	64.1	19.1	25.0	No	39.1
12	64.1	19.1	25.0	No	39.1
19	64.1	19.1	25.0	No	39.1
20	64.0	19.0	25.0	No	39.0
23	63.0	18.0	25.0	No	38.0
25	64.3	19.3	25.0	No	39.3
27	66.2	21.2	25.0	No	41.2
30	66.4	21.4	25.0	No	41.4

a Exterior noise level at the facade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
b Noise reduction required to satisfy the 45 dBA CNEL interior noise standards.
c A minimum 25 dBA noise reduction is assumed with standard building construction.
d Does the required interior noise reduction trigger upgraded with a minimum STC rating of greater than 27?
e Estimated interior noise level with minimum STC rating for all windows.

SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

The second floor interior noise level analysis shows that the City of Moreno Valley 45 dBA CNEL interior noise level standards for residential land use can be satisfied using standard windows with a minimum STC rating of 27 for all lots adjacent to Ironwood Avenue. The interior noise analysis indicates that with the recommended interior noise mitigation measures listed below, the Project would satisfy the City of Moreno Valley 45 dBA CNEL interior noise level standards for the Project. As such, with incorporation of MM NOISE-7, a less than significant impact to on-site interior noise would occur

Mitigation Measures

MM NOISE-6: Exterior Noise Mitigation: The Project applicant shall construct 4-foot high noise barriers for the outdoor living areas (backyards) of residential lots 26 to 30. The recommended noise control barriers shall be constructed so that the top of each wall extends to the recommended height above the pad elevation of the lit it is shielding. When the road is elevated above the pad elevation, the barrier shall extend to the recommended height above the highest point between the residential home and the road. The barriers shall provide a weight of at least 4 pounds per square foot of face area with no decorative cutouts or line-of-sight openings between shielded areas and the roadways. The noise barrier shall be constructed using one of the following materials: masonry block; stucco veneer over wood framing (or foam core), or 1-inch thick tongue and groove wood of sufficient weight per square foot; glass (1/4-inch thick), or other transparent material with sufficient weight per square feet; earthen berm; or any combination of these construction materials. The barrier must present a solid face from top to bottom. Unnecessary openings or decorative cutouts shall not be made. All gaps (except for weep holes) shall be filled with grout or caulking.

MM NOISE-7: Interior Noise Mitigation: The Project applicant shall provide the following or equivalent measures:

Windows: All windows and sliding glass doors shall be well fitted with well weather-stripped assemblies and a minimum STC rating of 27.

Doors: All exterior doors shall be well weather-stripped solid core assemblies at least 1 ¾-inch thick.

Roof: Roof sheathing of wood construction shall be well fitted or caulked plywood of at ½-inch thick. Ceilings shall be well fitted, well-sealed gypsum board of at least ½-inch thick.

Attic: Attic vents shall be oriented away from Ironwood Avenue. If such an orientation cannot be avoided, then an acoustical baffle shall be placed in the attic space behind the vents. Insulation with at least a rating of R-19 shall be used in the attic space.

Ventilation: When any habitable room is in use, arrangements shall be such that circulated air is received when any exterior door(s) or window(s) are closed. A forced air circulation system (e.g. air conditions) or active ventilation system (e.g. fresh air supply) shall be provided which satisfies the requirements of the Uniform Building Code.

b) Exposure of people to or generation of excessive groundborne vibration or groundborne noise levels?

Less Than Significant Impact.

Construction activity can result in varying degrees of ground vibration depending on the equipment and methods use, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. The use of heavy construction equipment and trucks would most likely cause vibration impacts. Although all heavy mobile construction equipment has the potential of causing at least some perceptible vibration while operating close to buildings, the vibration is usually short-term and is not of sufficient magnitude to cause building damage. It is not expected that heavy equipment such as large bulldozers would operate in a distance close enough to residences to cause a vibration impact. Trucks hauling building materials to construction sites can be sources of vibration intrusion if the haul routes pass through residential neighborhoods on streets with bumps or potholes. Repairing the bumps and potholes generally eliminate the problem.

As discussed above, ground-borne vibration levels resulting from construction activities occurring within the Project were estimated by data published by the FTA. Construction activities that would have the potential to generate low levels of ground-borne vibration within the Project site including grading. Using the vibration source level of construction equipment and vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts. **Table XII-21**, *Construction Equipment Vibration Levels,* presents the expected Project-related vibration levels at each of the nine sensitive receiver locations.

TABLE XII-21
CONSTRUCTION EQUIPMENT VIBRATION LEVELS

Noise Receiver[a]	Distance To Construction Activity (Feet)	Receiver Vibration Levels (VdB)[b]					Potential Significant[c]
		Small Bulldozer	Jackhammer	Loaded Trucks	Large Bulldozer	Peak Vibration	
R1	140'	35.6	56.6	63.6	64.6	64.6	No
R2	186'	31.9	52.9	59.9	60.9	60.9	No
R3	308'	25.3	46.3	53.3	54.3	54.3	No
R4	269'	27.0	48.0	55.0	56.0	56.0	No
R5	241'	28.5	49.5	56.5	57.5	57.5	No
R6	245'	28.3	49.3	56.3	57.3	57.3	No
R7	327'	24.5	45.5	52.5	53.5	53.5	No
R8	316'	24.9	45.9	52.9	53.9	53.9	No
R9	1,469'	4.9	25.9	32.9	33.9	33.9	No

[a] Noise receiver locations are shown on Exhibit 10-A.
[b] Based on the Vibration Source Levels of Construction Equipment included on Table 6-6.
[c] Does the Peak Vibration exceed the FTA maximum acceptable vibration standard of 80 (VdB)?

SOURCE: SOURCE: Ironwood Residential (TTM No. 37001), Noise Impact Analysis, City of Moreno Valley, prepared by Urban Crossroads, dated August 31, 2015.

Based on the reference vibration levels provided by the FTA, a large bulldozer represents the peak source of vibration with a reference velocity of 87 VdB at a distance of 25 feet. At distances ranging from 140 to 1,469 feet from the Project site, construction vibration velocity levels are expected to approach 64.6 VdB, as shown on Table XII-21. Based on the FTA vibration standards, the Project site would not include or require equipment, facilities, or activities that would result in a barely perceptible human response (annoyance) for infrequent events.

Further, vibration levels at the site of the closest sensitive receiver are unlikely to be sustained during the entire construction period, but would occur rather only during the times that heavy construction equipment is operating simultaneously at a distance of 100 feet from the Project site perimeter. Moreover, construction at the Project site would be restricted to daytime hours consistent with City requirements; thereby eliminating potential vibration impacts during the sensitive nighttime hours. The results of this analysis indicate that the vibration impacts due to Project construction would be less than significant.

Post-construction on-site activities would be limited to residential uses that would not generate excessive groundborne noise or vibration. As such, ground-borne vibration and noise levels associated with Project would be less than significant.

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

Less Than Significant Impact. The existing noise environment in the Project area is dominated by traffic noise from nearby roadways and nearby residential activities. Long-term operation of the Project would not have a significant effect on the community noise environment in proximity to the Project site. Noise sources that would have potential noise impacts include off-site vehicle traffic, on-site parking lots, walking trails, the proposed park, and mechanical equipment (i.e., air-conditioning). Motor vehicle travel on local roadways attributable to the Project, as discussed in Response XII.a, would have a less than significant impact on community noise levels. Noise levels associated with on-site operations are also considered less than significant as discussed in Response XII.a. As such, noise impacts in this regard would be less than significant.

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Less Than Significant Impact. The Project would result in a temporary increase in ambient noise near the Project site during the construction period. Construction noise impacts are discussed in Response XII.a. Noise generated by on-site construction activities would have a less than significant impact on surrounding uses.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. As discussed under Responses VIII.e and f, the Project site is not located within an airport land use plan or within two miles of a public or private airport. The nearest airport is the March Inland Port, a joint-use military and public airport, located approximately 5.15 miles southwest of the Project site. Therefore, construction or operation of the Project would not expose people to excessive airport related noise levels. As such, no impacts would occur.

f) For a project within the vicinity of a private airstrip, heliport or helistop, would the project expose people residing or working in the project area to excessive noise levels?

No Impact. The Project site is not located within the vicinity of a private airstrip, heliport or helistop. Therefore, the Project would not expose people residing or working in the Project area to excessive noise levels from such uses. No impact would occur in this regard.

XIII. Population and Housing

Would the Project:

a. Induce substantial population growth in an area either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

Less Than Significant Impact. The Project would introduce up to 181 single-family residential units that would generate a new residential population of up to approximately 708 persons.[17] The estimated 708 persons increase in the City's population would represent 0.35 percent increase to the existing population (202,976 persons) in the City.[18] Therefore, the new residents would not result in a substantial increase in the local population.

According to the Southern California Association of Governments (SCAG), the City's forecast population and household growth of 67,800 persons and 21,700 households is predicted between 2008 and 2035.[19] The estimated 708 Project generated increase in population and the proposed 181 single-family residential units are within SCAG's growth forecast. The City of Moreno Valley Housing Element 2014-2021 indicated the total housing growth need for the City during this planning period is 6,169 units.[20] The 6,169 units represents the City's share of the Regional Housing Needs Assessment (RHNA) approved by SCAG as a response to State mandated housing planning. As such, the 181 single-family residential units would contribute towards the

[17] 181 residential units X 3.91 persons = 708 residents (per the average household size of 3.91 persons/household for the City of Moreno Valley, U.S. Census Bureau, 2010 Census, http://www.census.gov/quickfacts/Table/PST045215/0649270,00, accessed May 2016.)

[18] U.S. Census Bureau, 2010 Census, population estimates as of July 1, 2014, http://www.census.gov/quickfacts/Table/PST045215/0649270,00, accessed May 2016.

[19] 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy, Table 18, Proposed 2012-2035 RTP/SCS Growth Forecast, page 35, prepared by Southern California Association of Governments, adopted April 2012, http://rtpscs.scag.ca.gov/Documents/2012/final/SR/2012fRTP_GrowthForecast.pdf, accessed May 2016 and the Culver City October 2013-2021 Housing Element, https://www.culvercity.org/~/media/Files/Planning/GeneralPlan/2013-2021_HousingElement.ashx, accessed May 2016.

[20] City of Moreno Valley Housing Element 2014-2021, dated February 11, 2014, http://www.moreno-valley.ca.us/city_hall/general-plan/06gpfinal/gp/8-housing.pdf, accessed May 2016.

RHNA of the City. Furthermore, the Project would be located in an area already served by existing infrastructure and anticipated within applicable City infrastructure plans (i.e., roadways, utility lines, etc.). As such, the Project would not induce substantial population growth in the area either directly or indirectly and impacts would be less than significant.

b. Displace substantial numbers of existing housing necessitating the construction of replacement housing elsewhere?

c. Displace substantial numbers of people necessitating the construction of replacement housing elsewhere?

No Impact (b-c). The Project site consists of one single-family residential designated parcel (APN 473-160-004-5). There is no street address associated with the property, which is currently vacant land, though several unimproved trails/dirt roads traverse the property. As such, Project implementation would not displace existing housing or people. Therefore, no impact would occur to existing housing or local populations such that construction of replacement housing would be necessary.

XIV. Public Services

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, the need for new or physically altered governmental facilities, construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

a. Fire protection.

Less Than Significant Impact With Mitigation Incorporated. Fire protection for the City and the Project site is provided by the Moreno Valley Fire Department (MVFD), which is a part of the California Department of Forestry and Fire Protection (CAL FIRE)/Riverside County Fire Department's (RCFD) regional fire protection organization. The MVFD is the primary response for fires, emergency medical services, hazardous materials, incidents, traffic accidents, terrorist acts, catastrophic weather events, and technical rescues for the City. The MVFD also provides a full range of fire prevention services including public education, code enforcement, plan check and inspection services for new and existing construction, and fire investigation.[21]

The MVFD consists of the fire operations division, fire prevention bureau, and the Office of Emergency Management (OEM) allowing for a well-coordinated response to both natural and man-made disaster. The fire operations division is the largest division within the MVFD which includes 72 sworn personnel and two non-sworn personnel. The main mission of the fire operations division is to respond to emergency calls for service from the community and provide quality emergency services while protecting the life and property of the residents of the City.

21 City of Moreno Valley Fire Department Website, http://www.moreno-valley.ca.us/city_hall/departments/fire/index-fire.shtml, accessed July 2016.

Further support activities conducted by the fire operations division include fire company annual business/commercial fire inspections; development and management of the MVFD budget; coordinating and responding to non-emergency requests for MVFD services from both the City Council Office as well as the public; long range planning for the MVFD; and applying for assistance to firefighters grant and other grant opportunities. The City's Fire Marshal, under direction of the City's Fire Chief, manages the fire prevention bureau. The fire prevention bureau is the second largest division of the MVFD which includes five non-sworn personnel and six non-sworn part time personnel. The bureau also has five defunded positions due to budget constraints. The fire prevention bureau conducts fire and life safety inspections as well as plan reviews for new construction, existing building, and special events. The bureau also oversees the City's hazard abatement program and the multi-family residential inspection program to ensure multi-housing units receive state mandated annual inspections. The MVFD's OEM is responsible for minimizing the impact of natural and man-made disaster by establishing readiness through City-wide prevention, preparedness, response, recover and mitigation. This includes coordinating and conducting drills for the City's Emergency Operations Center (EOC) as well as providing a wide variety of training to both employees including community emergency response team (CERT) training, terrorism awareness training, and emergency preparedness training. As part of the MVFD as well as the RCFD, it is critical that the City's OEM collaborates projects, emergency management grants, emergency management exercises, and the management of declared local disasters with the RCFD Office of Emergency Services.[22] **Table XIV-1**, *MVFD Fire Stations*, provides information on the location, type of equipment, and the approximate distance/direction from the Project site for the City's seven fire stations. As shown in Table XIV-1, the nearest MVFD fire stations are Fire Station 58 and Fire Station 99, located approximately 0.80 miles southeast and 1.50 miles south of the Project site, respectively.

Construction activities associated with the Project may temporarily increase the demand for fire protection and emergency medical services, and may cause the occasional exposure of combustible materials, such as wood, plastics, sawdust, covering and coatings, to heat sources including machinery and equipment sparking, exposed electrical lines, welding activities, and chemical reactions in combustible materials and coatings. However, in compliance with the requirements of the California Occupational Safety and Health Administration (OSHA), all construction managers and personnel would be trained in fire prevention and emergency response. Further, fire suppression equipment specific to construction would be maintained on the Project site. As applicable, construction activities would be required to comply with the 2013 CBC; the 2013 California Fire Code (CFD); and Title 8, Buildings and Construction, Chapter 8.36, International Fire Code (herein referred to as the City's "Fire Code"), of the MVMC.

[22] Moreno Valley Fire Department Strategic Plan 2012-2022, prepared by Moreno Valley Fire Department, dated December 2011, http://www.moreno-valley.ca.us/city_hall/departments/fire/pdfs/fireStrat-plan0612.pdf, accessed July 2016.

TABLE XIV-1
MVFD FIRE STATIONS

Fire Station	Address	Daily Personnel/Apparatus Equipment	Approximate Distance/Direction from Project site[a]
Fire Station 58 (Moreno Beach)	28040 Eucalyptus Avenue	3 firefighters/1 engine, 1 rescue engine	0.80 miles southeast
Fire Station 99 (Morrison Park)	13400 Morrison Street	3 firefighters, 1 battalion chief/1 engine, 1 staff vehicle	1.50 miles south
Fire Station 2 (Sunnymead)	24935 Hemlock Avenue	7 firefighters/1 engine, 1 aerial ladder truck, 1 urban search & rescue trailer, 1 rescue squad	2.10 miles west
Fire Station 48 (Sunnymead Ranch)	10511 Village Road	3 firefighters/1 engine	3.75 miles northwest
Fire Station 65 (Kennedy Park)	15111 Indian Avenue	3 firefighters/1 engine, 1 reserve engine	4.00 miles southwest
Fire Station 91 (College Park)	16110 Lasselle Street	7 firefighters/1 engine, 1 rescue squad	4.11 miles south
Fire Station 6 (Towngate)	22250 Eucalyptus Avenue	3 firefighters/1 engine, 1 reserve aerial ladder truck, 1 reserve engine	4.88 miles west

[a] Approximate distance/direction from Project site in miles is a straight line distance, not a drive distance.

Sources: City of Moreno Valley Fire Department Website, Fire Station Locations, http://www.moreno-valley.ca.us/city_hall/departments/fire/fire-locs.shtml, accessed July 2016 and Abdul R. Ahmad, Fire Chief, Moreno Valley Fire Department, Letter Correspondence, dated July 25, 2016.

Construction activities may involve temporary lane closures of right-of-way frontage improvements and utility construction. Construction-related traffic could result in increased travel time due to flagging or stopping of traffic to accommodate trucks entering and existing the Project site during construction. As such, construction activities could increase response times for emergency vehicles to local business and/or residences within the Project vicinity, due to travel time delays to through traffic. However, the impacts of such construction activity would be temporary and on an intermittent basis. Further, a Construction Traffic Management Plan for the Project would be prepared in order to minimize disruptions to through traffic flow, maintain emergency vehicle access to the Project site and neighboring land uses, and schedule worker and construction equipment delivery to avoid peak traffic hours (MM PS-1). As a component of the Construction Traffic Management Plan, the times of day and locations of all temporary lane closures would be coordinated so that they do not occur during peak periods of traffic congestion, to the extent feasible. Truck routes for material and equipment deliveries, as well as for soil export and disposal, would require approval by the City's Department of Public Works prior to construction activities. The Construction Traffic Management Plan would be prepared for review and approval by the Department of Public Works prior to commencement of any construction activity. These practices, as well as techniques typically employed by emergency vehicles to clear or circumvent traffic, are expected to limit the potential for significant delays in emergency response times during Project construction. Therefore, impacts regarding emergency response times and emergency access during construction would be less than significant with the incorporation of the Project's Construction Traffic Management Plan (MM PS-1).

Overall, with compliance to applicable MVFD requirements and implementation of the prescribed mitigation measure, and due to the temporary nature of the necessary construction activities, construction impacts on fire protection and emergency medical services would be less than significant.

Operational activities associated with the Project would increase demand for fire protection and emergency medical services. As discussed in Section VIII, *Population and Housing*, the estimated 708 increase in population generated by the Project would represent a 0.35 percent increase in the existing population in the City. The estimated Project generated increase in population and the proposed 181 single-family residential units are within SCAG's growth forecast. According to the MVFD, the proposed structures within the Project site are considered to be in both the high fire risk category and non-fire high risk category. As mentioned above, the nearest MVFD fire station is Fire Station 58 located approximately 0.80 miles southeast of the Project site, or approximately two miles utilizing existing roads. Further, the MVFD participates in the regionalized cooperative fire protection delivery system of CAL FIRE/RCFD. This system provides assurances that the nearest and most appropriate resources are dispatched to all requests for fire protection and emergency medical services regardless of the jurisdiction. The MVFD's goal is for an engine company to arrive on scene within four minutes of travel time to fire incidents and emergency medical aid calls 90 percent of the time.[23] A complete first alarm fire assignment is to arrive on scene within eight minutes of travel time 90 percent of the time.[24] The estimated travel time from Fire Station 58 is approximately five minutes for the first arriving engine for any emergency incidents and a six minute response time for the first arriving aerial ladder truck company.[25] Emergency vehicles and fire access to the Project site is currently and would continue to be provided via Ironwood Avenue, Nason Street, and Oliver Street. The primary driveway for the Project site would be located on Ironwood Avenue about mid-block between Nason Street and Oliver Street, immediately opposite from and north of Lantz Lane. Secondary site access would be provided by driveways on both Nason Street and Oliver Street just north of Ironwood Avenue. According to the MVFD, the Department would be able to mitigate an emergency requiring the specialized services of either a fire engine or an aerial ladder truck with its current equipment and three nearest fire stations (i.e., Fire Stations 58, 99, and 2) in a timely manner.[26] The Project would not impact the MVFD fire protection services and service levels would be sufficient without the addition of equipment and/or fire station locations.[27] The Project would be designed, constructed and maintained in accordance with MVFD's development and construction requirements to minimize the risks associated with fires. Based on the considerations above, the increase in population from the Project would not be substantial enough to significantly impact fire and emergency services on a daily or annual basis. No new fire protection facilities would be necessary as a result of Project implementation.

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23 Abdul R. Ahmad, Fire Chief, Moreno Valley Fire Department, Letter Correspondence, dated July 25, 2016.
24 Ibid.
25 Ibid.
26 Ibid.
27 Ibid.

The Project site is susceptible to wildland fire hazards and is located in a VHFHSZ. Section VIII, *Hazards and Hazardous Materials*, Response VIII.h, above, discusses the potential for impacts associated with wildland fires. As discussed in Response VIII.h, any significant risk of loss, injury or death involving wildland fires, would be minimized to the maximum extent feasible through implementation of a Project-specific Fuel Modification Plan that would be subject to review and approval by the MVFD. As importantly, because the existing site is not currently maintained as a fuel modification area and consists of uncontrolled vegetation, existing single-family residences to the south and west of the Project site would gain increased protection from the spread of fire. As such, the Project would reduce the threat of wildland fires to people and structures in the Project vicinity and thus, lessen the potential demand for fire services needed in the event of a wildland fire.

Another important component of ensuring fire protection services is the availability of adequate firefighting water flow. Fire flow requirements are closely related to land use. The quantity of water necessary for fire protection varies with the type of development, life hazard, occupancy, and the degree of fire hazards. The ability of the water service provider to provide water supply to the Project is discussed in Section XVII, *Utilities and Service Systems*, below. As discussed therein, adequate water supply would be available to serve the Project site, including minimum fire flow requirements.

Overall, given the Project's conformance to expected growth scenarios for the City, the existing number of MVFD staff, and the Project's planned on-site fire protection design features consistent with applicable regulatory requirements of the CBC, CFD, the MVMC, and the MVFD, the Project is not expected to be beyond the scope of available fire services. Accordingly, the MVFD's response times would not be substantially changed such that response time objectives are compromised in any significant manner. Further, no new or expanded fire facilities would be constructed as a result of the Project. Nonetheless, to further ensure impacts to fire protection services and facilities would be less than significant, the Project applicant shall comply with Title 3, Revenue and Finance, Chapter 3.38, Residential Development Impact Fees, Section 3.38.060, Fire Facilities Residential Development Impact Fees, of the MVMC. Compliance would offset the incremental cost of the increased demand to maintain adequate fire protection facilities and equipment, and/or personnel, resulting from the Project by payment of development fees per the MVMC. As such, impacts to fire protection services and facilities would be less than significant.

Mitigation Measures

MM PS-1: Construction Traffic Management Plan - A Construction Traffic Management Plan shall be developed by the Project contractor in consultation with the Project's traffic and/or civil engineer and approved by the City of Moreno Valley Department of Public Works prior to issuance of any Project demolition, grading or excavation permit. The Construction Traffic Management Plan shall also be reviewed and approved by the MVFD. The City of Moreno Valley Department of Public Works reserves the right to reject any engineer at any time and to require that the Plan be prepared by a different engineer. The construction management plan shall include, at a minimum, the following.

- The name and telephone number of a contact person who can be reached 24 hours a day regarding construction traffic complaints or emergency situations;
- An up-to-date list of local police, fire, and emergency response organizations and procedures for the continuous coordination of construction activity, potential delays, and any alerts related to unanticipated road conditions or delays, with local police, fire, and emergency response agencies. Coordination shall include the assessment of any alternative access routes that might be required through the site, and maps showing access to and within the site and to adjacent properties;
- Procedures for the training and certification of the flag persons used in implementation of the Construction Traffic Management Plan;
- The location, times, and estimated duration of any roadway closures, traffic detours, use of protective devices, warning signs, and staging or queuing areas;
- Identify the locations of the off-site truck parking and staging and provide measures to ensure that trucks use the specified haul route, and do not travel through nearby residential neighborhoods or schools;
- Schedule vehicle movements to ensure that there are no vehicles waiting off-site and impeding public traffic flow on surrounding streets;
- Establish requirements for loading/unloading and storage of materials on the Project site;
- During construction activities when construction worker parking cannot be accommodated on the Project site, a Construction Worker Parking Plan shall be prepared which identifies alternate parking location(s) for construction workers and the method of transportation to and from the Project site (if beyond walking distance) for approval by the City of Moreno Valley. The Construction Worker Parking Plan shall prohibit construction worker parking on residential streets and prohibit on-street parking, except as approved by the City.

b. Police protection.

Less Than Significant Impact With Mitigation Incorporated. Police protection for the City and the Project site is provided by the City of Moreno Valley Police Department (MVPD), which contracts with the Riverside County Sheriff's Department (RCSD). The MVPD serves a population of approximately 207,000 persons. Currently, the MVPD consists of 199 full time employees which includes 150 sworn officers and 49 non-sworn (i.e., front office staff, support personnel). The MVPD station is located 22850 Calle San Juan de Los Lagos, approximately 4.7 miles southwest of the Project site. At this time, there are no planned improvements for the MVPD facilities. As the City contracts their police protections services with the RCSD, the City has access to all of the RCSD services which include dispatch, a specials weapons and tactics (SWAT) team, a bomb squad, a dive team, off-highway enforcement team, and a helicopter. [28]

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28 Deputy M. Reilly #4695, Community Services Unit, Moreno Valley Police Department, letter correspondence, dated June 7, 2016.

During construction, equipment and building materials could be temporarily stored on-site, which could result in theft, graffiti, and vandalism. However, the Project site is located in area with moderate vehicular activity from Ironwood Avenue. In addition, the construction site would be fenced along the perimeter, with the height and fence materials subject to review and approval by the City's Department of Public Works. Temporary lane closures may be required for right-of-way frontage improvements and utility construction. However, these closures would be temporary in nature and in the event of partial lane closures, both directions of travel on area roadways and access to the Project site would be maintained. Emergency vehicle drivers have a variety of options for advoiding traffic, such as using their sirens to clear a path of travel or driving in lanes of opposing traffic. Further, as discussed above, a Construction Traffic Management Plan for the Project would be prepared in order to minimize disruptions to through traffic flow, maintain emergency vehicle access to the Project site and neighboring land uses, and schedule worker and construction equipment delivery to avoid peak traffic hours (MM PS-1). Given the visibility of the Project site from adjacent roadways and surrounding properties, existing police presence in the City, maintained emergency access, construction fencing, and incorporation of MM PS-1, the Project is not expected to increase demand on existing police services to a meaningful extent. Therefore, the Project would have a less than significant temporary impact on police protection during the construction phases.

Operational activities associated with the Project would increase demand for police protection services. As discussed above, the estimated 708 increase in population generated by the Project would represent a 0.35 percent increase in the existing population in the City. The estimated Project generated increase in population and the proposed 181 single-family residential units are within SCAG's growth forecast.

With development on the site, patrol routes in the area would be slightly modified to include the site, as necessary. To ensure that police protection considerations are incorporated into the Project design, prior to the issuance of a building permit for the Project, the MVPD would be provided the opportunity to review and comment upon building plans in order to facilitate opportunities for improved emergency access and response; ensure the consideration of design strategies that facilitate public safety and police surveillance; and other specific design recommendations to enhance public safety and reduce potential demands upon police protection services. Upon initial review of the Project Description, the MVPD has provided the following recommendations: address numbers on all buildings/residences shall be placed in the most visible location on the building and illuminated as well as painted on the curb in front of each residence; the parking lots, walking trails, street and buildings shall have appropriate lighting and shadows casted by landscaping and trees shall be minimized on walkways and public areas; a City wide camera system shall be installed at the corner of Nason Street and Ironwood Avenue; if one or more community mailbox areas are proposed, these areas shall have appropriate lighting and be located in a highly visible public location and designed to resist mail theft; and speed bumps, dips, or similar traffic calming measures shall be constructed on the long south main street.[29]

Overall, given the Project's conformance to expected growth scenarios for the City, the existing number of police staff, and incorporation of the MVPD's recommendations, the Project is not expected to be beyond the scope of available police services. Accordingly, the MVPD's response times would not be substantially changed such that response time objectives are compromised in any significant manner. Further, according to the MVPD, Project implementation would not require the physical expansion of an existing police station or new police station, or additional staffing to the police protection facilities serving the Project site.[30] Nonetheless, to further ensure impacts to police protection services and facilities would be less than significant, the Project applicant shall comply with Title 3, Revenue and Finance, Chapter 3.38, Residential Development Impact Fees, Section 3.38.070, Police Facilities Residential Development Impact Fees, of the MVMC. Compliance would offset the incremental cost of the increased demand to maintain adequate police protection facilities and equipment, and/or personnel, resulting from the Project by payment of development fees per the MVMC. As such, impacts to police protection services and facilities would be less than significant.

Mitigation Measures

Refer to MM PS-1.

c. Schools.

Less Than Significant Impact. The Project would be served by the Moreno Valley Unified School District (MVUSD). The MVUSD includes 23 elementary schools, 6 middle schools, 4 high schools, and 9 specialized schools. The Project site is located within the attendance boundaries of the Cloverdale Elementary School, Palm Middle School, and Valley View High School. The Cloverdale Elementary School, transitional kindergarten through fifth grade (TK-5), is located at 12050 Kitching Street, approximately 1.5 miles west of the Project site. Cloverdale Elementary School currently has 12 portable classrooms and 22 permanent classrooms with an existing enrollment of 770 students and a projected enrollment of 800 students with a design capacity of 850 students during the school year 2019/2020 (Project buildout year 2020). The Palm Middle School, (grades 6-8), is located at 11900 Swanson Avenue, approximately 1.25 miles west of the Project site. Palm Middle School currently has 5 portable classrooms and 51 permanent classrooms with an existing enrollment of 1,243 students and a projected enrollment of 1,300 students with a design capacity of 1,465 students during the school year 2019/2020. The Valley View High School, (grades 9-12), is located at 13135 Nason Street, approximately 1.2 miles south of the Project site. Valley View High School currently has 27 portables classrooms and 73 permanent classrooms with an existing enrollment of 2,636 students and a projected enrollment of 2,636 students with a design capacity of 2,638 students during the school year 2019/2020. The MVUSD is in the process of construction an additional high school which would

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29 Deputy M. Reilly #4695, Community Services Unit, Moreno Valley Police Department, letter correspondence, dated June 7, 2016.

30 Ibid.

serve the Project area. The land has been purchased and due diligence is currently being performed. The MVUSD's goal is to have the new high school ready for occupancy by year 2020, with a capacity of 2,400 students. Initial enrollment would be grade 9 only; second year grades 9 and 10; third year grades 9-11; and forth year grades 9-12.[31]

The MVUSD created and adopted the 2013/2014 Facilities Master Plan which identified improvements, dependent upon available funding, for schools within the MVUSD including the Cloverdale Elementary School, Palm Middle School, and Valley View High School. Improvements for the Cloverdale Elementary School include the following: removal of all 12 portable classrooms and one portable restroom building; construction of a 2-story permanent classroom building (10 classrooms and restrooms) to replace the 12 portable classrooms and one portable restroom building; addition of staff toilets to Classroom Building C and D; and 21st century technology upgrades. Improvements for the Palm Middle School include the following: parking expansion and reconfiguration; separate bus and parent drop off; replacement of drinking fountains; upgrade exterior fencing and gates; new enclosed gymnasium to replace existing pavilion; food service and locker room transformation; and classroom building transformation including science classrooms (interior finishes, ceilings and energy efficient lighting). Improvements for the Valley View High School including the following: classroom buildings transformation including science and special education (SDC Therapy) classrooms; new defined and secured point of entry; transformation of gymnasium, locker rooms and weight rooms; food service area transformation; new girls' softball field; new lunch shelter; new guard shack at main parking lot entrance; removal of portable classrooms after construction of the new high school (high school No. 5); new culinary arts program; and 21st century upgrades.[32]

Project operation would incrementally increase demand for school services. The estimated 708 increase in population generated by the Project would represent a 0.35 percent increase in the existing population in the City. The Project is estimated to generate 55 elementary school students, 27 middle school students, and 36 high school students for a total of 118 students.[33] Project impacts related to schools would be addressed through payment of required Senate Bill 50 (SB 50) development fees pursuant to Section 65995 of the California Government Code. In accordance with SB 50, the payment of these fees are deemed to provide full and complete mitigation for impacts to school facilities. Therefore, impacts to school services and facilities would be less than significant.

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31 Sergio San Martin, Director, Facilities Planning and Development, MVUSD, letter correspondence dated May 18, 2016.

32 Sergio San Martin, Director, Facilities Planning and Development, MVUSD, letter correspondence dated May 18, 2016.

33 Student generation rates sourced from the Fee Justification Report for New Residential & Commercial/Industrial Development, dated April 21, 2016. Elementary: 0.3019 X 181 single-family units = 55 elementary school students. Middle: 0.1500 X 181 single-family units = 27 middle school students. High School: 0.1973 X 181 single-family units = 36 high school students. 55 + 27 + 36 = 118 total students. .Sergio San Martin, Director, Facilities Planning and Development, MVUSD, letter correspondence dated May 18, 2016.

d. Parks.

Less Than Significant Impact. The Moreno Valley Parks and Community Services Department (Parks Department) manages and provides maintenance services for the City's parks and facilities and provides a wide range of recreation activities, programs and services throughout the community. The City has two golf courses including the 27-hole Moreno Valley Ranch Golf Club. The City is the home to the 8,000-acre Lake Perris State Park. The State Park offers boating, fishing and camping facilities. The City's park system includes 32 parks and/or joint-use facilities (531.66 maintained acres) and includes a 9-hole executive golf course, 24 multi-use sports fields, 11 tennis courts, nine basketball courts, 28 play apparatus, and three recreation centers.[34] At this time, there are no planned improvements to the parks and recreational facilities in the service area of the Project site.[35]

The Project site is located within the vicinity of six park facilities. **Table XIV-2**, *City of Moreno Valley Parks Facilities Located in the Vicinity of the Project Site*, provides information on the park/facility, location, size, park amenities/activities, and the approximate distance/direction from the Project site.

The proposed Ironwood Village Park, which would be a private facility for exclusive use by Ironwood Village residents, would be located centrally within the Project site allowing residents to walk to the park safely using the Project-wide interconnected trails system. The park may include, but is not limited to, the following features and amenities: bench seating, an open play area, Bocce ball courts, picnic area and a tot lot "children's play equipment". The actual park amenities would be decided at time of buildout by the developer with approval from the City of Moreno Valley. Please refer to **Figure A-6**, *Conceptual Park Plan*, in the Project Description, for a conceptual illustration of the proposed on-site park.

The Project would include multi-use trails that would interconnect the Project neighborhoods to the interior open spaces and on-site park, as well as to the future City of Moreno Valley's off-site trails system, as illustrated in **Figure A-7**, *Trail Connection Map*, of the Project Description. There would be "nodes of interest" located along the central trail that leads from north to south to and from the proposed Ironwood Village Park. There would also be trail connections onto the central trail from trails leading off the adjacent cul-de-sacs. The central trail would provide areas to rest and enjoy the outdoors within walking distance of on-site residents' homes. Trails would provide connections through the central open space area and would branch off east and west along the north-south-oriented open space area, with additional trails connecting to neighborhood streets, as well as other off-site trails. All the trails would loop throughout the Project, which would allow pedestrian connections to the park and the proposed City Trails to the north, east and west of the Project site. The trails would be built per City of Moreno Valley Standards.

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34 The City of Moreno Valley Website, Parks and Community Services, http://www.moreno-valley.ca.us/resident_services/park_rec/index_park-rec.shtml?tab=3#Tab-mv, accessed June 8, 2016.

35 Tony Hetherman, Parks Projects Coordinator, Parks & Community Services, City of Moreno Valley, phone correspondence on June 8, 2016.

TABLE XIV-2
CITY OF MORENO VALLEY PARK FACILITIES LOCATED IN THE VICINITY OF THE PROJECT SITE

Park/Facility/Type	Location	Size (acres)	Parks Amenities/Activities	Approximate Distance/Direction from Project site[a]
Rock Ridge Park (Mini Neighborhood Park)	27119 Waterford Way	1.93	Barbeques, picnic tables, security lighting, tot lot	1.00 miles south
Cold Creek Trailhead (Trailhead)	Nason Street and Dracaea Avenue	0.64	Multi-purpose trail, off-street parking, picnic tables, security lighting	1.25 miles south
Morrison Park (Community Park)	26667 Dracaea Avenue	14.01	Barbeques, off-street parking, picnic tables, restrooms, security lighting, soccer field, snack bar, four-lighted softball/baseball fields	1.38 miles northeast
Weston Park (Neighborhood Park)	13170 Lasselle Street	4.14	Barbeques, multi-use athletic fields, picnic tables, restrooms, security lighting, softball/baseball fields, tot lot	1.50 miles southwest
Cottonwood Equestrian Staging Area (Trailhead)	28590 Cottonwood Avenue	0.40	Multi-purpose trail, picnic tables, security lighting	2.15 miles southeast
Moreno Valley Equestrian Park & Nature Center including Hound Town Dog Park (Specialty Park)	11150 Redlands Boulevard	45.00	Dog park, horse area, multi-purpose trails, off-street parking	2.30 miles northeast

[a] Approximate distance/direction from Project site in miles is a straight line distance, not a drive distance.

SOURCE: City of Moreno Valley Website, Explore our Parks, http://www.moreno-valley.ca.us/resident_services/park_rec/pdfs/prks_map.pdf, accessed June 8, 2016.
City of Moreno Valley Parks, Recreation and Open Space Comprehensive Master Plan, Table 3.1, Moreno Valley Parks, dated September 2010.
Tony Hetherman, Parks Projects Coordinator, Parks & Community Services, City of Moreno Valley, phone correspondence on June 8, 2016.

According to the Parks Department, Project implementation would not require the physical expansion of an existing park or new park facilities serving the Project site.[36] Nonetheless, to further ensure impacts to parks would be less than significant, the Project applicant would be responsible for meeting the parkland dedication or fee requirements as required by the Quimby Act and Title 3, Revenue and Finance, Chapter 3.38, Residential Development Impact Fees, Section 3.38.080, Park Improvements Residential Development Impact Fees, Section 3.38.090, Community/Recreation Center Residential Development Impact Fees, and Chapter 3.40, Dedication of Land for Park Facilities and Payment of in-lieu fees, of the MVMC. Compliance would offset the incremental cost of the increased demand to maintain adequate park facilities and equipment, resulting from the Project by parkland dedication or payment of development fees per the MVMC. As such, impacts to parks services and facilities would be less than significant.

36 Tony Hetherman, Parks Projects Coordinator, Parks & Community Services, City of Moreno Valley, phone correspondence on June 8, 2016.

e. Other public facilities.

Less Than Significant Impact. The Moreno Valley Public Library (MVPL) provides library services to the City and the Project site. The MVPL is located at 25480 Alessandro Boulevard, approximately 2.5 miles southwest of the Project site. The 15,000 square-foot Library includes a collection size of 82,405 items. The MVPL includes 23 full-time employees with an average of 32 volunteers per month.[37]

To address potential impacts to libraries, the Project applicant shall comply with Title 3, Revenue and Finance, Chapter 3.38, Residential Development Impact Fees, Section 3.38.100, Library Facilities and Materials Residential Development Impact Fees, of the MVMC. Compliance would offset the incremental cost of the increased demand to maintain adequate library facilities and materials, and/or personnel, resulting from the Project by payment of development fees per the MVMC. Further, according to the MVPL, Project implementation would not require the physical expansion of an existing library or a new library serving the Project site.[38] As such, impacts to library services and facilities would be less than significant.

The Project residents would utilize and, to some extent, impact the maintenance of public facilities, including roads. However, implementation of the Project would result in an inconsequential increase of 708 persons (0.35 percent population increase) in the type or frequency of uses of area governmental services and roadways. Therefore, development of the Project would not significantly increase the use of government services beyond current levels. Construction activities would result in a temporary increased use of the surrounding roads. However, the use of such facilities would not require maintenance of such facilities beyond normal requirements. The Project applicant would need to pay all City and/or County impact fees, as applicable, including the City of Moreno Valley Development Impact Fee (DIF) and the Transportation Uniform Mitigation Fee (TUMF) as described in Section XVI, *Transportation/Traffic*, below. Overall, less than significant impacts to governmental services, including roads, would occur.

XV. Recreation

a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

Less Than Significant Impact (a-b). As described under Response XIV.d, operational activities associated with the Project would increase demand for parks services. However, the Project would include the Ironwood Village Park, multi-use trails that would interconnect the Project

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37 Terrie Stevens, Administrative Services Director, Administrative Services, City of Moreno Valley, email correspondence on July 18, 2016.
38 Ibid.

neighborhoods to the interior open spaces and on-site park, as well as to the future City of Moreno Valley's off-site trails system. As such, the demand or use of nearby park facilities may be reduced at times by the Project. Nonetheless, to offset the Project's demand on park facilities and services, the Project applicant would be responsible for meeting the parkland dedication or fee requirements pursuant to the Quimby Act and Title 3, Revenue and Finance, Chapter 3.38, Residential Development Impact Fees, Section 3.38.080, Park Improvements Residential Development Impact Fees, Section 3.38.090, Community/Recreation Center Residential Development Impact Fees, and Chapter 3.40, Dedication of Land for Park Facilities and Payment of in-lieu fees, of the MVMC. Therefore, with the proposed park, trails, and open space features and parkland dedication or payment of development fees, the Project would not substantially deteriorate, or accelerate the deterioration of recreational facilities or resources. Impacts would be less than significant in this regard.

XVI. Transportation/Traffic

The following discussion, is based, in part, on the Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley *(herein referred to as the "Traffic Impact Analysis"), prepared by Urban Crossroads, dated March 9, 2016. The Traffic Impact Analysis was conducted using procedures and criteria adopted by the City's Traffic Study Guidelines, and addressed the Project's trip generation and potential impacts to the surrounding roadway network. The Traffic Impact Analysis evaluates six Project scenarios: Existing (2015), Existing With Project (2015), Opening Year Cumulative Without Project (2020), Opening Year Cumulative With Project (2020), Horizon Year Without Project (2035), and Horizon Year With Project (2035). Future conditions take into account the potential development of 252 related projects in the general Project vicinity, as identified by the City. The Traffic Impact Analysis is provided in Appendix J.*

Would the Project:

Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

Less Than Significant Impact With Mitigation Incorporated. Seven (7) study area intersections were selected for evaluation in consultation with the City's Traffic Engineering Division based on the City's traffic impact analysis methodology that requires analysis of intersection locations with 50 or more peak hour project trips; refer to **Table XVI-1**, *Study Area Intersections* and **Figure XVI-1**, *Intersection Location Map*.

TABLE XVI-1
STUDY AREA INTERSECTIONS

ID	Intersection Location	Jurisdiction
1	Nason Street/Street "A" – Future Intersection	Moreno Valley
2	Nason Street/Ironwood Avenue	Moreno Valley
3	Nason Street/SR-60 Westbound Ramps	Moreno Valley, Caltrans
4	Nason Street/SR-60 Eastbound Ramps	Moreno Valley, Caltrans
5	Street "B"/Lantz Lane/Ironwood Avenue	Moreno Valley
6	Oliver Street/Street "C"	Moreno Valley
7	Oliver Street/Ironwood Avenue	Moreno Valley

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, *prepared by Urban Crossroads, dated March 9, 2016.*

Ten (10) study area roadways were selected for evaluation based on a review of the key roadway segments in which the Project is anticipated to contribute 50 or more peak hour trips; refer to **Table XVI-2**, *Study Area Roadways* and Figure XVI-1.

Level of Service Methodology

Traffic operations of roadway facilities are described using the term "level of service" (LOS). LOS is a qualitative description of traffic flow based on several factors such as speed, travel time, delay, and freedom to maneuver. Six levels are typically defined ranging from LOS "A", representing completely free-flow conditions, to LOS "F", representing breakdown in flow resulting in stop-and-go conditions. LOS "E" represents operations at or near capacity, an unstable level where vehicles are operating with the minimum spacing for maintaining uniform flow.

Intersection Capacity Analysis Methodology

The definitions of LOS for interrupted traffic flow (flow restrained by the existence of traffic signals and other traffic control devices) differ slightly depending on the type of traffic control. The LOS is typically dependent on the quality of traffic flow at the intersections along a roadway. The *Highway Capacity Manual* (HCM) 2010 methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. The HCM uses different procedures depending on the type of intersection control.

Signalized Intersections

The City requires signalized intersection operations analysis based on the methodology described in Chapter 18 and Chapter 31 of the HCM 2010. Intersections LOS operations are based on an intersection's average control delay. Control delay includes initial deceleration delay, queue move-up-time, stopped delay, and final acceleration delay. For signalized intersections LOS is directly related to the average control delay per vehicle and is correlated to a LOS designation as described in **Table XVI-3**, *Signalized Intersection LOS Thresholds.*

SOURCE: Urban Crossroads, 2015

Ironwood Village Project

Figure XVI-1
Location Map

ESA PCR

TABLE XVI-2
STUDY AREA ROADWAYS

ID	Intersection Location	Jurisdiction
1	Nason Street, Street "A" to Ironwood Avenue	Moreno Valley
2	Nason Street, South of Ironwood Avenue	Moreno Valley
3	Nason Street, North of SR-60 Westbound Ramps	Moreno Valley
4	Nason Street, SR-60 Westbound Ramps to SR-60 Eastbound Ramps	Moreno Valley
5	Nason Street South of SR-60 Eastbound Ramps	Moreno Valley
6	Ironwood Avenue, West of Nason Street	Moreno Valley
7	Ironwood Avenue, Nason Street to Lantz Lane	Moreno Valley
8	Ironwood Avenue, Lantz Lane to Olive Street	Moreno Valley
9	Ironwood Avenue, East of Oliver Street	Moreno Valley
10	Oliver Street, Street "C" and Ironwood Avenue	Moreno Valley

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, *prepared by Urban Crossroads, dated March 9, 2016.*

TABLE XVI-3
SIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay (Seconds) V/C ≤ 1.0	Level of Service V/C ≤ 1.0	Level of Service V/C > 1.0
Operations with very low delay occurring with favorable progression and/or short cycle length.	0 to 10.00	A	F
Operations with low delay occurring with good progression and/or short cycle lengths.	10.01 to 20.00	B	F
Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.01 to 35.00	C	F
Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.01 to 55.00	D	F
Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.01 to 80.00	E	F
Operations with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	80.01 and up	F	F

SOURCE: HCM 2010, Chapter 18; Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, *prepared by Urban Crossroads, dated March 9, 2016.*

Unsignalized Intersections

The City requires the operations of unsignalized intersections to be evaluated using the methodology described in Chapters 19, 20, and 32 of the HCM 2010. The LOS rating is based on the weighted average control delay expressed in seconds per vehicle; refer to **Table XVI-4**, *Unsignalized Intersection LOS Thresholds.* At two-way or side-street stop-controlled intersections, the LOS criteria apply to each lane on a given approach and to each approach on the minor street. LOS is not calculated for major street approaches or for the intersection as a whole. For all-way stop controlled intersections, LOS is based solely on control delay for assessment of LOS at the approach and intersection levels.

TABLE XVI-4
UNSIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay Per Vehicle (Seconds)	Level of Service V/C ≤ 1.0	Level of Service V/C > 1.0
Little or no delays.	0 to 10.00	A	F
Short traffic delays.	10.01 to 15.00	B	F
Average traffic delays.	15.01 to 25.00	C	F
Long traffic delays.	25.01 to 35.00	D	F
Very long traffic delays.	35.01 to 50.00	E	F
Extreme traffic delays with intersection capacity exceeded.	50.00	F	F

SOURCE: HCM 2010, Chapter 19, 20, and 32; Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, *prepared by Urban Crossroads, dated March 9, 2016.*

Roadway Segment Capacity Analysis Methodology

Roadway segment operations have been evaluated using the City's daily roadway capacity values provided in the *City of Moreno Valley Transportation Engineering Division Traffic Impact Analysis (TIA) Preparation Guide* (2007). Per the City's traffic impact analysis guidelines, roadway segments within the study area should maintain the LOS capacities illustrated in **Figure XVI-2**, *City of Moreno Valley Level of Service (LOS) Standards*. **Table XVI-5**, *Roadway Segment Capacity LOS Thresholds*, summarizes the daily roadway capacities for each type of roadway. These roadway capacities are "rule of thumb" estimates for planning purposes and are affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian bicycle traffic. As such, where the ADT-based roadway segment analysis indicates a deficiency (unacceptable LOS), a review of the more detailed peak hour intersection analysis and progression analysis are undertaken. The more detailed peak hour intersection analysis explicitly accounts for factors that affect roadway capacity. Therefore, roadway segment widening is typically only recommended if the peak hour intersection analysis indicates the need for additional through lanes.

TABLE XVI-5
ROADWAY SEGMENT CAPACITY LOS THRESHOLDS

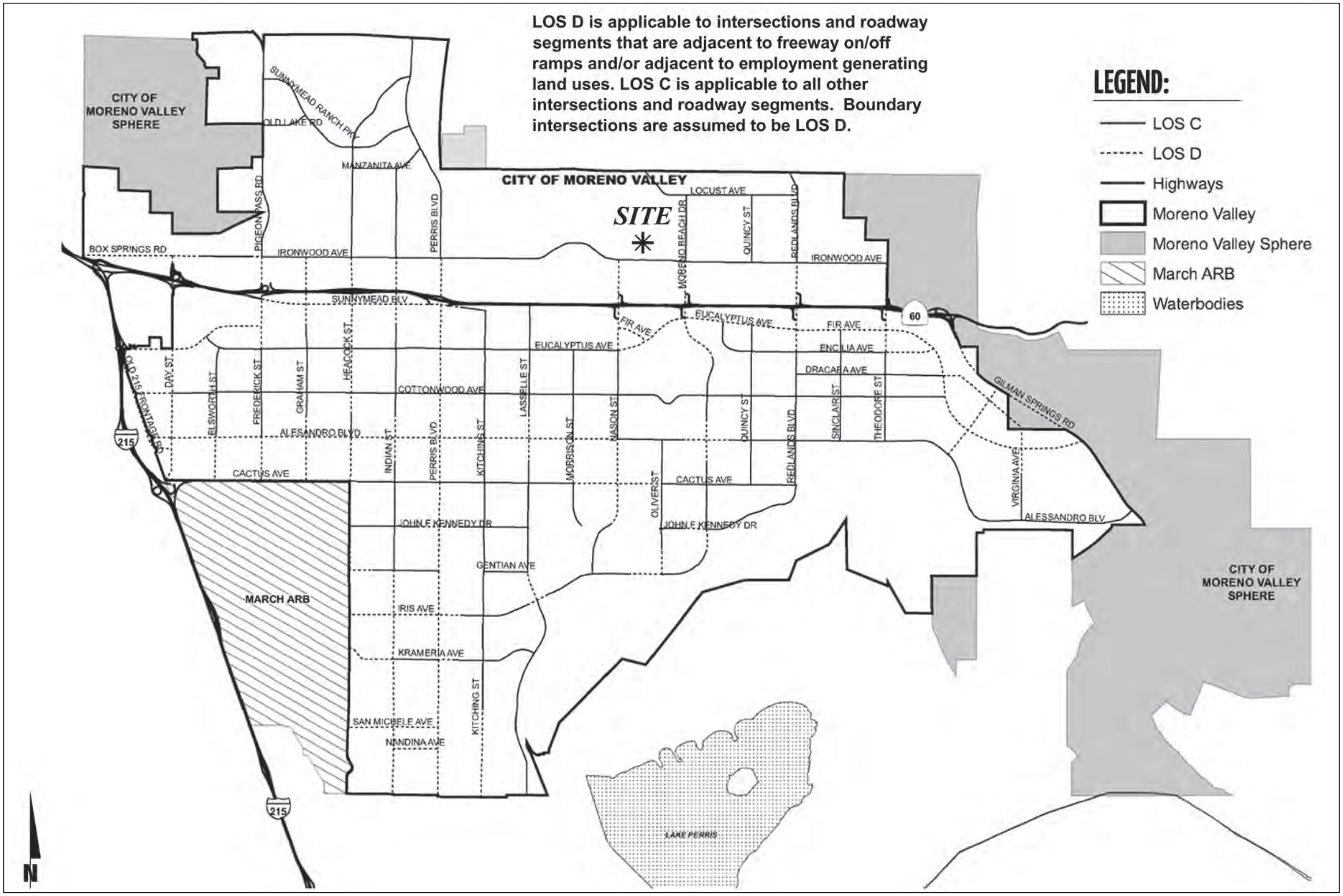
	Level of Service Capacity[a]				
Receptor Location	**A**	**B**	**C**	**D**	**E**
Six Lane Divided Arterial	33,900	39,400	45,000	50,600	56,300
Four Lane Divided Arterial	22,500	26,300	30,000	33,800	37,500
Four Lane Undivided Arterial	15,000	17,500	20,000	22,500	25,000
Two Lane Industrial Collector	7,500	8,800	10,000	11,300	12,500
Two Lane Undivided Residential	N/A	N/A	N/A	N/A	2,000

[a] These maximum roadway capacities have been extracted from the City of Moreno Valley's Transportation Division's TIA Preparation Guidelines (August 2007). These roadways capacities are "rule of thumb" estimates for planning purposes. The LOS "E" service volumes are estimated maximum daily capacity for respective roadway classifications. Capacity is affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian and bicycle traffic.

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, *prepared by Urban Crossroads, dated March 9, 2016*.

Traffic Signal Warrant Analysis Methodology

The term "signal warrants" refers to the list of established criteria used by Caltrans and other public agencies to quantitatively justify or ascertain the potential need for installation of a traffic signal at an otherwise unsignalized intersection. The Traffic Impact Analysis uses the signal warrant criteria presented in the latest edition of the Federal Highway Administration's (FHWA) *Manual on Uniform Traffic Control Devices (MUTCD)*, as amended by the *MUTCD 2012 California Supplement*, for all study area intersections. The signal warrant criteria for Existing conditions are based upon several factors, including volume of vehicular and pedestrian traffic, frequency of accidents, and location of school areas. Both the FHWA's *MUTCD* and the *MUTCD 2012 California Supplement* indicate that the installation of a traffic signal should be considered if one or more of the signal warrants are met. Specifically, the Traffic Impact Analysis utilized the peak hour volume-based Warrant 3 as the appropriate representative traffic signal warrant analysis for existing traffic conditions. Warrant 3 criteria are basically identical for both the FHWA's *MUTCD* and the *MUTCD 2012 California Supplement*. Warrant 3 is appropriate to use for the Traffic Impact Analysis as it provides specialized warrant criteria for intersections with rural characteristics (e.g. located in communities with populations of less than 10,000 persons or with adjacent major streets operating above 40 miles per hour). For the purposes of the Traffic Impact Analysis, the speed limit was the basis for determining whether urban or rural warrants were used for a given intersection. Future unsignalized intersections have been assessed regarding the potential need for new traffic signals based on the future average daily traffic (ADT) volumes, using the Caltrans planning level ADT-based signal warrant analysis worksheets. Traffic signal warrant analyses were performed for the following unsignalized study area intersections as identified in **Table XVI-6**, *Traffic Signal Warrant Analysis Locations.*



SOURCE: Urban Crossroads, 2015

Ironwood Village Project

Figure XVI-2

City of Moreno Valley Level of Service (LOS) Standards

ESA PCR

TABLE XVI-6
TRAFFIC SIGNAL WARRANT ANALYSIS LOCATIONS

ID	Intersection Location	Jurisdiction
1	Nason Street/Street "A"	Moreno Valley
5	Street "B"/Ironwood Avenue	Moreno Valley
6	Oliver Street/Street "C"	Moreno Valley
7	Oliver Street/Ironwood Avenue	Moreno Valley

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, *prepared by Urban Crossroads, dated March 9, 2016.*

It is important to note that a signal warrant defines the minimum condition under which the installation of a traffic signal might be warranted. Meeting this threshold condition does not require that a traffic control signal be installed at a particular location, but rather that other traffic factors and conditions be evaluated in order to determine whether the signal is truly justified. It should also be noted that signal warrants do not necessarily correlate with LOS. An intersection may satisfy a signal warrant condition and operate at or above acceptable LOS or operate below acceptable LOS and not meet a signal warrant.

LOS Criteria

The definition of an intersection deficiency in the City is based on the City's General Plan Circulation Element. The City's General Plan states that target LOS "C" or LOS "D" be maintained along City roads (including intersections) wherever possible. Figure XVI-2 depicts the level of service standards within the City. A summary of the jurisdiction, LOS methodology and acceptable LOS for all study area intersection is described in **Table XVI-7**, *Summary of LOS Criteria and For Study Area Intersections.*

TABLE XVI-7
SUMMARY OF LOS CRITERIA AND FOR STUDY AREA INTERSECTIONS

#	Intersection	Traffic Control[1]	Jurisdiction	LOS Methodology[2]	Acceptable LOS
1	Nason Street/Street "A"	CSS	Moreno Valley	HCM 2010	C
2	Nason Street/Ironwood Avenue	TS	Moreno Valley	HCM 2010	D
3	Nason Street/SR-60 WB Ramps	TS	Moreno Valley	HCM 2010	D
4	Nason Street/SR-60 EB Ramps	TS	Moreno Valley	HCM 2010	D
5	Lantz Lane/Ironwood Avenue	CSS	Moreno Valley	HCM 2010	C
6	Oliver Street/Street "C"	CSS	Moreno Valley	HCM 2010	C
7	Oliver Street/Ironwood Avenue	CSS	Moreno Valley	HCM 2010	C

[a] CSS = cross-street stop; TS = traffic signal.
[2b] HCM 2010 = Highway Capacity Manual 2010 Methodology.

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, *prepared by Urban Crossroads, dated March 9, 2016.*

Local and Regional Funding Mechanisms

Transportation improvements throughout the City are funded through a combination of project mitigation, fair share contributions or development impact fee programs, such as Transportation Uniform Mitigation Fee (TUMF) program or the County's Development Impact Fee (DIF) program. Identification and timing of needed improvements is generally determined through local jurisdictions based upon a variety of factors.

Transportation Uniform Mitigation Fee (TUMF) Program

The Western Riverside Council of Governments (WRCOG) is responsible for establishing and updating TUMF rates. The County may grant to developers a credit against the specific components of fees for the dedication of land or the construction of facilities identified in the list of improvements funded by each of these programs. Fees are based upon projected land uses and a related transportation needs to address growth based upon a 2009 Nexus study.

TUMF is an ambitious regional program created to address cumulative impacts of growth throughout western Riverside County. Program guidelines are being handled on an iterative basis. Exemptions, credits, reimbursements and local administration are being deferred to primary agencies. The County serves the function for the proposed Project. Fees submitted to the County are passed on the WRCOG as the ultimate program administrator.

TUMF guidelines empower a local zone committee to prioritize and arbitrate certain projects. The Project is located within the Central Zone. This zone has developed a 5-year capital improvements program to prioritize public construction of certain roads. TUMF is focused on improvements necessitated by regional growth. The SR-60/Nason Street interchange, Nason Street, and Ironwood Avenue are designated TUMF roadways/facilities within the Project's study area.

City of Moreno Valley Development Impact Fee (DIF) Program

The City has created its own local DIF program to impose and collect fees from new residential, commercial and industrial development for the purpose of funding roadways and intersections necessary to accommodate City growth as identified in the City's General Plan Circulation Element. The City's DIF program includes facilities that are not part of, or which may exceed improvements identified and covered by the TUMF program. As a result, the pairing of the regional and local fee programs provides a more comprehensive funding and implementation plan to ensure an adequate and interconnected transportation system. Under the City's DIF program, the City may grant to developers a credit against specific components of fees when those developers construct certain facilities and landscaped medians identified in the list of improvements funded by the DIF program.

The timing to use the DIF fees is established through periodic capital improvement programs which are overseen by the City's Public Works Department. Periodic traffic counts, review of traffic accidents, and a review of traffic trends throughout the City are also periodically performed by City staff and consultants. The City uses this data to determine the timing of implementing the improvements listed in its facilities list.

Fair Share Contribution

Project mitigation may include a combination of fee payments to established programs (e.g., TUMF and/or DIF), construction of specific improvements, payment of a fair share contribution toward future development improvements or a combination of these approaches. Improvements constructed by development may be eligible for a fee credit or reimbursement through the program where appropriate (to be determined at the City's discretion). When off-site improvements are identified with a minor share of responsibility assigned to the proposed development, the approving jurisdiction may elect to collect a fair share contribution or require the development to construct improvements.

Existing Traffic Counts

The AM peak hour traffic volumes were determined by counting traffic volumes in the two hour period between 7:00 AM and 9:00 AM on January 29, 2015. Similarly, the PM peak hour traffic volumes were identified by counting traffic volumes in the two hour period between 4:00 PM and 6:00 PM on January 29, 2015. The Thursday, January 29, 2015 count data is representative of typical weekday peak hour traffic conditions in the study area. Exhibit 3-8, Existing (2015) Traffic Volumes, of the Traffic Impact Analysis, displays the Existing ADT, AM and PM peak hour intersection volumes.

Existing Conditions Intersection Operations Analysis

Existing peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodology discussed above. The intersection operations analysis results are summarized in **Table XVI-8**, *Intersection Analysis for Existing (2015) Conditions* and illustrated in Exhibit 3-9, Summary of Peak Hour Intersection LOS for Existing (2015) Conditions, of the Traffic Impact Analysis. Table XVI-8 indicates that the existing study area intersections are currently operating at an acceptable LOS during the peak hours, based on applicable jurisdiction's LOS criteria.

TABLE XVI-8
INTERSECTION ANALYSIS FOR EXISTING (2015) CONDITIONS

#	Intersection	Traffic Control [c]	Intersection Approach Lanes [a] Northbound	Southbound	Eastbound	Westbound	Delay (secs.) [b]		Level of Service	
			L T R	L T R	L T R	L T R	AM	PM	AM	PM
1	Nason St. / Street "A"		Future Intersection							
2	Nason St. / Ironwood Av.	TS	0 1 1	0 1 0	1 1 0	1 1 0	18.1	16.7	B	B
3	Nason St. / SR-60 WB Ramps	TS	1 2 1>	1 2 0	1 1 1>	1 1 1>	19.1	20.3	B	C
4	Nason St. / SR-60 EB Ramps	TS	0 2 0	1 2 0	1 1 1	0 0 0	11.9	14.1	B	B
5	Lantz Ln. / Ironwood Av.	CCS	0 1 0	0 0 0	0 1 d	0 1 0	11.6	11.0	B	B
6	Oliver St. / Street "C"		Future intersection							
7	Oliver St. / Ironwood Av	CCS	0 1 0	0 1 0	0 1 d	0 1 0	11.5	11.2	B	B

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[a] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.
L = Left; T = Through; R = Right; > = Right-Turn Overlap Phasing; d= Defacto Right Turn Lane

[b] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[c] CSS = Cross-street Stop; TS = Traffic Signal

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, prepared by Urban Crossroads, dated March 9, 2016.

Existing Conditions Roadway Segment Capacity Analysis

The City's General Plan Circulation Element provides roadway volume capacity values as described in Table XVI-5, above. The roadway segment capacities are approximate figures only, and are used at the General Plan level to assist in determining the roadway functional classification (i.e., number of through lanes) needed to meet traffic demand. **Table XVI-9**, *Roadway Volume/Capacity Analysis for Existing (2015) Conditions***,** provides a summary of the Existing conditions roadway segment capacity analysis based on the City's General Plan Circulation Element Roadway Segment Capacity (LOS) Thresholds identified in Table XVI-5. As shown in Table XVI-9, all of the study area segments currently operate at acceptable LOS based on the City's planning level daily roadway capacity thresholds.

TABLE XVI-9
ROADWAY VOLUME/CAPACITY ANALYSIS FOR EXISTING (2015) CONDITIONS

#	Roadway	Segment Limits	Roadway Section	LOS Capacity [a]	Existing (2015)	V/C	LOS	Acceptable LOS
1		Street "A" to Ironwood Avenue	2U		N/A			C
2		South of Ironwood Avenue	4D	12,500	4,306	0.34	A	D
3	Nason St	North of SR-60 WB Ramps	4D	37,500	4,760	0.38	A	D
4		SR-60 WB Ramps to SR-60 EB Ramps	4D	37,500	12,687	0.34	A	D
5		South of SR-60 EB Ramps	2U	37,500	17,807	0.47	A	D
6		West of Nason Street	2U	12,500	6,754	0.54	A	C
7	Ironwood	Nason Street to Lantz Lane	2U	12,500	4,568	0.37	A	C
8	Ave	Lantz Lane to Oliver Street	2U	12,500	4,279	0.34	A	C
9		East of Oliver Street	2U	12,500	4,319	0.35	A	C
10	Oliver St	Between Street "C" and Ironwood Avenue			N/A			C

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS). N/A = Not Applicable; Segment does not exist.

[a] These maximum roadway capacities have been extracted from the City of Moreno Valley's Transportation Division's Traffic Impact Analysis
Transportation Division's Traffic Impact Analysis Preparation Guidelines (August 2007). These roadway capacities are "rule of thumb" estimates for planning purposes. The LOS "E" service volumes are estimated maximum daily capacity for respective classifications. Capacity is affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian and bicycle traffic.

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, prepared by Urban Crossroads, dated March 9, 2016.

Existing Conditions Traffic Signal Warrants Analysis

Traffic signal warrants for Existing traffic conditions are based on existing peak hour intersection turning volumes. For Existing traffic conditions, no study area intersections appear to currently warrant a traffic signal.

Existing Conditions Off-Ramp Queuing Analysis

A queuing analysis was performed for the off-ramps at the SR-60 Freeway at the Nason Street interchange to assess vehicle queues for the off ramps that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the SR-60 Freeway mainline. Queuing analysis findings are presented in **Table XVI-10**, *Peak Hour Freeway Off-Ramp Queuing Summary for Existing (2015)* Conditions. As shown on Table XVI-10, there are no queuing issues during the peak 95th percentile traffic flows under Existing traffic conditions.

TABLE XVI-10
PEAK HOUR FREEWAY OFF-RAMP QUEUING SUMMARY FOR EXISTING (2015) CONDITIONS

Intersection	Movement	Available Stacking Distance (feet)	95th Percentile Queue (Feet) [b]		Acceptable? [a]	
			AM Peak Hour	PM Peak Hour	AM	PM
Nason St. /SR 60 WB Ramps	WBL	1,370	83	132	YES	YES
	WBT	2,140	21	31	YES	YES
	WBR	190	0	0	YES	YES
Nason St. /SR-60 EB Ramps	EBL	805	27	96	YES	YES
	EBT	1,300	46	66	YES	YES
	EBR	225	45	63	YES	YES

[a] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this Table, where applicable.
[b] Maximum queue length for the approach reported.

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, prepared by Urban Crossroads, dated March 9, 2016.

Project Trip Generation

Trip generation represents the amount of traffic which is both attracted to and produced by a development. Determining traffic generation for a specific project is therefore based upon forecasting the amount of traffic that is expected to be both attracted to and produced by the specific land uses being proposed for a given development. Trip generation rates used to estimate Project traffic and a summary of the Project's trip generation are described in **Table XVI-11**, *Project Trip Generation Summary***.** The trip generation rates are based upon data collected by the Institute of Transportation Engineers (ITE) and presented in ITE's most recent edition of *Trip Generation Manual*. The Project is anticipated to generate a net total of approximately 1,723 trip-ends per day with 136 AM peak hour trips and 181 PM peak hour trips.

TABLE XVI-11
PROJECT TRIP GENERATION SUMMARY

Land Use	ITE Code	Units [b]	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Project Trip Generation Rates[a]									
Single Family Detached Residential	210	DU	0.19	0.56	0.75	0.63	0.37	1.00	9.52
Land Use	**Quantity**	**Units [b]**	**In**	**Out**	**Total**	**In**	**Out**	**Total**	**Daily**
Project Trip Generation Summary									
Single Family Detached Residential	181	DU	34	102	136	114	67	181	1,723

[a] Source: ITE (Institute of Transportation Engineers) Trip Generation Manual, 9th Edition, 2012.
[b] DU = Dwelling Units

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, prepared by Urban Crossroads, dated March 9, 2016.

Project Trip Distribution

Trip distribution is the process of identifying the probable destinations, directions or traffic routes that would be utilized by Project traffic. The potential interaction between the planned land uses and surrounding regional access routes are considered, to identify the route where the Project traffic would distribute. The Project trip distribution was developed based on anticipated travel patterns to and from the Project site for the traffic associated with the proposed residential uses. The total volume on each roadway was divided by the total site traffic generation to indicate the percentage of Project traffic that would use each component of the regional roadway system in each relevant direction. The Project trip distribution patterns are illustrated on Exhibit 4-1, Project Trip Distribution, of the Traffic Impact Analysis.

Project Trip Assignment

The assignment of traffic from the Project area to the adjoining roadway system is based upon the Project trip generation, trip distribution, and the arterial highway and local street system improvements that would be in place by the time of initial occupancy of the Project. Based on the identified Project traffic generation and trip distribution patterns, Project ADT, AM and PM peak hour traffic volumes are illustrated on Exhibit 4-2, Project Only Traffic Volumes, of the Traffic Impact Analysis.

Existing Plus Project Traffic Analysis

The Existing Plus Project analysis determines significant traffic impacts that would occur on the existing roadway system with the addition of Project traffic. The Existing Plus Project analysis is intended to identify the Project-specific impacts associated solely with the development of the Project based on a comparison of the Existing Plus Project traffic conditions to Existing conditions.

Existing Plus Project Roadway Improvements

The lane configurations and traffic controls assumed to be in place for the Existing Plus Project conditions are consistent with those illustrated on Exhibit 3-1, Existing Number of Through Lanes and Intersection Controls, of the Traffic Impact Analysis, with the exception of Project streets assumed to be constructed by the Project to provide site access. No other off-site improvements are assumed beyond those that currently exist with the exception of the intersections and roadways that would be improved by the Project for access.

Existing Plus Project Traffic Volume Forecasts

This scenario includes Existing traffic volumes plus Project traffic. Exhibit 5-1, Existing Plus Project Traffic Volumes, Exhibit 3-1, Existing Number of Through Lanes and Intersection Controls, of the Traffic Impact Analysis, illustrates the ADT, AM and PM peak hour traffic volumes which can be expected for Existing Plus Project traffic conditions.

Existing Plus Project Intersection Operations Analysis

Existing Plus Project intersection analysis results are summarized in **Table XVI-12**, *Intersection Analysis for Existing Plus Project Conditions.* Table XVI-12 indicates all study area intersections are anticipated to continue to operate at acceptable LOS consistent with Existing traffic conditions. As such, the addition of Project traffic is not anticipated to result in any deficiencies. Consistent with Table XVI-12, a summary of peak hour intersection LOS for Existing Plus Project conditions are illustrated on Exhibit 5-2, Summary of Peak Hour Intersection LOS for Existing Plus Project Conditions, of the Traffic Impact Analysis.

Existing Plus Project Roadway Segment Capacity Analysis

Table XVI-13, *Roadway Volume/Capacity Analysis for Existing Plus Project Conditions*, provides a summary of the Existing Plus Project conditions roadway segment capacity. As shown in Table XVI-13, all the study roadway segments are anticipated to operate at acceptable LOS consistent with Exiting traffic conditions. As such, the addition of Project traffic is not anticipated to result in any deficiencies.

TABLE XVI-12
INTERSECTION ANALYSIS FOR EXISTING PLUS PROJECT CONDITIONS

#	Intersection	Traffic Control [b]	Existing 2015				Existing Plus Project			
			Delay (secs.) [a]		Level of Service		Delay (secs.) [a]		Level of Service	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Nason St. / Street "A"	**CSS**	Future Intersection				8.9	8.9	A	A
2	Nason St. / Ironwood Av.	TS	18.1	16.7	B	B	20.0	18.7	B	B
3	Nason St. / SR-60 WB Ramps	TS	19.1	20.3	B	C	19.9	20.5	B	C
4	Nason St. / SR-60 EB Ramps	TS	11.9	15.1	B	B	12.3	14.6	B	B
5	Lantz Ln. / Ironwood Av.	CCS	11.6	11.0	B	B	12.2	12.0	B	B
6	Oliver St. / Street "C"	**CSS**	Future intersection				8.9	9.2	A	A
7	Oliver St. / Ironwood Av	CCS	11.5	11.2	B	B	12.0	11.6	B	B

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).
[a] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.
[b] CSS = Cross-street Stop; TS = Traffic Signal

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, prepared by Urban Crossroads, dated March 9, 2016.

TABLE XVI-13
ROADWAY VOLUME/CAPACITY ANALYSIS FOR EXISTING PLUS PROJECT CONDITIONS`

#	Roadway	Segment Limits	Roadway Section	LOS Capacity [a]	Existing (2015)	V/C	LOS	E+P	V/C	LOS	Acceptable LOS
1		Street "A" to Ironwood Avenue	2U		N/A			637	0.32	A	C
2		South of Ironwood Avenue	4D	12,500	4,306	0.34	A	5,253	0.42	A	D
3	Nason St	North of SR-60 WB Ramps	4D	37,500	4,760	0.38	A	5,707	0.46	A	D
4		SR-60 WB Ramps to SR-60 EB Ramps	4D	37,500	12,687	0.34	A	13,332	0.34	A	D
5		South of SR-60 EB Ramps	2U	37,500	17,807	0.47	A	18,151	0.48	A	D
6		West of Nason Street	2U	12,500	6,754	0.54	A	7,098	0.57	A	C
7	Ironwood	Nason Street to Lantz Lane	2U	12,500	4,568	0.37	A	5,342	0.43	A	C
8	Ave	Lantz Lane to Oliver Street	2U	12,500	4,279	0.34	A	4,537	0.36	A	C
9		East of Oliver Street	2U	12,500	4,319	0.35	A	4,750	0.38	A	C
10	Oliver St	Between Street “C” and Ironwood Avenue			N/A			517	0.26	A	C

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS). N/A = Not Applicable; Segment does not exist.
[a] These maximum roadway capacities have been extracted from the City of Moreno Valley's Transportation Division's Traffic Impact Analysis Transportation Division's Traffic Impact Analysis Preparation Guidelines (August 2007). These roadway capacities are "rule of thumb" estimates for planning purposes. The LOS "E" service volumes are estimated maximum daily capacity for respective classifications. Capacity is affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian and bicycle traffic.

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, prepared by Urban Crossroads, dated March 9, 2016.

Existing Plus Project Traffic Signal Warrants Analysis

Traffic signal warrants for Existing Plus Project traffic conditions are based on both Existing Plus Project Caltrans planning-level ADT and peak hour volumes. For Existing Plus Project conditions, there are no traffic signals that appear to be warranted.

Existing Plus Project Off-Ramp Queuing Analysis

Table XVI-14, *Peak Hour Freeway Off-Ramp Queuing Summary for Existing Plus Project Conditions*, the Existing Plus Project queuing analysis findings. As shown in Table XVI-14, there are no queuing issues during the peak 95th percentile traffic flows under Existing Plus Project traffic conditions consistent with Existing traffic conditions. As such, the addition of Project traffic is not anticipated to result in any potential off-ramp queues at the SR-60 Freeway and Nason Street.

TABLE XVI-14
PEAK HOUR FREEWAY OFF-RAMP QUEUING SUMMARY FOR EXISTING PLUS PROJECT CONDITIONS

Intersection	Movement	Available Stacking Distance (feet)	95th Percentile Queue (Feet) [b] AM Peak Hour	PM Peak Hour	Acceptable? [a] AM	PM
Existing (2015) Condition						
Nason St. /SR 60 WB Ramps	WBL	1,370	83	132	YES	YES
	WBT	2,140	21	31	YES	YES
	WBR	190	0	0	YES	YES
Nason St. /SR-60 EB Ramps	EBL	805	27	96	YES	YES
	EBT	1,300	46	66	YES	YES
	EBR	225	45	63	YES	YES
Existing Plus Project Conditions						
Nason St. /SR 60 WB Ramps	WBL	1,370	83	132	YES	YES
	WBT	2,140	21	31	YES	YES
	WBR	190	0	0	YES	YES
Nason St. /SR-60 EB Ramps	EBL	805	35	113	YES	YES
	EBT	1,300	46	64	YES	YES
	EBR	225	45	62	YES	YES

[a] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this Table, where applicable.
[b] Maximum queue length for the approach reported.

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, prepared by Urban Crossroads, dated March 9, 2016.

Opening Year Cumulative (2020) Traffic Analysis

To account for background traffic, other known cumulative development projects in the study area were included in addition to 10.41 percent of ambient growth for Opening Year Cumulative (2020) traffic conditions in conjunction with traffic associated with the proposed Project. Although it is unlikely that these cumulative projects would be fully built and occupied by Year 2020, these projects have been included in an effort to conduct a conservative analysis and overstate and opposed to understate potential cumulative traffic impacts.

The currently adopted Southern California Association of Governments (SCAG) 2012 Regional Transportation Plan (RTP) (April 2012) growth forecasts for the unincorporated areas of the City identifies projected growth in population of 187,400 in 2008 to 255,200 in 2035, or a 36.2 percent increase over the 27 year period. The change in population equates to roughly a 1.5 percent growth rate compounded annually. Similarly, growth over the same 27 year period in households is projected to increase by 42.5 percent, or 1.32 percent annual growth rate. Finally, growth in employment over the same 27 year period is projected to increase by 99.5 percent, or a 2.59 percent annual growth rate.

Based on a comparison of Existing traffic volumes to the Horizon Year (2035) forecasts, the average growth rate is estimated at approximately 3.17 percent compounded annually between Existing and Horizon Year (2035) traffic conditions. The annual growth rate at each individual intersection is not lower than 2.08 percent compounded annually to as high as 4.20 percent compounded annually over the same time period. Therefore, the annual growth rate utilized for the purposes of this analysis would appear to conservatively approximate the anticipated regional growth in traffic volumes in the City for both Opening Year Cumulative (2020) and Horizon Year (2035) traffic conditions, especially when considered along with the addition of Project-related traffic. As such, the growth in traffic volumes assumed would tend to overstate as opposed to understate the potential impacts to traffic and circulation.

Opening Year Cumulative (2020) Roadway Improvements

The lane configurations and traffic controls assumed to be in place for Opening Year Cumulative (2020) conditions are consistent with those previously shown on Exhibit 3-1, Existing Number of Through Lanes and Intersection Controls, of the Traffic Impact Analysis, with the exception of Project driveways assumed to be constructed by the Project to provide site access. No other off-site improvements are assumed beyond those that currently exist with the exception of the intersections and roadways that would be improved by the Project for access.

Opening Year Cumulative (2020) Without Project Traffic Volume Forecasts

Exhibit 6-1, Opening Year Cumulative (2020) Without Project Traffic Volumes, of the Traffic Impact Analysis, illustrates the ADT, AM and PM peak hour traffic volumes which can be expected for Opening Year (2020) Without Project traffic conditions.

Opening Year Cumulative (2020) With Project Traffic Volume Forecasts

Exhibit 6-2, Opening Year Cumulative (2020) With Project Traffic Volumes, of the Traffic Impact Analysis, illustrates the ADT, AM and PM peak hour traffic volumes which can be expected for Opening Year (2020) With Project traffic conditions.

Opening Year Cumulative (2020) Intersection Operations Analysis

Opening Year Cumulative (2020) intersection analysis results are summarized in **Table XVI-15,** *Intersection Analysis for Opening Year Cumulative (2020) Conditions***.** Table XVI-15 indicates all study area intersections are anticipated to continue to operate at acceptable LOS under both Opening Year Cumulative (2020) Without and Opening Year Cumulative (2020) With Project consistent with Project traffic conditions. A summary of peak hour intersection LOS for Opening Year Cumulative (2020) Without and With Project conditions are illustrated on Exhibit 6-3, Summary of Peak Hour Intersection LOS for Opening Year Cumulative (2020) Without Project Conditions and Exhibit 6-4, Summary of Peak Hour Intersection LOS for Opening Year Cumulative (2020) With Project Conditions, of the Traffic Impact Analysis, respectively.

TABLE XVI-15
INTERSECTION ANALYSIS FOR OPENING YEAR CUMULATIVE (2020) CONDITIONS

#	Intersection	Traffic Control [b]	2020 Without Project				2020 With Project			
			Delay (secs.) [a]		Level of Service		Delay (secs.) [a]		Level of Service	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Nason St. / Street "A"	**CSS**	Future Intersection				8.9	8.9	A	A
2	Nason St. / Ironwood Av.	TS	47.0	28.6	D	C	54.7	32.7	D	C
3	Nason St. / SR-60 WB Ramps	TS	20.2	13.74	C	C	23.6	24.1	C	C
4	Nason St. / SR-60 EB Ramps	TS	22.7	18.7	C	B	26.1	19.4	C	B
5	Lantz Ln. / Ironwood Av.	CCS	13.3	12.8	B	B	14.5	14.5	B	B
6	Oliver St. / Street "C"	**CSS**	Future intersection				8.9	9.2	A	A
7	Oliver St. / Ironwood Av	CCS	13.2	13.0	B	B	13.9	13.6	B	B

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).
[a] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.
[b] CSS = Cross-street Stop; TS = Traffic Signal

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, prepared by Urban Crossroads, dated March 9, 2016.

Opening Year Cumulative (2020) Roadway Segment Analysis

Table XVI-16, *Roadway Volume/Capacity Analysis for Opening Year Cumulative (2020) Project Conditions,* provides a summary of the Opening Year Cumulative (2020) Project conditions roadway segment capacity. As shown in Table XVI-16, all the study roadway segments are anticipated to operate at acceptable LOS with the exception of the segment of Ironwood Avenue, west of Nason Street.

As noted above under the Roadway Segment Capacity Analysis Methodology, where the ADT-based roadway segment analysis indicates a deficiency (unacceptable LOS), a review of the more detailed peak hour intersection analysis are undertaken. The more detailed peak hour intersection analysis explicitly accounts for factors that affect roadway capacity. As such, roadway segment widening is typically only recommended if the peak hour intersection analysis indicates the need for additional through lanes. The adjacent intersection of Nason Street at Ironwood Avenue is anticipated to operate at acceptable LOS under Opening Year Cumulative (2020) traffic conditions without roadway widening. As such, roadway widening or additional improvements to the eastbound approach at this intersection have not been recommended and impacts are considered less than significant.

Opening Year Cumulative (2020) Traffic Signal Warrants Analysis

Traffic signal warrants for Opening Year Cumulative (2020) traffic conditions are based on both Opening Year Cumulative Caltrans planning-level ADT and peak hour volumes. For Opening Year Cumulative (2020) Without and With Project traffic conditions, there are no study area intersections anticipated to meet traffic signal warrants.

Opening Year Cumulative (2020) Off-Ramp Queuing Analysis

Table XVI-17, *Peak Hour Freeway Off-Ramp Queuing Summary for Opening Year Cumulative (2020) Conditions***,** the Opening Year Cumulative (2020) Project queuing analysis findings. As shown in Table XVI-17, there are no queuing issues during the peak 95th percentile traffic flows under Opening Year Cumulative (2020) With Project traffic conditions and Opening Year Cumulative (2020) Without Project traffic conditions.

TABLE XVI-16
ROADWAY VOLUME/CAPACITY ANALYSIS FOR OPENING YEAR CUMULATIVE (2020) CONDITIONS

#	Roadway	Segment Limits	Roadway Section	LOS Capacity [a]	2020 Without Project	V/C	LOS	2020 With Project	V/C	LOS	Acceptable LOS
1		Street "A" to Ironwood Avenue	**2U**	2,000	N/A			649	0.32	A	C
2		South of Ironwood Avenue	4D	12,500	8,951	0.72	C	9.898	0.79	C	D
3	Nason St	North of SR-60 WB Ramps	4D	37,500	9,452	0.25	A	10,399	0.28	A	D
4		SR-60 WB Ramps to SR-60 EB Ramps	4D	37,500	18,743	0.40	A	19,388	0.52	A	D
5		South of SR-60 EB Ramps	2U	37,500	24,886	0.66	B	25,230	0.67	B	D
6		West of Nason Street	2U	12,500	12,164	0.97	E	12,508	1.00	E	C
7	Ironwood	Nason Street to Lantz Lane	2U	12,500	7,829	0.63	B	8,603	0.69	B	C
8	Ave	Lantz Lane to Oliver Street	2U	12,500	7,394	0.59	A	7,652	0.61	B	C
9		East of Oliver Street	2U	12,500	7,371	0.59	A	7,802	0.62	B	C
10	Oliver St	Between Street “C” and Ironwood Avenue	2U	2,000	N/A			517	0.26	A	C

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS). N/A = Not Applicable; Segment does not exist.
[a] These maximum roadway capacities have been extracted from the City of Moreno Valley's Transportation Division's Traffic Impact Analysis Transportation Division's Traffic Impact Analysis Preparation Guidelines (August 2007). These roadway capacities are "rule of thumb" estimates for planning purposes. The LOS "E" service volumes are estimated maximum daily capacity for respective classifications. Capacity is affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian and bicycle traffic.

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, prepared by Urban Crossroads, dated March 9, 2016.

TABLE XVI-17
PEAK HOUR FREEWAY OFF-RAMP QUEUING SUMMARY FOR OPENING YEAR CUMULATIVE (2020) CONDITIONS

Intersection	Movement	Available Stacking Distance (feet)	95th Percentile Queue (Feet) [b] AM Peak Hour	95th Percentile Queue (Feet) [b] PM Peak Hour	Acceptable? [a] AM	Acceptable? [a] PM
Opening Year Cumulative (2020) Without Project						
Nason St. /SR 60 WB Ramps	WBL	1,370	103	254 [c]	YES	YES
	WBT	2,140	22	33	YES	YES
	WBR	190	2	19	YES	YES
Nason St. /SR-60 EB Ramps	EBL	805	30	67	YES	YES
	EBT	1,300	98	45	YES	YES
	EBR	225	97	43	YES	YES
Opening Year Cumulative (2020) With Project						
Nason St. /SR 60 WB Ramps	WBL	1,370	106	254 [c]	YES	YES
	WBT	2,140	22	33	YES	YES
	WBR	190	4	25	YES	YES
Nason St. /SR-60 EB Ramps	EBL	805	37	129	YES	YES
	EBT	1,300	120	137	YES	YES
	EBR	225	118	134	YES	YES

[a] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this Table, where applicable.
[b] Maximum queue length for the approach reported.
[c] 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, prepared by Urban Crossroads, dated March 9, 2016.

Horizon Year (2035) Traffic Analysis

The Horizon Year (2035) Without Project traffic conditions were derived from the Riverside County Transportation Analysis Model (RivTAM) modified to represent Horizon Year (2035) conditions for the City using accepted procedures for model forecast refinement and smoothing. The traffic forecasts reflect the area-wide growth anticipated between Existing conditions and Horizon Year (2035) conditions. The Horizon Year (2035) With Project traffic forecasts were determined by adding the Project traffic to the Horizon Year (2035) Without Project traffic forecasts from the RivTAM model. The Horizon Year (2035) traffic forecasts used in the traffic analysis were refined with existing peak hour traffic count data collected at intersection analysis locations. The initial estimate of the future peak hour turning movements has, therefore, been reviewed for reasonableness. The reasonableness checks performed include a review of traffic flow conservation in addition to comparison with the Existing and Opening Year (2020)

Cumulative traffic volumes. Where necessary, the Horizon Year (2035) volumes have been adjusted to achieve flow conservation, reasonable growth, and reasonable diversion between parallel routes.

The Horizon Year (2035) Without and With Project traffic conditions analysis would be utilized to determine if improvements funded through regional transportation mitigation fee programs, such as the TUMF and DIF programs, or other approved funding mechanisms can accommodate the long-range cumulative traffic at the target LOS identified in the City's General Plan. If the "funded" improvements can provide the target LOS, then the Project's payment into TUMF and/or DIF would be considered as long-range cumulative mitigation through the conditions of approval. Other improvements needed beyond the "funded" improvements (i.e. localized improvements to non-TUMF facilities) are identified as such.

Horizon Year (2035) Roadway Improvements

The lane configurations and traffic controls assumed to be in place for Horizon Year (2035) conditions are consistent with those previously shown on Exhibit 3-1, Existing Number of Through Lanes and Intersection Controls, of the Traffic Impact Analysis, with the exception of Project driveways assumed to be constructed by the Project to provide site access. No other off-site improvements are assumed beyond those that currently exist with the exception of the intersections and roadways that would be improved by the Project for access.

Horizon Year (2035) Without Project Traffic Volume Forecasts

Exhibit 7-1, Horizon Year (2035) Without Project Traffic Volumes, of the Traffic Impact Analysis, illustrates the ADT, AM and PM peak hour traffic volumes which can be expected for Horizon Year (2035) Without Project traffic conditions.

Horizon Year (2035) With Project Traffic Volume Forecasts

Exhibit 7-2, Horizon Year (2035) With Project Traffic Volumes, of the Traffic Impact Analysis, illustrates the ADT, AM and PM peak hour traffic volumes which can be expected for Horizon Year (2035) With Project traffic conditions.

Horizon Year (2035) Intersection Operations Analysis

Horizon Year (2035) intersection analysis results are summarized in **Table XVI-18,** *Intersection Analysis for Horizon Year (2035) Conditions***.** Table XVI-18 indicates all study area intersections are anticipated to continue to operate at acceptable LOS under both Horizon Year (2035) Without and With Project traffic conditions, with the exception of the intersection of Nason Street at Ironwood Avenue. A summary of peak hour intersection LOS Horizon Year (2035) Without and With Project conditions are illustrated on Exhibit 7-3, Summary of Peak Hour Intersection LOS for Horizon Year (2035) Without Project Conditions and Exhibit 7-4, Summary of Peak Hour Intersection LOS for Horizon Year (2035) With Project Conditions, of the Traffic Impact Analysis, respectively.

TABLE XVI-18
INTERSECTION ANALYSIS FOR HORIZON YEAR (2035) CONDITIONS

#	Intersection	Traffic Control [b]	2035 Without Project				2035 With Project			
			Delay (secs.) [a]		Level of Service		Delay (secs.) [a]		Level of Service	
			AM	PM	AM	PM	AM	PM	AM	PM
1	Nason St. / Street "A"	CSS	Future Intersection				9.0	9.0	A	A
2	Nason St. / Ironwood Av.	TS	**>200.0**	**141.2**	**F**	**F**	**>200.0**	**>200.0**	**F**	**F**
3	Nason St. / SR-60 WB Ramps	TS	23.9	31.1	C	C	27.5	31.5	C	C
4	Nason St. / SR-60 EB Ramps	TS	27.2	31.0	C	C	28.1	32.1	C	C
5	Lantz Ln. / Ironwood Av.	CCS	14.1	13.5	B	B	14.2	13.6	B	B
6	Oliver St. / Street "C"	CSS	Future intersection				8.8	9.1	A	A
7	Oliver St. / Ironwood Av	CCS	13.9	13.8	B	B	14.6	13.8	B	B

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[a] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[b] CSS = Cross-street Stop; TS = Traffic Signal

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, prepared by Urban Crossroads, dated March 9, 2016.

Horizon Year (2035) Roadway Segment Analysis

Table XVI-19, *Roadway Volume/Capacity Analysis for Horizon Year (2035) Project Conditions*, provides a summary of the Horizon Year (2035) Project conditions roadway segment capacity. As shown in Table XVI-19, all the study roadway segments are anticipated to operate at acceptable LOS with the exception of the segment of Ironwood Avenue, west of Nason Street.

As noted above under the Roadway Segment Capacity Analysis Methodology, where the ADT-based roadway segment analysis indicates a deficiency (unacceptable LOS), a review of the more detailed peak hour intersection analysis are undertaken. The more detailed peak hour intersection analysis explicitly accounts for factors that affect roadway capacity. As such, roadway segment widening is typically only recommended if the peak hour intersection analysis indicates the need for additional through lanes. The adjacent intersection of Nason Street at Ironwood Avenue is anticipated to operate at acceptable LOS under Horizon Year (2035) traffic conditions with turn lane improvements as identified in **Table XVI-20**, *Intersection Analysis for Horizon Year (2035) Conditions With Improvements*, but without additional through lanes. As such, roadway widening or additional improvements to the eastbound approach at this intersection have not been recommended beyond those needed to address peak hour intersection operational deficiencies and impacts are considered less than significant.

TABLE XVI-19
ROADWAY VOLUME/CAPACITY ANALYSIS FOR HORIZON YEAR (2035) CONDITIONS

#	Roadway	Segment Limits	Roadway Section	LOS Capacity [a]	2035 Without Project	V/C	LOS	2035 With Project	V/C	LOS	Acceptable LOS
1		Street "A" to Ironwood Avenue	**2U**	2,000	N/A			817	0.41	A	C
2		South of Ironwood Avenue	4D	12,500	9,846	0.79	C	10,793	0.86	D	D
3	Nason St	North of SR-60 WB Ramps	4D	37,500	10,398	.28	A	11,345	0.30	A	D
4		SR-60 WB Ramps to SR-60 EB Ramps	4D	37,500	20,617	0.55	A	21,262	0.57	A	D
5		South of SR-60 EB Ramps	2U	37,500	27,375	0.73	C	27,719	0.74	C	D
6		West of Nason Street	2U	12,500	**13,381**	**1.07**	**F**	**13,725**	**1.10**	**F**	C
7	Ironwood	Nason Street to Lantz Lane	2U	12,500	8,612	0.69	B	9,386	0.75	C	C
8	Ave	Lantz Lane to Oliver Street	2U	12,500	8.134	0.65	B	8.392	0.67	B	C
9		East of Oliver Street	2U	12,500	8,101	0.65	B	8,532	0.68	B	C
10	Oliver St	Between Street “C” and Ironwood Avenue	2U	2,000	N/A			517	0.26	A	C

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS). N/A = Not Applicable; Segment does not exist.

[a] These maximum roadway capacities have been extracted from the City of Moreno Valley's Transportation Division's Traffic Impact Analysis Transportation Division's Traffic Impact Analysis Preparation Guidelines (August 2007). These roadway capacities are "rule of thumb" estimates for planning purposes. The LOS "E" service volumes are estimated maximum daily capacity for respective classifications. Capacity is affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian and bicycle traffic.

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, prepared by Urban Crossroads, dated March 9, 2016.

TABLE XVI-20
INTERSECTION ANALYSIS FOR HORIZON YEAR (2035) CONDITIONS WITH IMPROVEMENTS

#	Intersection	Traffic Control [c]	Intersection Approach Lanes [a] Northbound L T R	Southbound L T R	Eastbound L T R	Westbound L T R	Delay (secs.) [b] AM	PM	Level of Service AM	PM
2	Nason St. / Ironwood Av.									
	Without Project	TS	1 1 1	1 1 0	1 1 1>	1 1 0	30.0	34.3	C	C
	With Project	TS	1 1 1	1 1 0	1 1 0	1 1 0	34.2	36.4	C	D

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).
[a] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.
L = Left; T = Through; R = Right; > = Right-Turn Overlap Phasing; d= Defacto Right Turn Lane
[b] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.
[c] CSS = Cross-street Stop; TS = Traffic Signal

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, prepared by Urban Crossroads, dated March 9, 2016.

Horizon Year (2035) Traffic Signal Warrants Analysis

Traffic signal warrants for Horizon Year (2035) traffic conditions are based on both Horizon Year (2035) Caltrans planning-level ADT and peak hour volumes. For Horizon Year (2035) Without and With Project traffic conditions, there are no study area intersections anticipated to meet traffic signal warrants.

Horizon Year (2035) Off-Ramp Queuing Analysis

Table XVI-21, *Peak Hour Freeway Off-Ramp Queuing Summary for Horizon Year (2035) Conditions*, presents the Horizon Year (2035) Project queuing analysis findings. As shown in Table XVI-21, there are no queuing issues during the peak 95th percentile traffic flows under Horizon Year (2035) With Project traffic conditions and Horizon Year (2035) Without Project traffic conditions.

Recommended Improvements

As discussed in the Traffic Impact Analysis and included below as COA TRAF-1, potential all-way stop locations along Street "A" could be a relatively low cost solution to discourage speeding along this street segment, if speeding becomes an issue after the Project is constructed and occupied and appropriate warrants are met. As these particular street segments are bounded by private residential units on both sides, the use of midblock chokers or street narrowing measures were considered, but have not been recommended as they would reduce the amount of on-street parking in front or nearby the residential units. Potential speed hump locations have been recommended within three locations along Street "A".

TABLE XVI-21
PEAK HOUR FREEWAY OFF-RAMP QUEUING SUMMARY FOR HORIZON YEAR (2035) CONDITIONS

Intersection	Movement	Available Stacking Distance (feet)	95th Percentile Queue (Feet) [b] AM Peak Hour	95th Percentile Queue (Feet) [b] PM Peak Hour	Acceptable? [a] AM	Acceptable? [a] PM
Opening Year Cumulative (2035) Without Project						
Nason St. /SR 60 WB Ramps	WBL	1,370	94	308 [c]	YES	YES
	WBT	2,140	16	62	YES	YES
	WBR	190	0	25	YES	YES
Nason St. /SR-60 EB Ramps	EBL	805	42	129	YES	YES
	EBT	1,300	180 [c]	226 [c]	YES	YES
	EBR	225	171 [c]	220 [c]	YES	YES
Opening Year Cumulative (2035) With Project						
Nason St. /SR 60 WB Ramps	WBL	1,370	140	308 [c]	YES	YES
	WBT	2,140	35	62	YES	YES
	WBR	190	6	31	YES	YES
Nason St. /SR-60 EB Ramps	EBL	805	50	152	YES	YES
	EBT	1,300	202 [c]	232 [c]	YES	YES
	EBR	225	187 [c]	226 [c]	YES	YES

[a] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this Table, where applicable.
[b] Maximum queue length for the approach reported.
[c] 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles

SOURCE: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis City of Moreno Valley, prepared by Urban Crossroads, dated March 9, 2016.

Potential all-way stop locations have also been recommended in three locations along Street “A”. Please refer to Exhibit 1-5: Traffic Calming Recommendations, of the Traffic Impact Analysis, for recommended locations of speed humps and all-way stop locations.

Improvement strategies have been recommended at intersections that have been identified as deficient in an effort to reduce each location’s peak hour delay and to improve the associated LOS grade to an acceptable LOS (LOS “D” or better). The effectiveness of the recommended improvement strategies discussed below to address Horizon Year (2035) traffic deficiencies is illustrated in Table XVI-20. Further, the Project applicant shall participate in the funding of off-site improvements, including traffic signals that are needed to serve cumulative traffic conditions through the payment of TUMF and City DIF fees (if the improvements are included in the TUMF or DIF programs) or on a fair share basis (if the improvements are not included in the TUMF or

DIF programs). These fees shall be collected by the City, with the proceeds solely used as part of a funding mechanism used to ensure that regional highways and arterial expansions keep pace with the projected population increases (MM TRAF-1). There are no other applicable pre-existing funding programs for the study area aside from TUMF and DIF. As such, incorporation of the recommended improvements and strategies and implementation of MM TRAF-1, a less than significant impact would occur in this regard.

Project Design Features (Conditions of Approval)

COA TRAF-1 As recommended by the project's traffic consultant, prior to project occupancy, three potential speed hump locations have been proposed along Street "A". Final speed hump locations to be reviewed and approved by the City's Traffic Engineer. Further, prior to project occupancy, potential all-way stop locations, to be determined if warranted by the City's Traffic Engineer, have also been recommended in three locations along Street "A".

Mitigation Measures

MM TRAF-1: The Project applicant shall participate in the funding of off-site improvements, including traffic signals that are needed to serve cumulative traffic conditions through the payment of TUMF and City DIF fees (if the improvements are included in the TUMF or DIF programs) or on a fair share basis (if the improvements are not included in the TUMF or DIF programs). These fees shall be collected by the City, with the proceeds solely used as part of a funding mechanism used to ensure that regional highways and arterial expansions keep pace with the projected population increases.

b. Conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

Less Than Significant Impact. The CMP is a State-mandated program enacted by the State legislature to address the impacts that urban congestion has on local communities and the region as a whole. The Riverside County Transportation Commission (RCTC) is the designated congestion management agency (CMA) for Riverside County, and holds responsibility for the development and implementation of the Riverside County CMP. New projects located in the City must comply with the requirements set forth in the County's CMP. These requirements include the provision that all freeway segments where a project could add 150 or more trips in each direction during the peak hours be evaluated. The guidelines also require evaluation of all designated CMP intersections where a project could add 50 or more trips during either peak hour.

The CMP intersection analysis locations for the Project include Nason Street and the SR-60 Westbound Ramps (Intersection ID #3) and Nason Street and the SR-60 Eastbound Ramps (Intersection ID #4); refer to Figure XVI-1. The Project would not add 150 or more trips (in either direction) during either the weekday AM or PM peak hours to CMP freeway monitoring locations which is the threshold for preparing a traffic impact assessment, as stated in the CMP manual. The Project would not add 50 or more trips during either the weekday AM or PM peak hours (i.e., of adjacent street traffic) at CMP monitoring intersections, as stated in the CMP manual as the threshold criteria for a traffic impact assessment. Therefore, no further review of potential impacts to freeway or intersection monitoring locations that are part of the CMP highway system is required. As such, based on the CMP guidelines for intersections and freeways, a less than significant impact would occur for any analysis scenario based on CMP criteria.

c. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

No Impact. As discussed under Responses VIII.e and f, the Project site is not located within an airport land use plan or within two miles of a public or private airport. The nearest airport is the March Inland Port, a joint-use military and public airport, located approximately 5.15 miles southwest of the Project site. The Project would not introduce structures substantial enough to interfere with existing flight paths, or result in a measureable increase in airport traffic that would result in substantial safety risks. As such, no impacts would occur.

d. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Less Than Significant Impact. There are no existing hazardous design features such as sharp curves or dangerous intersections or incompatible uses on-site or within the Project vicinity. Vehicular access to the Project site currently and would continue to be provided via Ironwood Avenue, Nason Street, and Oliver Street. The Project's proposed access is located on Nason Street via Street "A", Ironwood Avenue via Street "B" (northern extension of Lantz Lane), and Oliver Street via Street "C". Ironwood Avenue is an east-west oriented roadway located along the Project's southern boundary. The Project proposes to widen Ironwood Avenue from Nason Street to Oliver Street to its half-section width of as a minor arterial (88-foot right-of-way). Nason Street is a north-south oriented roadway located along the Project's western boundary. The Project proposes to widen Nason Street from the Project's northern boundary to Ironwood Avenue to its half-section width as a collector (66-foot right-of-way). Oliver Street is a north-south oriented roadway located along the Project's eastern boundary. The Project proposes to widen Oliver Street from the Project's northern boundary to Ironwood Avenue to its half-section width as a local road (56-foot right-of-way). On-site traffic signing and striping would be implemented in conjunction with detailed construction plans for the Project site. Sight distance at each Project access point would be reviewed with respect to standard Caltrans and City sight distance standards at the time of preparation of final grading, landscape and street improvement plans. All on-site roadway and site access improvements would be designed in compliance with applicable City standards.

As discussed in Response XVI.a, a queuing analysis was performed of all six Project scenarios for the off-ramps at the SR-60 Freeway at the Nason Street interchange to assess vehicle queues for the off ramps that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the SR-60 Freeway mainline. Further, a traffic signal warrant analysis was performed of all six Project scenarios to quantitatively justify or ascertain the potential need for installation of a traffic signal at an otherwise unsignalized intersection. As discussed therein, there are no queuing issues during the 95th percentile traffic flows and no study area intersections anticipated to meet traffic signal warrants under any of the six Project scenarios. As such, impacts would be less than significant in this regard.

e. Result in inadequate emergency access?

Less Than Significant Impact. The Project site is located in an established rural area that is well served by the surrounding roadway network. While it is expected that the majority of construction activities for the Project would be confined on-site, construction activities may temporarily affect access on portions of adjacent streets during certain periods of the day, including during construction of potential off-site infrastructure upgrades/improvements (i.e., street widening, water and sewer lines) (discussed below in Section 17, *Utilities and Service Systems*). However, through-access for drivers, including emergency personnel, along all roads would still be provided. In these instances, the Project would implement traffic control measures (e.g., construction flagmen, signage, etc.) to maintain flow and access. Furthermore, in accordance with the City, the Project would develop a Construction Management Plan, which includes designation of a haul route, to ensure that adequate emergency access is maintained during construction. Therefore, construction is not expected to result in inadequate emergency access.

Project operation would generate traffic in the Project vicinity and would result in some modifications to access (i.e., street widening, new curb cuts for Project driveways) from the streets that surround the Project site. However, emergency access to the Project site and surrounding area would continue to be provided similar to existing conditions. Emergency vehicles and fire access would be provided from the primary driveway for the Project site located on Ironwood Avenue about mid-block between Nason Street and Oliver Street, immediately opposite from and north of Lantz Lane. Secondary site access would be provided by driveways on both Nason Street and Oliver Street just north of Ironwood Avenue. Future street widening, driveway, and building configurations would comply with applicable fire code requirements for emergency evacuation. Subject to review and approval of Project site access and circulation plans by the MVFD, the Project would not result in inadequate emergency access. Therefore, Project operation would result in a less than significant impact in this regard.

f. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

Less Than Significant Impact. The Project site is not currently being served by a direct transit line. The Riverside Transit Agency (RTA) has existing bus services running along Nason Street, south of the SR-60 Freeway via Route 210. Transit service is reviewed and updated by the RTA periodically to address ridership, budget and community demand needs. Changes in land uses can affect these period adjustments which may lead to enhanced or reduced service where deemed appropriate. Currently, there are existing Class II bike lanes located on Nason Street south of the SR-60 westbound ramps interchange. A Class I bikeway is proposed along the west side of Nason Street south of Ironwood Avenue and through the SR-60 Freeway interchange.

Class II bikeways are proposed along Elder Avenue while Class III bikeways are proposed along Ironwood Avenue from west of Nason Street to east of Oliver Street. There are no existing pedestrian facilities (sidewalk and crosswalk) along the Project boundaries. Further, there are proposed trails long Ironwood Avenue east of Nason Street and along Oliver Street. Overall, the Project is not expected to interfere with or degrade the performance or safety of public transit, bicycle, or pedestrian facilities, and a less than significant impact would result.

XVII. Utilities and Service Systems

Would the Project:

a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

Less Than Significant Impact. Under the NPDES permit system, all existing and future municipal and industrial discharges to surface waters within the City are subject to applicable local, State and/or federal regulations. The Project must comply with all provisions of the NPDES program and other applicable waste discharge requirements (WDRs), as enforced by the RWQCB. Therefore, implementation of the Project would not result in an exceedance of wastewater treatment requirements.

The Eastern Municipal Water District (EMWD) provides wastewater services to the City, including the Project site. The EMWD has four operational RWRFs located throughout the EMWD. Inter-connections between the local collections systems serving each treatment plant allow operational flexibility, improved reliability, and expanded deliveries of recycled water. All of EMWD's RWRF's produce tertiary effluent, suitable for all Department of Health Services permitted uses, including irrigation of food crops and full-body contact. The four RWRFs have a combined capacity of 81,800 acre-feet per year (AFY). In 2015, the EMWD collected and treated a total of 48,665 acre-feet (AF) of wastewater at its four regional water reclamation facilities (RWRFs). The Moreno Valley RWRF with a capacity of 17,900 AFY would treat the Project site. Compliance with applicable WDRs would ensure that Project implementation would not exceed the applicable wastewater treatment requirements of the CRRWQCB with respect to discharges to the sewer system. As such, impacts would be less than significant in this regard.

b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

Wastewater

Less Than Significant Impact. During Project construction, a negligible amount of wastewater would be generated by construction workers. It is anticipated that portable toilets would be provided by a private company and the waste disposed off-site. Wastewater generation from construction activities is not anticipated to cause a measureable increase in wastewater flows at a point where, and at a time when, a sewer's capacity is already constrained or that would cause a sewer's capacity to become constrained. Additionally, construction is not anticipated to generate wastewater flows that would substantially or incrementally exceed the future scheduled collection of the Moreno Valley RWRF. Therefore, construction impacts to the local wastewater conveyance and treatment system would be less than significant.

Existing sewer lines within the City are maintained by the EMWD. No public sewers exist adjacent to the Project site, and thus the Project proposes the construction of a new off-site sewer main in addition to proposed on-site sewer collection improvements. The on-site sewer system, which would be owned and maintained by EMWD once constructed by the Project, would collect wastewater generated by the proposed residential units, which would be conveyed via a new sewer line extending from the Project site southward along Oliver Street to an existing sewer owned and operated by EMWD located south of the SR-60 freeway near Eucalyptus Avenue. Construction of the Project would include all necessary on and off-site sewer pipe improvements and connections to adequately link the Project to the existing City sewer system (refer to Figure A-11 in Attachment A of this Initial Study for the location of the proposed sewer improvements). The necessary improvements would be verified through the permit approval process of obtaining a sewer capacity and connection permit from the City. Construction-related impacts would be temporary and within the scope of impacts evaluated in this MND. However, the impacts of such construction activity would be temporary and on an intermittent basis. Further, a Construction Management Plan for the Project would be prepared in order to minimize disruptions to through traffic flow, which would consider any off-site utility improvements, as necessary.

Implementation of the Project would generate approximately 63,350 gallons per day (gpd) or about 71 AFY of wastewater.[39] The four EMWD RWRFs have a combined capacity of 81,800 AFY. The Moreno Valley RWRF has a capacity of 17,900 AFY. Given the current capacity of the Moreno Valley RWRF, the Project wastewater generation would account for a less than 0.4-percent increase in demand at the Moreno Valley RWFR, and thus there would be ample capacity to treat this increased volume.

Based on the above, and given existing and anticipated future capacity at the wastewater treatment facilities and wastewater generation expected from the Project, impacts regarding wastewater facilities would be less than significant.

Water

Less Than Significant Impact. During construction activities associated with the future development within the Project site, there would be temporary, intermittent demand for water for such activities as soil watering for site preparation, fugitive dust control, concrete preparation, paining, cleanup, and other short-term activities. Construction-related water usage is not

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39 Total wastewater generation based on 181 residential units x 350 gpd/du = 63,350 gpd, and (63,350 gpd x 365 days/year)/(325,851 gallons/AF) = 70.96 AFY. Generation factors based on the Eastern Municipal Water District's *Sanitary Sewer System Planning & Design Guidelines*, dated September 1, 2006. Available at: *http://www.emwd.org/home/showdocument?id=744*. Accessed August 2016.

expected to have an adverse impact on available water supplies or the existing water distribution system, and impacts would be less than significant.

The EMWD provides water and water treatment to the City, including the Project site. Existing water lines within the City adjacent to the Project site include an existing 12-inch water line on Ironwood Avenue, an existing 8-inch water line on Nason Street, and an existing 24-inch water line on Oliver Street. It should be noted that these existing water lines are either not within the current pressure zone of the Project site or are in a restricted zone, and therefore, new off-site water service connections and associated pipelines would be required to be constructed as part of the Project. As such, water service would be provided by an on-site distribution system with supply provided via two new connections to existing EMWD pipelines, one from the southeast near the intersection of Oliver Street and Ironwood Avenue, and the other from the north via a new pipeline connection along Oliver Street at the western terminus of Kalmia Avenue (refer to Figure A-11 in Attachment A of this Initial Study for the locations of the proposed water lines). All connections and water-related infrastructure improvements would be provided by the Project in consultation with the EMWD and the City, as necessary. Further, all water line improvements and connections would be provided in consultation with MVFD to ensure that the minimum fire flow requirements would be provided to serve the proposed development.

The EMWD Urban Water Management Plan (UWMP), 2015 Update (May 2016), provides water demand and water supply projections in five-year increments through 2040, which are based on regional demographic data provided by SCAG, as well as billing data for each major customer class, weather, and conservation. The EMWD local supplies of water include recycled water, potable groundwater, and desalinated groundwater. In addition to local supplies, the EMWD received imported water from the Metropolitan Water District (MWD) by direct delivery as potable water, delivery as raw water and then treated at EMWD's two local filtration plants, or delivery as water for non-potable use and groundwater recharge. The EMWD depends on MWD for approximately half of its retail water supply. According to the UWMP, the EMWD will have sufficient supplies to meet both retail and wholesale demands from 2020 to 2040 under average year conditions, single-dry year conditions, and multiple-dry year conditions.

The Project would result in an estimated water demand of approximately 76,020 gpd, or about 85 AFY when fully occupied.[40] The estimated 85 AFY increase in water demand generated by the Project would constitute approximately less than 0.04-percent of the EMWD year 2020 water supply and water demand of 212,901 AFY. Further, the Project would comply with Title 9, Planning and Zoning, Chapter 9.17, Landscape and Water Efficiency Requirements, of the MVMC. The Project would also comply with the EMWD UWMP recommendations regarding drought management and water conservation. With implementation of water conservation measures per the requirements cited above, the Project's actual water demand would be well below the conservative amount stated above. Based on the above, no additional water treatment

40 The water demand would be consistent with the estimated wastewater generation of the Project. To be conservative, 20 percent was added (to account for outdoor water use). 65,350 gpd X 1.20 = 76,020 gpd. (76,020 gpd x 365 days/year) = 27,747,300 gallons per year; (27,747,300 gallons per year)/(325,851 gallons per AF) = 85.15 AFY.

facilities are required to meet the water supply demands associated with the Project, and the Project would not require the construction or expansion of water treatment facilities. Therefore, water infrastructure impacts associated with Project operation would be less than significant.

c. Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

Less Than Significant Impact. The Project would include a number of stormwater detention basins, as well as other stormwater management features and facilities, in accordance with applicable regulatory requirements as required by City and County. The proposed stormwater basins would be located along the southern edge of the Project site. The basins would not only provide a necessary function of retaining stormwater on-site to prevent run-off, but would also provide a transition and visual buffer to the existing residences south of Ironwood Avenue. The basins help make the transition softer and more visually appealing by having landscaping and open space, instead of walls and roof tops. The basins would be planted as appropriate to the Project site's climate and would incorporate drought-tolerant materials and irrigation systems. Hardscape areas are recommended to be constructed with pervious surfaces where feasible to reduce run off and allow water percolation and minimize stormwater runoff volumes requiring on-site retention. Environmental impacts associated with development of the Project, including on-site drainage facilities, have been evaluated throughout this document. As concluded in this document, all potentially significant impacts associated with development of the Project, including on-site stormwater drainage facilities, would be less than significant. Therefore, impacts would be less than significant in this regard.

d. Have sufficient water supplies available to serve the project from existing entitlements and resource, or are new or expanded entitlements needed?

Less Than Significant Impact. As described in Response XVII.b., above, the Project would fall within the 2015 EMWD UWMP available and projected water supplies. According to the UWMP, the EMWD will have sufficient supplies to meet both retail and wholesale demands from 2020 to 2040 under average year conditions, single-dry year conditions, and multiple-dry year conditions. As a result, the Project is within the capacity of the EMWD to serve the Project as well as existing and planned future water demands of its service area.

Sections 10910-10915 of the State Water Code (Senate Bill [SB] 610) requires the preparation of a water supply assessment (WSA) demonstrating sufficient water supplies for a project that is: 1) a shopping center or business establishment that will employ more than 1,000 persons or have more than 500,000 square feet of floor space; 2) a commercial office building that will employ more than 1,000 persons or have more than 250,000 square feet of space, or 3) any mixed-use project that would demand an amount of water equal to or greater than the amount of water needed to serve a 500 dwelling unit subdivision. In addition, similar to SB 610, SB 221 requires preparation of a Verification of Sufficient Water Supply for all residential subdivisions of 500 dwelling units or more. As discussed under Response XVII, the Project would generate a water demand of approximately 85 AFY (without accounting for water conservation features). With implementation of water conservation measures per the requirements cited above, the Project's actual water demand would be well below the conservative amount stated above. A typical 500 dwelling unit subdivision would have a water demand of approximately 154 AFY. As the Project does not propose construction of 500 or more dwelling units, and also does not meet the established thresholds regarding preparation of a WSA, no WSA pursuant to SB 610 or Verification of Sufficient Water Supply pursuant to SB 221 are required for this Project. As such, the Project would have a less than significant impact with respect to water entitlements and supply.

e. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

Less Than Significant Impact. As indicated in the Response XVII.b, implementation of the Project would generate 63,350 gpd or 71 AFY. The four EMWD RWRFs have a combined capacity of 81,800 AFY. Given the current capacity of the Moreno Valley RWRF of 17,900 AFY, Project wastewater generation would account for a less than 0.4-percent increase in demand at the Moreno Valley RWFR and there would be ample capacity to treat this increase. Therefore, the Project would have a less than significant impact with respect to wastewater treatment capacity.

f. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?

Less Than Significant Impact. The City's Public Works Department works with Waste Management of the Inland Empire to collect residential solid waste. Commercial and industrial solid waste is picked up by private haulers. The division also provides a curbside recycling program including paper, cardboard, cans/aluminum, plastic, and glass. The recyclable materials are hauled to private recyclable material companies. The City does not own or operate any landfill facilities, and the majority of its solid waste is disposed at the El Sobrante Landfill as well as the Badlands Landfill and the Lamb Canyon Landfill. The El Sobrante Landfill has a remaining capacity of 145,530,000 tons with a projected closing year of 2045.[41] The Badlands Landfill has a remaining capacity of 15,748,799 cubic yards with a projected closing year of 2022.[42] Lamp Canyon has a remaining capacity of 19,242,950 cubic yards with a projected closing year of 2029.[43]

Based on solid waste generation factors from the California Integrated Waste Management Board (CIWMB), the Project could generate approximately 724 lbs/day 0.362 tons/day or 132 tons/year)

41 CalRecycle Website, El Sobrante Landfill, http://www.calrecycle.ca.gov/SWFacilities/Directory/33-AA-0217/Detail/, accessed June 2016.
42 CalRecycle Website, Badlands Sanitary Landfill, http://www.calrecycle.ca.gov/SWFacilities/Directory/33-AA-0006/Detail/, accessed June 2016.
43 CalRecycle Website, Lamb Canyon Sanitary Landfill, http://www.calrecycle.ca.gov/SWFacilities/Directory/33-AA-0007/Detail/, accessed June 2016.

of solid waste.[44] The annual amount of solid waste generated by the Project would represent a minor amount of the estimated remaining capacities of the El Sobrante Landfill, Badlands Landfill, and Lamb Canyon Landfill. As such, the solid waste generated by the Project could be accommodated by the County's available regional landfills.

The California Department of Resources and Recycling and Recovery (CalRecycle) is the California State Agency that promotes the importance of reducing waste and oversees California's waste management and recycling efforts. CalRecycle has issued jurisdiction waste diversion rate targets equivalent to 50 percent of the waste stream as expressing in pounds per person per day. Thus, it is important to note that the estimate of solid waste generated by the Project is conservative, in that the amount of solid waste that would need to be landfilled would likely be less than this forecast based on the City's implementation of solid waste diversion targets.

Construction of the Project would result in generation of solid waste such as scrap, lumber, concrete, residual wastes, packing materials, and plastics which could require disposal of construction associated debris at the landfills. It is anticipated that a large amount of the construction debris would be recycled. Disposal and recycling of the construction debris would be required to comply with all federal, State, and local regulations. In addition, the Project would comply with Title 6: Health and Sanitation, Chapter 6.02, Refuse Collection, Transfer, and Disposal, of the MVMC. Therefore, the Project would not cause any significant impacts from conflicting with statutes or regulations related to solid waste.

Based on the above, a less than significant impact regarding solid waste would occur.

g. Comply with federal, state, and local statutes and regulations related to solid waste?

Less Than Significant Impact. All local governments, including the City, are required under Assembly Bill 939 (AB 939), the Integrated Waste Management Act of 1989, to develop source reduction, reuse, recycling, and composting programs to reduce tonnage of solid waste going to landfills. Cities must divert at least 50 percent of their solid waste generation into recycling. If the City's target is exceeded, the City would be required to pay fines or penalties from the State for not complying with AB 939. The waste generated by the Project would be incorporated into the waste stream of the City, and diversion rates would not be substantially altered. The Project does not include any component that would conflict with state laws governing construction or operational solid waste diversion and would comply pursuant to local implementation requirements. Thus, less than significant impacts regarding compliance with AB 939 would occur with Project implementation.

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44 181 residential units X 4 lbs/unit/day = 724 lbs/day = 0.362 tons/day X 365 days = 132 tons per year. Generation factors provided by the CalRecycle website, refer to Estimated Solid Waste Generation Rates. http://www.calrecycle.ca.gov/WasteChar/WasteGenRates/default.htm, accessed June 2016.

XVIII. Mandatory Findings of Significance

a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

Less Than Significant Impact With Mitigation Incorporated. As discussed above in Sections IV, *Biological Resources*, and Section V, *Cultural Resources*, of this Initial Study, implementation of the Project would not result in significant impacts to known or undiscovered biological or cultural resources given implementation of applicable mitigation measures and Project Design Features (including Conditions of Approval). As such, the Project would not have the potential to degrade the quality of the environment, substantially reduce the habitat of fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory; therefore, impacts in this regard would be less than significant with mitigation.

b. Does the project have impacts which are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)

Less Than Significant Impact With Mitigation Incorporated. Cumulative impacts are defined as the direct and indirect effects of a proposed Project which, when considered alone, would not be deemed a substantial impact, but when considered in addition to the impacts of related projects in the area, would be considered significant. "Related projects" refers to past, present, and reasonably foreseeable probable future projects, which would have similar impacts to the proposed Project. CEQA deems a cumulative impact analysis to be adequate if a list of "related projects" is included in the CEQA document or the proposed project is consistent with an adopted general, specific, master, or comparable programmatic plan [Section 15130(b)(1)(B)]. CEQA also states that no further cumulative impact analysis is necessary for impacts of a proposed project consistent with an adopted general, specific, master, or comparable programmatic plan [Section 15130(d)].

The approach for the analysis of cumulative impacts varies for various environmental issues depending on the potential for additive effects from other development in the area, the physical extent and intensity of such effects, and the nature of the resources affected. The project would generally result in nominal environmental impacts, as discussed in the analysis of impacts presented above for each environmental topic. Construction-related impacts related to noise and pollutant emissions would be at less than significant levels and therefore would not contribute substantially to any other concurrent construction programs that may be occurring in the vicinity. The project's contribution to long-term, cumulative impacts would not be substantial with implementation of the City's existing policies, programs, conditions of approval, regulatory requirements, and/or mitigation measures. Particularly, the project is subject to development impact fees and property taxes to offset project-related impacts to public services and utility systems, such as fire protection services, traffic control and roadways, storm drain facilities, and other public facilities and equipment. Where impacts have been identified, mitigation measures have been crafted and will be made a part of the Project's conditions of approval. Further, consistent with CEQA, since the Project would not result in significant and unavoidable impacts, it would not result in impacts that are cumulative considerable.

With regard to cumulative biological resources impacts, the Western Riverside MSHCP identifies areas for long-term conservation and management. As such, cumulative impacts of proposed projects within authorized take lands are minimized through the conservation of land. Cumulative impacts to the biological resources listed below for the study area are considered to be less than significant based on compliance with the Western Riverside County MSHCP, and regulations for jurisdictional waters. This includes implementation of the mitigation measures and conditions of approval outlined above in Section IV of this Initial Study. Since the study area was determined not to function as a regional wildlife movement corridor, this biological resource is not included below.

- Special-status plant species (Parry's spineflower and white-bracted spineflower);
- Burrowing owl;
- Migratory and/or nesting birds; and
- Drainage features (including USACE, RWQCB and CDFW jurisdictional features and MSHCP Riparian/Riverine areas).

The proposed mitigation would result in a minimum no-net-loss of the biological function and value of these resources, and the conditions of approval would ensure compliance with existing regulations (such as the Western Riverside County MSHCP) and regulations for jurisdictional drainages. Therefore, with the proposed mitigation and conditions of approval, impacts would not be considered cumulatively significant. A summary is provided below.

<u>Special-Status Plant Species:</u> Mitigation is proposed and includes a spring focused survey prior to ground disturbance to determine the presence/absence of Parry's spineflower and white-bracted spineflower within the off-site eastern manufactured slope area. If either or both of these species are observed, collection of seed and planting within an on-site or off-site mitigation site is required. The mitigation site is required to be preserved as open space in perpetuity. With this mitigation measure, any impacts to Parry's spineflower and white-bracted spineflower would not be considered cumulatively significant.

<u>Special-Status Wildlife Species:</u> Mitigation is proposed if burrowing owls are observed on the study area in the future, which would avoid direct impacts in compliance with the Western Riverside County MSHCP. Mitigation is also proposed to avoid direct impacts to raptors and migratory bird species through compliance with the MBTA. With these mitigation measures, any impacts would not be considered cumulatively significant.

Jurisdictional Drainages: Impacts to jurisdictional features would be subject to permitting with the regulatory agencies, including USACE, RWQCB and/or CDFW, including compensatory mitigation. With the proposed compliance of existing regulations through the permitting process, impacts would not be considered cumulatively significant.

Riparian/Riverine Areas: Impacts to MSHCP Riparian/Riverine areas would be subject to approval of a DBESP by the City of Moreno Valley and Wildlife Agencies, as required in Section 6.1.2 of the Western Riverside County MSHCP. With the approval and implementation of the DBESP impacts would not be considered cumulatively significant. Mitigation is proposed as compensation for impacts to jurisdictional drainages through the regulatory process as described above.

Based on the discussion above, the City hereby finds that with mitigation measures incorporated the contribution of the Project to cumulative impacts would be less than significant.

c. Does the project have environmental effects which cause substantial adverse effects on human beings, either directly or indirectly?

Less Than Significant Impact With Mitigation Incorporated. Based on the analysis of the Project's impacts provided above in Sections I through XVII of this Initial Study, there is no indication that this Project could result in substantial adverse effects on human beings. While there would be a variety of effects during construction related to traffic, noise and air quality, these impacts would be less than significant based on compliance with applicable regulatory requirements and established impact thresholds, as well as the prescribed mitigation measures, where applicable. Long-term effects would include increased vehicular traffic, traffic-related noise, periodic on-site operational noise, various changes to on-site drainage, and changing of the visual character of the site, with a majority of these impacts affecting adjacent roadway segments and intersections in the immediate area. The analysis herein concludes that direct and indirect environmental effects will at most require mitigation to reduce to less than significant levels. Generally, environmental effects will result in less than significant impacts. Based on the analysis in this Initial Study, the City finds that direct and indirect impacts to human beings will be less than significant with mitigation incorporated, as necessary.

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memorandum

date	January 18, 2017
to	Claudia Manrique, Associate Planner City of Moreno Valley
cc	Chris Ormsby, Senior Planner Richard Sandzimier, Planning Official
from	David Crook, ESA
subject	Ironwood Residential Project IS/MND Public Comment Summary

Based on a review of the public and agency comments received on the Draft Initial Study/Mitigated Negative Declaration (IS/MND) prepared for the proposed Ironwood Village Residential Project, ESA has prepared the following summary of the comments received and general responses to those comment on an issue-by-issue basis. The following discussion provides an overview of the key issues raised in the comments and ESA's responses to those comments, with evidence cited in the IS/MND and supporting technical reports to substantiate those responses. The format of the comment summary and responses generally follows that of the IS/MND, with issues presented in the order they are discussed in that document, as well as other issues regarding compliance with CEQA and those that are not germane to the discussion of impacts provided in the IS/MND. Each of these issues is addressed individually below. If warranted, a more detailed response to individual comments can be prepared prior to City Council hearing based on testimony gathered at the Planning Commission public hearing.

1. **Preparation of an Environmental Impact Report vs. Mitigated Negative Declaration**

A number of comment letters were received from the public that suggest that an IS/MND is not the appropriate level of CEQA documentation for the project, but suggest that an Environmental Impact Report (EIR) must be prepared. To the contrary, based on the nature of the proposed single-family development and the City's review of initial technical studies, it was determined that the proposed project would not result in any environmental impacts that cannot be mitigated to a level less than significant. Specifically, though the Initial Study process, during which each of the checklist items contained Appendix G of the State CEQA Guidelines were thoroughly addressed, the City concluded that based on the analysis and supporting documentation contained in the Initial Study, the project would not result in any significant impacts with implementation of applicable mitigation.

Despite some comments indicating that the project should require preparation of an EIR due to the proposed General Plan Amendment and Zone Change, there is no specific requirement in cases where a project involves such requests that an EIR must be prepared, but instead this should be determined through the Initial Study process as required by CEQA. While some may argue that an EIR is a more appropriate level of CEQA documentation for the proposed project, there is no factual basis for this claim, and thus the City maintains that the IS/MND is adequate and the appropriate documentation for the project.

2. Growth Inducement

A number of comment letters were received that suggest that the proposed project is growth-inducing and that this was not adequately addressed in the IS/MND. First, the project site is located adjacent to existing single-family urban development to the west and south, with rock outcroppings and undeveloped land (zoned RA2 and HR) to the north, and undeveloped land zoned for low-density residential uses (RA2) to the east. While much of the land surrounding the project site is undeveloped, it is nonetheless zoned for residential uses and it is reasonable to assume that such uses may be developed at some point in the future as development applications are submitted. While the proposed project would require extensions of infrastructure to serve the proposed residential uses, such improvements are intended to serve the project site and would not be sized to accommodate additional development in the area; however, the location and sizing of water and sewer lines to serve the project are under the control of the Eastern Municipal Water District (EMWD) and thus the specific alignment and capacity of proposed facilities would be determined by EMWD. Nonetheless, the provision of water, sewer, electrical, natural gas, and telecommunications services to the project site does not necessarily mean that the project would induce substantial growth in the area since these services are generally available within the City and in the surrounding developed properties, and the project would simply require extension of those services to serve proposed uses. With regard to sewer service, given that no other development proposals for adjacent parcels have been submitted, it is speculative to assume that future development on these properties would require sewer service, as each project application must be reviewed by the City to determine the appropriateness of the site for septic systems or sewer service (e.g., adequacy of soils to support septic systems). Thus it is not anticipated that the provision of sewer infrastructure to serve the project site would result in unforeseen growth in the area, beyond what is already anticipated in the City's General Plan. As is the case with the proposed project, any future development applications, including those that may request changes in the General Plan or zoning for those properties near the site, must also undergo the same site plan review and environmental review processes. At that point in time, the decision makers will determine if such proposals are appropriate in the context of the surrounding development and the City's goals and policies for managing future growth. Nonetheless, the development of up to 181 single-family residential units on the project site and provision of necessary infrastructure to serve the associated project demands would not induce substantial growth beyond that proposed as part of the project, the approval of which is at the discretion of the decision makers.

3. Project Description

A number of comments received on the IS/MND suggested that the Project Description provided as Attachment A is not adequate to allow for meaningful understanding of the project. However, this suggestion is not supported by evidence. For instance, some comments state that the Project Description did not discuss the proposed General Plan Amendment and zone change, but only described the proposed physical improvements on-site, and that the off-site infrastructure improvements were also not addressed. To the contrary, as discussed on page A-4 in Attachment A, "[i]n order to accommodate the proposed density on the Project site, which is currently zoned RA2 with a density of up to two units per acre, the applicant is requesting a change of zone to R3 (single-family residential up to 3 units per acre) on the western portion of the Project site, and R5 (single-family residential uses up to 5 units per acre) on the eastern portion of the site." The proposed zoning on-site is also illustrated in Figure A-3, *Conceptual Land Use Plan*, in the same section. The requested entitlements and approvals necessary for the project are also clearly identified on page A-18 in Attachment A, while the off-site improvements are described on page A-16 under Infrastructure and Utilities and illustrated in Figure A-11. In addition, comments suggesting that the IS/MND should have evaluated the development potential on-site under the proposed zoning, but in the absence of the proposed project is not appropriate or warranted since the GPA and zone change would not be sought by the applicant if the proposed Tentative Tract Map were not approved. As such, it is speculative and unnecessary to evaluate the potential development on-site without approval of the project itself. With regard to the northwest portion of the project site planned to remain as open space, while the IS/MND does not specifically state that this portion of the property would continue to be zoned HR, this fact is indicated clearly in Figure A-4, *Project Site Plan*, in Attachment A, in which that portion of the site is labeled "Proposed HR". As no development would occur in this area, no further discussion of potential effects of the proposed project as it relates to this portion of the site is warranted.

4. Aesthetics

A number of comments received suggest that the aesthetic impacts of the project would be significant due to the intensification of land use on the project site, obstruction of valued scenic resources, and introduction of light and glare to the undeveloped site. However, as discussed in detail on pages B-1 through B-11 of the IS/MND, and illustrated in the site photos provided in Figures 1-2 through 1-5, the project site is characterized by varying topography and thus views of and across the project site from publicly available vantage points such as along Ironwood Avenue are intermittent due to this circumstance. Although the IS/MND does not provide photo-realistic simulations or renderings of the proposed project, the evaluation of impacts to views and visual character are based, in part, on the relative size and visual prominence of the property as viewed from public vantage points, particularly from designated Scenic Routes or View Corridors identified in the City's General Plan. Based on these designated viewpoints, which are located at some distance from the project site, views of the project site are obscured or obstructed by intervening topography, vegetation, or existing development, or the project site represents a small percentage of the overall view field (i.e., the project site is very small in the context of the overall view field and thus does not constitute a visually prominent feature). Specifically, with regard to views eastward from Ironwood Avenue just west of Avocado Lane (i.e., a designated view corridor indicated in Figure 7-2, Major Scenic Resources, of the City's General Plan Conservation Element), views of the project site are completely obstructed, and thus implementation of the project would have no effect on views at this location. Similarly, views northward from Alessandro Boulevard west of Moreno Beach Drive (i.e., another designated view corridor in relative proximity to the project site indicated in Figure 7-2 of the General Plan) would not be affected by project implementation, as the project site is not visible from this location given the presence of Moreno Peak and intervening topography, vegetation, and development. Likewise, views westward from Ironwood Avenue to the east of Moreno Beach Drive (i.e., another designated view corridor in relative proximity to the project site indicated in Figure 7-2 of the General Plan) would not be affected by project implementation, as the project site is not visible from this location given the presence of vegetation and development, as well as the distance to the project site which also diminishes its visual prominence. Lastly, as discussed on page B-8 of the IS/MND and illustrated in Figure I-5, while relatively unobstructed views of the project site are available from Moreno Beach Drive, a designated Scenic Route in the City's General Plan, the project site represents such a small portion of the view field that even with implementation of the proposed project with structures up to 35 feet in height, the development would not have the potential to obstruct views of valued scenic resources such as the Reche Mountains, Box Spring Mountains, and Moreno Peak, and long-distance views of the San Gabriel Mountains. Thus, impacts to views were determined to be less than significant.

Next, with regard to visual character, the conversion of the project site from undeveloped land to a single-family residential community does not necessarily constitute an adverse impact to visual character or quality. Rather, the project site, while undeveloped, does not contain any notable visual features, such as vegetation or habitat areas, and is devoid of any structures. The proposed project would be implemented in accordance with the Moreno Valley Municipal Code (MVMC) and/or the proposed project Design Guidelines, as applicable, which would ensure that the proposed improvements are visually attractive and compatible with surrounding development to the extent feasible. Similarly, all project-related lighting would be designed and installed in compliance with the MVMC and applicable Design Guidelines provisions regarding lighting. Accordingly, despite the conversion of the project site from undeveloped land to a single-family residential subdivision, impacts related to visual character and quality and light and glare were concluded to be less than significant.

5. Agriculture and Forestry Resources

Comments received on the IS/MND suggest that although the project would not result in direct effects on agricultural land or activities, and no portion of the project site is designated as Farmland by the California Department of Conservation, the document failed to analyze the potential of the project to result in additional development that could indirectly affect designated Farmland elsewhere in the area. The consideration of such indirect effects would be purely speculative and not supported by any evidence, and further is not required by CEQA. The project site does not contain any designated Farmland and the project's implementation would have no potential to result in the conversion of Farmland to non-agricultural use. As such, no further analysis of this issue is necessary.

6. Air Quality

The air quality study was prepared consistent with the methodology available from the South Coast Air Quality Management District and other air quality studies conducted in the City of Moreno Valley and the County of Riverside. This includes the use of the SCAQMD's look-up tables for determining localized impacts. At the time the air study was prepared, no rock blasting construction activities were planned, and therefore, were not analyzed in the air study. In addition, the site is expected to balance all grading quantities on-site and thus no additional air quality analysis of import or export of soil is required. As noted in the Air Quality report, consistency with the AQMP is determined by the fact that the project does not have a significant direct impact with respect to the adopted AQMD thresholds and therefore does not result in a cumulatively considerable impact. As such, the air quality study correctly finds that there would be less than significant impacts resulting from the project.

7. Biological Resources

Numerous comments received on the IS/MND suggest that impacts to biological resources resulting from the proposed project would be significant. The IS/MND included as technical appendices including both the project Biological Resources Assessment (BRA) dated August 2016 and the Determination of Biologically Equivalent or Superior Preservation (DBESP) dated September 2016. The BRA served as the biological technical study while the DBESP was included at the lead agency's request in order to provide more detailed and specific mitigation measures implemented for compliance with the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). These biological documents provided a thorough evaluation of existing conditions, impacts, and mitigation, proposed as part of the Ironwood Village residential development. The assessment of biological resources included the quantification of off-site impacts to streambeds. The streambed impact analysis assessed three (3) potential water line alignments (proposed and two alternatives) and one sewer alignment, while acknowledging that only one water line alignment would ultimately be selected for construction; therefore; the final acreage of actual impacts would be much less than that evaluated in the discussion (see Section 1.3, "Study Area Location" on page 7 of the BRA, and Section 6.3.2.2, "CDFW Jurisdiction" on page 69 of the BRA). Although COA BIO-2 on page 78 of the BRA requires the processing of regulatory permits from the U.S. Army Corps of Engineers, Regional Water Quality Control Board, and California Department of Fish and Wildlife (CDFW), the measure also includes specific mitigation ratios and habitat types required to adequately mitigate for the loss of jurisdictional streambeds to ensure no deferral of mitigation under CEQA. It should be noted that CDFW jurisdiction within the project study areas was found to be commensurate with the limits of MSHCP Riparian/Riverine Areas associated with the project, which is common. No other impacts to sensitive biological resources were identified within these off-site areas or anywhere else within the on or off-site disturbance areas.

Section 2.1, "Project Description," on page 7 of the BRA and Section 2.1, "Proposed Project," on page 11 of the DBESP, included an erroneous typo indicating that, "The 78.48-acre project site is a single-family residential development occupying approximately *38.5 acres*..." However, the BRA and DBESP accurately assessed existing conditions and proposed impacts to the correct development footprint of 68.5 acres which is evidenced on the corresponding study area maps and site plans, biological impact maps and tables. Therefore, no overestimation of open space or lack of appropriate assessments of biological resources occurred as part of the BRA or the DBESP. Impacts to biological resources in the DBESP were based on disturbance areas which would be presumed to be the same regardless of lot densities or other design features.

As documented in Section 6.2.6, "Consistency with Adopted Natural Community Conservation Plan," on page 73 of the BRA, the project study areas are not located within, or within vicinity to, MSHCP cells, designated cell groups, or a subunit within the Reche Canyon/Badlands Area Plan, and will not be subject to certain requirements outlined in Section 6.1.3 of the MSHCP associated with "Guidelines Pertaining to the Urban/Wildlands Interface." Section 6.2.6 of the BRA also indicated that the project study areas are not within the survey overlays for Criteria Area Species, Narrow Endemic Plant Species, Amphibian Species, or Mammal Species. The fact that the study areas are not within MSHCP conservation cells is further supported by entering the project APN (473-160-004) into the Riverside County Integrated Project (RCIP) MSHCP Summary Report Generator found online at http://rctlma.org/Online-Services/rcip-report-generator as well as Figure 5 of the project DBESP (Figure 5, Relationship to the MSHCP). Compliance with Section 6.1.2 of the MSHCP, is thoroughly documented in Section 5, "Assessment of Riparian/Riverine and Vernal Pool Resources," on pages 27-36 for existing MSHCP resource conditions and Section 7.3, "Mitigation for Direct Impacts to MSHCP Riverine Resources," on pages 45-57 for MSHCP resource impacts and mitigation. Focused surveys for burrowing owl required by the MSHCP were negative as documented in Section 6.3.1.2, "Special-status Wildlife Species," on page 66 of the BRA, while COA BIO-1 and MM BIO-2 on page 78 of the BRA require a 30-day pre-construction survey and outline measures to be taken in the event that burrowing owls are found, respectively.

Although no plant surveys were required by the MSHCP, the project proponent took the additional step of conducting plant surveys for plants potentially sensitive by CEQA standards. Based on Section 4.7.5, "Special-Status Plant Species," on page 43 of the BRA and Section 6.3.2.1, "Sensitive Plant Communities," on page 67 of the BRA, no special-status plants or sensitive vegetation communities, respectively, were determined to occur within the study areas based on focused plant surveys conducted in 2015 and 2016, and based on vegetation communities mapping conducted by ESA PCR as part of the BRA. Focused plant surveys for the easterly manufactured slope area located off-site were not completed prior to preparation of the BRA but will be completed in spring 2017 as documented. In addition, MM BIO-1, on page 77 of the BRA includes specific mitigation measures for Parry's spineflower and white-bracted spineflower in the event individual plants are found during the spring 2017 surveys. Riversidean sage scrub habitat mapped within the study areas does not warrant any special protections under the MSHCP or the California Environmental Quality Act.

8. Cultural Resources

Comments received from affected tribal groups and the California Native American Heritage Commission (NAHC) indicate that the City must provide evidence of formal consultation with tribal groups and also provide a discussion of Tribal Cultural Resources (TCRs), the requirement for which was recently enacted in late 2016. While the City has engaged in formal consultation with affected tribal groups in the area that requested such consultation, and has also worked with these tribal groups to revise proposed mitigation measures provided in the IS/MND regarding cultural resources, the determinations in the IS/MND regarding impacts to cultural resources found impacts to be less than significant with implementation of applicable mitigation measures. However, per the request of affected tribal groups and at the suggestion of the NAHC, the City will provide additional discussion of impacts to TCRs as well as revised mitigation based on input from the tribe(s), to be included in the Final IS/MND and associated Mitigation Monitoring and Reporting Program (MMRP). The Final IS/MND will also include documentation of the City's consultation efforts with the affected tribes, as requested by the NAHC.

9. Geology and Soils

A number of comments suggest that the IS/MND indicates that the site is not located within an earthquake fault zone and further suggest that there is no analysis of whether the existence of a feldspar vein would require modification of the recommendations in the geotechnical report (including blasting). It is the opinion of the project's engineering geologist that faulting and seismicity at the subject property have been adequately addressed in the referenced geotechnical reports prepared by EEI for the proposed project (included as Appendix D of the IS/MND). Those reports indicated that the closest active fault to the subject property is the San Jacinto Valley segment of the San Jacinto Fault Zone, located approximately 1.5 miles to the northeast. A review of the State of California Special Studies Zone map for the Sunnymead Quadrangle (CDMG, 1974) indicates that the project site is not located within a State of California Earthquake Fault Zone. Additionally, the subject property is not located within a designated County of Riverside Fault Zone (Riverside County, 2017). It is unclear which four faults ("Faults" "F", "G", "H" and "J") the comments are referring to based on a review of the Special Studies Zone map, regional geologic mapping (Morton, 2004), regional fault mapping (Jennings, 1994) and review of the County of Riverside website. Based on EEI's review, there are no mapped faults crossing the subject property or located offsite in the nearby vicinity. Additionally, no evidence of surface faulting was observed onsite during the geotechnical evaluations of the subject property. Based on the results of the geotechnical evaluations, the subject property is underlain by continuous, unbroken, massive Cretaceous age plutonic rocks composed of weathered tonalite partially covered by surficially alluvial and colluvial sediments which show no evidence of faulting on the subject property.

With regard to the feldspar vein, based on the results of EEI's geotechnical evaluations at the site, the tonalite bedrock at the site is generally moderately to highly weathered and should in general be rippable and excavatable with standard earth moving equipment with minimal difficulty. There are likely to be small areas/pockets of more resistant bedrock that may be encountered during grading, but this was not encountered during the subsurface investigation to a maximum depth of 50.5 feet below existing grade where drilling refusal was not encountered within the relatively soft, highly weathered tonalite bedrock. Based on the results of EEI's geotechnical evaluations at the site regarding the weathered character of the underlying tonalite bedrock, it appears that blasting during site grading for excavation purposes is unlikely. The feldspar vein was a surficial reference provided by Kane Geotechnical during field study for the Rockfall Investigation Report, the EEI Geotechnical Report is considered more exhaustive, with their subsurface explorations.

In addition, other comments suggest that the IS fails to consider hazards from site preparation work to include removal of oversized rock materials and the feldspar vein, as well as related rock fall hazards. The potential hazards due to rockfall were investigated by Kane Geotechnical and their methodology and recommendations were described in their corresponding report dated March 15, 2015. Kane concluded that the residences should not be affected and that no formal rockfall measures would be required. Rock fall hazards are discussed on pages B-79 and B-80 of the IS/MND with specific mitigation provided to address such hazards.

With regard to comments received that suggest that "a more complete geotechnical study needs to be done," as stated in Section 10.0 of the project geotechnical report (EEI, 2014) contained in Appendix D of the IS/MND, "Once detailed site and grading plans are available, they should be submitted to this office for review and comment, to reduce the potential for discrepancies between plans and the preliminary recommendations presented herein. If conditions are found to differ substantially from those stated, appropriate recommendations would be provided. Additional field studies may be warranted." As stated in Section 11.0 of the geotechnical report (EEI, 2014), "Site conditions, land use (both onsite and offsite), or other factors may change as a result of man-made influences, and additional work may be required with the passage of time." Additionally, EEI expects that site conditions remain essentially unchanged since performing the geotechnical evaluations at the site. Therefore, additional geotechnical evaluation of the project site is unwarranted at this time.

It is EEI's opinion that seismicity and faulting issues for the subject property and vicinity have been adequately addressed in the referenced geotechnical reports and associated discussion presented in the IS/MND. As such, no further analysis or response is warranted.

10. Greenhouse Gas Emissions

Comments received suggest, as for Air Quality impacts, that impacts regarding greenhouse gas emissions (GHG) are not adequately analyzed, but these comments provide no evidence to support this notion, other than speculation that the analysis did not assume worst-case conditions. However, the analysis of air quality and greenhouse gas emissions impacts are based on peak construction activities on-site, the phasing of which is summarized in Table III-1, *Construction Duration*, on page B-15 of the IS/MND, which shows overlapping activities associated with building construction and architectural coatings to represent a worst-case scenario. In addition, the analysis is considered conservative in that it assumes current emission rates over the course of construction activities, while in fact, emissions tend to decrease over time as equipment efficiency increases, which would result in lower emissions than stated in the IS/MND. However, the IS/MND analysis does not rely on any such future emission reductions but rather provides what is likely an overestimation of actual project-related GHG construction emissions. Thus, impacts were determined to be less than significant.

11. Hazards and Hazardous Materials

Some comments on the IS/MND suggest that the document did not adequately analyze potential wildfire hazards at the project site. However, to the contrary, the IS/MND discussed this issue in detail on pages B-92 and B-93 and provided mitigation to ensure that wildfire hazard impacts remain less than significant, with the preliminary

Fuel Modification Plan illustrated in Figure VIII-1, *Preliminary Fuel Modification Plan*. As concluded on page B-93, with implementation of a Fire Department-approved Fuel Modification Plan, impacts would be reduced to less than significant.

12. Hydrology and Water Quality

Various comments received claim that the analysis of hydrology/drainage, flooding, and water quality presented in the IS/MND and associated technical appendix (Appendix G of the IS/MND) is not adequate but do not offer any specific evidence to support this suggestion, only anecdotal statements regarding historic flooding in the area. The Preliminary Hydrology Study contained in Appendix G of the IS/MND provides all the technical information utilized to evaluate the project's impacts to hydrology and drainage, which prepared in accordance with the County of Riverside's accepted methodology; furthermore, the sizing and design of proposed project's stormwater facilities (including proposed on-site basins) are subject to review and approval by the County. The analysis presented in the IS/MND evaluates potential impacts both on- and off-site, and as concluded therein, stormwater flows to downstream areas in the post-development condition would be no greater than under existing conditions. As such, the project would provide on-site retention for all upstream flows entering the project site, as well as all flows generated on-site, such that downstream discharges would be no greater than under existing conditions. Thus, the project would not have the potential to result in increased potential for flooding, exceedances of the capacity of downstream stormwater conveyance facilities, or substantial erosion or siltation. With regard to mapped floodplains, per Flood Insurance Rate Maps (FIRMs) issued by FEMA, some comments suggested that a portion of the project site is located within a 100-year flood hazard area; however, per the applicable FIRMs for the project site (FIRM No. 06065C0755G and 06065C0760G), no portion of the property is located within a designated floodplain.

13. Land Use and Planning

A number of comments were submitted that suggest that the proposed project is not consistent with applicable land use plans, policies, and/or regulations including the City's General Plan and the County of Riverside MSHCP. Specifically, comments indicate that the project would not be consistent with Objective 2.1 in the Community Development Element of the General Plan, which suggests that future development "[b]alance the provision of urban and rural lands within Moreno Valley by providing adequate land for present and future urban and economic development needs, while retaining the significant natural features and the rural character and lifestyle of the northeastern portion of the community." The proposed project, contrary to the commenters' suggestion, would retain the most significant natural features on the project site, namely the existing rock outcroppings in the northwest portion of the site, and would provide a single-family residential community with varying densities on the balance of the site. While the overall density on the project site would be higher than in the existing adjacent residential neighborhoods, the increase in density would not affect the rural character and lifestyle in the surrounding area, as the proposed single-family development is not a substantial departure from the larger lot single-family development in the area. In any case, however, to the extent that a project is not fully consistent with any one adopted goal or policy of the General Plan, this does not necessarily constitute a significant impact on the environment under CEQA. Rather, should such an inconsistency result in significant adverse physical impacts, it may be construed to have a significant effect; however, as demonstrated by the various analyses presented in the IS/MND, the proposed project would not result in significant adverse environmental effects with implementation of applicable mitigation measures.

With regard to consistency with the MSHCP, please see the discussion above under Biological Resources.

14. Mineral Resources

Comments received suggest that the IS/MND does not adequately evaluate impacts to mineral resources due to the presence of a feldspar vein in the rock outcroppings in the northwest portion of the site. However, despite the potential presence of feldspar in the on-site geologic formations, this does not constitute a mineral resource that would be of value to the region and the residents of the state, or suggest that the project site be considered a locally important mineral resource recovery site. The project site is not delineated as locally important mineral resource recovery site in the City's General Plan or other land use plan, and no mineral recovery operations currently occur on-site or in the project vicinity that could be potentially affected by implementation of the proposed project. As such, no impact would occur in this regard and no further analysis or response is warranted.

15. Noise

The noise study was prepared consistent with the methodology of the Federal Highway Administration guidelines for noise analysis and other noise studies conducted in the City of Moreno Valley and the County of Riverside. This includes the use of the City of Moreno Valley Municipal Code noise level standards and the significance criteria identified in the noise study. Further, the construction noise analysis represents worst-case conditions with all construction equipment for a given phase of Project construction operating simultaneously from a single point closest to each sensitive receiver location. In reality, this scenario is unlikely to occur since the mobile equipment will traverse the site as it operates throughout the day. At the time the noise study was prepared, no rock blasting construction activities were planned, and therefore, were not analyzed in the noise study. In addition, the site is expected to balance and no additional noise analysis of import or export of soil is required. Therefore, using significance criteria consistent with other environmental documents in the City of Moreno Valley and the County of Riverside, and standard practices for traffic and construction noise analyses, the noise study found that the Project will result in less than significant impacts.

16. Population and Housing

Several comments submitted in response to the IS/MND state that the analysis did not evaluate the project's potential to result in substantial growth (please also see discussion above regarding growth inducement). However, as discussed on pages B-152 and B-153 of the IS/MND, the project-related population and housing growth would be within the growth projections for the City. While these projections are based on the anticipated growth anticipated in the City's General Plan, the proposed project would result in greater population and housing growth on the project site than that assumed in the SCAG projections. However, as is the case for any projects that request a General Plan Amendment and/or zone change that could result in additional development than allowable under the existing land use and zoning designations, the City decision makers must weigh the relative benefits of increasing development type and intensity on a project-by-project basis, and make a determination if the change is appropriate for the site. Nonetheless, the projected growth at the project site, irrespective of the allowable development under the existing R2 General Plan land use designation and RA2 zoning, would be well within the growth projections for the City and thus impacts were determined to be less than significant.

17. Public Services

Comments regarding public services indicate that the project would result in deficiencies in public service ratios and/or response times, but offer no evidence to support this claim. As discussed on pages B-153 through B-164, the proposed project would either provide on-site improvements or pay requisite developer fees to address project-related impacts of the proposed project on fire protection, police protection, schools, parks, and libraries. As further discussed therein, the project would result in less than significant impacts to these public services with implementation of applicable mitigation measures (fire and police protection) and/or payment of developer fees as required by the Moreno Valley Municipal Code and State law, as applicable.

18. Recreation

Comments received have suggested that the use of the project site by off-site residents for recreation translates to a loss of recreational facilities should the project be implemented. However, this is not what is required by CEQA as pertains to recreational facilities, and further, the use of the project site (which is private property) by local residents would be considered trespassing. As stated on page B-163 of the IS/MND, according to the City's Parks Department, Project implementation would not require the physical expansion of an existing park or new park facilities serving the Project site. Nonetheless, to further ensure impacts to parks would be less than significant, the Project applicant would be responsible for meeting the parkland dedication or fee requirements as required by the Quimby Act and Title 3, Revenue and Finance, Chapter 3.38, Residential Development Impact Fees, Section 3.38.080, Park Improvements Residential Development Impact Fees, Section 3.38.090, Community/Recreation Center Residential Development Impact Fees, and Chapter 3.40, Dedication of Land for Park Facilities and Payment of in-lieu fees, of the MVMC. Compliance would offset the incremental cost of the increased demand to maintain adequate park facilities and equipment, resulting from the Project by parkland dedication or payment of development fees per the MVMC. As such, impacts to recreation were determined to be less than significant in the IS/MND.

19. Transportation/Traffic

The Traffic Impact Analysis was prepared consistent with the City of Moreno Valley Transportation Engineering Division's Traffic Impact Analysis Preparation Guide and other traffic studies conducted in the City of Moreno Valley and the County of Riverside. The study area includes all the intersections for "Collector" or higher classification street where the proposed project will add 50 or more peak hour trips. The "50 peak hour trip" criteria is consistent with the methodology employed by City of Moreno Valley and other jurisdictions throughout Riverside County and generally represents a threshold of trips at which a typical intersection would have been impacted. A project's trip distribution does not necessarily correlate directly with the turning movement counts collected at a particular intersection on one day. The project trip distribution was developed based on interaction of proposed residential use with the commercial uses south of SR-60 and the project's location in relation to the SR-60 freeway. The project trip distribution was developed in consultation with and approved by the City staff and is appropriate for determining the project's impacts and mitigation measures. Project's potential impacts to traffic was assessed for Existing, Opening Year Cumulative (2020) and Horizon Year (2040) traffic conditions and improvements were recommended, where applicable, to maintain acceptable level of service.

The half-section improvements on site adjacent streets are consistent with the City of Moreno Valley General Plan Circulation Element and is typically required by the City for all development projects. The design feature (curve) on Ironwood Avenue is an existing off-site condition. As previously noted, the project contributes less than 50 peak hour trips to this roadway segment and would not have a significant impact on safety or operations of the roadway.

20. Utilities and Service Systems

Comments received on the IS/MND also indicate that impacts related to water and wastewater utilities would be significant, but offer no evidence to support this conclusion. As discussed on pages B-196 through B-200, the projected water and wastewater demands of the project would represent nominal quantities relative to the projected water supplies and wastewater treatment capacity of EMWD's facilities. It should also be noted that the proposed project does not trigger the requirement to prepare a formal assessment of water supply pursuant to SB221 or SB610. Furthermore, all project-related utility improvements would be subject to review and approval by EMWD to ensure that such improvements are consistent with EMWD's facility plans for the project area. Contrary to other comments received, the IS/MND evaluated all potential off-site improvements that were contemplated by EMWD to serve the project site at the time the IS/MND was prepared. EMWD will determine which of the potential alignments would be the preferred alignments and only those would actually be constructed. As such, to the extent that the IS/MND evaluated impacts associated with all potential pipeline alignments, but only a subset of those would be implemented to serve the project, the analysis of off-site impacts is considered conservative. In addition, it should be noted that all off-site improvements would be located underground and thus their implementation would only result in temporary physical impacts associated with construction activities, which would be carried out in the context of the overall project construction effort.

MITIGATION MONITORING AND REPORTING PROGRAM

This Mitigation Monitoring and Reporting Program (MMRP) has been prepared for the Ironwood Residential Project in compliance with Section 21081.6 of the Public Resources Code and Section 15097 of the CEQA *Guidelines*, which is required for all projects where an Environmental Impact Report or Mitigated Negative Declaration (MND) has been prepared. Section 21081.6 of the Public Resources Code sates: " …the [lead] agency shall adopt a reporting or monitoring program from the changes made to the project or conditions of project approval, adopted in order to mitigate or avoid significant effects on the environment…[and the program] shall be designed to ensure compliance during project implementation". The primary purpose of this MMRP is to ensure that the mitigation measures identified in the MND are implemented, thereby minimizing identified environmental effects. The City of Moreno Valley (City) is the Lead Agency for the proposed project.

The MMRP for the proposed project will be in place through all phases of project implementation. The City shall be responsible for administering the MMRP activities to its staff, other City departments (e.g., Fire Department), consultants, and/or contractors. The City will also ensure that mitigation monitoring is documented through reports and that deficiencies are promptly corrected. The designated environmental monitor (e.g., City building inspector, project contractor, certified professionals, etc., depending on the provisions specified below) will track and document compliance with mitigation measures, note any problems that may result, and take appropriate action to remedy problems. The MMRP lists mitigation measures according to the same numbering system contained in the MND sections. Each mitigation measure is categorized by topic, with an accompanying discussion of the following:

- The monitoring phase of the project during which the mitigation measure should be monitored (i.e., Operation, Construction, or Prior to Construction Activities);
- The monitoring frequency of the mitigation measures (i.e., during periodic field inspection); and
- The enforcement agency (i.e., the agency with the authority to enforce the mitigation measure).

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
Air Quality			
MM AQ-1 The Project shall comply with the provisions of South Coast Air Quality Management District Rule 403, "Fugitive Dust." Rule 403 requires implementation of best available dust control measures during construction activities that generate fugitive dust, such as earth moving, grading, and equipment travel on unpaved roads. Prior to grading permit issuance, the City of Moreno Valley shall verify that the following notes are specified on the grading plan. Project construction contractors shall be required to ensure compliance with the notes and permit periodic inspection of the construction site by City of Moreno Valley staff or its designee to confirm compliance. These notes shall also be specified in bid documents issued to prospective construction contractors. a) All clearing, grading, earth-moving, and excavation activities shall cease when winds exceed 25 miles per hour; b) During grading and ground-disturbing construction activities, the construction contractor shall ensure that all unpaved roads, active soil stockpiles, and areas undergoing active ground disturbance within the Project site are watered at least three (3) times daily during dry weather. Watering, with complete coverage of disturbed areas by water truck, sprinkler system, or other comparable means, shall occur in the mid-morning, afternoon, and after work is done for the day; c) Temporary signs shall be installed on the construction site along all unpaved roads indicating a maximum speed limit of 15 miles per hour (MPH). The signs shall be installed before construction activities commence and remain in place for the duration of construction activities that include vehicle activities on	Throughout Construction Activities	As needed during construction or in response to complaints	City of Moreno Valley

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
unpaved roads; and d) The cargo area of all vehicles hauling soil, sand, or other loose earth materials shall be covered.			
MM AQ-2 The Project shall comply with the provisions of South Coast Air Quality Management District Rule 1186 "PM10 Emissions from Paved and Unpaved Roads and Livestock Operations" and Rule 1186.1, "Less-Polluting Street Sweepers" by complying with the following requirements. To ensure and enforce compliance with these requirements and reduce the release of criteria pollutant emissions into the atmosphere during construction, prior to grading and building permit issuance, the City of Moreno Valley shall verify that the following notes are included on the grading and building plans. Project construction contractors shall be required to ensure compliance with the notes and permit periodic inspection of the construction site by City of Moreno Valley staff or its designee to confirm compliance. The notes also shall be specified in bid documents issued to prospective construction contractors. a) If visible dirt or accumulated dust is carried onto paved roads during construction, the contractor shall remove such dirt and dust at the end of each work day by street cleaning and b) Street sweepers shall be certified by the South Coast Air Quality Management District as meeting the Rule 1186 sweeper certification procedures and requirements for PM10-efficient sweepers. All street sweepers having a gross vehicle weight of 14,000 pounds or more shall be powered with alternative (non-diesel) fuel or otherwise comply with South Coast Air Quality	Throughout Construction Activities	As needed during construction or in response to complaints	City of Moreno Valley

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
Management District Rule 1186.1.			
MM AQ-3 The Project is required to comply with the provisions of South Coast Air Quality Management District Rule 402 "Nuisance." To ensure and enforce compliance with this requirement, which applies to the release of odorous emissions into the atmosphere, prior to the issuance of grading and building permits, the City of Moreno Valley shall verify that the following note is included on grading and building plans. During Project construction, contractors shall be required to ensure compliance with Rule 402 and permit periodic inspection of the construction site by the City of Moreno Valley staff or its designee to confirm compliance.	Throughout Construction Activities	As needed during construction or in response to complaints	City of Moreno Valley
Biological Resources			
Condition of Approval BIO-1 Due to the presence of suitable habitat and in compliance with the MSHCP, a pre-construction survey for burrowing owl is required within 30 days prior to ground disturbance to determine the presence of burrowing owls and avoid potential direct take of burrowing owls if present.	Within 30 days prior to site disturbance	Once within 30 days prior to site clearing activities; review survey results	City of Moreno Valley/ Resource Agency(ies)
MM BIO-1 Due to the presence of suitable habitat within the proposed off-site manufactured slope area located directly east of the Project boundary, a spring focused plant survey to determine the presence/absence of Parry's spineflower and white-bracted spineflower is required to be conducted during the appropriate blooming periods of the two species (between April and June) prior to ground disturbance. If individuals are found, significant impacts would occur as a result of implementation of the Project and unless mitigation is implemented to reduce impacts to less than significant. Mitigation includes seed collection of individuals	Prior to site disturbance	Once prior to site clearing activities	City of Moreno Valley/ Resource Agency(ies)

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
that would be significantly impacted by the Project at the end of the growing season and prior to ground disturbance. Collected seeds will be planted within an appropriate on-site or off-site mitigation area, which will be conserved as open space in perpetuity. Mitigation for significant impacts to Parry's spineflower and white-bracted spineflower will be implemented in consultation with the City of Moreno Valley and CDFW.			
MM BIO-2 If burrowing owls are determined present during the 30-day pre-construction survey, occupied burrows shall be avoided to the greatest extent feasible, following the guidelines in the Staff Report on Burrowing Owl Mitigation published by Department of Fish and Wildlife including, but not limited to, conducting pre-construction surveys, avoiding occupied burrows during the nesting and non-breeding seasons, implementing a worker awareness program, biological monitoring, establishing avoidance buffers, and flagging burrows for avoidance with visible markers. If occupied burrows cannot be avoided, acceptable methods may be used to exclude burrowing owl either temporarily or permanently, pursuant to a Burrowing Owl Exclusion Plan that shall be prepared and approved by the County of Riverside Environmental Programs Department (EPD), in coordination with the CDFW. The Burrowing Owl Exclusion Plan shall be prepared in accordance with the guidelines in the Staff Report on Burrowing Owl Mitigation and the MSHCP.	Prior to site disturbance; throughout site clearing, grading, and construction activities	Once prior to site clearing activities; as needed during grading and construction/ review Exclusion Plan	City of Moreno Valley/ Resource Agency(ies)
Condition of Approval BIO-2/MM BIO-3 Prior to the issuance of any grading permit for permanent impacts in the areas designated as jurisdictional features, the Project applicant shall obtain regulatory permits from the USACE, RWQCB, and CDFW. The following shall be incorporated into the permitting, subject to approval by the regulatory agencies:	Prior to issuance of grading permit	Once prior to issuance of grading permit; review agency permit(s)	City of Moreno Valley/ Resource Agency(ies)

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
1. On-site or off-site creation, restoration and/or enhancement of USACE/RWQCB jurisdictional "waters of the U.S." within the San Jacinto watershed at a ratio no less than 1:1 or within an adjacent watershed at a ratio no less than 2:1 for permanent impacts, and for any temporary impacts to restore the impact area to pre-Project conditions (i.e. pre-Project contours). Off-site mitigation may occur on land acquired for the purpose of in-perpetuity preservation as approved by the resource agencies, or through the purchase of mitigation credits at a resource agency-approved off-site mitigation bank or in-lieu fee program. 2. On-site or off-site creation, restoration, and/or enhancement of CDFW jurisdictional streambed within the San Jacinto watershed at a ratio no less than 1:1 or within an adjacent watershed at a ratio no less than 2:1 for permanent impacts, and for any temporary impacts to restore the impact area to pre-Project conditions (i.e. pre-Project contours). Off-site mitigation may occur on land acquired for the purpose of in-perpetuity preservation as approved by the resource agencies, or through the purchase of mitigation credits at a resource agency-approved off-site mitigation bank or in-lieu fee program. Purchase of any mitigation credits through an agency-approved mitigation bank or in-lieu fee program should occur prior to any impacts to jurisdictional drainages. Any mitigation proposed on land acquired for the purpose of in-perpetuity mitigation that is not part of an agency-approved mitigation bank or in-lieu fee program shall include the creation, restoration, and/or enhancement of similar streambed habitat pursuant to a resource agency-approved Habitat Mitigation and Monitoring Plan (HMMP). The HMMP shall be prepared prior to any impacts to jurisdictional features, and shall provide details as to the implementation of the			

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
mitigation, maintenance, and future monitoring of mitigation areas. The goal of the mitigation shall be to create, restore, and/or enhance similar habitat with equal or greater function and value than the impacted habitat.			
MM BIO-4 Prior to the issuance of any grading permit that would remove potentially suitable nesting habitat for raptors or songbirds, the Project applicant shall demonstrate to the satisfaction of the City of Moreno Valley that either of the following have been or will be accomplished: 1. Vegetation removal activities shall be scheduled outside the nesting season (September 1 to February 14 for songbirds; September 1 to January 14 for raptors) to avoid potential impacts to nesting birds. 2. Any construction activities that occur during the nesting season (February 15 to August 31 for songbirds; January 15 to August 31 for raptors) will require that all suitable habitat be thoroughly surveyed for the presence of nesting birds by a qualified biologist before commencement of clearing. If any active nests are detected a buffer of 300 feet (500 feet for raptors) around the nest adjacent to construction will be delineated, flagged, and avoided until the nesting cycle is complete. The buffer may be modified and/or other recommendations proposed as determined appropriate by the biological monitor to minimize impacts.	Prior to issuance of grading permit; throughout grading and construction where vegetation removal would occur	Once prior to issuance of grading permit; as needed during site clearing, grading, or construction activities	City of Moreno Valley/ Resource Agency(ies)
Condition of Approval BIO-3 Prior to the issuance of any grading permit the Project applicant shall comply with all of the provisions of the MSHCP, including payment of the MSHCP Local Development Mitigation Fee, compliance with Section 6.1.2 of the MSHCP pertaining to Riparian/Riverine Areas, implementation of drainage, toxics and non-native species guidelines pertaining to the	Prior to issuance of grading permit	Once prior to issuance of grading permit; confirmation of fee payment	City of Moreno Valley/ Resource Agency(ies)

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
Urban/Wildlands Interface in Section 6.1.4 of the MSHCP, and compliance with Section 6.3.2 of the MSHCP pertaining to Burrowing Owl Survey Area requirements. Compliance with Section 6.1.2 of the MSHCP will require approval of the project Determination of Biologically Equivalent or Superior Preservation (DBESP) analysis outlining the impacts and proposed compensatory mitigation for impacts to the Riparian/Riverine Areas for approval by the wildlife agencies prior to issuance of a grading permit. The DBESP will be submitted to the wildlife agencies concurrent to the processing of regulatory permits for jurisdictional streambed impacts, in order to ensure that mitigation requirements proposed under the DBESP are commensurate with the preferences of the resource agencies (USACE, CDFW, and RWQCB) as part of subsequent regulatory permit conditions to be issued following adoption of the project MND.			
Cultural Resources			
MM CULT 1: Archaeologist Retained/CRMP Prepared. Prior to the issuance of a grading permit, the Project Applicant shall provide evidence to the City of Moreno Valley that a professional archaeological monitor has been retained by the Applicant to conduct monitoring of all mass grading and trenching activities and that the monitor has the authority to temporarily halt and redirect earthmoving activities in the event that suspected archaeological resources are unearthed during Project construction. The Project archaeologist, in coordination with the Consulting Tribes that have requested monitoring, shall prepare a Cultural Resources Monitoring Plan (CRMP) to document protocols for inadvertent finds, to determine potential protection measures from further damage and destruction for any identified archaeological resource(s)/ tribal cultural resources (TCRs), outline the process for monitoring and for completion of the final Phase IV Monitoring Report. If any archaeological and/or TCRs are identified during monitoring, these will also	Prior to issuance of grading permit; throughout ground disturbing activities	Once prior to grading activities; as needed during grading and construction activities	City of Moreno Valley and Consulting Tribe(s)

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
be documented and addressed per standard archaeological protocols in the Phase IV report, with the exception of human remains which will be addressed per MM CULT-13. The Project Archaeologist shall attend the pre-grading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.			
MM CULT 2: Tribal Monitor Retained. At least 30 days prior to the issuance of a Grading permit the Applicant shall contact the consulting Tribe(s) that have requested monitoring, to develop Monitoring Agreement(s) for all mass grading and trenching activities and shall provide evidence of the agreement to the City of Moreno Valley. The Tribal representative(s) shall attend the pre-grading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.	At least 30 days prior to issuance of grading permit	Once at least 30 days prior to prior to grading activities	City of Moreno Valley and Consulting Tribe(s)
MM CULT 3: Grading Plans. Prior to grading permit issuance, the City shall verify that the following note is included on the Grading Plan: "If any suspected archaeological resources are discovered during ground-disturbing activities and the archaeological monitor or Tribal representatives are not present, the construction supervisor is obligated to halt work in a 100-foot radius around the find and call the project archaeologist and the Tribal representatives to the site to assess the significance of the find."	Prior to issuance of grading permit	Once at plan check/review of grading plans	City of Moreno Valley
MM CULT 4: Preservation Plan for CA-RIV-12,333. Prior to building permit issuance, the Project Applicant and the Consulting Tribe(s) shall prepare a Preservation and Maintenance Plan for the long-term care and maintenance of CA-RIV-12,333 and, if any, all new features identified during mass grading activities. The Plan shall indicate, at a minimum, the specific areas to be included in and	Prior to issuance of building permit	Prior to issuance of building permit/ review of Preservation and Maintenance Plan	City of Moreno Valley and Consulting Tribe(s)

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
excluded from long-term maintenance; prohibited activities; methods of preservation to be employed (fencing, vegetative deterrence, etc.); the entity(s) responsible for the long-term maintenance; maintenance scheduling and notification; appropriate avoidance protocols; monitoring by the Tribe and compensation for services if applicable; and necessary emergency protocols. The Project Applicant/Landowner shall submit a fully executed copy of the Preservation and Maintenance Plan to the City to ensure compliance with this mitigation measure.			
MM CULT 5: Conduct Archaeological Sensitivity Training for Construction Personnel. The Applicant shall retain a qualified professional archaeologist who shall conduct an Archaeological Sensitivity Training for construction personnel prior to commencement of excavation activities, along with representatives from Tribes that have requested monitoring. The training session, shall be carried out by a cultural resources professional with expertise in archaeology, will focus on how to identify archaeological/cultural resources that may be encountered during earthmoving activities, and the procedures to be followed in such an event. The training session will include a Power Point presentation and/or handouts for all attendees. The basic topics to be addressed in the session include: a brief cultural and archaeological history of the area and the Applicant's and City's cultural resource compliance obligations; training in potential resources that may be encountered through the use of photographs or other illustrations; the duties of archaeological monitors; notification and other procedures to follow upon discovery of resources; and, the general steps that would be followed to conduct a salvage investigation if one is necessary. A sign-in sheet shall be compiled to track attendance and shall be submitted to the City with the Archaeological Monitoring Report.	Prior to grading and construction activities; as needed during site ground disturbing activities	Once prior to grading and construction activities; as needed during site ground disturbing activities	City of Moreno Valley and Consulting Tribe(s)

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
MM CULT 6: Monitor Construction Excavations for Archeological Resources in Younger Alluvial Sediments. The Applicant shall retain a qualified archaeological monitor, who will work under the direction and guidance of a qualified professional archaeologist. The archaeological monitor shall be present during all construction excavations (e.g., grading, trenching, or clearing/grubbing) into non-fill younger Pleistocene alluvial sediments. Multiple earth-moving construction activities may require multiple archaeological monitors. The frequency of monitoring shall be based on the rate of excavation and grading activities, proximity to known archaeological resources, the materials being excavated (native versus artificial fill soils), and the depth of excavation, and if found, the abundance and type of archaeological resources encountered. Full-time monitoring can be reduced to part-time inspections, or ceased entirely, if determined adequate by the Project archaeologist.	Prior to grading activities; throughout site ground disturbing activities	Once prior to grading activities; as needed throughout site ground disturbing activities	City of Moreno Valley and Consulting Tribe(s)
MM CULT 7: Inadvertent Finds. If, during mass grading and trenching activities, the Archaeologist or Tribal representatives/monitors suspect that an archaeological resource and/or TCR may have been unearthed, the monitor identifying the potential resources, in consultation with the other monitor as appropriate, shall immediately halt and redirect grading operations in a 100-foot radius around the find to allow identification and evaluation of the suspected resource. The Native American monitor(s) or appropriate representative(s) and the archaeological monitor shall evaluate the suspected resource and make a determination of significance pursuant to California Public Resources Code Section 21083.2. The archaeological monitor and tribal monitor(s) or appropriate representative(s), the Project Applicant, and the City Planning Division shall confer regarding mitigation of the discovered resource(s). All sacred sites, should they be encountered within the project area, shall be avoided and preserved as the preferred mitigation, if feasible. If preservation in place is not feasible, steps for treatment	Throughout site ground disturbing activities	As needed during site ground disturbing activities	City of Moreno Valley and Consulting Tribe(s)

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
and disposition shall be carried out in accordance as set forth in per MM CULT-9.			
MM CULT 8: Final Phase IV Monitoring Report. Prior to building permit issuance, the Project archaeologist shall prepare a final Phase IV Monitoring Report as outlined in the CRMP, which shall be submitted to the City Planning Division, the appropriate Native American tribe(s), and the Eastern Information Center at the University of California, Riverside. The report shall document project impacts to CA-RIV-857, CA-RIV-3159 and CA-RIV-3341, including the relocation area and protection measures taken for CA-RIV-3341.	Prior to issuance of building permit	Once prior to issuance of building permit/ review of Phase IV Report	City of Moreno Valley and Consulting Tribe(s)
MM CULT 9: Treatment and Disposition of Discoveries. In the event that Native American cultural resources are inadvertently discovered during the course of grading for this Project. The following procedures will be carried out for treatment and disposition of the discoveries: 1. **Treatment and Final Disposition**: The landowner(s) shall relinquish ownership of all cultural resources, including sacred items, burial goods, and all archaeological artifacts and non-human remains as part of the required mitigation for impacts to cultural resources. The applicant shall relinquish the artifacts through one or more of the following methods and provide the City of Moreno Valley Planning Department with evidence of same: a. Accommodate the process for Preservation In Place/Onsite reburial of the discovered items with the consulting Native American tribes or bands. This shall include measures and provisions to protect the future reburial area from any future impacts. Reburial shall not occur until all cataloguing and basic recordation have been	Throughout site ground disturbing activities	As needed during site ground disturbing activities	City of Moreno Valley and Consulting Tribe(s)

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
completed; b. A curation agreement with an appropriate qualified repository within Riverside County that meets federal standards per 36 CFR Part 79 and therefore would be professionally curated and made available to other archaeologists/researchers for further study. The collections and associated records shall be transferred, including title, to an appropriate curation facility within Riverside County, to be accompanied by payment of the fees necessary for permanent curation: c. For purposes of conflict resolution, if more than one Native American tribe or band is involved with the project and cannot come to an agreement as to the disposition of cultural materials, they shall be curated at the Western Science Center by default.			
MM CULT 10: Conduct Paleontological Sensitivity Training for Construction Personnel. The Applicant shall retain a qualified paleontologist who shall conduct a Paleontological Sensitivity Training for construction personnel prior to commencement of excavation activities. The training session, shall be carried out by a cultural resources professional with expertise in paleontology, will focus on how to identify paleontological resources that may be encountered during earthmoving activities, and the procedures to be followed in such an event. The training session will include a Power Point presentation and/or handouts for all attendees. The basic topics to be addressed in the session include: a brief cultural and geologic history of the area and the City cultural resource compliance obligations; training in potential resources that may be encountered through the use of photographs or other illustrations; the duties of paleontological monitors;	Prior to grading activities; throughout site ground disturbing activities	Once prior to grading activities; as needed throughout site ground disturbing activities	City of Moreno Valley

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
notification and other procedures to follow upon discovery of resources; and, the general steps that would be followed to conduct a salvage investigation if one is necessary.			
MM CULT 11: Monitor Construction Excavations for Paleontological Resources in Older Pleistocene Alluvial Deposits. The Applicant shall retain a qualified paleontological monitor, who will work under the guidance and direction of a qualified professional paleontologist. The paleontological monitor shall be present during all construction excavations (e.g., grading, trenching, or clearing/grubbing) into non-fill older Pleistocene alluvial deposits. Multiple earth-moving construction activities may require multiple paleontological monitors. The frequency of monitoring shall be based on the rate of excavation and grading activities, proximity to known paleontological resources and/or unique geological features, the materials being excavated (native versus artificial fill soils), and the depth of excavation, and if found, the abundance and type of paleontological resources and/or unique geological features encountered. Full-time monitoring can be reduced to part-time inspections if determined adequate by the qualified professional paleontologist.	Throughout site ground disturbing activities	As needed during site ground disturbing activities	City of Moreno Valley
MM CULT 12: Cease Ground-Disturbing Activities and Implement Treatment Plan if Paleontological Resources Are Encountered. In the event that paleontological resources and or unique geological features are unearthed during ground-disturbing activities, ground-disturbing activities shall be halted or diverted away from the vicinity of the find so that the find can be evaluated. A buffer area of at least 25 feet shall be established around the find where construction activities shall not be allowed to continue. Work shall be allowed to continue outside of the buffer area. The Applicant and City shall coordinate with a qualified professional paleontologist to develop an appropriate treatment plan for	Throughout site ground disturbing activities	As needed during site ground disturbing activities	City of Moreno Valley

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
the resources. Treatment may include implementation of paleontological salvage excavations to remove the resource along with subsequent laboratory processing and analysis or preservation in place. At the paleontologist's discretion and to reduce any construction delay, the grading and excavation contractor shall assist in removing rock samples for initial processing. Any fossils encountered and recovered shall be prepared to the point of taxonomic identification and catalogued and curated to a suitable museum or other repository with a research interest in the materials, such as the San Bernardino County Museum or Western Science Center. If no institution accepts the fossil collection, they shall be donated to a local school in the area for educational purposes. Accompanying notes, maps, and photographs shall also be filed at the repository and/or school.			
MM CULT 13: Cease Ground-Disturbing Activities and Notify County Coroner If Human Remains Are Encountered. If human remains are unearthed during implementation of the Proposed Project, the City shall comply with State Health and Safety Code Section 7050.5. The City shall immediately notify the County Coroner and no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to PRC Section 5097.98. If the remains are determined to be of Native American descent, the coroner has 24 hours to notify the Native American Heritage Commission (NAHC). The NAHC shall then identify the person(s) thought to be the Most Likely Descendent (MLD). The MLD may, with the permission of the landowner, inspect the site of the discovery of the Native American remains and may recommend to the landowner means for treating or disposing, with appropriate dignity, the human remains and any associated funerary objects. The MLD shall complete their inspection and make their recommendation within 48 hours of being granted access by the landowner to inspect the discovery. The recommendation may include the scientific removal and nondestructive analysis of human remains and cultural items	Throughout site ground disturbing activities	As needed during site ground disturbing activities	City of Moreno Valley and Consulting Tribe(s)

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
associated with Native American burials. Upon the discovery of the Native American remains, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located, is not damaged or disturbed by further development activity until the landowner has discussed and conferred, as prescribed in this mitigation measure, with the MLD regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. The landowner shall discuss and confer with the descendants all reasonable options regarding the descendants' preferences for treatment. MLDs in the region typically recommend reburial of the remains as close to the original burial location as feasible accompanied by a ceremony. The MLD shall file a record of the reburial with the NAHC and the Project archaeologist shall file a record of the reburial with the CHRIS-EIC. If the NAHC is unable to identify a MLD, or the MLD identified fails to make a recommendation, or the landowner rejects the recommendation of the MLD and the mediation provided for in Subdivision (k) of Section 5097.94, if invoked, fails to provide measures acceptable to the landowner, the landowner or his or her authorized representative shall inter the human remains and items associated with Native American human remains with appropriate dignity on the facility property in a location not subject to further and future subsurface disturbance. A record of the reburial shall be filed with the NAHC and the CHRIS-EIC.			
Geology and Soils			
MM GEO-1: Site-specific structural and seismic design parameters and recommendations for foundations, retaining walls/shoring, and excavation shall be implemented per the Project's Preliminary Geotechnical Evaluation and the	Prior to issuance of grading permit; foundation and building	Plan check; on-site inspection.	City of Moreno Valley

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
Supplemental Geotechnical Evaluation, subject to review and approval by the City of Moreno Valley Building Safety Department.	construction		
Project Design Feature-GEO-1: The Project applicant would construct reinforced concrete or block privacy walls on Lots 36, 37, 38, 39, and 40 to provide supplementary protection and to prevent small, nuisance rockfall from accumulating in proposed residential areas.	Prior to issuance of Certificate of Occupancy	Plan check; on-site inspection.	City of Moreno Valley
Hazards and Hazardous Materials			
MM HAZ-1: The Project applicant shall implement a Project-specific Fuel Modification Plan based on the *General Guidelines for Creating Defensible Space* prepared by the California Department of Forestry and Fire Protection (2006). The Fuel Modification Plan shall be subject to review and approval by the Moreno Valley Fire Department.	Prior to issuance of grading permit	Plan check; approval of Fuel Modification Plan	Moreno Valley Fire Department
Noise			
MM NOISE-1: Prior to approval of the grading plans and/or issuance of building permits, plans shall include a note indicating that noise-generating Project construction activities shall only occur between the hours of 7:00 AM and 7:00 PM, Monday through Friday, excluding holidays, and from 8:00 AM and 4:00 PM on Saturday, unless written approval is obtained from the City's building official or city engineer. The Project construction supervisor shall ensure compliance with the note and the City shall conduct periodic inspection at its discretion.	Prior to issuance of grading permit; Throughout construction activities	Plan check/construction bid documents; As needed during construction or in response to complaints	City of Moreno Valley

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
MM NOISE-2: The Project applicant shall install temporary noise control barriers that provide a minimum noise level attenuation of 10 dBA when Project construction occurs near existing noise-sensitive structures. The noise control barrier must present a solid face from top to bottom. The noise control barrier must be designed with appropriate height and length to block the view of the noise source. Unnecessary openings shall not be made. The noise barrier may be constructed using an acoustical blanket (e.g. vinyl acoustic curtains or quilted blankets) attached to the construction site perimeter fence or equivalent temporary fence posts. The noise barriers must be maintained and any damage promptly repaired. Gaps, holes, or weaknesses in the barrier or openings between the barrier and the ground shall be promptly repaired. The noise control barriers and associated elements shall be completely removed and the site appropriately restored upon the conclusion of the construction activity.	Throughout construction activities	As needed during construction or in response to complaints	City of Moreno Valley
MM NOISE-3: During all Project site construction, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise sensitive receptors nearest the Project site.	Throughout construction activities	As needed during construction or in response to complaints	City of Moreno Valley
MM NOISE-4: The construction contractor shall locate equipment staging in areas that would create the greatest distance between construction-related noise sources and noise-sensitive receivers nearest the Project site (i.e., to the northern	Throughout construction activities	As needed during construction or in response to complaints	City of Moreno Valley

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
center) during all Project construction.			
MM NOISE-5: The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment (between the hours of 7:00 AM and 7:00 PM, Monday through Friday, excluding holidays, and from 8:00 AM and 4:00 PM on Saturday, unless written approval is obtained from the City's building official or city engineer). The contractor shall design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.	Throughout construction activities	As needed during construction or in response to complaints	City of Moreno Valley
MM NOISE-6: <u>Exterior Noise Mitigation</u>: The Project applicant shall construct 4-foot high noise barriers for the outdoor living areas (backyards) of residential lots 26 to 30. The recommended noise control barriers shall be constructed so that the top of each wall extends to the recommended height above the pad elevation of the lit it is shielding. When the road is elevated above the pad elevation, the barrier shall extend to the recommended height above the highest point between the residential home and the road. The barriers shall provide a weight of at least 4 pounds per square foot of face area with no decorative cutouts or line-of-sight openings between shielded areas and the roadways. The noise barrier shall be constructed using one of the following materials: masonry block; stucco veneer over wood framing (or foam core), or 1-inch thick tongue and groove wood of sufficient weight per square foot; glass (1/4-inch thick), or other transparent material with sufficient weight per square feet; earthen berm; or any combination of these construction materials. The barrier must present a solid face from top to bottom. Unnecessary openings or decorative cutouts shall not be made. All gaps (except for weep holes) shall be filled with grout or caulking.	Prior to Certificate of Occupancy	Plan check; on-site inspection	City of Moreno Valley

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
MM NOISE-7: Interior Noise Mitigation: The Project applicant shall provide the following or equivalent measures: Windows: All windows and sliding glass doors shall be well fitted with well weather-stripped assemblies and a minimum STC rating of 27. Doors: All exterior doors shall be well weather-stripped solid core assemblies at least 1 ¾-inch thick. Roof: Roof sheathing of wood construction shall be well fitted or caulked plywood of at ½-inch thick. Ceilings shall be well fitted, well-sealed gypsum board of at least ½-inch thick. Attic: Attic vents shall be oriented away from Ironwood Avenue. If such an orientation cannot be avoided, then an acoustical baffle shall be placed in the attic space behind the vents. Insulation with at least a rating of R-19 shall be used in the attic space. Ventilation: When any habitable room is in use, arrangements shall be such that circulated air is received when any exterior door(s) or window(s) are closed. A forced air circulation system (e.g. air conditions) or active ventilation system (e.g. fresh air supply) shall be provided which satisfies the requirements of the Uniform Building Code.	Prior to Certificate of Occupancy	Plan check; on-site inspection	City of Moreno Valley
Public Services			
MM PS-1: Construction Traffic Management Plan - A Construction Traffic Management Plan shall be developed by the Project contractor in consultation with	Prior to issuance of grading or building permit; throughout	Prior to construction activities; As needed during construction	City of Moreno Valley

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
the Project's traffic and/or civil engineer and approved by the City of Moreno Valley Department of Public Works prior to issuance of any Project demolition, grading or excavation permit. The Construction Traffic Management Plan shall also be reviewed and approved by the MVFD. The City of Moreno Valley Department of Public Works reserves the right to reject any engineer at any time and to require that the Plan be prepared by a different engineer. The construction management plan shall include, at a minimum, the following: ▪ The name and telephone number of a contact person who can be reached 24 hours a day regarding construction traffic complaints or emergency situations; ▪ An up-to-date list of local police, fire, and emergency response organizations and procedures for the continuous coordination of construction activity, potential delays, and any alerts related to unanticipated road conditions or delays, with local police, fire, and emergency response agencies. Coordination shall include the assessment of any alternative access routes that might be required through the site, and maps showing access to and within the site and to adjacent properties; ▪ Procedures for the training and certification of the flag persons used in implementation of the Construction Traffic Management Plan; ▪ The location, times, and estimated duration of any roadway closures, traffic detours, use of protective devices, warning signs, and staging or queuing areas; ▪ Identify the locations of the off-site truck parking and staging and provide measures to ensure that trucks use the specified haul route, and do not travel through nearby residential neighborhoods or schools;	construction		

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
▪ Schedule vehicle movements to ensure that there are no vehicles waiting off-site and impeding public traffic flow on surrounding streets; ▪ Establish requirements for loading/unloading and storage of materials on the Project site; ▪ During construction activities when construction worker parking cannot be accommodated on the Project site, a Construction Worker Parking Plan shall be prepared which identifies alternate parking location(s) for construction workers and the method of transportation to and from the Project site (if beyond walking distance) for approval by the City of Moreno Valley. The Construction Worker Parking Plan shall prohibit construction worker parking on residential streets and prohibit on-street parking, except as approved by the City.			
Transportation/Traffic			
Condition of Approval TRAF-1 : As recommended by the project's traffic consultant, prior to project occupancy, three potential speed hump locations have been proposed along Street "A". Final speed hump locations to be reviewed and approved by the City's Traffic Engineer. Further, prior to project occupancy, potential all-way stop locations, to be determined if warranted by the City's Traffic Engineer, have also been recommended in three locations along Street "A".	Prior to Certificate of Occupancy	Plan check; on-site inspection	City of Moreno Valley
MM TRAF-1: The Project applicant shall participate in the funding of off-site improvements, including traffic signals that are needed to serve cumulative traffic conditions through the payment of TUMF and City DIF fees (if the improvements are included in the TUMF or DIF programs) or on a fair share basis (if the improvements are not included in the TUMF or DIF programs). These fees shall be	Prior to Certificate of Occupancy	Review Proof of Fee Payment	City of Moreno Valley

Mitigation Monitoring and Reporting Program

Mitigation Measure	Monitoring Phase	Monitoring Frequency	Enforcement Agency
collected by the City, with the proceeds solely used as part of a funding mechanism used to ensure that regional highways and arterial expansions keep pace with the projected population increases.			

Source: ESA PCR, 2017

This may affect your property

Notice of
PUBLIC HEARING

Notice is hereby given that a Public Hearing will be held by the Planning Commission of the City of Moreno Valley on the following item(s):

Project: PEN16-0077 (PA15-0037, General Plan Amendment), PEN16-0078 (PA15-0038, Change of Zone), PEN16-0079 (PA15-0039, Tentative Tract Map 37001), PEN16-0080 (PA15-0040, Plot Plan for Design Guidelines) and PEN16-0081 (P15-087, Expanded Environmental Review/Initial Study)

Applicant: Global Investment & Development LLC

Owner: Ironwood 8 Properties LP

Representative: Anderson Consulting Engineers, Inc.

A.P. No(s): 473-160-004

Location: Ironwood Avenue, east of Nason Street and west of Oliver Street

Proposal: The project proposes to develop a 181 lot single-family residential development on approximately 68.5 net acres. Lot sizes for the proposed single-family homes would range from a minimum of 7,200 square feet to over 17,200 square feet with an average lot size of approximately 9,260 square feet. The proposed General Plan Amendment will change the existing land use designation from Residential 2 (R2) to Residential 3 (R3) and Residential 5 (R5). The proposed Change of Zone will change the underlying zoning from Residential Agriculture 2 (RA2) to Residential 3 (R3) and Residential 5 (R5). The existing approximately 10.3 acres of Hillside Residential (HR) in the northwest corner of the site will remain as open space. The Design Guidelines include site development regulations in order to provide cohesive design throughout the Ironwood Village Project. The proposed Project is intended to encourage a range of housing alternatives with a variety of lot sizes intermixed with trails, a park, open space areas and water quality features.

Council District: 2

Environmental Determination: Mitigated Negative Declaration. The City of Moreno Valley has reviewed the above project in accordance with California Environmental

Quality Act (CEQA) Guidelines Section 15070 and has determined that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because mitigation measures have been required of the project that will reduce potential impacts to a less than significant level. The 30-day public review period commenced on November 15, 2016 and concluded on December 14, 2016. The MND was mailed to interested parties, public agencies and to the State Clearinghouse (#2016111039). The public comments received have been considered fully in preparing the final MND. Any public agency which commented on the MND has been notified in writing of the scheduled public hearing on the project.

A public hearing before the Planning Commission has been scheduled for the proposed project. Any person interested in commenting on the proposal and recommended environmental determination may speak at the hearing or provide written testimony at or prior to the hearing. The project application, supporting plans and environmental documents may be inspected at the Community Development Department at 14177 Frederick Street, Moreno Valley, California during normal business hours (7:30 a.m. to 5:30 p.m., Monday through Thursday 7:30 a.m. to 4:30 p.m., Friday), or you may telephone (951) 413-3206 for further information.

The Planning Commission, at the Hearing or during deliberations, could approve changes or alternatives to the proposal. If you challenge any of these items in court, you may be limited to raising only those items you or someone else raised at the Public Hearing described in this notice or in written correspondence delivered to the Planning Commission at, or prior to, the Public Hearing.

See reverse side for site map

LOCATION N ↑

PLANNING COMMISSION HEARING

City Council Chamber, City Hall
14177 Frederick Street
Moreno Valley, Calif. 92553

DATE AND TIME: January 26, 2017 at 7 PM
CONTACT PLANNER: Claudia Manrique
PHONE: (951) 413-3225

Upon request and in compliance with the Americans with Disabilities Act of 1990, any person with a disability who requires a modification or accommodation in order to participate in a meeting should direct such request to Guy Pegan, ADA Coordinator, at 951.413.3120 at least 48 hours before the meeting. The 48-hour notification will enable the City to make reasonable arrangements to ensure accessibility to this meeting.

PLANNING COMMISSION RESOLUTION NO. 2017-05

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY RECOMMENDING THAT THE CITY COUNCIL APPROVE APPLICATION NO. PEN16-0077 (PA15-0037): AN AMENDMENT TO THE GENERAL PLAN LAND USE MAP, CHANGING THE LAND USE DESIGNATION FROM RESIDENTIAL 2 (R2) TO RESIDENTIAL 3 (R3), RESIDENTIAL 5 (R5) AND HILLSIDE RESIDENTIAL (HR) AND AMENDING GENERAL PLAN FIGURE 4-2 FUTURE PARKLAND ACQUISTION MAP AND GENERAL PLAN FIGURE 4-3 MASTER PLAN OF TRAILS IN THE PARKS, RECREATION AND OPEN SPACE ELEMENT INVOLVING AN APPROXIMATELY 78.4 ACRES PARCEL LOCATED AT THE NORTHEAST CORNER OF NASON STREET AND IRONWOOD AVENUE.

WHEREAS, the applicant, Global Investment & Development LLC, filed Application No. PEN16-0077 (PA15-0037), requesting an amendment to the Moreno Valley General Plan, as described in the title of this Resolution and the attached Exhibit A, Exhibit B and Exhibit C; and

WHEREAS, the application has been evaluated in accordance with established City of Moreno Valley (City) procedures, and with consideration of the General Plan and other applicable regulations; and

WHEREAS, the City has prepared an Initial Study and Mitigated Negative Declaration consistent with the California Environmental Quality Act (CEQA) based on a thorough analysis of potential environmental impacts; and

WHEREAS, upon completion of a thorough development review process the project was appropriately agendized and noticed for a public hearing before the Planning Commission of the City of Moreno Valley (Planning Commission); and

WHEREAS, the public hearing notice for this project was published in the local newspaper on January 15, 2017. Public notice was sent to all property owners of record within 300 feet of the project site on January 13, 2017. The public hearing notice for this project was also posted on the project site on January 13, 2017;

WHEREAS, on January 26, 2017, the Planning Commission held a public hearing to consider the application; and

WHEREAS, all legal prerequisites to the adoption of this Resolution have occurred; and

WHEREAS, pursuant to Government Code Section 66020(d)(1), **NOTICE IS HEREBY GIVEN** that this project is subject to certain fees, dedications, reservations and other exactions as provided herein.

NOW, THEREFORE, BE IT RESOLVED, it is hereby found, determined and resolved by the Planning Commission as follows:

A. This Planning Commission hereby specifically finds that all of the facts set forth above in this Resolution are true and correct.

B. Based upon substantial evidence presented to this Planning Commission during the above-referenced meeting on January 26, 2017, including written and oral staff reports, public testimony and the record from the public hearing, this Planning Commission hereby specifically finds as follows:

1. **Conformance with General Plan Policies –** The proposed general plan amendment and zone change are consistent with the General Plan, and its goals, objectives, policies and programs.

   FACT: The project proposes development of a 181 lot single family tract (TTM 37001) on an approximately 78 acres parcel (APN: 473-160-004). The General Plan land use designations for the project site are Hillside Residential (HR), Residential 3 (R3), and Residential 5 (R5). No development will occur within the Hillside Residential (HR) portion of the site. All development related to the apartments will occur within the R30 portion of the property.

   The project is consistent with General Plan policies and objectives. General Plan Policy 2.2.2 states that the primary purpose of areas designated Hillside Residential (HR) is to balance the preservation of hillside areas with the development of view-oriented residential uses. General Plan Policy 2.2.2.c goes on to require development in the Hillside Residential (HR) designation to maximize preservation of natural hillside contours, vegetation and other characteristics. The proposed Hillside Residential (HR) portion of the site provides for conservation of the steeper slopes more so than afforded by the existing Residential 2 (R2) General Plan designation and the related TTM 37001 will have no development occurring within the Hillside Residential (HR) portion of the site.

   General Plan Policy 2.2.6 states that the primary purpose of areas designated Residential 3 (R3) is to provide a transition between rural and urban density development areas, and to provide for a suburban lifestyle on residential lots larger than those commonly found in suburban subdivisions. The Residential 3 (R3) zoning will still allow for suburban lifestyles on lots larger than commonly available in suburban subdivisions. The project provides opportunity for active lifestyle living with trail linkages, recreational, and open space amenities. In addition, the proposed Residential 3 (R3) General Plan designation on the westerly portion of the site will provide an appropriate transition from the proposed Residential 5 (R5) area of the project to the existing

Residential 2 (R2) General Plan designated land to the immediate west of the project site.

General Plan Policy 2.2.7 states that the primary purpose of areas designated Residential 5 (R5) is to provide for single-family detached housing on standard sized suburban lots. The Residential 5 (R5) zoning mixture along with Residential 3 (R3) will still allow for suburban lifestyles on lots larger than commonly available in suburban subdivisions. The project provides opportunity for active lifestyle living with trail linkages, recreational, and open space amenities.

The project as designed and conditioned meets the stated General Plan policies for Hillside Residential (HR), Residential 3 (R3) and Residential 5 (R5).

The Goals and Objectives of the Community Development Element of the General Plan include providing a wide range of housing types in sufficient numbers suitable to meet the diverse needs of present and future residents of all socioeconomic groups and to support healthy economic development without creating an oversupply of any particular type of housing (Goal 2.4 and Objective 2.2). The proposal will provide a wider range of housing types than currently permitted under the R2 General Plan designation by clustering development on the flatter portions of the site, and protecting the hillside areas.

As a component of the proposed General Plan Amendment, the project proposes to remove the site from the “General Plan Figure 4-2 Future Parkland Acquisition Area” map and proposes to revise “General Plan Figure 4-3 Master Plan of Trails”. The current Master Plan of Trails identifies a theoretical future public trail running north and south through the center of the project parcel connecting to a forked future trail just north of the project limits. This central City trail section is proposed to be replaced with private, HOA maintained multi-use trails that would connect the Ironwood Village Project neighborhoods, interior open spaces and on-site park, and will connect to the future City of Moreno Valley public off-site trails on Ironwood Avenue, Oliver Street and to the north of the project site. Parks, Recreation and Open Space Element Policy 4.2.8 encourages the development of recreational facilities within private developments, with appropriate mechanisms to ensure that such facilities are properly maintained and that they remain available to residents in perpetuity.

Based upon the information presented above, the proposed change in land use and trail system are compatible and would not conflict with the goals, objectives, policies or programs of the General Plan. Ironwood Village exhibits a balanced land use pattern that accommodates a range of residential opportunities (Goal 9.1.I), provides recreational amenities including a park, multi-use trails and open space (Goal 9.1.V), and recognizes the need to conserve natural resources by preserving 10.3 acres of the project site as open space (Goal 9.1.VIII).

2. **Health, Safety and Welfare –** The proposed general plan amendment will not be detrimental to the public health, safety or welfare.

FACT: The proposed General Plan Amendment will not result in unacceptable levels of protection from natural and man-made hazards to life, health, and property and is therefore consistent with General Goal 9.6.1. The project site is located within approximately 1.3 miles of Fire Station #58 and within close proximity to emergency services which is consistent with General Plan Goal 9.6.2 which requires emergency services that are adequate to meet minor emergency and major catastrophic situations. The proposed General Plan Amendment will not allow for development that would be inconsistent with General Plan Objective 6.1 to minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage due to seismic ground shaking and secondary effects or General Plan Objective 6.2 to minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage, and to minimize nuisances due to flooding.

The California Environmental Quality Act (CEQA) is a statewide environmental law contained in Public Resources Code §§21000-21177. CEQA applies to most public agency decisions to carry out, authorize, or approve actions that have the potential to affect the environment. CEQA requires that public agencies analyze and acknowledge the environmental consequences of their discretionary actions and consider alternatives and mitigation measures that could avoid or reduce significant adverse impacts to the environment when avoidance or reduction is feasible. The CEQA compliance process provides public agencies and the general public an opportunity to comment on a proposed project's environmental effects. The proposed project is not exempt from CEQA. It was determined that an Initial Study would be prepared to determine whether the proposed project may have a significant effect on the environment.

An Initial Study/Mitigated Negative Declaration were prepared which assessed the potential of the proposed General Plan Amendment and the related Change of Zone, Tentative Tract Map (TTM 37001), and Plot Plan for Ironwood Village Design Guidelines applications to impact the environment. The proposed project includes the development of the project site with 181 single family lots on approximately 78.4 acres. The project site is located in the City of Moreno Valley, County of Riverside and State of California.

The Initial Study provided the documentation of the factual basis for the finding in the Mitigated Negative Declaration that the proposed project will not have a significant effect on the environment with the implementation of mitigation measures. The City as the Lead Agency has prepared a Mitigated Negative Declaration (MND) pursuant to Sections 15070 et seq. of the State CEQA Guidelines.

The Mitigated Negative Declaration is an informational document that provides the City, other public agencies, and the public at-large with an objective assessment of the potential environmental impacts that could result from implementation of the proposed project. The preparation and review of the Initial Study/Mitigated Negative Declaration reflects the independent judgment of the City.

The MND has been considered by the Planning Commission and prepared as there is no evidence that the proposed project will have a significant impact on public health or be materially injurious to surrounding properties of the environment as a whole.

BE IT FURTHER RESOLVED that the Planning Commission **HEREBY RECOMMENDS** that the City Council:

1. **ADOPT** a Mitigated Negative Declaration for Application No. PEN16-0077 (PA15-0037) pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

2. **ADOPT** the Mitigation Monitoring and Reporting Program prepared for General Plan Amendment Application No. PEN16-0077 (PA15-0037), pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

3. **APPROVE** General Plan Amendment Application No. PEN16-0077 (PA15-0037), based on the findings contained in this resolution.

APPROVED this 26th day of January, 2017.

Brian Lowell
Chair, Planning Commission

ATTEST:

Richard J. Sandzimier, Planning Official

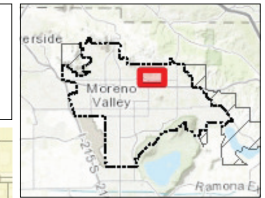
APPROVED AS TO FORM:

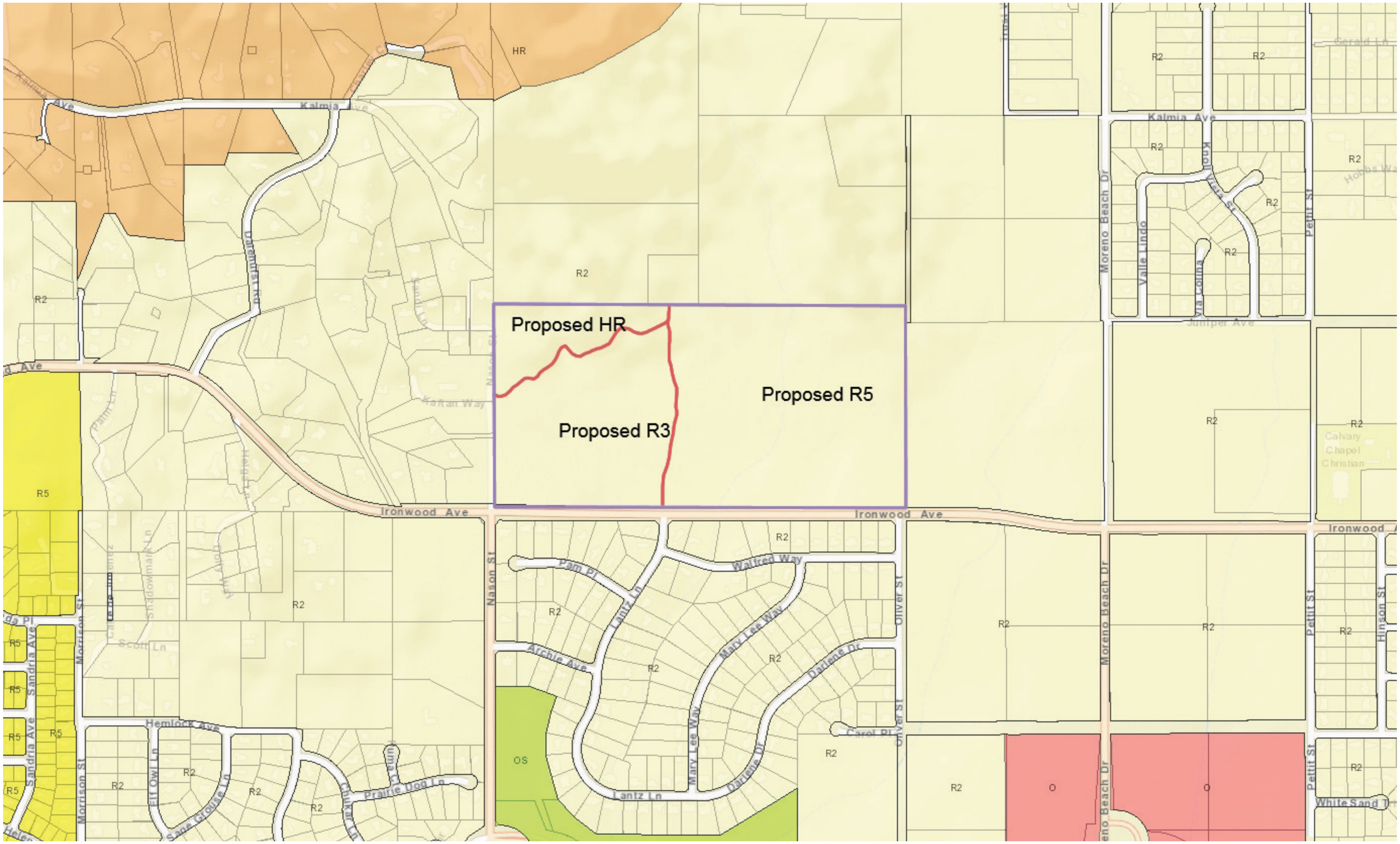
____
City Attorney

ATTACHED: Exhibit A: General Plan Amendment Map, Exhibit B: General Plan Figure 4-2 Future Parkland Acquisition Area and Exhibit C: General Plan Figure 4-3 Master Plan of Trails

General Plan Amendment
PEN16-0077 (PA15-0037)

MORENO VALLEY
WHERE DREAMS SOAR





Legend

Land Use

- Residential: Max. 1 du/ac
- Mixed Use
- Residential: Max. 2 du/ac
- Rural Residential: Max 2.5 du/ac
- Residential: Max. 3 du/ac
- Residential: Max. 5 du/ac
- Residential: Max. 5 or 15 du/ac
- Residential: Max. 10 du/ac
- Residential: Max.15 du/ac
- Residential: Max. 20 du/ac
- Residential: Max. 30 du/ac
- Hillside Residential
- Planned Residential
- Residential/Office
- Office
- Commercial
- Business Park/Light Industrial
- Open Space
- Public Facilities
- Floodplain

Parcels

1,261.9 0 630.96 1,261.9 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere

Print Date: 1/18/2017

N

DISCLAIMER: The information shown on this map was compiled from the City of Moreno Valley GIS and Riverside County GIS. The land base and facility information on this map is for display purposes only and should not be relied upon without independent verification as to its accuracy. Riverside County and City of Moreno Valley will not be held responsible for any claims, losses or damages resulting from the use of this map.

Notes

The current Land Use Designation is R2, proposed are HR, R3 and R5 for APN 473-160-004.

4.m

Attachment: Exhibit A General Plan Amendment Map 8x11 [Revision 1] (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

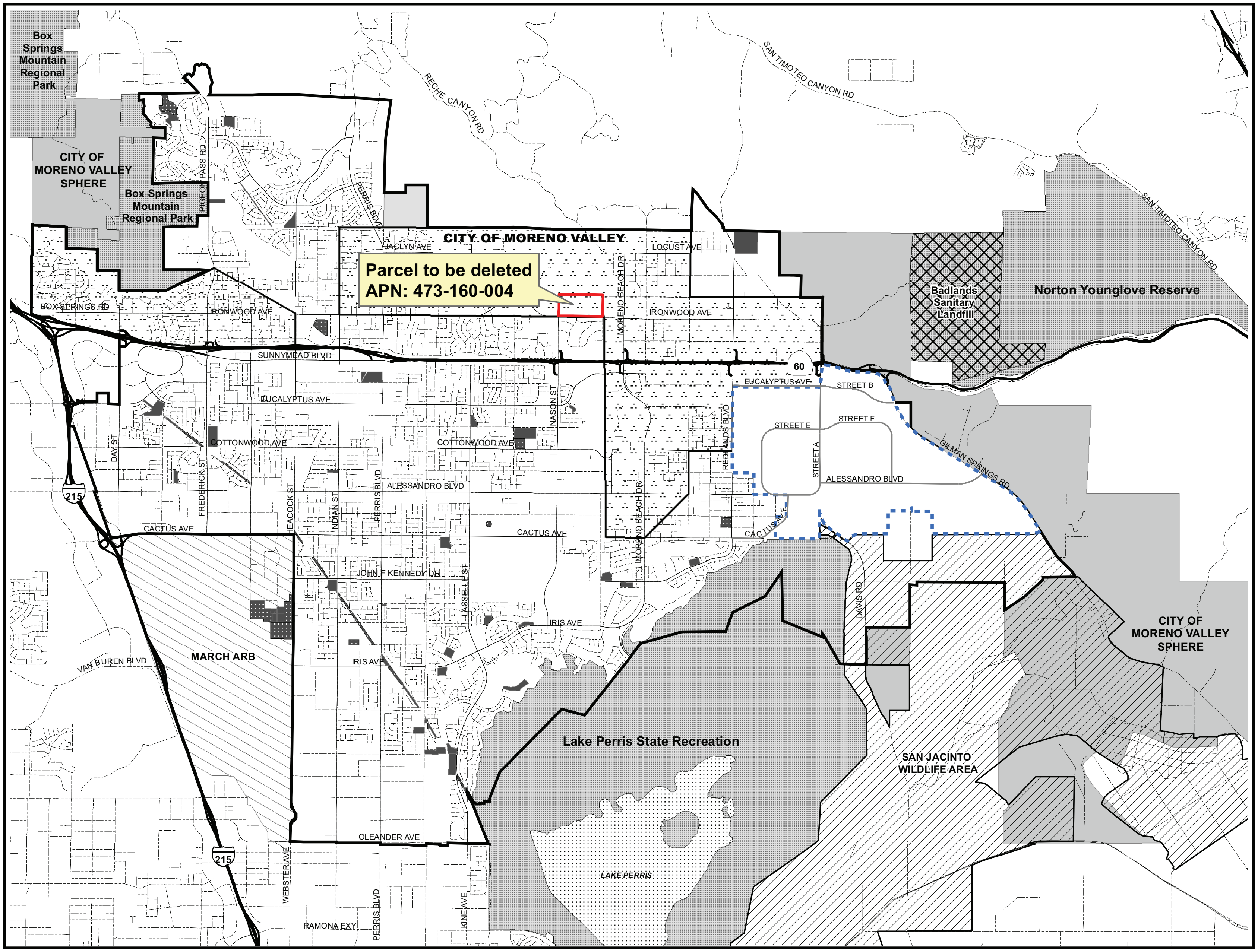


FIGURE 4-2 FUTURE PARKLANDS ACQUISITION AREAS

- Highways
- Major Streets
- Streets
- San Jacinto Wildlife Area
- Waterbodies
- Future Parkland Acquisition Areas
- Existing Active Parks
- Proposed Active Parks
- March ARB
- Badlands Landfill
- State and County Parks
- Moreno Valley
- Moreno Valley Sphere

N

5,000 2,500 0 5,000 Feet

0.5 0.25 0 0.5 1 Miles

Date: January 17, 2017
State Plane NAD83 Zone 6
File: G:\ArcMap\Planning\GPA1014\Future_Parklands.mxd

GEOGRAPHIC INFORMATION SYSTEMS

The information shown on this map was compiled from the Riverside County GIS and the City of Moreno Valley GIS. The land base and facility information on this map is for display purposes only and should not be relied upon without independent verification as to its accuracy. Riverside County and City of Moreno Valley will not be held responsible for any claims, losses or damages resulting from the use of this map.

MORENO VALLEY
WHERE DREAMS SOAR

4.n

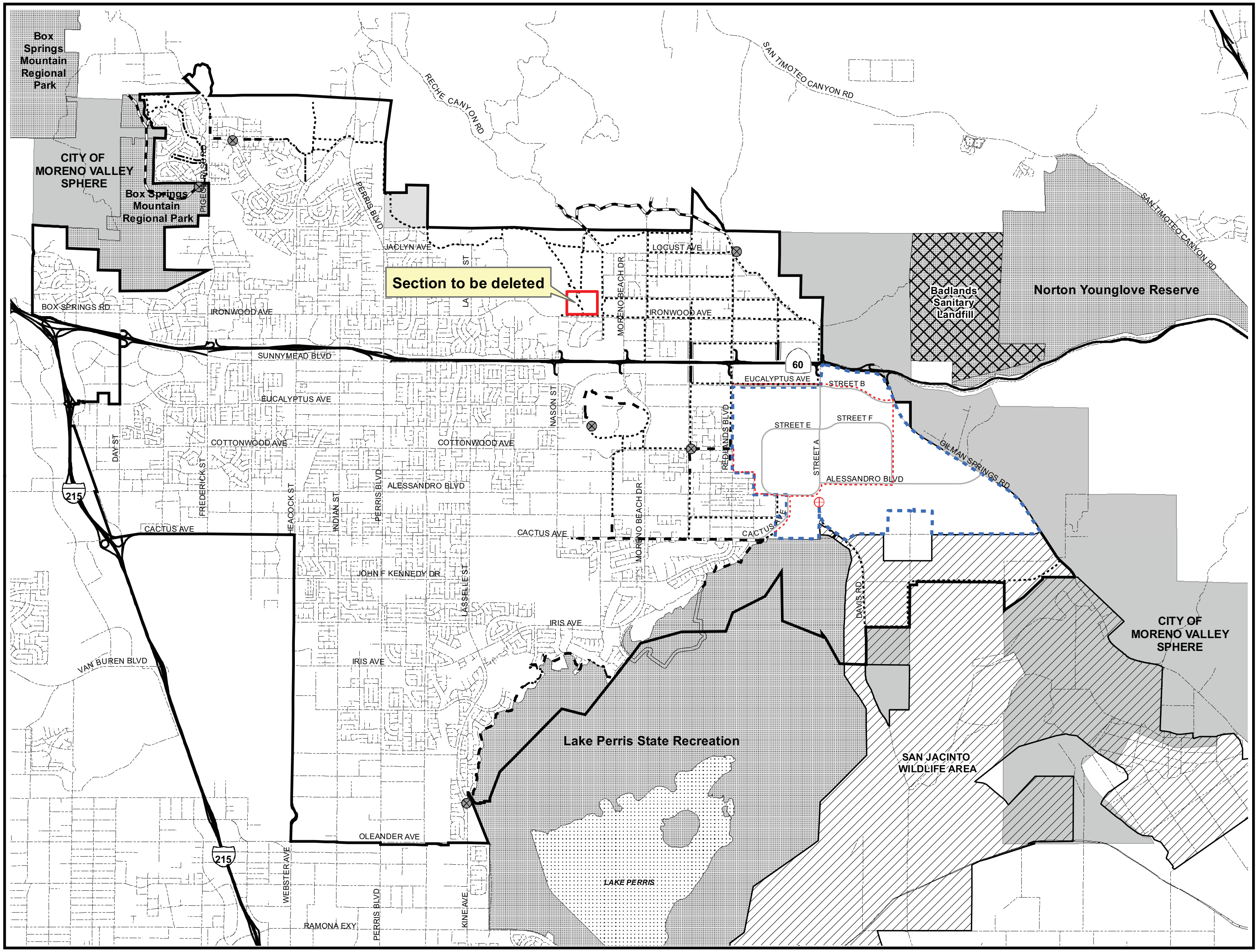


FIGURE 4-3 MASTER PLAN OF TRAILS

- Trail Staging - Existing
- Trail Staging - Proposed
- Streets
- Highways
- Improved Trail
- Multiuse Trail
- Proposed Trail
- Regional Trail
- State Trail
- Proposed Subject to Feasibility of Freeway Bridge or Underpass
- Badlands Landfill
- State and County Parks
- Moreno Valley
- Moreno Valley Sphere
- San Jacinto Wildlife Area
- Waterbodies

* Trail locations are approximate

N

5,000 2,500 0 5,000 Feet

0.5 0.25 0 0.5 1 Miles

Date: January 17, 2017
State Plane NAD83 Zone 6
File: G:\ArcMap\Planning\GPA1014\MasterTrails.mxd

GEOGRAPHIC INFORMATION SYSTEMS

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MORENO VALLEY
WHERE DREAMS SOAR

PLANNING COMMISSION RESOLUTION NO. 2017-06

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY RECOMMENDING THAT THE CITY COUNCIL APPROVE APPLICATION NO. PEN16-0078 (PA15-0038): AN AMENDMENT TO THE OFFICIAL ZONING ATLAS, CHANGING THE ZONING CLASSIFICATION FROM RESIDENTIAL AGRICULTURE (RA2) TO RESIDENTIAL 3 (R3) AND RESIDENTIAL 5 (R5) OF AN APPROXIMATELY 68 ACRES OF A 78.4 ACRES PARCEL AND REMOVAL OF THE PARCEL FROM THE PRIMARY ANIMAL KEEPING OVERLAY (PAKO). PARCEL LOCATED AT THE NORTHEAST CORNER OF NASON STREET AND IRONWOOD AVENUE.

WHEREAS, the applicant, Global Investment & Development LLC, filed Application No. PEN16-0078 (PA15-0038), requesting an amendment to Pages 39 and 50 of the Official Zoning Atlas to the zoning classification for Assessor Parcel Number 473-160-004 and withdrawal from the Primary Animal Keeping Overlay (PAKO), as described in the title of this resolution and the attached Exhibit A: Proposed Changes to the Zoning Atlas, Exhibit B: Change of Zone Map and Exhibit: PAKO Map; and

WHEREAS, the application has been evaluated in accordance with established City of Moreno Valley (City) procedures, and with consideration of the General Plan and other applicable regulations; and

WHEREAS, the City has prepared an Initial Study and Mitigated Negative Declaration consistent with the California Environmental Quality Act (CEQA) based on a thorough analysis of potential environmental impacts; and

WHEREAS, upon completion of a thorough development review process the project was appropriately agendized and noticed for a public hearing before the Planning Commission of the City of Moreno Valley (Planning Commission); and

WHEREAS, the public hearing notice for this project was published in the local newspaper on January 15, 2017. Public notice was sent to all property owners of record within 300 feet of the project site on January 13, 2017. The public hearing notice for this project was also posted on the project site on January 13, 2017;

WHEREAS, on January 26, 2017, the Planning Commission held a public hearing to consider the application; and

WHEREAS, all legal prerequisites to the adoption of this Resolution have occurred; and

WHEREAS, pursuant to Government Code Section 66020(d)(1), **NOTICE IS HEREBY GIVEN** that this project is subject to certain fees, dedications, reservations and other exactions as provided herein.

NOW, THEREFORE, BE IT RESOLVED, it is hereby found, determined and resolved by the Planning Commission as follows:

A. This Planning Commission hereby specifically finds that all of the facts set forth above in this Resolution are true and correct.

B. Based upon substantial evidence presented to this Planning Commission during the above-referenced meeting on January 26, 2017, including written and oral staff reports, public testimony and the record from the public hearing, this Planning Commission hereby specifically finds as follows:

1. **Conformance with General Plan Policies –** The proposed amendment and pre-zoning is consistent with the General Plan, and its goals, objectives, policies and programs.

FACT: The project includes four (4) applications, a General Plan Amendment and Zone Change, to allow the modification of the existing land use of Assessor's Parcel Number 473-160-004, a Tentative Tract Map (TTM 37001) for a 181 single family lot divisions and a Plot Plan for the Ironwood Village Design Guidelines. This project proposes to change the General Plan designation for approximately 68 acres of a 78 acres parcel from Residential Agriculture 2 (RA2) to Residential 3 (3) and Residential 5 (R5). The existing 10.3 acres of Hillside Residential (HR) in the northwest corner of the site will remain undeveloped and zoned as Hillside Residential (HR). Change of Zone will withdraw the parcel from the Primary Animal Keeping Overlay (PAKO) as well.

The maximum density allowed in Residential Agriculture 2 (RA2) zones is two (2) units per acre. As an innovative approach, which attempts to respect the integrity of the current general plan and zoning designations for larger residential lots while also respecting present and anticipated market demands for efficient residential subdivisions, the applicant has proposed a blended zoning modification. The applicant is requesting a change of zone to Residential 3 (R3), which allows up to 3 dwelling units per acre, on the western portion of the Project site and Residential 5 (R5), which allows up to 5 dwelling units per acre, on the eastern portion of the site. A proposed open space and recreation corridor would bisect the property in a north-south orientation, thereby separating the lower density and higher density components. As a result, the tentative tract is proposed at an overall density of 2.7 dwelling units per acre with overall average lot sizes of 9,260 square feet, some lots over 17,000 square feet, and considerate use of open space and trails.

The project will provide a transition between existing lower density Residential 1 (R1) zoned residential uses immediately to the west of the Project site across Nason Street. Existing parcels to the west range in parcel size from roughly one-half acre to over an acre. The project provides for thoughtful transition to the existing Residential 2 (R2) residential development to the south and farther to the east across Moreno Beach Drive, as well as Residential Agriculture 2 (RA2), zoning immediately to the east of the Project site.

The Change of Zone includes withdrawal of the 78.4 acres of the project area from the Primary Animal Keeping Overlay (PAKO). Residential 3 (R3) and Residential 5 (R5) zoning do not allow for medium and large animal keeping. The purpose of the PAKO district is to provide for animal keeping in areas of the City with rural characteristics. The PAKO apply to animal keeping activities in the Rural Residential (RR), Residential 1 (R1) and Residential Agriculture 2 (RA2) land use districts only within an area bounded by Nason Street to the west, Theodore Street to the east, the city limit line to the north and Cottonwood Avenue to the south. This boundary of available land designated in the City for PAKO is quite large (estimated at 2,500 acres); the withdrawal of the 78.4 acres does not preclude all opportunity for PAKO. Furthermore, the residential market trend in the City over the last decade demonstrates almost no measurable interest/demand for PAKO development.

The residential areas to the west and south of the site are not currently designated as within the PAKO. The existing designated areas within the PAKO overlay in proximity to the project area are immediate north, east, and southeast.

The Goals and Objectives of the Community Development Element of the General Plan include providing a wide range of housing types in sufficient numbers suitable to meet the diverse needs of present and future residents of all socioeconomic groups and to support healthy economic development without creating an oversupply of any particular type of housing (Goal 2.4 and Objective 2.2). The proposal is consistent with the General Plan and will provide a wider range of housing types than currently permitted under the R2 General Plan designation by clustering development on the flatter portions of the site, and protecting the hillside areas.

2. **Conformance with the Zoning Regulations –** The proposed zoning is consistent with the purposes and intent of Title 9 of the City of Moreno Valley Municipal Code.

FACT: As proposed, the Change of Zone from Residential Agriculture 2 (RA2) for approximately 68 acres of the 78 acre project site is consistent with the purposes and intent of Title 9. A residential development under Residential 3 (R3) and Residential 5 (R5) zoning would continue to further the comprehensive and orderly development of the site and surrounding areas.

The surrounding land uses near the site include single-family residential development to the west (Residential 1 (R1) large-lot residential uses, one acre and larger in size) and south (Residential 2 (R2) residential uses up to 2 units per acre). To the east and northeast of the site there vacant land zoned for single-family residential uses (Residential Agriculture 2 (RA2) residential agriculture up to 2 units per acre) and to the north and northeast vacant land zoned for single-family residential uses (Residential Agriculture 2 (RA2) and Hillside Residential (HR) uses). Further east of Moreno Beach Drive and Pettit Street is mix of developed Residential 2 (R2) and Residential Agriculture 2 (RA2) as well as the Calvary Chapel Church of Moreno Valley and School.

The proposed Residential 3 (R3) and Residential 5 (R5) uses are compatible with the established land use designations of the parcels in the area, allowing for suburban lifestyles on lots larger than commonly available in suburban subdivisions. The project provides opportunity for active lifestyle living with trail linkages, recreational, and open space amenities. The change is reflective of a reconsideration of land use patterns in this area of the community.

3. **Health, Safety and Welfare –** The proposal will not be detrimental to the public health, safety or welfare.

FACT: The proposed Change of Zone will not result in unacceptable levels of protection from natural and man-made hazards to life, health, and property and is therefore consistent with General Goal 9.6.1. The project site is located within approximately 1.3 miles of Fire Station #58 and within close proximity to emergency services which is consistent with General Plan Goal 9.6.2 which requires emergency services that are adequate to meet minor emergency and major catastrophic situations. The proposed General Plan Amendment will not allow for development that would be inconsistent with General Plan Objective 6.1 to minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage due to seismic ground shaking and secondary effects or General Plan Objective 6.2 to minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage, and to minimize nuisances due to flooding.

The California Environmental Quality Act (CEQA) is a statewide environmental law contained in Public Resources Code §§21000-21177. CEQA applies to most public agency decisions to carry out, authorize, or approve actions that have the potential to affect the environment. CEQA requires that public agencies analyze and acknowledge the environmental consequences of their discretionary actions and consider alternatives and mitigation measures that could avoid or reduce significant adverse impacts to the environment when avoidance or reduction is feasible. The CEQA compliance process provides public agencies and the general public an opportunity to comment on a proposed project's environmental effects. The proposed project is not exempt from CEQA. It was determined that an Initial Study would be prepared to determine whether the proposed project may have a significant effect on the environment.

An Initial Study/Mitigated Negative Declaration were prepared which assessed the potential of the proposed General Plan Amendment and the related Change of Zone, Tentative Tract Map (TTM 37001), and Plot Plan for Ironwood Village Design Guidelines applications to impact the environment. The proposed project includes the development of the project site with 181 single family lots on approximately 78.4 acres. The project site is located in the City of Moreno Valley, County of Riverside and State of California.

The Initial Study provided the documentation of the factual basis for the finding in the Mitigated Negative Declaration that the proposed project will not have a significant effect on the environment with the implementation of mitigation measures. The City as the Lead Agency has prepared a Mitigated Negative Declaration (MND) pursuant to Sections 15070 et seq. of the State CEQA Guidelines.

The Mitigated Negative Declaration is an informational document that provides the City, other public agencies, and the public at-large with an objective assessment of the potential environmental impacts that could result from implementation of the proposed project. The preparation and review of the Initial Study/Mitigated Negative Declaration reflects the independent judgment of the City.

The MND has been considered by the Planning Commission and prepared as there is no evidence that the proposed project will have a significant impact on public health or be materially injurious to surrounding properties of the environment as a whole.

BE IT FURTHER RESOLVED that the Planning Commission **HEREBY RECOMMENDS** that the City Council:

1. **ADOPT** a Mitigated Negative Declaration for Application No. PEN16-0078 (PA15-0038) pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

2. **ADOPT** the Mitigation Monitoring and Reporting Program prepared for Change of Zone Application No. PEN16-0078 (PA15-0038) pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

3. **APPROVE** Change of Zone Application No. PEN16-0078 (PA15-0038), based on the findings contained in this resolution.

APPROVED this 26th day of January, 2017**.**

____

Brian Lowell
Chair, Planning Commission

ATTEST:

____

Richard J. Sandzimier, Planning Official

APPROVED AS TO FORM:

____

City Attorney

ATTACHED: Exhibit A: Proposed Changes to the Zoning Atlas, Exhibit B: Change of Zone Map and Exhibit C: PAKO Map.

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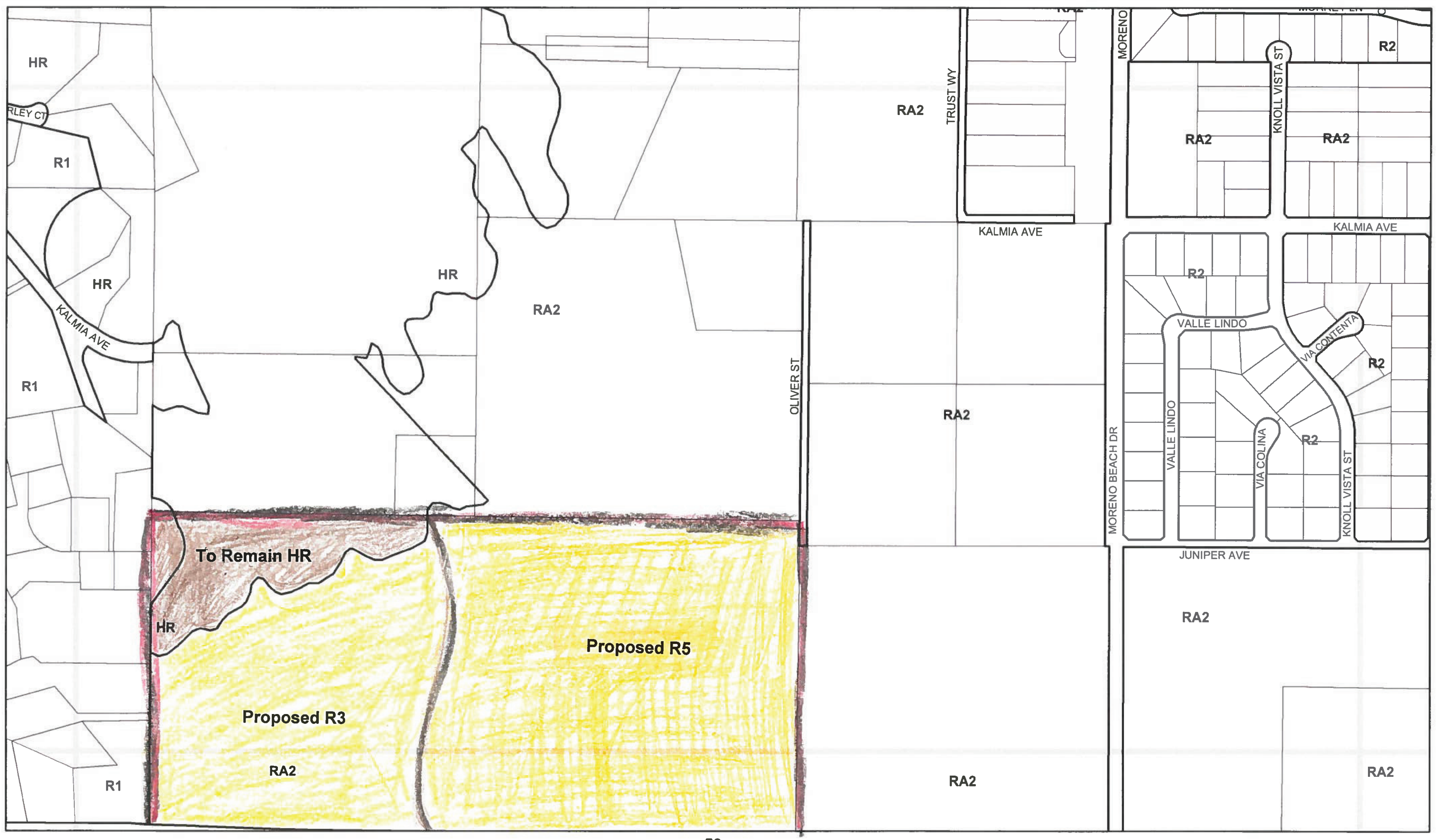

MORENO VALLEY
WHERE DREAMS SOAR

1 inch equals 400 feet

0 200 400 600 800 Feet

City of Moreno Valley Zoning Atlas

N W E S

39

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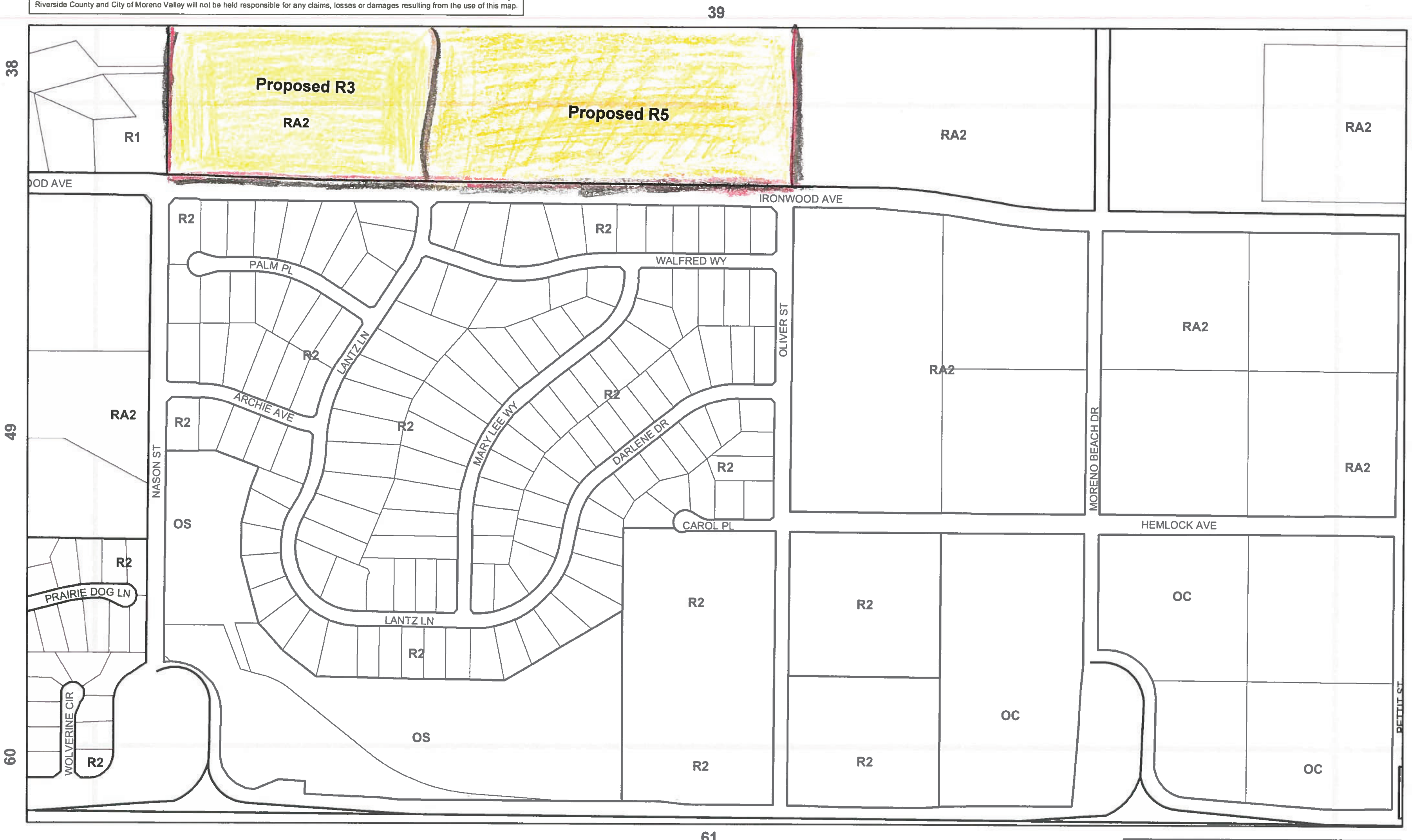
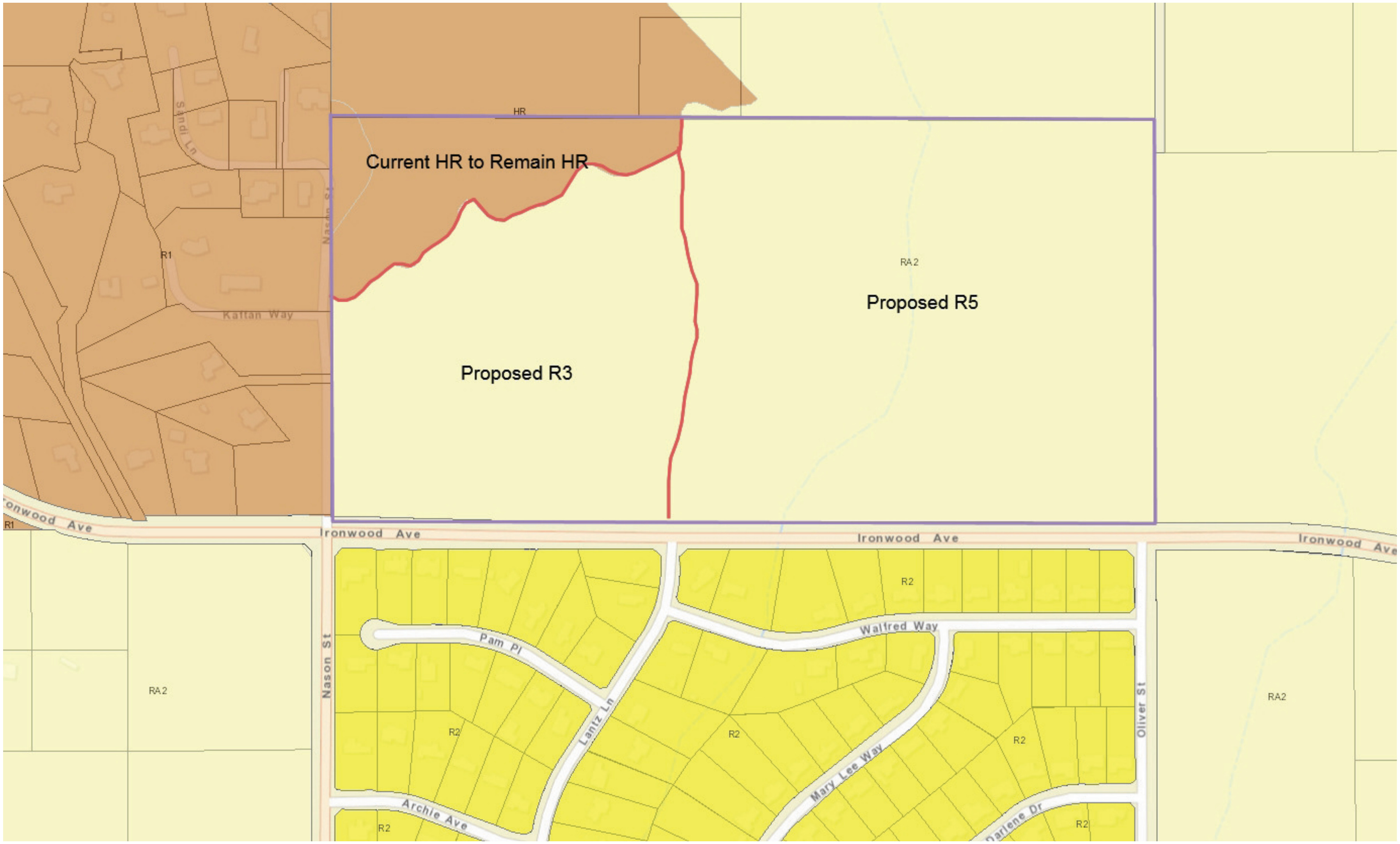


City of Moreno Valley Zoning Atlas

MORENO VALLEY
WHERE DREAMS SOAR

Change of Zone
PEN16-0078 (PA15-0038)



Legend

Zoning

- Commercial
- Industrial/Business Park
- Public Facilities
- Office
- Planned Development
- Large Lot Residential
- Residential Agriculture 2 DU/AC
- Residential 2 DU/AC
- Suburban Residential
- Multi-family
- Open Space/Park
- Parcels

631.0 | 0 | 315.48 | 631.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere

Print Date: 1/18/2017

N

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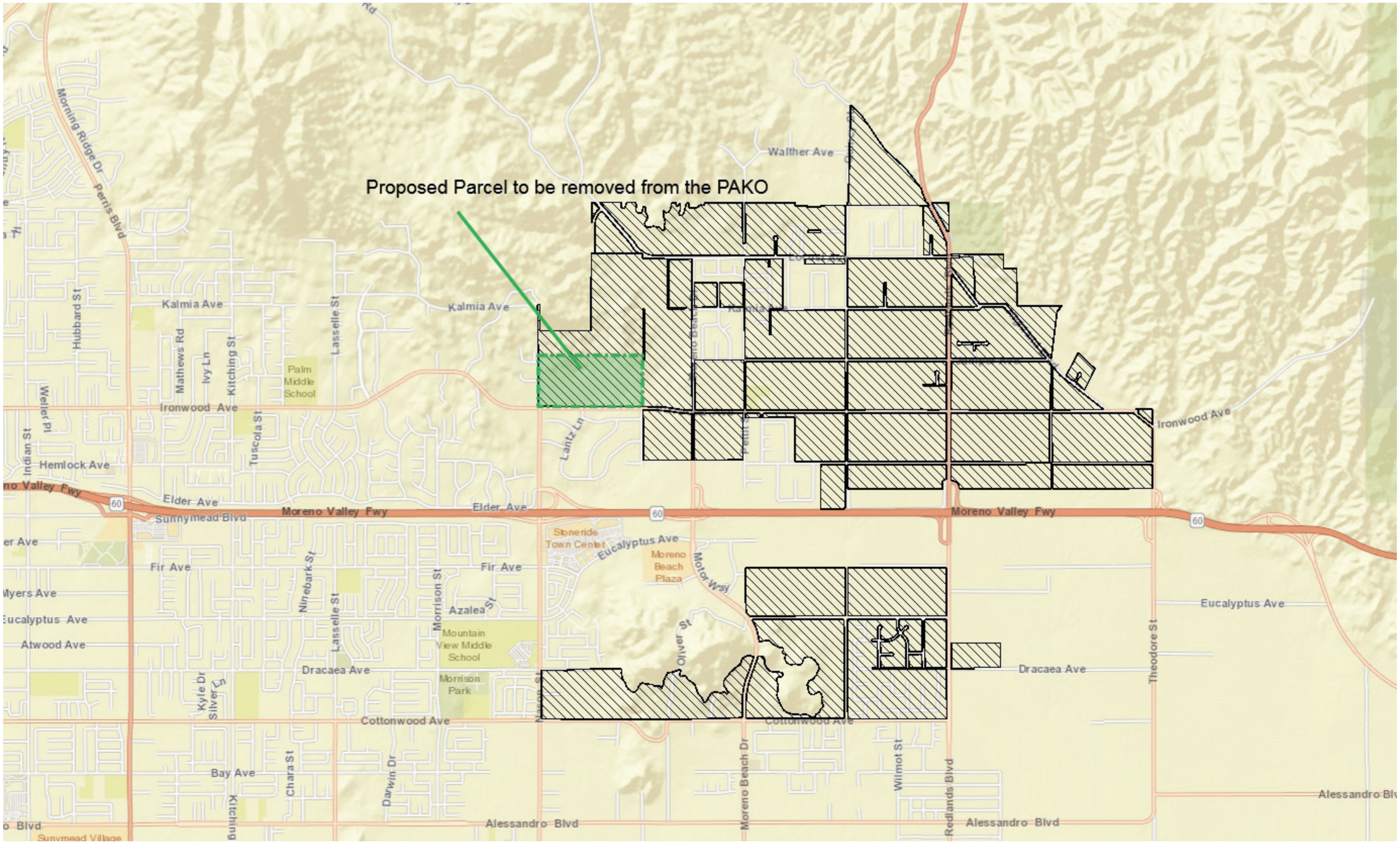
Notes

The current Zoning Districts are HR and RA2. The proposed Zoning Districts for APN: 473-160-004 are HR, R3 and R5.

4.r

Attachment: Exhibit B: Change of Zone Map [Revision 1] (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Change of Zone (PAKO)
PEN16-0078 (PA15-0038)



Legend
Primary Animal Keeping Overla

5,047.7 0 2,523.83 5,047.7 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere

Print Date: 1/18/2017

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Notes
Proposed removal of APN 473-160-004 from the Primary Animal Keeping Overlay (PAKO).

4.s

Attachment: Exhibit C: PAKO Map [Revision 1] (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

PLANNING COMMISSION RESOLUTION NO. 2017-07

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF MORENO VALLEY RECOMMENDING THAT THE CITY COUNCIL APPROVE APPLICATION NO. PEN16-0079 (PA15-0039): TENTATIVE TRACT MAP 37001, TO SUBDIVIDE 78.4 GROSS ACRES INTO 181 SINGLE FAMILY RESIDENTIAL LOTS WITHIN THE RESIDENTIAL 3 (R3) AND RESIDENTIAL 5 (R5) ZONING DISTRICTS AND APPLICATION NO. PEN16-0080 (PA15-0040): PLOT PLAN FOR THE IRONWOOD VILLAGE DESIGN GUIDELINES. THE PROJECT IS LOCATED AT THE NORTHEAST CORNER OF IRONWOOD AVENUE AND NASON STREET (ASSESSORS PARCEL NUMBER 473-160-004)

Section 1:

WHEREAS, the applicant, Global Investment & Development LLC, filed Application No. PEN16-0079 (PA15-0039), has filed an application for the approval of Tentative Tract Map 37001 for development of a 181 single family lot subdivision located at the northeast corner of Ironwood Avenue and Nason Street as described in the title of this resolution and the attached Exhibit A:Conditions of Approval; and

WHEREAS, the application has been evaluated in accordance with established City of Moreno Valley (City) procedures, and with consideration of the General Plan and other applicable regulations; and

WHEREAS, the City has prepared an Initial Study and Mitigated Negative Declaration consistent with the California Environmental Quality Act (CEQA) based on a thorough analysis of potential environmental impacts; and

WHEREAS, upon completion of a thorough development review process the project was appropriately agendized and noticed for a public hearing before the Planning Commission of the City of Moreno Valley (Planning Commission); and

WHEREAS, the public hearing notice for this project was published in the local newspaper on January 15, 2017. Public notice was sent to all property owners of record within 300 feet of the project site on January 13, 2017. The public hearing notice for this project was also posted on the project site on January 13, 2017;

WHEREAS, on January 26, 2017, the Planning Commission held a public hearing to consider the application; and

WHEREAS, all legal prerequisites to the adoption of this Resolution have occurred; and

WHEREAS, pursuant to Government Code Section 66020(d)(1), **NOTICE IS HEREBY GIVEN** that this project is subject to certain fees, dedications, reservations and other exactions as provided herein.

NOW, THEREFORE, BE IT RESOLVED, it is hereby found, determined and resolved by the Planning Commission as follows:

A. This Planning Commission hereby specifically finds that all of the facts set forth above in this Resolution are true and correct.

B. Based upon substantial evidence presented to this Planning Commission during the above-referenced meeting on January 26, 2017, including written and oral staff reports, public testimony and the record from the public hearing, this Planning Commission hereby specifically finds as follows:

1. **Conformance with General Plan Policies –** The proposed use is consistent with the General Plan, and its goals, objectives, policies and programs.

   FACT: The project includes four (4) applications, a General Plan Amendment and Zone Change, to allow the modification of the existing land use of Assessor's Parcel Number 473-160-004, a Tentative Tract Map (TTM 37001) for a 181 single family lot divisions and a Plot Plan for the Ironwood Village Design Guidelines. This project proposes to change the General Plan designation for approximately 68 acres of a 78 acres parcel from Residential Agriculture 2 (RA2) to Residential 3 (3) and Residential 5 (R5). The existing 10.3 acres of Hillside Residential (HR) in the northwest corner of the site will remain undeveloped and zoned as Hillside Residential (HR). Change of Zone will withdraw the parcel from the Primary Animal Keeping Overlay (PAKO) as well.

   The maximum density allowed in Residential Agriculture 2 (RA2) zones is two (2) units per acre. As an innovative approach, which attempts to respect the integrity of the current general plan and zoning designations for larger residential lots while also respecting present and anticipated market demands for efficient residential subdivisions, the applicant has proposed a blended zoning modification. The applicant is requesting a change of zone to Residential 3 (R3), which allows up to 3 dwelling units per acre, on the western portion of the Project site and Residential 5 (R5), which allows up to 5 dwelling units per acre, on the eastern portion of the site. A proposed open space and recreation corridor would bisect the property in a north-south orientation, thereby separating the lower density and higher density components. As a result, the tentative tract is proposed at an overall density of 2.7 dwelling units per acre with overall average lot sizes of 9,260 square feet, some lots over 17,000 square feet, and considerate use of open space and trails.

The Goals and Objectives of the Community Development Element of the General Plan include providing a wide range of housing types in sufficient numbers suitable to meet the diverse needs of present and future residents of all socioeconomic groups and to support healthy economic development without creating an oversupply of any particular type of housing (Goal 2.4 and Objective 2.2). The proposal is consistent with the General Plan and will provide a wider range of housing types than currently permitted under the R2 General Plan designation by clustering development on the flatter portions of the site, and protecting the hillside areas.

Tentative Tract Map 37001 as designed and conditioned meets the stated General Plan policies for Hillside Residential (HR), Residential 3 (R3) and Residential 5 (R5).

2. **Conformance with Zoning Regulations –** The proposed use complies with all applicable zoning and other regulations.

FACT: As proposed, Tentative Tract Map 37001 is consistent with the purposes and intent of Title 9. A residential development under Residential 3 (R3) and Residential 5 (R5) zoning would continue to further the comprehensive and orderly development of the site and surrounding areas.

The surrounding land uses near the site include single-family residential development to the west (Residential 1 (R1) large-lot residential uses, one acre and larger in size) and south (Residential 2 (R2) residential uses up to 2 units per acre). To the east and northeast of the site there vacant land zoned for single-family residential uses (Residential Agriculture 2 (RA2) residential agriculture up to 2 units per acre) and to the north and northeast vacant land zoned for single-family residential uses (Residential Agriculture 2 (RA2) and Hillside Residential (HR) uses). Further east of Moreno Beach Drive and Pettit Street is mix of developed Residential 2 (R2) and Residential Agriculture 2 (RA2) as well as the Calvary Chapel Church of Moreno Valley and School.

The proposed Residential 3 (R3) and Residential 5 (R5) uses are compatible with the established land use designations of the parcels in the area, allowing for suburban lifestyles on lots larger than commonly available in suburban subdivisions. The project provides opportunity for active lifestyle living with trail linkages, recreational, and open space amenities. The change is reflective of a reconsideration of land use patterns in this area of the community.

3. **Health, Safety and Welfare –** The proposed use will not be detrimental to the public health, safety or welfare or materially injurious to properties or improvements in the vicinity.

FACT: : The proposed Tentative Tract Map 37001 will not result in unacceptable levels of protection from natural and man-made hazards to life, health, and property and is therefore consistent with General Goal 9.6.1. The project site is located within approximately 1.3 miles of Fire Station #58 and within close proximity to emergency services which is consistent with General Plan Goal 9.6.2 which requires emergency services that are adequate to meet minor emergency and major catastrophic situations. The proposed General Plan Amendment will not allow for development that would be inconsistent with General Plan Objective 6.1 to minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage due to seismic ground shaking and secondary effects or General Plan Objective 6.2 to minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage, and to minimize nuisances due to flooding.

The California Environmental Quality Act (CEQA) is a statewide environmental law contained in Public Resources Code §§21000-21177. CEQA applies to most public agency decisions to carry out, authorize, or approve actions that have the potential to affect the environment. CEQA requires that public agencies analyze and acknowledge the environmental consequences of their discretionary actions and consider alternatives and mitigation measures that could avoid or reduce significant adverse impacts to the environment when avoidance or reduction is feasible. The CEQA compliance process provides public agencies and the general public an opportunity to comment on a proposed project's environmental effects. The proposed project is not exempt from CEQA. It was determined that an Initial Study would be prepared to determine whether the proposed project may have a significant effect on the environment.

An Initial Study/Mitigated Negative Declaration were prepared which assessed the potential of the proposed General Plan Amendment and the related Change of Zone, Tentative Tract Map (TTM 37001), and Plot Plan for Ironwood Village Design Guidelines applications to impact the environment. The proposed project includes the development of the project site with 181 single family lots on approximately 78.4 acres. The project site is located in the City of Moreno Valley, County of Riverside and State of California.

The MND has been considered by the Planning Commission and prepared as there is no evidence that the proposed project will have a significant impact on public health or be materially injurious to surrounding properties of the environment as a whole.

4. **Location, Design and Operation –** The location, design and operation of the proposed project will be compatible with existing and planned land uses in the vicinity.

FACT: The surrounding land uses near the site include single-family residential development to the west (Residential 1 (R1) large-lot residential uses, one acre and larger in size) and south (Residential 2 (R2) residential uses up to 2 units per acre). To the east and northeast of the site there vacant land zoned for single-family residential uses (Residential Agriculture 2 (RA2) residential agriculture up to 2 units per acre) and to the north and northeast vacant land zoned for single-family residential uses (Residential Agriculture 2 (RA2) and Hillside Residential (HR) uses). Further east of Moreno Beach Drive and Pettit Street is mix of developed Residential 2 (R2) and Residential Agriculture 2 (RA2) as well as the Calvary Chapel Church of Moreno Valley and School.

The site is within a mile of the Stoneridge Towne Centre that will serve the retail/commercial needs of residents. Valley View High School and Mountain View Middle School are located approximately 1 mile to the south on Nason Street.

The project is in close proximity to regional transportation corridors. State Route 60 is located approximately one-half mile to the south on Nason Street and the I-215 freeway is located approximately six miles to the west on Ironwood Avenue/Box Springs Road. Other land uses in the vicinity include the Moreno Valley Auto Mall to the southeast, off of Moreno Beach Drive.

As designed and conditioned and with the implementation of required mitigation measures, the proposed Tentative Tract Map 37001 is compatible with existing and proposed land uses in the vicinity.

Section 2:

WHEREAS, the applicant, Global Investment & Development LLC, filed Application No. PEN16-0080 (PA15-0040), has filed an application for the approval of a Plot Plan for the Ironwood Village Design Guidelines that are related to Tentative Tract Map 37001 for development of a 181 single family lot subdivision located at the northeast corner of Ironwood Avenue and Nason Street and as described in the title of this resolution and the attached Exhibit B: Ironwood Village Design Guidelines; and

WHEREAS, the application has been evaluated in accordance with established City of Moreno Valley (City) procedures, and with consideration of the General Plan and other applicable regulations; and

WHEREAS, the City has prepared an Initial Study and Mitigated Negative Declaration consistent with the California Environmental Quality Act (CEQA) based on a thorough analysis of potential environmental impacts; and

WHEREAS, upon completion of a thorough development review process the project was appropriately agendized and noticed for a public hearing before the Planning Commission of the City of Moreno Valley (Planning Commission); and

WHEREAS, the public hearing notice for this project was published in the local newspaper on January 15, 2017. Public notice was sent to all property owners of record within 300 feet of the project site on January 13, 2017. The public hearing notice for this project was also posted on the project site on January 13, 2017;

WHEREAS, on January 26, 2017, the Planning Commission held a public hearing to consider the application; and

WHEREAS, all legal prerequisites to the adoption of this Resolution have occurred; and

WHEREAS, pursuant to Government Code Section 66020(d)(1), **NOTICE IS HEREBY GIVEN** that this project is subject to certain fees, dedications, reservations and other exactions as provided herein.

NOW, THEREFORE, BE IT RESOLVED, it is hereby found, determined and resolved by the Planning Commission as follows:

A. This Planning Commission hereby specifically finds that all of the facts set forth above in this Resolution are true and correct.

B. Based upon substantial evidence presented to this Planning Commission during the above-referenced meeting on January 26, 2017, including written and oral staff reports, public testimony and the record from the public hearing, this Planning Commission hereby specifically finds as follows:

1. **Conformance with General Plan Policies –** The proposed use is consistent with the General Plan, and its goals, objectives, policies and programs.

   FACT: The project includes four (4) applications, a General Plan Amendment and Zone Change, to allow the modification of the existing land use of Assessor's Parcel Number 473-160-004, a Tentative Tract Map (TTM 37001) for a 181 single family lot divisions and a Plot Plan for the Ironwood Village Design Guidelines. This project proposes to change the General Plan designation for approximately 68 acres of a 78 acres parcel from Residential Agriculture 2 (RA2) to Residential 3 (3) and Residential 5 (R5). The existing 10.3 acres of Hillside Residential (HR) in the northwest corner of the site will remain undeveloped and zoned as Hillside Residential (HR). Change of Zone will withdraw the parcel from the Primary Animal Keeping Overlay (PAKO) as well.

The maximum density allowed in Residential Agriculture 2 (RA2) zones is two (2) units per acre. As an innovative approach, which attempts to respect the integrity of the current general plan and zoning designations for larger residential lots while also respecting present and anticipated market demands for efficient residential subdivisions, the applicant has proposed a blended zoning modification. The applicant is requesting a change of zone to Residential 3 (R3), which allows up to 3 dwelling units per acre, on the western portion of the Project site and Residential 5 (R5), which allows up to 5 dwelling units per acre, on the eastern portion of the site. A proposed open space and recreation corridor would bisect the property in a north-south orientation, thereby separating the lower density and higher density components. As a result, the tentative tract is proposed at an overall density of 2.7 dwelling units per acre with overall average lot sizes of 9,260 square feet, some lots over 17,000 square feet, and considerate use of open space and trails.

The Goals and Objectives of the Community Development Element of the General Plan include providing a wide range of housing types in sufficient numbers suitable to meet the diverse needs of present and future residents of all socioeconomic groups and to support healthy economic development without creating an oversupply of any particular type of housing (Goal 2.4 and Objective 2.2). The proposal is consistent with the General Plan and will provide a wider range of housing types than currently permitted under the R2 General Plan designation by clustering development on the flatter portions of the site, and protecting the hillside areas.

The proposed Project is proposed to be implemented in accordance with the Ironwood Village Design Guidelines (Design Guidelines). The Design Guidelines serve as the codified site development regulations that will ensure cohesive design throughout the Ironwood Village Project. The Design Guidelines respect the intended and desired diversity of housing choices not available with typical tract developments. The Design Guidelines consider the variety of lot sizes available, the intermixed with trails, the park, open space areas and water quality features.

The development standards included in the Ironwood Village Design Guidelines call for a quality mix of floor plans, elevations, colors and materials, and create a walkable neighborhood with access to trails, outdoor recreation and open space opportunities. The proposed Project Guidelines respect the existing topography, maintain rock outcroppings where feasible and provide a transition into the hillside areas.

The Design Guidelines with Tentative Tract Map 37001 as designed and conditioned meets the stated General Plan policies for Hillside Residential (HR), Residential 3 (R3) and Residential 5 (R5).

2. **Conformance with Zoning Regulations –** The proposed use complies with all applicable zoning and other regulations.

FACT: As proposed, Design Guidelines are attached to Tentative Tract Map 37001 and consistent with the purposes and intent of Title 9. A residential development under Residential 3 (R3) and Residential 5 (R5) zoning would continue to further the comprehensive and orderly development of the site and surrounding areas.

The surrounding land uses near the site include single-family residential development to the west (Residential 1 (R1) large-lot residential uses, one acre and larger in size) and south (Residential 2 (R2) residential uses up to 2 units per acre). To the east and northeast of the site there vacant land zoned for single-family residential uses (Residential Agriculture 2 (RA2) residential agriculture up to 2 units per acre) and to the north and northeast vacant land zoned for single-family residential uses (Residential Agriculture 2 (RA2) and Hillside Residential (HR) uses). Further east of Moreno Beach Drive and Pettit Street is mix of developed Residential 2 (R2) and Residential Agriculture 2 (RA2) as well as the Calvary Chapel Church of Moreno Valley and School.

The proposed Residential 3 (R3) and Residential 5 (R5) uses are compatible with the established land use designations of the parcels in the area, allowing for suburban lifestyles on lots larger than commonly available in suburban subdivisions. The project provides opportunity for active lifestyle living with trail linkages, recreational, and open space amenities. The change is reflective of a reconsideration of land use patterns in this area of the community.

3. **Health, Safety and Welfare –** The proposed use will not be detrimental to the public health, safety or welfare or materially injurious to properties or improvements in the vicinity.

FACT: The proposed Ironwood Village Design Guidelines will not result in unacceptable levels of protection from natural and man-made hazards to life, health, and property and is therefore consistent with General Goal 9.6.1. The project site is located within approximately 1.3 miles of Fire Station #58 and within close proximity to emergency services which is consistent with General Plan Goal 9.6.2 which requires emergency services that are adequate to meet minor emergency and major catastrophic situations. The proposed General Plan Amendment will not allow for development that would be inconsistent with General Plan Objective 6.1 to minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage due to seismic ground shaking and secondary effects or General Plan Objective 6.2 to minimize the potential for loss of life and protect residents, workers, and visitors to the City from physical injury and property damage, and to minimize nuisances due to flooding.

The California Environmental Quality Act (CEQA) is a statewide environmental law contained in Public Resources Code §§21000-21177. CEQA applies to most public agency decisions to carry out, authorize, or approve actions that have the potential to affect the environment. CEQA requires that public agencies analyze and acknowledge the environmental consequences of their discretionary actions and consider alternatives and mitigation measures that could avoid or reduce significant adverse impacts to the environment when avoidance or reduction is feasible. The CEQA compliance process provides public agencies and the general public an opportunity to comment on a proposed project's environmental effects. The proposed project is not exempt from CEQA. It was determined that an Initial Study would be prepared to determine whether the proposed project may have a significant effect on the environment.

An Initial Study/Mitigated Negative Declaration were prepared which assessed the potential of the proposed General Plan Amendment and the related Change of Zone, Tentative Tract Map (TTM 37001), and Plot Plan for Ironwood Village Design Guidelines applications to impact the environment. The proposed project includes the development of the project site with 181 single family lots on approximately 78.4 acres. The project site is located in the City of Moreno Valley, County of Riverside and State of California.

The MND has been considered by the Planning Commission and prepared as there is no evidence that the proposed project will have a significant impact on public health or be materially injurious to surrounding properties of the environment as a whole.

4. **Location, Design and Operation –** The location, design and operation of the proposed project will be compatible with existing and planned land uses in the vicinity.

FACT: The surrounding land uses near the site include single-family residential development to the west (Residential 1 (R1) large-lot residential uses, one acre and larger in size) and south (Residential 2 (R2) residential uses up to 2 units per acre). To the east and northeast of the site there vacant land zoned for single-family residential uses (Residential Agriculture 2 (RA2) residential agriculture up to 2 units per acre) and to the north and northeast vacant land zoned for single-family residential uses (Residential Agriculture 2 (RA2) and Hillside Residential (HR) uses). Further east of Moreno Beach Drive and Pettit Street is mix of developed Residential 2 (R2) and Residential Agriculture 2 (RA2) as well as the Calvary Chapel Church of Moreno Valley and School.

The site is within a mile of the Stoneridge Towne Centre that will serve the retail/commercial needs of residents. Valley View High School and

Mountain View Middle School are located approximately 1 mile to the south on Nason Street.

The project is in close proximity to regional transportation corridors. State Route 60 is located approximately one-half mile to the south on Nason Street and the I-215 freeway is located approximately six miles to the west on Ironwood Avenue/Box Springs Road. Other land uses in the vicinity include the Moreno Valley Auto Mall to the southeast, off of Moreno Beach Drive.

As designed and conditioned and with the implementation of required mitigation measures, the proposed Ironwood Village Design Guidelines with Tentative Tract Map 37001 is compatible with existing and proposed land uses in the vicinity.

FEES, DEDICATIONS, RESERVATIONS, AND OTHER EXACTIONS

1. FEES

Impact, mitigation and other fees are due and payable under currently applicable ordinances and resolutions. These fees may include but are not limited to: Development Impact Fee, Transportation Uniform Mitigation Fee (TUMF), Multi-species Habitat Conservation Plan (MSHCP) Mitigation Fee, Stephens Kangaroo Habitat Conservation fee, Underground Utilities in lieu Fee, Area Drainage Plan fee, Bridge and Thoroughfare Mitigation fee (Future) and Traffic Signal Mitigation fee. The final amount of fees payable is dependent upon information provided by the applicant and will be determined at the time the fees become due and payable.

Unless otherwise provided for by this Resolution, all impact fees shall be calculated and collected at the time and in the manner provided in Chapter 3.32 of the City of Moreno Valley Municipal Code or as so provided in the applicable ordinances and resolutions. The City expressly reserves the right to amend the fees and the fee calculations consistent with applicable law.

2. DEDICATIONS, RESERVATIONS, AND OTHER EXACTIONS

The adopted Conditions of Approval for PEN16-0079 (PA15-0039) and PEN16-0080 (PA15-0040), incorporated herein by reference, may include dedications, reservations, and exactions pursuant to Government Code Section 66020 (d) (1).

3. CITY RIGHT TO MODIFY/ADJUST; PROTEST LIMITATIONS

The City expressly reserves the right to establish, modify or adjust any fee, dedication, reservation or other exaction to the extent permitted and as authorized by law.

Pursuant to Government Code Section 66020(d)(1), NOTICE IS FURTHER GIVEN that the 90 day period to protest the imposition of any impact fee, dedication, reservation, or other exaction described in this Resolution begins on the effective date of this Resolution and any such protest must be in a manner that complies with Section 66020(a) and failure to timely follow this procedure will bar any subsequent legal action to attack, review, set aside, void or annul imposition.

The right to protest the fees, dedications, reservations, or other exactions does not apply to planning, zoning, grading, or other similar application processing fees or service fees in connection with this project and it does not apply to any fees, dedication, reservations, or other exactions of which a notice has been given similar to this, nor does it revive challenges to any fees for which the applicable statute of limitations has previously expired.

BE IT FURTHER RESOLVED that the Planning Commission **HEREBY RECOMMENDS** that the City Council:

1. **ADOPT** a Mitigated Negative Declaration for Application Numbers PEN16-0079 (PA15-0039) and PEN16-0080 (PA15-0040) pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

2. **ADOPT** the Mitigation Monitoring and Reporting Program prepared for Tentative Tract Map 37001 Application No. PEN16-0079 (PA15-0039) and Plot Plan Application PEN16-0080 (PA15-0040) for the Ironwood Village Design Guidelines pursuant to the California Environmental Quality Act (CEQA) Guidelines; and

3. **APPROVE** Tentative Tract Map 37001 Application No. PEN16-0079 (PA15-0039) based on the findings contained in this resolution, and subject to the attached conditions of approval included as Exhibit A.

4. **APPROVE** Plot Plan Application PEN16-0080 (PA15-0040) for the Ironwood Village Design Guidelines based on the findings contained in this resolution.

APPROVED this 26th day of January, 2017.

Brian Lowell
Chair, Planning Commission

ATTEST:

Richard J. Sandzimier, Planning Official

APPROVED AS TO FORM:

City Attorney

ATTACHED: Exhibit A: Conditions of Approval for TTM 37001 and Exhibit B: Ironwood Village Design Guidelines

CITY OF MORENO VALLEY
CONDITIONS OF APPROVAL
PEN16-0079 (PA15-0039) TENTATIVE TRACT MAP 37001
AND PEN16-0080 (PA15-0040) DESIGN GUIDELINES
For IRONWOOD VILLAGE
APN: 473-160-004

APPROVAL DATE:
EXPIRATION DATE:

_X_ Planning (P), including School District (S), Post Office (PO), Building (B)
_X_ Public Works, Land Development (LD)
_X_ Public Works, Special Districts (SD)
_X_ Public Works – Transportation Engineering (TE)
_X_ Fire Prevention Bureau (F)
_X_ Finance and Management Services Department, Moreno Valley Utility (MVU)
_X_ Police (PD)
_X_ Parks and Community Services (PCS)

COMMUNITY DEVELOPMENT DEPARTMENT

Planning Division

P1. This approval shall comply with all applicable requirements of the City of Moreno Valley Municipal Code.

P2. Approval of PEN16-0079 (PA15-0039) - Tentative Tract 37001 and PEN16-0080 (PA15-0040) – Ironwood Village Design Guidelines are subject to the approval of the related PEN16-0077 (PA15-0037) - General Plan Amendment and PEN16-0078 (PA15-0038) - Change of Zone applications.

P3. Tentative Tract Map 37001 (PEN16-0079/PA15-0039) shall expire three years after the approval date of this tentative map unless extended as provided by the City of Moreno Valley Municipal Code; otherwise it shall become null and void and of no effect whatsoever in the event the applicant or any successor in interest fails to properly file a final map before the date of expiration. (MC 9.02.230, 9.14.050, 080)

Timing Mechanisms for Conditions (see abbreviation at beginning of affected condition):

R - Map Recordation
GP - Grading Permits
CO - Certificate of Occupancy or building final
WP - Water Improvement Plans
BP - Building Permits
P - Any permit

Governing Document (see abbreviation at the end of the affected condition):

GP - General Plan
MC - Municipal Code
CEQA - California Environmental Quality Act
Ord – Ordinance
DG - Design Guidelines
Ldscp - Landscape Development Guidelines and Specs
Res – Resolution
UFC - Uniform Fire Code
UBC - Uniform Building Code
SBM - Subdivision Map Act

P4. The Ironwood Village Design Guidelines (PEN16-0080/PA15-0040) shall expire three years after the approval date of this plot plan unless extended as provided by the City of Moreno Valley Municipal Code; otherwise it shall become null and void and of no effect whatsoever in the event the applicant or any successor in interest fails to properly file the related final map (TTM 37001) before the date of expiration. (MC 9.02.230, 9.14.050, 080)

P5. The site shall be developed in accordance with the approved tentative map and design guidelines on file in the Community Development Department -Planning Division, the Municipal Code regulations, General Plan, and the conditions contained herein. (MC 9.14.020)

P6. A drought tolerant, low water using landscape palette shall be utilized throughout the tract to the extent feasible.

P7. All undeveloped portions of the site shall be maintained in a manner that provides for the control of weeds, erosion and dust. (MC 9.02.030)

P8. Development of the project requires both an architectural review and model home complex application for approval of the design of the future single-family homes. The architecture must be consistent with the Ironwood Village Design Guidelines including the residences, fencing and walls.

P9. All site plans, grading plans, landscape and irrigation plans, and street improvement plans shall be coordinated for consistency with this approval.

P10. Any signs indicated in the Ironwood Village Design Guidelines are not included with this approval. Any signs, whether permanent (e.g. wall, monument) or temporary (e.g. banner, flag), proposed for this development shall be designed in conformance with the sign provisions of the Development Code or approved sign program, if applicable, and shall require separate application and approval by the Planning Division. No signs are permitted in the public right of way. (MC 9.12)

PRIOR TO GRADING

P11. (GP) Prior to issuance of grading permits, the developer shall pay the applicable Stephen's' Kangaroo Rat (SKR) Habitat Conservation Plan mitigation fee. (Ord)

P12. Due to the presence of suitable habitat and in compliance with the MSHCP, a pre-construction survey for burrowing owl is required within 30 days prior to ground disturbance to determine the presence of burrowing owls and avoid potential direct take of burrowing owls if present.

P13. (GP) Prior to the issuance of grading permits, mitigation measures contained in the Mitigation Monitoring Program approved with this project shall be implemented as provided therein. A mitigation monitoring fee, as provided by City ordinance, shall be paid by the applicant within 30 days of project or tentative map approval. No City permit or approval shall be issued until such fee is paid. (CEQA)

P14. (GP) Prior to the issuance of grading permits, final erosion control landscape and irrigation plans for all cut or fill slopes over 3 feet in height shall be submitted to the Planning Division for review and approval for the phase in process. The plans shall be designed in accordance with the slope erosion plan as required by the City Engineer for that phase. Man-made slopes greater than 10 feet in height shall be "land formed" to conform to the natural terrain and shall be landscaped and stabilized to minimize visual scarring. (GP Objective 1.5, MC 9.08.080, DG)

P15. (GP) Prior to approval of precise grading plan, final front and street side yard landscape and irrigation plans shall be submitted to the Planning Division for review. The plans shall be prepared in accordance with the City's Municipal Code and landscape specifications, and include required street trees.

P16. (GP) Prior to issuance of grading permits, the developer shall submit wall/fence plans to the Planning Division for review and approval that are consistent with the Ironwood Village Design Guidelines.

P17. (GP) Prior to the issuance of any grading permit for permanent impacts in the areas designated as jurisdictional features, the Project applicant shall obtain regulatory permits from the USACE, RWQCB, and CDFW. The following shall be incorporated into the permitting, subject to approval by the regulatory agencies:

1. On-site or off-site creation, restoration and/or enhancement of USACE/RWQCB jurisdictional “waters of the U.S.” within the San Jacinto watershed at a ratio no less than 1:1 or within an adjacent watershed at a ratio no less than 2:1 for permanent impacts, and for any temporary impacts to restore the impact area to pre-Project conditions (i.e. pre-Project contours). Off-site mitigation may occur on land acquired for the purpose of in-perpetuity preservation as approved by the resource agencies, or through the purchase of mitigation credits at a resource agency-approved off-site mitigation bank or in-lieu fee program.

2. On-site or off-site creation, restoration, and/or enhancement of CDFW jurisdictional streambed within the San Jacinto watershed at a ratio no less than 1:1 or within an adjacent watershed at a ratio no less than 2:1 for permanent impacts, and for any temporary impacts to restore the impact area to pre-Project conditions (i.e. pre-Project contours). Off-site mitigation may occur on land acquired for the purpose of in-perpetuity

preservation as approved by the resource agencies, or through the purchase of mitigation credits at a resource agency-approved off-site mitigation bank or in-lieu fee program.

Purchase of any mitigation credits through an agency-approved mitigation bank or in-lieu fee program should occur prior to any impacts to jurisdictional drainages. Any mitigation proposed on land acquired for the purpose of in-perpetuity mitigation that is not part of an agency-approved mitigation bank or in-lieu fee program shall include the creation, restoration, and/or enhancement of similar streambed habitat pursuant to a resource agency-approved Habitat Mitigation and Monitoring Plan (HMMP). The HMMP shall be prepared prior to any impacts to jurisdictional features, and shall provide details as to the implementation of the mitigation, maintenance, and future monitoring of mitigation areas. The goal of the mitigation shall be to create, restore, and/or enhance similar habitat with equal or greater function and value than the impacted habitat.

P18. Prior to the issuance of any grading permit the Project applicant shall comply with all of the provisions of the MSHCP, including payment of the MSHCP Local Development Mitigation Fee, compliance with Section 6.1.2 of the MSHCP pertaining to Riparian/Riverine Areas, implementation of drainage, toxics and non-native species guidelines pertaining to the Urban/Wildlands Interface in Section 6.1.4 of the MSHCP, and compliance with Section 6.3.2 of the MSHCP pertaining to Burrowing Owl Survey Area requirements. Compliance with Section 6.1.2 of the MSHCP will require approval of the project Determination of Biologically Equivalent or Superior Preservation (DBESP) analysis outlining the impacts and proposed compensatory mitigation for impacts to the Riparian/Riverine Areas for approval by the wildlife agencies prior to issuance of a grading permit. The DBESP will be submitted to the wildlife agencies concurrent to the processing of regulatory permits for jurisdictional streambed impacts, in order to ensure that mitigation requirements proposed under the DBESP are commensurate with the preferences of the resource agencies (USACE, CDFW, and RWQCB) as part of subsequent regulatory permit conditions to be issued following adoption of the project MND.

PRIOR TO RECORDATION OF FINAL MAP

P19. (R) Prior to final map recordation, subdivision phasing (including any proposed common open space or improvement phasing, if applicable), shall be subject to the Planning Division approval. Any proposed phasing shall provide for adequate vehicular access to all lots in each phase as determined by the City Transportation Engineer or designee and shall substantially conform to all intent and purpose of the subdivision approval. (MC 9.14.080)

P20. (R) Prior to recordation of the final subdivision map, the developer shall submit for review and approval the following documents to the Planning Division which shall demonstrate that the project will be developed and maintained in accordance with the intent and purpose of the approval:

a. The document to convey title
b. Deed restrictions, easements, or Covenants, Conditions and Restrictions to be recorded

The approved documents shall be recorded at the same time that the subdivision map is recorded. The documents shall contain provisions for general maintenance of the site, water quality basins, onsite park, private trails, and landscaping. The approved documents shall also contain a provision, which provides that they may not be terminated and/or substantially amended without the consent of the City and the developer's successor-in-interest. (MC 9.14.090)

In addition, the following deed restrictions and disclosures shall be included within the document and grant deed of the properties:

- The developer, Ironwood Village Design Guidelines and Homeowners Association (HOA) shall promote the use of native plants and trees and drought tolerant species to the extent feasible.

- All lots designated for water quality basins, shall be dedicated to and maintained by a Homeowners Association (HOA). The HOA shall contract with a private maintenance entity or establish a funding mechanism approved by the City in a maintenance agreement for City maintenance. Language to this effect shall be included and reviewed within the required Covenant Conditions and Restrictions (CC&Rs) prior to the approval of the final map.

- All reverse frontage property and public right-of-way landscape areas, shall be maintained by a Homeowners Association (HOA) or through a property owner funded landscaping district maintained by the City. Language to this effect shall be included and reviewed within the required Covenant Conditions and Restrictions (CC&Rs) prior to the approval of the final map.

- A conservation easement for lettered lots shall be recorded on the deed of the property and shown on the final map. Said easement shall include access restrictions prohibiting motorized vehicles from these areas except on the maintenance road and access driveways for the water quality basins.

PRIOR TO BUILDING PERMIT

P21. (BP) Prior to issuance of building permits, the developer or developer's successor-in-interest shall pay all applicable impact fees, including but not limited to Transportation Uniform Mitigation fees (TUMF), Multi-species Habitat Conservation Plan (MSHCP) mitigation fees, and the City's adopted Development Impact Fees. (Ord)

P22. (BP) Prior to issuance of building permits, final front and street side yard landscape and irrigation plans, and slope landscape plans and basin landscape plans, shall be approved.

P23. (BP) Prior to issuance of building permits, landscape plans (trees, shrubs and groundcover) for basins maintained by an HOA, or other private entity, shall be approved for the sides and or slopes of all water quality basins and drainage areas. Fencing consistent with the Ironwood Village Design Guidelines and approved by the Community Development Director is required to secure all water quality and detention basins more than 18 inches in depth.

PRIOR TO CERTIFICATE OF OCCUPANCY

P24. (CO) Prior to the issuance of Certificates of Occupancy or building final, slope landscape and irrigation shall be installed. Landscaping on lots not yet having dwelling units shall be maintained by the developer weed and disease free. (MC 9.03.040)

P25. (CO) Prior to the issuance of Certificates of Occupancy or building final, all required and proposed fences and walls shall be constructed per the approved plans on file in the Planning Division. (MC 9.080.070)

P26. (CO) For a basin maintained by an HOA or other private entity, landscape (trees, shrubs and groundcover) and irrigation shall be installed, and maintained by the HOA or other private entity.

MITIGATION MEASURES

Air Quality

P27. MM AQ-1: The Project shall comply with the provisions of South Coast Air Quality Management District Rule 403, "Fugitive Dust." Rule 403 requires implementation of best available dust control measures during construction activities that generate fugitive dust, such as earth moving, grading, and equipment travel on unpaved roads. Prior to grading permit issuance, the City of Moreno Valley shall verify that the following notes are specified on the grading plan. Project construction contractors shall be required to ensure compliance with the notes and permit periodic inspection of the construction site by City of Moreno Valley staff or its designee to confirm compliance. These notes shall also be specified in bid documents issued to prospective construction contractors.

a) All clearing, grading, earth-moving, and excavation activities shall cease when winds exceed 25 miles per hour;

b) During grading and ground-disturbing construction activities, the construction contractor shall ensure that all unpaved roads, active soil stockpiles, and areas undergoing active ground disturbance within the Project site are watered at least three (3) times daily during dry weather. Watering, with complete coverage of disturbed areas by water truck, sprinkler system, or other comparable means, shall occur in the mid-morning, afternoon, and after work is done for the day;

c) Temporary signs shall be installed on the construction site along all unpaved roads indicating a maximum speed limit of 15 miles per hour (MPH). The signs shall be installed before construction activities commence and remain in place for the duration of construction activities that include vehicle activities on unpaved roads; and

d) The cargo area of all vehicles hauling soil, sand, or other loose earth materials shall be covered.

P28. **MM AQ-2:** The Project shall comply with the provisions of South Coast Air Quality Management District Rule 1186 "PM10 Emissions from Paved and Unpaved Roads and Livestock Operations" and Rule 1186.1, "Less-Polluting Street Sweepers" by complying with the following requirements. To ensure and enforce compliance with these requirements and reduce the release of criteria pollutant emissions into the atmosphere during construction, prior to grading and building permit issuance, the City of Moreno Valley shall verify that the following notes are included on the grading and building plans. Project construction contractors shall be required to ensure compliance with the notes and permit periodic inspection of the construction site by City of Moreno Valley staff or its designee to confirm compliance. The notes also shall be specified in bid documents issued to prospective construction contractors.

a) If visible dirt or accumulated dust is carried onto paved roads during construction, the contractor shall remove such dirt and dust at the end of each work day by street cleaning and

b) Street sweepers shall be certified by the South Coast Air Quality Management District as meeting the Rule 1186 sweeper certification procedures and requirements for PM10-efficient sweepers. All street sweepers having a gross vehicle weight of 14,000 pounds or more shall be powered with alternative (non-diesel) fuel or otherwise comply with South Coast Air Quality Management District Rule 1186.1.

P29. **MM AQ-3:** The Project is required to comply with the provisions of South Coast Air Quality Management District Rule 402 "Nuisance." To ensure and enforce compliance with this requirement, which applies to the release of odorous emissions into the atmosphere, prior to the issuance of grading and building permits, the City of Moreno Valley shall verify that the following note is included on grading and building plans. During Project construction, contractors shall be required to ensure compliance with Rule 402 and permit periodic inspection of the construction site by the City of Moreno Valley staff or its designee to confirm compliance.

Biological Resources

P30. **MM BIO-1:** Due to the presence of suitable habitat within the proposed off-site manufactured slope area located directly east of the Project boundary, a spring focused plant survey to determine the presence/absence of Parry's spineflower and white-bracted spineflower is required to be conducted during the appropriate blooming periods of the two species (between April and June) prior to ground disturbance. If individuals are found, significant impacts would occur as a result of implementation of the Project and unless mitigation is implemented to reduce impacts to less than significant. Mitigation includes seed collection of individuals that would be significantly impacted by the Project at the end of the growing season and prior to ground disturbance. Collected seeds will be planted within an appropriate on-site or off-site mitigation area, which will be conserved as open space in perpetuity. Mitigation for significant impacts to Parry's spineflower and white-bracted spineflower will be implemented in consultation with the City of Moreno Valley and CDFW.

P31. **MM BIO-2:** If burrowing owls are determined present during the 30-day pre-construction survey, occupied burrows shall be avoided to the greatest extent feasible, following the guidelines in the Staff Report on Burrowing Owl Mitigation published by Department of Fish and Wildlife including, but not limited to, conducting pre-construction surveys, avoiding occupied burrows during the nesting and non-breeding seasons, implementing a worker awareness program, biological monitoring, establishing avoidance buffers, and flagging burrows for avoidance with visible markers. If occupied burrows cannot be avoided, acceptable methods may be used to exclude burrowing owl either temporarily or permanently, pursuant to a Burrowing Owl Exclusion Plan that shall be prepared and approved by the County of Riverside Environmental Programs Department (EPD), in coordination with the CDFW. The Burrowing Owl Exclusion Plan shall be prepared in accordance with the guidelines in the Staff Report on Burrowing Owl Mitigation and the MSHCP.

P32. **MM BIO-3:** Prior to the issuance of any grading permit for permanent impacts in the areas designated as jurisdictional features, the Project applicant shall obtain regulatory permits from the USACE, RWQCB, and CDFW. The following shall be incorporated into the permitting, subject to approval by the regulatory agencies:

1. On-site or off-site creation, restoration and/or enhancement of USACE/RWQCB jurisdictional "waters of the U.S." within the San Jacinto watershed at a ratio no less than 1:1 or within an adjacent watershed at a ratio no less than 2:1 for permanent impacts, and for any temporary impacts to restore the impact area to pre-Project conditions (i.e. pre-Project contours). Off-site mitigation may occur on land acquired for the purpose of in-perpetuity preservation as approved by the resource agencies, or through the purchase of mitigation credits at a resource agency-approved off-site mitigation bank or in-lieu fee program.

2. On-site or off-site creation, restoration, and/or enhancement of CDFW jurisdictional streambed within the San Jacinto watershed at a ratio no less than 1:1 or within an adjacent watershed at a ratio no less than 2:1 for permanent impacts, and for any temporary impacts to restore the impact area to pre-Project conditions (i.e. pre-Project contours). Off-site mitigation may occur on land acquired for the purpose of in-perpetuity preservation as approved by the resource agencies, or through the purchase of mitigation credits at a resource agency-approved off-site mitigation bank or in-lieu fee program.

Purchase of any mitigation credits through an agency-approved mitigation bank or in-lieu fee program should occur prior to any impacts to jurisdictional drainages. Any mitigation proposed on land acquired for the purpose of in-perpetuity mitigation that is not part of an agency-approved mitigation bank or in-lieu fee program shall include the creation, restoration, and/or enhancement of similar streambed habitat pursuant to a resource agency-approved Habitat Mitigation and Monitoring Plan (HMMP). The HMMP shall be prepared prior to any impacts to jurisdictional features, and shall provide details as to the implementation of the mitigation, maintenance, and future monitoring of mitigation areas. The goal of the mitigation shall be to create, restore, and/or enhance similar habitat with equal or greater function and value than the impacted habitat.

P33. **MM BIO-4:** Prior to the issuance of any grading permit that would remove potentially suitable nesting habitat for raptors or songbirds, the Project applicant shall demonstrate to the satisfaction of the City of Moreno Valley that either of the following have been or will be accomplished:

1. Vegetation removal activities shall be scheduled outside the nesting season (September 1 to February 14 for songbirds; September 1 to January 14 for raptors) to avoid potential impacts to nesting birds.

2. Any construction activities that occur during the nesting season (February 15 to August 31 for songbirds; January 15 to August 31 for raptors) will require that all suitable habitat be thoroughly surveyed for the presence of nesting birds by a qualified biologist before commencement of clearing. If any active nests are detected a buffer of 300 feet (500 feet for raptors) around the nest adjacent to construction will be delineated, flagged, and avoided until the nesting cycle is complete. The buffer may be modified and/or other recommendations proposed as determined appropriate by the biological monitor to minimize impacts.

P34. **BIO-5:** Prior to the issuance of any grading permit the Project applicant shall comply with all of the provisions of the MSHCP, including payment of the MSHCP Local Development Mitigation Fee, compliance with Section 6.1.2 of the MSHCP pertaining to Riparian/Riverine Areas, implementation of drainage, toxics and non-native species guidelines pertaining to the Urban/Wildlands Interface in Section 6.1.4 of the MSHCP, and compliance with Section 6.3.2 of the MSHCP pertaining to Burrowing Owl Survey Area requirements. Compliance with Section 6.1.2 of the MSHCP will require approval of the project Determination of Biologically Equivalent or Superior Preservation (DBESP) analysis outlining the impacts and proposed compensatory mitigation for impacts to the Riparian/Riverine Areas for approval by the wildlife agencies prior to issuance of a grading permit. The DBESP will be submitted to the wildlife agencies concurrent to the processing of regulatory permits for jurisdictional streambed impacts, in order to ensure that mitigation requirements proposed under the DBESP are commensurate with the preferences of the resource agencies (USACE, CDFW, and RWQCB) as part of subsequent regulatory permit conditions to be issued following adoption of the project MND.

P35. **MM CULT 1:** Archaeologist Retained/CRMP Prepared. Prior to the issuance of a grading permit, the Project Applicant shall provide evidence to the City of Moreno Valley that a professional archaeological monitor has been retained by the Applicant to conduct monitoring of all mass grading and trenching activities and that the monitor has the authority to temporarily halt and redirect earthmoving activities in the event that suspected archaeological resources are unearthed during Project construction. The Project archaeologist, in coordination with the Consulting Tribes that have requested monitoring, shall prepare a Cultural Resources Monitoring Plan (CRMP) to document protocols for inadvertent finds, to determine potential protection measures from further damage and destruction for any identified archaeological resource(s)/ tribal cultural resources (TCRs), outline the process for monitoring and for completion of the final Phase IV Monitoring Report. If any archaeological and/or TCRs are identified during monitoring, these will also be documented and addressed per standard archaeological protocols in the Phase IV report, with the exception of human remains which will be addressed per MM CULT-13. The Project Archaeologist shall attend the pre-grading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.

P36. **MM CULT 2:** Tribal Monitor Retained. At least 30 days prior to the issuance of a Grading permit the Applicant shall contact the consulting Tribe(s) that have requested monitoring, to develop Monitoring Agreement(s) for all mass grading and trenching activities and shall provide evidence of the agreement to the City of Moreno Valley. The Tribal representative(s) shall attend the pre-grading meeting with the City and contractors to explain and coordinate the requirements of the monitoring program.

P37. **MM CULT 3:** Grading Plans. Prior to grading permit issuance, the City shall verify that the following note is included on the Grading Plan:

"If any suspected archaeological resources are discovered during ground-disturbing activities and the archaeological monitor or Tribal representatives are not present, the construction supervisor is obligated to halt work in a 100-foot radius around the find and call the project archaeologist and the Tribal representatives to the site to assess the significance of the find."

P38. **MM CULT 4:** Preservation Plan for CA-RIV-12,333. Prior to building permit issuance, the Project Applicant and the Consulting Tribe(s) shall prepare a Preservation and Maintenance Plan for the long-term care and maintenance of CA-RIV-12,333 and, if any, all new features identified during mass grading activities. The Plan shall indicate, at a minimum, the specific areas to be included in and excluded from long-term maintenance; prohibited activities; methods of preservation to be employed (fencing, vegetative deterrence, etc.); the entity(s) responsible for the long-term maintenance; maintenance scheduling and notification; appropriate avoidance protocols; monitoring by the Tribe and compensation for services if applicable; and necessary emergency protocols. The Project Applicant/Landowner shall submit a fully executed copy of the Preservation and Maintenance Plan to the City to ensure compliance with this mitigation measure.

P39. **MM CULT 5:** Conduct Archaeological Sensitivity Training for Construction Personnel. The Applicant shall retain a qualified professional archaeologist who shall conduct an Archaeological Sensitivity Training for construction personnel prior to commencement of excavation activities, along with representatives from Tribes that have requested monitoring. The training session, shall be carried out by a cultural resources professional with expertise in archaeology, will focus on how to identify archaeological/cultural resources that may be encountered during earthmoving activities, and the procedures to be followed in such an event. The training session will include a Power Point presentation and/or handouts for all attendees. The basic topics to be addressed in the session include: a brief cultural and archaeological history of the area and the Applicant's and City's cultural resource compliance obligations; training in potential resources that may be encountered through the use of photographs or other illustrations; the duties of archaeological monitors; notification and other procedures to follow upon discovery of resources; and, the general steps that would be followed to conduct a salvage investigation if one is necessary. A sign-in sheet shall be compiled to track attendance and shall be submitted to the City with the Archaeological Monitoring Report.

P40. **MM CULT 6:** Monitor Construction Excavations for Archeological Resources in Younger Alluvial Sediments. The Applicant shall retain a qualified archaeological monitor, who will work under the direction and guidance of a qualified professional archaeologist. The archaeological monitor shall be present during all construction excavations (e.g., grading, trenching, or clearing/grubbing) into non-fill younger Pleistocene alluvial sediments. Multiple earth-moving construction activities may require multiple archaeological monitors. The frequency of monitoring shall be based on the rate of excavation and grading activities, proximity to known archaeological resources, the materials being excavated (native versus artificial fill soils), and the depth of excavation, and if found, the abundance and type of archaeological resources encountered. Full-time monitoring can be reduced to part-time inspections, or ceased entirely, if determined adequate by the Project archaeologist.

P41. **MM CULT 7:** Inadvertent Finds. If, during mass grading and trenching activities, the Archaeologist or Tribal representatives/monitors suspect that an archaeological resource and/or TCR may have been unearthed, the monitor identifying the potential resources, in consultation with the other monitor as appropriate, shall immediately halt and redirect grading operations in a 100-foot radius around the find to allow identification and evaluation of the suspected resource. The Native American monitor(s) or appropriate representative(s) and the archaeological monitor shall evaluate the suspected resource and make a determination of significance pursuant to California Public Resources Code Section 21083.2. The archaeological monitor and tribal monitor(s) or appropriate representative(s), the Project Applicant, and the City Planning Division shall confer regarding mitigation of the discovered resource(s). All sacred sites, should they be encountered within the project area, shall be avoided and preserved as the preferred mitigation, if feasible. If preservation in place is not feasible, steps for treatment and disposition shall be carried out in accordance as set forth in per MM CULT-9.

P42. **MM CULT 8:** Final Phase IV Monitoring Report. Prior to building permit issuance, the Project archaeologist shall prepare a final Phase IV Monitoring Report as outlined in the CRMP, which shall be submitted to the City Planning Division, the appropriate Native American tribe(s), and the Eastern Information Center at the University of California, Riverside. The report shall document project impacts to CA-RIV-857, CA-RIV-3159 and CA-RIV-3341, including the relocation area and protection measures taken for CA-RIV-3341.

P43. **MM CULT 9:** Treatment and Disposition of Discoveries**.** In the event that Native American cultural resources are inadvertently discovered during the course of grading for this Project. The following procedures will be carried out for treatment and disposition of the discoveries:

1. Treatment and Final Disposition: The landowner(s) shall relinquish ownership of all cultural resources, including sacred items, burial goods, and all archaeological artifacts and non-human remains as part of the required mitigation for impacts to cultural resources. The applicant shall relinquish the artifacts through one or more of the following methods and provide the City of Moreno Valley Planning Department with evidence of same:

    a. Accommodate the process for Preservation In Place/Onsite reburial of the discovered items with the consulting Native American tribes or bands. This shall include measures and provisions to protect the future reburial area from any future impacts. Reburial shall not occur until all cataloguing and basic recordation have been completed;

    b. A curation agreement with an appropriate qualified repository within Riverside County that meets federal standards per 36 CFR Part 79 and therefore would be professionally curated and made available to other archaeologists/researchers for further study. The collections and associated records shall be transferred, including title, to an appropriate curation facility within Riverside County, to be accompanied by payment of the fees necessary for permanent curation:

    c. For purposes of conflict resolution, if more than one Native American tribe or band is involved with the project and cannot come to an agreement as to the disposition of cultural materials, they shall be curated at the Western Science Center by default.

P44. **MM CULT 10:** Conduct Paleontological Sensitivity Training for Construction Personnel. The Applicant shall retain a qualified paleontologist who shall conduct a Paleontological Sensitivity Training for construction personnel prior to commencement of excavation activities. The training session, shall be carried out by a cultural resources professional with expertise in paleontology, will focus on how to identify paleontological resources that may be encountered during earthmoving activities, and the procedures to be followed in such an event. The training session will include a Power Point presentation and/or handouts for all attendees. The basic topics to be addressed in the session include: a brief cultural and geologic history of the area and the City cultural resource compliance obligations; training in potential resources that may be encountered through the use of photographs or other illustrations; the duties of paleontological monitors; notification and other procedures to follow upon discovery of resources; and, the general steps that would be followed to conduct a salvage investigation if one is necessary.

P45. **MM CULT 11:** Monitor Construction Excavations for Paleontological Resources in Older Pleistocene Alluvial Deposits. The Applicant shall retain a qualified paleontological monitor, who will work under the guidance and direction of a qualified professional paleontologist. The paleontological monitor shall be present during all construction excavations (e.g., grading, trenching, or clearing/grubbing) into non-fill older Pleistocene alluvial deposits. Multiple earth-moving construction activities may require multiple paleontological monitors. The frequency of monitoring shall be based on the rate of excavation and grading activities, proximity to known paleontological resources and/or unique geological features, the materials being excavated (native versus artificial fill soils), and the depth of excavation, and if found, the abundance and type of paleontological resources and/or unique geological features encountered. Full-time monitoring can be reduced to part-time inspections if determined adequate by the qualified professional paleontologist.

P46. **MM CULT 12:** Cease Ground-Disturbing Activities and Implement Treatment Plan if Paleontological Resources Are Encountered. In the event that paleontological resources and or unique geological features are unearthed during ground-disturbing activities, ground-disturbing activities shall be halted or diverted away from the vicinity of the find so that the find can be evaluated. A buffer area of at least 25 feet shall be established around the find where construction activities shall not be allowed to continue. Work shall be allowed to continue outside of the buffer area. The Applicant and City shall coordinate with a qualified professional paleontologist to develop an appropriate treatment plan for the resources. Treatment may include implementation of paleontological salvage excavations to remove the resource along with subsequent laboratory processing and analysis or preservation in place. At the paleontologist's discretion and to reduce any construction delay, the grading and excavation contractor shall assist in removing rock samples for initial processing. Any fossils encountered and recovered shall be prepared to the point of taxonomic identification and catalogued and curated to a suitable museum or other repository with a research interest in the materials, such as the San Bernardino County Museum or Western Science Center. If no institution accepts the fossil collection, they shall be donated to a local school in the area for educational purposes. Accompanying notes, maps, and photographs shall also be filed at the repository and/or school.

P47. **MM CULT 13:** Cease Ground-Disturbing Activities and Notify County Coroner If Human Remains Are Encountered. If human remains are unearthed during implementation of the Proposed Project, the City shall comply with State Health and Safety Code Section 7050.5. The City shall immediately notify the County

Coroner and no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to PRC Section 5097.98. If the remains are determined to be of Native American descent, the coroner has 24 hours to notify the Native American Heritage Commission (NAHC). The NAHC shall then identify the person(s) thought to be the Most Likely Descendent (MLD). The MLD may, with the permission of the landowner, inspect the site of the discovery of the Native American remains and may recommend to the landowner means for treating or disposing, with appropriate dignity, the human remains and any associated funerary objects. The MLD shall complete their inspection and make their recommendation within 48 hours of being granted access by the landowner to inspect the discovery. The recommendation may include the scientific removal and nondestructive analysis of human remains and cultural items associated with Native American burials. Upon the discovery of the Native American remains, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located, is not damaged or disturbed by further development activity until the landowner has discussed and conferred, as prescribed in this mitigation measure, with the MLD regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. The landowner shall discuss and confer with the descendants all reasonable options regarding the descendants' preferences for treatment. MLDs in the region typically recommend reburial of the remains as close to the original burial location as feasible accompanied by a ceremony. The MLD shall file a record of the reburial with the NAHC and the Project archaeologist shall file a record of the reburial with the CHRIS-EIC.

If the NAHC is unable to identify a MLD, or the MLD identified fails to make a recommendation, or the landowner rejects the recommendation of the MLD and the mediation provided for in Subdivision (k) of Section 5097.94, if invoked, fails to provide measures acceptable to the landowner, the landowner or his or her authorized representative shall inter the human remains and items associated with Native American human remains with appropriate dignity on the facility property in a location not subject to further and future subsurface disturbance. A record of the reburial shall be filed with the NAHC and the CHRIS-EIC.

Geology and Soils

P48. **MM GEO-1:** Site-specific structural and seismic design parameters and recommendations for foundations, retaining walls/shoring, and excavation shall be implemented per the Project's Preliminary Geotechnical Evaluation and the Supplemental Geotechnical Evaluation, subject to review and approval by the City of Moreno Valley Building Safety Department.

P49. **Project Design Feature-GEO-1:** The Project applicant would construct reinforced concrete or block privacy walls on Lots 36, 37, 38, 39, and 40 to provide supplementary protection and to prevent small, nuisance rockfall from accumulating in proposed residential areas.

Hazards and Hazardous Materials

P50. **MM HAZ-1:** The Project applicant shall implement a Project-specific Fuel Modification Plan based on the *General Guidelines for Creating Defensible Space* prepared by the California Department of Forestry and Fire Protection (2006). The Fuel Modification Plan shall be subject to review and approval by the Moreno Valley Fire Department.

Noise

P51. **MM NOISE-1**: Prior to approval of the grading plans and/or issuance of building permits, plans shall include a note indicating that noise-generating Project construction activities shall only occur between the hours of 7:00 AM and 7:00 PM, Monday through Friday, excluding holidays, and from 8:00 AM and 4:00 PM on Saturday, unless written approval is obtained from the City's building official or city engineer. The Project construction supervisor shall ensure compliance with the note and the City shall conduct periodic inspection at its discretion.

P52. **MM NOISE-2**: The Project applicant shall install temporary noise control barriers that provide a minimum noise level attenuation of 10 dBA when Project construction occurs near existing noise-sensitive structures. The noise control barrier must present a solid face from top to bottom. The noise control barrier must be designed with appropriate height and length to block the view of the noise source. Unnecessary openings shall not be made.

The noise barrier may be constructed using an acoustical blanket (e.g. vinyl acoustic curtains or quilted blankets) attached to the construction site perimeter fence or equivalent temporary fence posts.

The noise barriers must be maintained and any damage promptly repaired. Gaps, holes, or weaknesses in the barrier or openings between the barrier and the ground shall be promptly repaired.

The noise control barriers and associated elements shall be completely removed and the site appropriately restored upon the conclusion of the construction activity.

P53. **MM NOISE-3**: During all Project site construction, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise sensitive receptors nearest the Project site.

P54. **MM NOISE-4**: The construction contractor shall locate equipment staging in areas that would create the greatest distance between construction-related noise sources and noise-sensitive receivers nearest the Project site (i.e., to the northern center) during all Project construction.

P55. **MM NOISE-5**: The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment (between the hours of 7:00 AM and 7:00 PM, Monday through Friday, excluding holidays, and from 8:00 AM and 4:00 PM on Saturday, unless written approval is obtained from the City's building official or city engineer). The contractor shall design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.

P56. **MM NOISE-6**: Exterior Noise Mitigation: The Project applicant shall construct 4-foot high noise barriers for the outdoor living areas (backyards) of residential lots 26 to 30. The recommended noise control barriers shall be constructed so that the top of each wall extends to the recommended height above the pad elevation of the lit it is shielding. When the road is elevated above the pad elevation, the barrier shall extend to the recommended height above the highest point between the residential home and the road. The barriers shall provide a weight of at least 4 pounds per square foot of face area with no decorative cutouts or line-of-sight openings between shielded areas and the roadways. The noise barrier shall be constructed using one of the following materials: masonry block; stucco veneer over wood framing (or foam core), or 1-inch thick tongue and groove wood of sufficient weight per square foot; glass (1/4-inch thick), or other transparent material with sufficient weight per square feet; earthen berm; or any combination of these construction materials. The barrier must present a solid face from top to bottom. Unnecessary openings or decorative cutouts shall not be made. All gaps (except for weep holes) shall be filled with grout or caulking.

P57. **MM NOISE-7**: Interior Noise Mitigation: The Project applicant shall provide the following or equivalent measures:

- Windows: All windows and sliding glass doors shall be well fitted with well weather-stripped assemblies and a minimum STC rating of 27.
- Doors: All exterior doors shall be well weather-stripped solid core assemblies at least 1 ¾-inch thick.
- Roof: Roof sheathing of wood construction shall be well fitted or caulked plywood of at ½-inch thick. Ceilings shall be well fitted, well-sealed gypsum board of at least ½-inch thick.
- Attic: Attic vents shall be oriented away from Ironwood Avenue. If such an orientation cannot be avoided, then an acoustical baffle shall be placed in the attic space behind the vents. Insulation with at least a rating of R-19 shall be used in the attic space.

- Ventilation: When any habitable room is in use, arrangements shall be such that circulated air is received when any exterior door(s) or window(s) are closed. A forced air circulation system (e.g. air conditions) or active ventilation system (e.g. fresh air supply) shall be provided which satisfies the requirements of the Uniform Building Code.

<u>Public Services</u>

P58. **MM PS-1:** Construction Traffic Management Plan - A Construction Traffic Management Plan shall be developed by the Project contractor in consultation with the Project's traffic and/or civil engineer and approved by the City of Moreno Valley Department of Public Works prior to issuance of any Project demolition, grading or excavation permit. The Construction Traffic Management Plan shall also be reviewed and approved by the MVFD. The City of Moreno Valley Department of Public Works reserves the right to reject any engineer at any time and to require that the Plan be prepared by a different engineer. The construction management plan shall include, at a minimum, the following:

- The name and telephone number of a contact person who can be reached 24 hours a day regarding construction traffic complaints or emergency situations;
- An up-to-date list of local police, fire, and emergency response organizations and procedures for the continuous coordination of construction activity, potential delays, and any alerts related to unanticipated road conditions or delays, with local police, fire, and emergency response agencies. Coordination shall include the assessment of any alternative access routes that might be required through the site, and maps showing access to and within the site and to adjacent properties;
- Procedures for the training and certification of the flag persons used in implementation of the Construction Traffic Management Plan;
- The location, times, and estimated duration of any roadway closures, traffic detours, use of protective devices, warning signs, and staging or queuing areas;
- Identify the locations of the off-site truck parking and staging and provide measures to ensure that trucks use the specified haul route, and do not travel through nearby residential neighborhoods or schools;
- Schedule vehicle movements to ensure that there are no vehicles waiting off-site and impeding public traffic flow on surrounding streets;
- Establish requirements for loading/unloading and storage of materials on the Project site;
- During construction activities when construction worker parking cannot be accommodated on the Project site, a Construction Worker Parking Plan shall be prepared which identifies alternate parking location(s) for construction workers and the method of transportation to and from the

Project site (if beyond walking distance) for approval by the City of Moreno Valley. The Construction Worker Parking Plan shall prohibit construction worker parking on residential streets and prohibit on-street parking, except as approved by the City.

Transportation/Traffic

P59. **MM TRAF-1**: The Project applicant shall participate in the funding of off-site improvements, including traffic signals that are needed to serve cumulative traffic conditions through the payment of TUMF and City DIF fees (if the improvements are included in the TUMF or DIF programs) or on a fair share basis (if the improvements are not included in the TUMF or DIF programs). These fees shall be collected by the City, with the proceeds solely used as part of a funding mechanism used to ensure that regional highways and arterial expansions keep pace with the projected population increases.

P60. **Project Design Feature-TRAF-1:** As recommended by the project's traffic consultant, prior to project occupancy, three potential speed hump locations have been proposed along Street "A". Final speed hump locations to be reviewed and approved by the City's Traffic Engineer. Further, prior to project occupancy, potential all-way stop locations, to be determined if warranted by the City's Traffic Engineer, have also been recommended in three locations along Street "A".

Building and Safety Division

B1. New buildings/structures shall comply with the current California Building Standards Code (CBC, CEC, CMC, CPC and Green Building Standards) as well as City ordinances. Plans shall be submitted to the Building and Safety Division as a separate submittal and shall include a soils report at time of first submittal.

B2. Prior to the issuance of a building permit, the applicant shall submit a properly completed "Waste Management Plan" (WMP), as required, as a portion of the building or demolition permit process.

B3. Building plans and instruments of service submitted with a building permit application shall be signed and sealed by a California licensed design professional as required by the State Business and Professions Code.

B4. The proposed new development may be subject to the payment of development fees as required by the City's Fee Ordinance at the time an application is submitted or prior to the issuance of permits as determined by the City.

SCHOOL DISTRICT – Moreno Valley Unified School District

S1. (BP) Prior to issuance of building permits, the developer shall provide to the Community Development Director a written certification by the affected school district that either: (1) the project has complied with the fee or other exaction levied on the project by the governing board of the district, pursuant to Government Code Section 65996; or (2) the fee or other requirement does not apply to the project.

UNITED STATES POSTAL SERVICE

PO1. (BP) Prior to the issuance of building permits, the developer shall contact the U.S. Postal Service to determine the appropriate type and location of mailboxes.

PUBLIC WORKS DEPARTMENT – LAND DEVELOPMENT DIVISION

The following are the Public Works Department – Land Development Division Conditions of Approval for this project and shall be completed at no cost to any government agency. All questions regarding the intent of the following conditions shall be referred to the Land Development Division.

General Conditions

LD1. (G) The developer shall comply with all applicable City ordinances and resolutions including the City's Municipal Code (MC) and if subdividing land, the Government Code (GC) of the State of California, specifically Sections 66410 through 66499.58, said sections also referred to as the Subdivision Map Act (SMA). [MC 9.14.010]

LD2. (G) The tentative map shall correctly show all existing easements, traveled ways, and drainage courses. Any omission may require the map or plans associated with this application to be resubmitted for further consideration. [MC 9.14.040(A)]

LD3. (G) In the event right of way or offsite easements are required to construct offsite improvements necessary for the orderly development of the surrounding area to meet the public health and safety needs, the developer shall make a good faith effort to acquire the needed right of way in accordance with the Land Development Division's administrative policy. If unsuccessful, the Developer shall enter into an agreement with the City to acquire the necessary right of way or offsite easements and complete the improvements at such time the City acquires the right of way or offsite easements which will permit the improvements to be made. The developer shall be responsible for all costs associated with the right of way or easement acquisition. [GC 66462.5]

LD4. (G) If improvements associated with this project are not initiated within two (2) years of the date of approval of the Public Improvement Agreement (PIA), the City Engineer may require that the engineer's estimate for improvements associated with the project be modified to reflect current City construction costs in effect at the time of request for an extension of time for the PIA or issuance of a permit.

LD5. (G) The developer shall monitor, supervise and control all construction and construction supportive activities, so as to prevent these activities from causing a public nuisance, including but not limited to, insuring strict adherence to the following:

a. Removal of dirt, debris, or other construction material deposited on any public street no later than the end of each working day.

b. Observance of working hours as stipulated on permits issued by the Land Development Division.

c. The construction site shall accommodate the parking of all motor vehicles used by persons working at or providing deliveries to the site.

d. All dust control measures per South Coast Air Quality Management District (SCAQMD) requirements during the grading operations.

Violation of any condition, restriction or prohibition set forth in these conditions shall subject the owner, applicant, developer or contractor(s) to remedy as noted in City Municipal Code 8.14.090. In addition, the City Engineer or Building Official may suspend all construction related activities for violation of any condition, restriction or prohibition set forth in these conditions until such time as it has been determined that all operations and activities are in conformance with these conditions.

LD6. (G) The developer shall protect downstream properties from damage caused by alteration of drainage patterns (i.e. concentration or diversion of flow, etc.). Protection shall be provided by constructing adequate drainage facilities, including, but not limited to, modifying existing facilities or by securing a drainage easement. [MC 9.14.110]

LD7. (G) Public drainage easements, when required, shall be a minimum of 25 feet wide and shall be shown on the map and plan, and noted as follows: *“Drainage Easement – no structures, obstructions, or encroachments by landfills are allowed.”* In addition, the grade within the easement area shall not exceed a 3:1 (H:V) slope, unless approved by the City Engineer.

LD8. (G) For single family residential subdivisions, all lots shall drain toward the street unless otherwise approved by the City Engineer. Residential lot drainage to the street shall be by side yard swales, and must be directed to a driveway or drainage devices located outside the right of way in accordance with City Standard MVSI-154-0. No cross-lot or over the sidewalk drainage shall be allowed.

LD9. (G) Prior to any plan approval, a final detailed drainage study (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer. The study shall include existing and proposed hydrologic conditions as well as hydraulic calculations for all drainage control devices and storm drain lines. [MC 9.14.110(A.1)]. **The post-development flowrates shall not exceed the pre-development flowrates exiting the tract.** A digital (pdf) copy of the approved drainage study shall be submitted to the Land Development Division.

LD10. (G) Water quality best management practices (BMPs) designed to meet Water Quality Management Plan (WQMP) requirements for single-family residential development shall not be used as a construction BMP. Water quality BMPs shall be maintained for the entire duration of the project construction and be used to treat runoff from those developed portions of the project. Water quality BMPs shall be protected from upstream construction related runoff by having proper best management practices in place and maintained. Water quality BMPs shall be graded per the approved design plans and once landscaping and irrigation has been installed, it and its maintenance shall be turned over to an established Homeowner's Association (HOA). The Homeowner's Association shall enter into an agreement with the City for basin maintenance.

LD11. (G) The final approved conditions of approval (COAs) and any applicable Mitigation Measures issued by the Planning Division shall be photographically or electronically placed on Mylar sheets and included in the Grading and Street Improvement plans.

LD12. (G) Aggregate slurry, as defined in Section 203-5 of Standard Specifications for Public Works Construction, may be required just prior to the end of the one-year warranty period of the public streets at the discretion of the City Engineer. If slurry is required, a slurry mix design shall be submitted for review and approved by the City Engineer. The latex additive shall be Ultra Pave 70 (for anionic) or Ultra Pave 65 K (for cationic) or an approved equal per the geotechnical report. The latex shall be added at the emulsion plant after weighing the asphalt and before the addition of mixing water. The latex shall be added at a rate of two to two-and-one-half (2 to 2½) parts to one-hundred (100) parts of emulsion by volume. Any existing striping shall be removed prior to slurry application and replaced per City standards.

Prior to Grading Plan Approval

LD13. (GPA) Grading plans (prepared by a registered/licensed civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

LD14. (GPA) Landscape & Irrigation plans (prepared by a registered/licensed landscape architect) for water quality BMPs shall be submitted for review and approved by the City Engineer per the current submittal requirements, if applicable.

LD15. (GPA) The developer shall ensure compliance with the City Grading ordinance, these Conditions of Approval and the following criteria:

a. The project street and lot grading shall be designed in a manner that perpetuates the existing natural drainage patterns with respect to tributary drainage area and outlet points. Unless otherwise approved by the City Engineer, lot lines shall be located at the top of slopes.

b. Any grading that creates cut or fill slopes adjacent to the street shall provide erosion control, sight distance control, and slope easements as approved by the City Engineer.

c. All improvement plans are substantially complete and appropriate clearance letters are provided to the City.

d. A soils/geotechnical report (addressing the soil's stability and geological conditions of the site) shall be submitted to the Land Development Division for review. A digital (pdf) copy of the soils/geotechnical report shall be submitted to the Land Development Division.

LD16. (GPA) The developer shall select Low Impact Development (LID) Best Management Practices (BMPs) designed per the latest version of the Water Quality Management Plan (WQMP) - a guidance document for the Santa Ana region of Riverside County.

LD17. (GPA) For projects that will result in discharges of storm water associated with construction with a soil disturbance of one or more acres of land, the developer shall submit a Notice of Intent (NOI) and obtain a Waste Discharger's Identification number (WDID#) from the State Water Quality Control Board (SWQCB) which shall be noted on the grading plans.

LD18. (GPA) Two (2) copies of the final project-specific Water Quality Management Plan (WQMP) shall be submitted for review and approved by the City Engineer, which:

a. Addresses Site Design Best Management Practices (BMPs) such as minimizing impervious areas, maximizing permeability, minimizes directly connected impervious areas to the City's street and storm drain systems, and conserves natural areas;

b. Incorporates Source Control BMPs and provides a detailed description of their implementation;

c. Describes the long-term operation and maintenance requirements for BMPs requiring maintenance; and

d. Describes the mechanism for funding the long-term operation and maintenance of the BMPs.

A copy of the final WQMP template can be obtained on the City's Website or by contacting the Land Development Division. A digital (pdf) copy of the approved final project-specific Water Quality Management Plan (WQMP) shall be submitted to the Land Development Division.

LD19. (GPA) A Storm Water Pollution Prevention Plan (SWPPP) shall be prepared in conformance with the State's current Construction Activities Storm Water General Permit. A copy of the current SWPPP shall be kept at the project site and be available for review upon request.

LD20. (GPA) The developer shall pay all remaining plan check fees.

LD21. (GPA) Resolution of all drainage issues shall be as approved by the City Engineer.

Prior to Grading Permit

LD22. (GP) The developer shall submit recorded slope easements from adjacent property owners in all areas where grading resulting in slopes is proposed to take place outside of the project boundaries, if applicable. For all other offsite grading, written permission from adjacent property owners shall be submitted, if applicable.

LD23. (GP) A receipt showing payment of the Area Drainage Plan (ADP) fee to Riverside County Flood Control and Water Conservation District shall be submitted. [MC 9.14.100(O)]

LD24. (GP) Security, in the form of a cash deposit (preferable), or letter of credit shall be submitted as a guarantee of the completion of the grading operations for the project. [MC 8.21.070]

LD25. (GP) Security, in the form of a cash deposit (preferable), or letter of credit shall be submitted as a guarantee of the implementation and maintenance of erosion control measures. At least twenty-five (25) percent of the required security shall be in the form of a cash deposit with the City. [MC 8.21.160(H)]

LD26. (GP) The developer shall pay all applicable inspection fees.

LD27. (GP) A digital (pdf) copy of the approved grading plans shall be submitted to the Land Development Division.

LD28. (GP) Prior to the payment of the Development Impact Fee (DIF), the developer may enter into a DIF Improvement Credit Agreement to secure credit for the construction of applicable improvements, if applicable. If the developer fails to complete this agreement prior to the timing specified above, no credits will be given. The developer shall pay current DIF fees adopted by the City Council. [Ord. 695 § 1.1 (part), 2005] [MC 3.38.030, 040, 050]

LD29. (BP) Prior to the payment of the Transportation Uniform Mitigation Fee (TUMF), the developer may enter into a TUMF Improvement Credit Agreement to secure credit for the construction of applicable improvements, if applicable. If the developer fails to complete this agreement by the timing specified above, no credits will be given. The developer shall pay current TUMF fees adopted by the City Council. [Ord. 835 § 2.1, 2012] [MC 3.44.060]

Prior to Map Approval

LD30. (MA) Final maps (prepared by a registered civil engineer and/or licensed surveyor) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

LD31. (MA) Resolution of all drainage issues shall be as approved by the City Engineer.

LD32. (MA) A copy of the Covenants, Conditions and Restrictions (CC&Rs) shall be submitted for review and approved by the City Engineer. The CC&Rs shall include, but not be limited to, access easements, reciprocal access, private and/or public utility easements as may be relevant to the project. In addition, for single-family residential development, bylaws and articles of incorporation shall also be included as part of the maintenance agreement for any water quality BMPs.

LD33. (MA) All street dedications shall be free of all encumbrances, irrevocably offered to the public and shall continue in force until the City accepts or abandons such offers, unless otherwise approved by the City Engineer.

LD34. (MA) The developer shall guarantee the completion of all related improvements required for this project by executing a Public Improvement Agreement (PIA) with the City and posting the required security. [MC 9.14.220]

LD35. (MA) All public improvement plans required for this project shall be approved by the City Engineer in order to execute the Public Improvement Agreement (PIA).

LD36. (MA) The developer shall enter into a Cooperative Agreement with the City and Riverside County Flood Control and Water Conservation District establishing the terms and conditions covering the inspection, operation and maintenance of Master Drainage Plan facilities required to be constructed as part of the project, if applicable.

LD37. (MA) The developer shall comply with the requirements of the City Engineer based on recommendations of the Riverside County Flood Control District regarding the construction of County Master Plan Facilities.

LD38. (MA) If the project involves the subdivision of land, maps may be developed in phases with the approval of the City Engineer. Financial security shall be provided for all public improvements associated with each phase of the map. The boundaries of any multiple map increment shall be subject to the approval of the City Engineer. The City Engineer may require the dedication and construction of necessary utility, street or other improvements beyond the project boundary, if the improvements are needed for circulation, parking, access, or for the welfare or safety of the public. [MC 9.14.080(B)(C), GC 66412 & 66462.5]

LD39. (MA) All proposed street names shall be submitted for review and approved by the City Engineer, if applicable. [MC 9.14.090(E.2.k)]

LD40. (MA) Under the current permit for storm water activities required as part of the National Pollutant Discharge Elimination System (NPDES) as mandated by the Federal Clean Water Act, this project is subject to the following requirements:

a. Establish a Home Owners Association (HOA) to finance the maintenance of the “Water Quality BMPs”. Any lots which are identified as “Water Quality BMPs” shall be owned in fee by the HOA.

b. Dedicate a maintenance easement to the City of Moreno Valley.

c. Execute a maintenance agreement between the City of Moreno Valley and the HOA, which shall be approved by City Council.

d. Provide a certificate of insurance per the terms of the maintenance agreement.

e. Select one of the following options to meet the financial responsibility to provide storm water utilities services for the required continuous operation, maintenance, monitoring system evaluations and enhancements, remediation and/or replacement, all in accordance with Resolution No. 2002-46.

i. Participate in the mail ballot proceeding in compliance with Proposition 218, for the Residential NPDES Regulatory Rate Schedule and pay all associated costs with the ballot process, or

ii. Establish an endowment to cover future maintenance costs for the Residential NPDES Regulatory Rate Schedule.

f. Notify the Special Districts Division of the intent to record the final map 90 days prior to City Council action authorizing recordation of the final map and the financial option selected. The final option selected shall be in place prior to the issuance of certificate of occupancy. [California Government Code & Municipal Code]

LD41. (MA) After recordation, a digital (pdf) copy of the recorded map shall be submitted to the Land Development Division.

Prior to Improvement Plan Approval

LD42. (IPA) All public improvement plans (prepared by a licensed/registered civil engineer) shall be submitted for review and approved by the City Engineer per the current submittal requirements.

LD43. (IPA) The developer shall submit clearances from all applicable agencies, and pay all applicable plan check fees.

LD44. (IPA) The street improvement plans shall comply with current City policies, plans and applicable City standards (i.e. MVSI-160 series, etc.) throughout this project.

LD45. (IPA) The design plan and profile shall be based upon a centerline, extending beyond the project boundaries a minimum distance of 300 feet at a grade and alignment approved by the City Engineer.

LD46. (IPA) The plans shall indicate any restrictions on trench repair pavement cuts to reflect the City's moratorium on disturbing newly-constructed pavement less than three (3) years old and recently slurry sealed streets less than one (1) year old. Pavement cuts for trench repairs may be allowed for emergency repairs or as specifically approved by the City Engineer.

LD47. Prior to precise grading plan approval, all dry and wet utilities shall be shown on the plans and any crossings shall be potholed to determine actual location and elevation. Any conflicts shall be identified and addressed on the plans. The pothole survey data shall be submitted to Land Development with the public improvement plans for reference purposes only. The developer is responsible to coordinate with all affected utility companies and bear all costs of any utility relocation.

LD48. (IPA) The developer is required to bring any existing access ramps adjacent to and fronting the project to current ADA (Americans with Disabilities Act) requirements. However, when work is required in an intersection that involves or impacts existing access ramps, all access ramps in that intersection shall be retrofitted to comply with current ADA requirements, unless approved otherwise by the City Engineer.

LD49. (IPA) Drainage facilities (i.e. catch basins, etc.) with sump conditions shall be designed to convey the tributary 100-year storm flows. Secondary emergency escape shall also be provided.

LD50. (IPA) The hydrology study shall be designed to accept and properly convey all off-site drainage flowing onto or through the site. All storm drain design and improvements shall be submitted for review and approved of the City Engineer. In the event that the City Engineer permits the use of streets for drainage purposes, the provisions of current City standards shall apply. Should the quantities exceed the street capacity or the use of streets be prohibited for drainage purposes, as in the case where one travel lane in each direction shall not be used for drainage conveyance for emergency vehicle access on streets classified as minor arterials and greater, the developer shall provide adequate facilities as approved by the City Engineer. [MC 9.14.110 A.2]

Prior to Encroachment Permit

LD51. (EP) All work performed within public right of way requires an encroachment permit. Security (in the form of a cash deposit or other approved means) may be required as determined by the City Engineer. All inspection fees shall be paid prior to issuance of construction permit. [MC 9.14.100(C.4)]

LD52. (EP) A digital (pdf) copy of all approved improvement plans shall be submitted to the Land Development Division.

LD53. (EP) All applicable inspection fees shall be paid.

Prior to Building Permit

LD54. (BP) For all subdivision projects, the map shall be recorded (excluding model homes). [MC 9.14.190]

LD55. (BP) Certification to the line, grade, flow test, and system invert elevations for the water quality control BMPs shall be submitted or review and approved by the City Engineer (excluding models homes).

LD56. (BP) Residential subdivision projects are subject to the following requirements under the current permit for storm water activities required as part of the National Pollutant Discharge Elimination System (NPDES) as mandated by the Federal Clean Water Act:

a. Establish a Home Owners Association (HOA) to finance the maintenance of the “Water Quality BMPs”. Any lots which are identified as “Water Quality BMPs” shall be owned in fee by the HOA.

b. Dedicate a maintenance easement to the City of Moreno Valley.

c. Execute a maintenance agreement between the City of Moreno Valley and the HOA, which shall be approved by City Council.

d. Provide a certificate of insurance per the terms of the maintenance agreement.

e. Select one of the following options to meet the financial responsibility to provide storm water utilities services for the required continuous operation, maintenance, monitoring system evaluations and enhancements, remediation and/or replacement, all in accordance with Resolution No. 2002-46.

i. Participate in the mail ballot proceeding in compliance with Proposition 218, for the Residential NPDES Regulatory Rate Schedule and pay all associated costs with the ballot process, or

ii. Establish an endowment to cover future maintenance costs for the Residential NPDES Regulatory Rate Schedule.

f. Notify the Special Districts Division of the intent to obtain a building permit 90 days prior to the City's issuance of a building permit and the financial option selected. [California Government Code & Municipal Code]

LD57. (BP) An engineered-fill certification, rough grade certification and compaction report shall be submitted for review and approved by the City Engineer. A digital (pdf) copy of the approved compaction report shall be submitted to the Land Development Division. All pads shall meet pad elevations per approved grading plans as noted by the setting of "blue-top" markers installed by a registered land surveyor or licensed civil engineer.

Prior to Occupancy

LD58. (CO) The engineered final/precise grade certification shall be submitted for review and approved by the City Engineer.

LD59. (CO) All outstanding fees shall be paid.

LD60. (CO) The developer shall complete all public improvements in conformance with current City standards, except as noted in the Special Conditions, including but not limited to the following:

a. Street improvements including, but not limited to: pavement, base, curb and/or gutter, cross gutters, spandrel, sidewalks, drive approaches, pedestrian ramps, street lights, signing, striping, under sidewalk drains, landscaping and irrigation, medians, redwood header boards, pavement tapers/transitions and traffic control devices as appropriate.

b. Storm drain facilities including, but not limited to: storm drain pipe, storm drain laterals, open channels, catch basins and local depressions.

c. City-owned utilities.

d. Sewer and water systems including, but not limited to: sanitary sewer, potable water and recycled water.

e. Under grounding of all existing and proposed utilities adjacent to and on-site. [MC 9.14.130]

f. Relocation of overhead electrical utility lines including, but not limited to: electrical, cable and telephone.

LD61. (CO) For residential subdivisions, prior to releasing the last 20% or last 5 permitted structures (whichever is greater, unless otherwise determined by the City Engineer) of any Map Phase, punch list work for improvements and capping of streets in that phase shall be completed and approved for acceptance by the City Engineer.

LD62. (CO) The Developer shall comply with the following water quality related items:

a. Notify the Land Development Division prior to construction and installation of all structural BMPs so that an inspection can be performed.

b. Demonstrate that all structural BMPs described in the approved final project-specific WQMP have been constructed and installed in conformance with the approved plans and specifications;

c. Demonstrate that Developer is prepared to implement all non-structural BMPs described in the approved final project-specific WQMP; and

d. Demonstrate that an adequate number of copies of the approved final project-specific WQMP are available for future owners/occupants.

e. Clean and repair the water quality BMP's, including re-grading to approved civil drawings if necessary.

f. Provide City with updated Engineer's Line and Grade Certification.

g. Obtain approval and complete installation of the irrigation and landscaping.

LD63. (CO) The applicant shall ensure the following, pursuant to Section XII. I. of the 2010 NPDES Permit:

a. Field verification that structural Site Design, Source Control and Treatment Control BMPs are designed, constructed and functional in accordance with the approved Final Water Quality Management Plan (WQMP).

b. Certification of best management practices (BMPs) from a state licensed civil engineer. An original WQMP BMP Certification shall be submitted for review and approved by the City Engineer.

Special Conditions

LD77. The following project engineering design plans (24"x36" sheet size) shall be submitted for review and approval as well as additional plans deemed necessary by the City during the plan review process:

a. Rough Grading Plan
b. Precise Grading Plan
c. Street Improvement Plan

d. Signing and Striping Plan
e. Final Drainage Study
f. As-Built Plans of all “plans” listed above.

LD78. Developer shall coordinate with the City regarding maintenance responsibilities of the water quality basins for this project.

LD79. All multi-use trails shall be shall be constructed per City Standard Series No. MVGF-610 Series, as applicable.

LD80. As-built drawings for precise grading plans shall be submitted for review and approval prior to the last issuance of certificate of occupancy for any construction phase or as determined by the City Engineer.

LD81. The developer shall be required to grade and build the water quality basins to allow maintenance vehicles access. This will be accomplished by separate designated road that permits vehicles the ability to drive into the basin. The City of Moreno Valley Land Development division, Storm Water Management Program section shall have final determination regarding the basin configuration and slope ratios. Signature on the grading plans by the Storm Water Management Program shall be required per the conditions of approval.

LD82. Prior to street improvement plan approval, pavement core samples of existing pavement may be taken and findings submitted to the City for review and consideration of pavement improvements. The City will determine the adequacy of the existing pavement structural section. If the existing pavement structural section is found to be adequate, the developer may still be required to perform a one-tenth inch grind and overlay or slurry seal depending on the severity of existing pavement cracking, as required by the City Engineer. If the existing pavement section is found to be inadequate, the Developer shall replace the pavement to meet or exceed the City’s pavement structural section standard.

LD83. Prior to approval of any grading plan, the plans and the submitted drainage study shall clearly demonstrate this project’s increased runoff mitigation. This project shall not discharge runoff at a rate greater in the post developed condition than that in the pre-developed condition, for any given storm event. The storms to be studied include the 1-hour, 3-hour, 6-hour and 24-hour duration events for the 2-year, 5-year, 10-year and 100-year return frequencies.

LD84. Prior to rough grading plan approval, the grading plans shall clearly demonstrate, with detail, the proper function and design of the water quality basins). The design of the basin shall conform to City guidelines as found on the City’s website. The water quality basin design, including inlet/outlet/overflow/maintenance access locations, shall be designed per the approval of the City engineer.

LD85. Prior to rough grading plan approval, steep street grades such as those shown on the tentative tract map shall be approved by the City Engineer. Street intersection approach grades shall be designed per Standard MVSI-160C-0 to achieve adequate line of sight and stopping sight distances as approved by the City Engineer.

LD86. Prior to rough grading plan approval, the grading plan shall show all offsite flows being intercepted and directed to storm drain systems.

LD87. Prior to the issuance of the first building permit, a Construction Phasing Plan shall be submitted to the Land Development Division for review and approval, if applicable.

LD88. Prior to issuance of a building permit, the Developer shall submit Covenant Conditions and Restrictions (CCR's) stating that an HOA will be responsible for maintaining the open space areas as well as any other common facilities identified by the City Engineer.

LD89. Prior to issuance of a building permit, the Developer shall submit Covenant Conditions and Restrictions (CCR's) stating that an HOA will be responsible for maintaining open space areas and any other common facilities identified by the City Engineer.

LD90. Prior to final map approval, Lot "A shall be designated Open Space as shown on the tentative tract map.

LD91. Prior to final map approval, Lots "B", "C", "D", "E", "F", "G", "H", "L"and "P" shall be designated as landscape/walkway areas as determined by the Planning Division.

LD92. Prior to final map approval, Lots "J", "N", "O", shall be designated as trails as determined by the Parks and Community Services Department.

LD93. Prior to final map approval, the Developer shall guarantee the construction of the following improvements by entering into a public improvement agreement and posting security. The improvements shall be completed prior to occupancy of the first building or as otherwise determined by the City Engineer.

a. Nason St (66' RW / 44' CC) shall be constructed to half-width plus 12' per City Standard No. MVSI-106B-0. Improvements shall consist of, but not be limited to, pavement, base, curb, gutter, sidewalk, driveway approaches, cross gutter, any necessary drainage structures including catch basins, local depressions, storm drain, streetlights, pedestrian access ramps, and dry and wet utilities street dedication.

b. Oliver St (66' RW / 44' CC) shall be constructed to half-width plus 12' per City Standard No. MVSI-106B-0. Improvements shall consist of, but not be limited to, pavement, base, curb, gutter, sidewalk, driveway approaches, cross gutter, any necessary drainage structures including catch basins, local depressions, storm drain, streetlights, pedestrian access ramps, and dry and wet utilities and street dedication.

c. Ironwood Ave (88' RW / 64' CC) shall be constructed to half-width plus 12' per City Standard No. MVSI-105A-0. Improvements shall consist of, but not be limited to, pavement, base, curb, gutter, sidewalk, driveway approaches, cross gutter, any necessary drainage structures including catch basins, local depressions, storm drain, streetlights, pedestrian access ramps, and dry and wet utilities and street dedication, if applicable.

LD94. The Applicant shall substantiate all applicable Hydrologic Condition of Concern (HCOC) issues in the first submittal of the F-WQMP, if applicable.

LD95. The Applicant has proposed to incorporate the use of Extended Detention Basins. Final design details of the LID BMPs must be provided in the first submittal of the F-WQMP. The sizes of all LID BMPs are to be determined using the current procedures set forth the Riverside County Flood Control and Water Conservation District's Design Handbook for Low Impact Development Best Management Practices. The Applicant acknowledges that there are discrepancies between the basin routing calculations and the BMP worksheets. Address and coordinate all calculations in the document with the LID BMP worksheets for the F-WQMP submittal.

LD96. Prior to Occupancy Permit issuance, all overhead utilities including utility lines less than 115,000 volts fronting or within the entire project site boundary shall be placed underground per Section 9.14.130C of the City Municipal Code.

LD97. Prior to Occupancy Permit issuance, the Developer is required to repair, replace or install any damaged, substandard or missing improvements on Ironwood Ave. along the project frontage on Ironwood Ave, Nason St and Oliver St.

PUBLIC WORKS DEPARTMENT – SPECIAL DISTRICTS DIVISION

Conditions are standard to all or most development projects. Some special conditions, modified conditions or clarification of conditions may be included. Please review conditions as listed and contact the Division at 951.413.3480 for any questions.

Acknowledgement of Conditions

The following are the Special Districts Division's Conditions of Approval for PEN16-0079 this project shall be completed at no cost to any Government Agency. All questions regarding the following Conditions including but not limited to intent, requests for change/modification, variance and/or request for extension of time shall be sought from the Special Districts Division of the Public Works Department 951.413.3480 or by emailing specialdistricts@moval.org.

General Conditions

SD-1 The parcel(s) associated with this project have been incorporated into the Moreno Valley Community Services District Zone A (Parks & Community Services) and Zone C (Arterial Street Lighting). All assessable parcels therein shall be subject to annual parcel taxes for Zone A and Zone C for operations and capital improvements.

SD-2 Plans for parkway landscape areas designated in the project's Conditions of Approval for incorporation into a City coordinated landscape maintenance program, shall be prepared and submitted in accordance with the City of Moreno Valley Public Works Department Landscape Design Guidelines. The guidelines are available on the City's website at www.moval.org/sd or from the Special Districts Division (951.413.3480 or specialdistricts@moval.org).

SD-3 In the event the City of Moreno Valley determines that funds authorized by any Proposition 218 mail ballot proceeding are insufficient to meet the costs for parkway, slope, and/or open space maintenance and utility charges, the City shall have the right, at its option, to terminate the grant of any or all parkway, slope, and/or open space maintenance easements. This power of termination, should it be exercised, shall be exercised in the manner provided by law to quit claim and abandon the property so conveyed to the District, and to revert to the Developer or the Developer's successors in interest, all rights, title, and interest in said parkway, slope, and/or open space areas, including but not limited to responsibility for perpetual maintenance of said areas.

SD-4 The Developer, or the Developer's successors or assignees shall be responsible for all parkway landscape maintenance for a period of one (1) year commencing from the time all items of work have been completed to the satisfaction of Special Districts staff as per the City of Moreno Valley Public Works Department Landscape Design Guidelines, or until such time as the District accepts maintenance responsibilities.

SD-5 Plan check fees for review of parkway landscape plans for improvements that shall be maintained by the City of Moreno Valley are due upon the first plan submittal. (MC 3.32.040)

SD-6 Inspection fees for the monitoring of landscape installation associated with the City of Moreno Valley maintained parkways are due prior to the required pre-construction meeting. (MC 3.32.040)

SD-7 Street Light Authorization forms for all street lights that are conditioned to be installed as part of this project must be submitted to the Special Districts Division for approval, prior to street light installation. The Street Light Authorization form can be obtained from the utility company providing electric service to the project, either Moreno Valley Utility or Southern California Edison. For questions, contact the Special Districts Division at 951.413.3480 or specialdistricts@moval.org.

SD-8 Parkway landscape areas maintained as part of the City of Moreno Valley Community Facilities District 2014-01 shall be required to have independent utility systems, including but not limited to water, electric, and telephone services. An independent irrigation controller and pedestal will also be required. Combining utility systems with existing or future landscape areas not associated with the City of Moreno Valley Community Facilities District (CFD) landscaping will not be permitted.

Prior to Recordation of Final Map

SD-9 (R) This project has been conditioned to provide a funding source for the continued maintenance, enhancement, and/or retrofit of parks, open spaces, linear parks, and/or trail systems. The Developer shall satisfy this condition with one of the options below.

a. Participate in a special election for annexation into Community Facilities District No. 1 and pay all associated costs of the special election process and formation, if any; or

b. Establish an endowment fund to cover future maintenance costs for new neighborhood parks.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option prior to City Council action authorizing recordation of the final map for the development. A minimum of 90 days is needed to complete the special election process. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

Annexation to CFD No. 1 shall be completed or proof of payment to establish the endowment fund shall be provided prior to the issuance of the first building permit for this project.

SD-10 (R) This project has been identified to be included in the formation of a Community Facilities District for Public Safety services including but not limited to Police, Fire Protection, Paramedic Services, Park Rangers, and Animal Control services. The property owner(s) shall not protest the formation; however, they retain the right to object to the rate and method of maximum special tax. In compliance with Proposition 218, the property owner shall agree to approve the mail ballot proceeding (special election) for either formation of the CFD or annexation into an existing district that may already be established. The Developer must notify the Special Districts Division at 951.413.3480 or specialdistricts@moval.org of its intent to record the final map for the development 90 days prior to City Council action authorizing recordation of the map. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution. (California Government Code Section 53313 et. seq.)

SD-11 (R) This project is conditioned to provide a funding source for the following special financing program(s):

a. Street Lighting Services for capital improvements, energy charges, and maintenance.
b. Landscape Maintenance Services for parkway landscaping on Ironwood Avenue, Nason Street, and Oliver Street.

The Developer's responsibility is to provide a funding source for the capital improvements and the continued maintenance of the landscaped area. The Developer shall satisfy this condition with one of the options below.

i. Participate in a special election (mail ballot proceeding) and pay all associated costs of the special election and formation, if any. Financing may be structured through a Community Services District zone, Community Facilities District, Landscape and Lighting Maintenance District, or other financing structure as determined by the City; or

ii. Establish a Property Owner's Association (POA) or Home Owner's Association (HOA) which will be responsible for any and all operation and maintenance costs.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option prior to City Council action authorizing recordation of the final map for the development. The option for participating in a special election requires approximately 90 days to complete the special election process. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

The financial option selected shall be in place prior to the issuance of the first building permit for this project.

SD-12 (R) This project is conditioned to provide a funding source for the operation and maintenance of public improvements and/or services associated with new development in that territory. The Developer shall satisfy this condition with one of the options below.

a. Participate in a special election for maintenance/services and pay all associated costs of the election process and formation, if any. Financing may be structured through a Community Facilities District, Landscape and Lighting Maintenance District, or other financing structure as determined by the City; or

b. Establish an endowment fund to cover the future maintenance and/or service costs.

The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option prior to City Council action authorizing recordation of the final map for the development. A minimum of 90 days is needed to complete the special election process. This allows adequate time to be in compliance with the provisions of Article 13C of the California Constitution for conducting a special election.

The financial option selected shall be in place prior to the issuance of the first building permit for the project.

SD-13 *Residential* (R) If Land Development, a Division of the Public Works Department, requires this project to supply a funding source necessary to provide for, but not limited to, stormwater utilities services for the required continuous operation, maintenance, monitoring, systems evaluation and enhancements of on-site facilities and performing annual inspections of the affected areas to ensure compliance with state mandated storm water regulations, a funding source needs to be established. The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option for the National Pollution Discharge Elimination System (NPDES) program (see Land Development's related condition). Participating in a special election the process requires a 90 day period prior to City Council action authorizing recordation of the final map for the development and to participate in a special election process. This allows adequate time to be in compliance with the provisions of Article 13D of the California Constitution. California Health and Safety Code Sections 5473 through 5473.8 (Ord. 708 Section 3.1, 2006) & City of Moreno Valley Municipal Code Title 3, Section 3.50.050.)

SD-14 (R) Easements for reverse frontage parkway and slope landscape areas abutting Ironwood Avenue, Nason Street, and Oliver Street shall be 6 ft. or to top of parkway facing slope or to face of perimeter tract wall, whichever is greater. Easements shall be dedicated to the City of Moreno Valley for landscape maintenance purposes, and shall be depicted on the final map, and an offer of their dedication made thereon.

Prior to Building Permit Issuance

SD-15 (BP) This project has been identified to potentially be included in the formation of a Map Act Area of Benefit Special District for the construction of major thoroughfares and/or freeway improvements. The property owner(s) shall participate in such District and pay any special tax, assessment, or fee levied upon the project property for such District. At the time of the public hearing to consider formation of the district, the property owner(s) will not protest the formation, but will retain the right to object any eventual assessment that is not equitable should the financial burden of the assessment not be reasonably proportionate to the benefit the affected property obtains from the improvements to be installed. The Developer must notify the Special Districts Division at 951.413.3480 or at specialdistricts@moval.org of its selected financial option when submitting an application for the first building permit to determine whether the development will be subjected to this condition. If subject to the condition, the special election requires a 90 day process in compliance with the provisions of Article 13C of the California Constitution. (Street & Highway Code, GP Objective 2.14.2, MC 9.14.100).

SD-16 (BP) Prior to the issuance of the first building permit for this project, the Developer shall pay Advanced Energy fees for all applicable Residential and Arterial Street Lights required for this development. Payment shall be made to the City of Moreno Valley and collected by the Land Development Division. Fees are based upon the Advanced Energy fee rate in place at the time of payment, as set forth in the current Listing of City Fees, Charges, and Rates adopted by City Council. The Developer shall provide a copy of the receipt to the Special Districts Division *(specialdistricts@moval.org).* Any change in the project which may increase the number of street lights to be installed will require payment of additional Advanced Energy fees at the then current fee. Questions may be directed to the Special Districts Division at 951.413.3480 or specialdistricts@moval.org.

SD-17 (BP) For those areas to be maintained by the City and prior to the issuance of the first Building Permit, Planning Division (Community Development Department), Special Districts Division (the Public Works Department) and Transportation Division (the Public Works Department) shall review and approve the final parkway landscape/irrigation plans as designated on the tentative map or in these Conditions of Approval prior to the issuance of the first Building Permit.

SD-18 (BP) Parkway landscaping specified in the project's Conditions of Approval shall be constructed in compliance with the City of Moreno Valley Public Works Design Guidelines and completed prior to the issuance of 25% (or 46) of the dwelling permits for this tract or 12 months from the issuance of the first dwelling permit, whichever comes first. In cases where a phasing plan is submitted, the actual percentage of dwelling permits issued prior to the completion of the landscaping shall be subject to the review of the construction phasing plan.

Prior to Certificate of Occupancy

SD-19 (CO) Landscape and irrigation plans for parkway landscape areas designated to be maintained by the City shall be placed on compact disk (CD) in pdf format. The CD shall include "As Built" plans, revisions, and changes. The CD will become the property of the City of Moreno Valley and the Moreno Valley Community Services District.

PUBLIC WORKS DEPARTMENT – TRANSPORTATION DIVISION

GENERAL CONDITIONS

TE1. Ironwood Avenue is classified as a Minor Arterial (88'RW/64'CC) per City Standard Plan No. MVSI-105A-0. Traffic Signal Interconnect along project frontage shall be required per City Standard Plan No. MVSI-186-0. Any improvements undertaken by this project shall be consistent with the City's standards for this facility.

TE2. Oliver Street is designated as a Collector (66'RW/44'CC) per City Standard Plan No. MVSI-106B-0. Any improvements undertaken by this project shall be consistent with the City's standards for this facility.

TE3. Nason Street, north of Ironwood Avenue, is designated as a Collector (66'RW/44'CC) per City Standard Plan No. MVSI-106B-0. Any improvements undertaken by this project shall be consistent with the City's standards for this facility.

TE4. Sight distance at the proposed roadways and driveways shall conform to City of Moreno Valley Standard No. MVSI-164A,B,C-0 at the time of preparation of final grading, landscape, and street improvement plans.

TE5. Conditions of approval may be modified if project is phased or altered from any approved plans.

PRIOR TO IMPROVEMENT PLAN APPROVAL OR CONSTRUCTION PERMIT

TE7. Traffic calming features shall be required for Street "A". Prior to the final approval of the street improvement plans, a traffic calming plan prepared by a qualified, registered Civil or Traffic Engineer shall be required for plan approval or as required by the City Traffic Engineer.

TE8. Prior to the final approval of the street improvement plans, traffic signal modification plans shall be required for the existing traffic signal located at Nason Street and Ironwood Avenue intersection. Modifications may include but not limited to new signal poles, new pull boxes, new traffic detector loops or video detection system, relocation of signal controller cabinet, etc. Specific modifications shall be determined during plan check review.

TE9. Prior to the final approval of the street improvement plans, a signing and striping plan shall be prepared per the latest edition of the California Manual on Uniform Traffic Control Devices (CAMUTCD) and City of Moreno Valley Standard Plans for Nason Street, Inrowood Avenue, Oliver Street, and all interior streets.

TE10. Prior to the final approval of the street improvement plans, a bus stop/bus bay shall be designed, per the latest City of Moreno Valley Standard Plans, for westbound traffic and shall be located on the north side of Ironwood Avenue, just west of Oliver Street.

TE11. Prior to issuance of a construction permit, construction traffic control plans prepared by a qualified, registered Civil or Traffic Engineer shall be required for plan approval or as required by the City Traffic Engineer.

TE12. Prior to final approval of the street improvement plans, the project plans shall demonstrate that sight distance at proposed streets and driveways conforms to City Standard Plan No. MVSI-164A-0 through MVSI-164C-0.

PRIOR TO CERTIFICATE OF OCCUPANCY OR BUILDING FINAL

TE13. (CO) Prior to issuance of Certificate of Occupancy, improvements identified in TE7, TE8, TE9, and TE10 shall be completed per the approved plans to the satisfaction of the City Engineer.

TE14. (CO) Prior to issuance of Certificate of Occupancy, all signing and striping shall be installed per current City Standards and the approved plans.

PRIOR TO ACCEPTANCE OF STREETS INTO THE CITY-MAINTAINED ROAD SYSTEM

TE15. Prior to acceptance of streets into the City-maintained road system, all approved signing and striping shall be installed per current City Standards and the approved plans.

FIRE PREVENTION BUREAU

With respect to the conditions of approval, the following fire protection measures shall be provided in accordance with Moreno Valley City Ordinances and/or recognized fire protection standards:

F1. Final fire and life safety conditions will be addressed when the Fire Prevention Bureau reviews building plans. These conditions will be based on occupancy, use, California Building Code (CBC), California Fire Code (CFC), and related codes, which are in force at the time of building plan submittal.

F2. The Fire Prevention Bureau is required to set a minimum fire flow for the remodel or construction of all commercial buildings per CFC Appendix B and Table B105.1. The applicant/developer shall provide documentation to show there exists a water system capable of delivering 1000 GPM for 1 hour(s) duration at 20-PSI residual operating pressure. The required fire flow may be adjusted during the approval process to reflect changes in design, construction type, or automatic fire protection measures as approved by the Fire Prevention Bureau. Specific requirements for the project will be determined at time of submittal. (CFC 507.3, Appendix B).

F3. Single Family Dwellings. Schedule "A" fire prevention approved standard fire hydrants (6” x 4” x 2 ½”) located at each intersection of all residential streets and spaced no more than 500 feet apart in any direction, more than 250 feet from any portion of the building as measured along approved emergency vehicular travel ways. Minimum fire flow shall be 1000 GPM for 1 hour duration of 20 PSI. Where new water mains are extended along streets where hydrants are not needed for protection of structures or similar fire problems, serving one and two-family residential developments, standard fire hydrants shall be provided at spacing not to exceed 1000 feet along the tract boundary for transportation hazards. (CFC 507.3, Appendix B, MVMC 8.36.060).

F4. Prior to issuance of Certificate of Occupancy or Building Final, “Blue Reflective Markers” shall be installed to identify fire hydrant locations in accordance with City specifications. (CFC 509.1 and MVLT 440A-0 through MVLT 440C-0)

F5. During phased construction, dead end roadways and streets which have not been completed shall have a turn-around capable of accommodating fire apparatus. (CFC 503.1 and 503.2.5)

F6. If construction is phased, each phase shall provide an approved emergency vehicular access way for fire protection prior to any building construction. (CFC 501.4)

F7. Prior to issuance of Building Permits, the applicant/developer shall provide the Fire Prevention Bureau with an approved site plan for Fire Lanes and signage. (CFC 501.3)

F8. Prior to construction and issuance of building permits, all locations where structures are to be built shall have an approved Fire Department emergency vehicular access road (all weather surface) capable of sustaining an imposed load of 80,000 lbs. GVW, based on street standards approved by the Public Works Director and the Fire Prevention Bureau. (CFC 501.4 and MV City Standard Engineering Plan 108d)

F9. Prior to construction and issuance of Building Permits, fire lanes and fire apparatus access roads shall have an unobstructed width of not less than twenty–four (24) feet as approved by the Fire Prevention Bureau and an unobstructed vertical clearance of not less the thirteen (13) feet six (6) inches. (CFC 503.2.1 and MVMC 8.36.060[E])

F10. Prior to construction, all roads, driveways and private roads shall not exceed 12 percent grade. (CFC 503.2.7 and MVMC 8.36.060[G])

F11. Prior to construction, all locations where structures are to be built shall have an approved Fire Department access based on street standards approved by the Public Works Director and the Fire Prevention Bureau. (CFC 501.4)

F12. Prior to building construction, dead end roadways and streets which have not been completed shall have a turnaround capable of accommodating fire apparatus. (CFC 503.2.5)

F13. The angle of approach and departure for any means of Fire Department access shall not exceed 1 ft drop in 20 ft (0.3 m drop in 6 m), and the design limitations of the fire apparatus of the Fire Department shall be subject to approval by the AHJ. (CFC 503 and MVMC 8.36.060)

F14. Prior to issuance of the building permit for development, independent paved access to the nearest paved road, maintained by the City shall be designed and constructed by the developer within the public right of way in accordance with City Standards. (MVMC 8.36.060, CFC 501.4)

F15. Prior to construction, "private" driveways over 150 feet in length shall have a turn-around as determined by the Fire Prevention Bureau capable of accommodating fire apparatus. Driveway grades shall not exceed 12 percent. (CFC 503 and MVMC 8.36.060, CFC 501.4)

F16. Prior to issuance of Certificate of Occupancy or Building Final, all residential dwellings shall display street numbers in a prominent location on the street side of the residence in such a position that the numbers are easily visible to approaching emergency vehicles. The numbers shall be located consistently on each dwelling throughout the development. The numerals shall be no less than four (4) inches in height and shall be low voltage lighted fixtures. (CFC 505.1, MVMC 8.36.060[I])

F17. Prior to Certificate of Occupancy or Building Final, all structures shall have fire retardant roofing materials (Class A roofs) as described in CBC Chapter 7A, CRC R327, and CFC Chapter 49.

F18. Preliminary fuel modification plans shall be reviewed and approved by the fire code official prior to recording of the final map. Final fuel modification plans shall be submitted to and approved by the fire code official prior to the issuance of a grading permit.

F19. Prior to issuance of Building Permits, plans for structural protection from vegetation fires shall be submitted to the Fire Prevention Bureau for review and approval. Measures shall include, but are not limited to: noncombustible barriers (cement or block walls), fuel modification zones, etc. (CFC Chapter 49)

F20. Prior to issuance of Building Permits, the applicant/developer shall participate in the Fire Impact Mitigation Program. (Fee Resolution as adopted by City Council)

F21. Prior to issuance of Certificate of Occupancy or Building Final, the applicant/developer shall install a fire sprinkler system based on square footage and type of construction, occupancy or use. Fire sprinkler plans shall be submitted to the Fire Prevention Bureau for approval prior to installation. (CFC Chapter 9, MVMC 8.36.100[D])

F22. Prior to issuance of Building Permits, the applicant/developer shall furnish one copy of the water system plans to the Fire Prevention Bureau for review. Plans shall:

a) Be signed by a registered civil engineer or a certified fire protection engineer;
b) Contain a Fire Prevention Bureau approval signature block; and
c) Conform to hydrant type, location, spacing of new and existing hydrants and minimum fire flow required as determined by the Fire Prevention Bureau.

After the local water company signs the plans, the originals shall be presented to the Fire Prevention Bureau for signatures. The required water system, including fire hydrants, shall be installed, made serviceable, and be accepted by the Moreno Valley Fire Department prior to beginning construction. They shall be maintained accessible.

Existing fire hydrants on public streets are allowed to be considered available. Existing fire hydrants on adjacent properties shall not be considered available unless fire apparatus access roads extend between properties and easements are established to prevent obstruction of such roads. (CFC 507, 501.3)

F23. Prior to construction, all traffic calming designs/devices must be approved by the Fire Marshal and City Engineer.

F24. Provide to the Fire Department a copy of the fire flow verification report from the water purveyor. See the fire flow letter attached that specifies the minimum fire flow required for this project.

FIRE FLOW LETTER

Date:		**Address:**	Northside of Ironwood Ave. East of Nason Street and West of Oliver Street
Case Number:	TTM 37001 Case # PEN16-0079 (PA15-0039)	**A.P.N.:**	473-160-004

This is certification the water system is capable of meeting the following required fire flows as determined by the California Fire Code Appendix B.

Based on the information provided on the above referenced case. The fire flow required for this project will be 1000 G.P.M. for duration of 1-HOUR measured at 20-psi residual pressure.

The required fire flow may be adjusted during the approval process to reflect changes in design, construction type or automatic fire protection measures as approved by the Fire Prevention Bureau.

Applicant/ Developer: ______________________________

By: ______________________________ **Date:** ______________

Title: ______________________________

WATER AGENCY APPROVAL

Name of Agency: ______________________________

Address: ______________________________

Telephone: ______________________________ **Date:** ______________

By: ______________________________ **Title:** ______________

NOTE: THE COMPLETION AND SUBMITTAL OF THIS LETTER TO THE FIRE PREVENTION BUREAU SHALL NOT BE CONSTRUED AS APPROVAL FOR THE INSTALLATION OF THE REQUIRED FIRE HYDRANT (S) AND/OR WATER SYSTEM.

FINANCE AND MANAGEMENT SERVICES DEPARTMENT

Moreno Valley Utility

The following items are Moreno Valley Utility's Conditions of Approval for project PA15-0037, 0038, 0039, 0040 & P15-087; this project shall be completed at no cost to any Government Agency. All questions regarding Moreno Valley Utility's Conditions including but not limited to, intent, requests for change/modification, variance and/or request for extension of time shall be sought from Moreno Valley Utility (the Electric Utility Division) of the Finance and Management Services Department 951.413.3500, mvuengineering@moval.org. The applicant is fully responsible for communicating with Moreno Valley Utility staff regarding their conditions.

PRIOR TO ENERGIZING MVU ELECTRIC UTILITY SYSTEM AND CERTIFICATE OF OCCUPANCY

MVU-1 (R) This project requires the installation of electric distribution facilities. A non-exclusive easement shall be provided to Moreno Valley Utility and shall include the rights of ingress and egress for the purpose of operation, maintenance, facility repair, and meter reading.

MVU-2 (BP) **City of Moreno Valley Municipal Utility Service – Electrical Distribution**: Prior to constructing the MVU Electric Utility System, the developer shall submit a detailed engineering plan showing design, location and schematics for the utility system to be approved by the City Engineer. In accordance with Government Code Section 66462, the Developer **shall** execute an agreement with the City providing for the installation, construction, improvement and dedication of the utility system following recordation of final map and concurrent with trenching operations and other subdivision improvements so long as said agreement incorporates the approved engineering plan and provides financial security to guarantee completion and dedication of the utility system.

The Developer **shall** coordinate and receive approval from the City Engineer to install, construct, improve, and dedicate to the City, or the City's designee, all utility infrastructure (including but not limited to conduit, equipment, vaults, ducts, wires, switches, conductors, transformers, and "bring-up" facilities including electrical capacity to serve the identified development and other adjoining/abutting/ or benefiting projects as determined by Moreno Valley Utility) – collectively referred to as "utility system" (to and through the development), along with any appurtenant real property easements, as determined by the City Engineer to be necessary for the distribution and /or delivery of any and all "utility services" to each lot and unit within the Tentative Map. For purposes of this condition, "utility services" shall mean electric, cable television, telecommunication (including video, voice, and data) and other similar services designated by the City Engineer. "Utility services" shall not include sewer, water, and natural gas services, which are addressed by other conditions of approval.

The City, or the City's designee, shall utilize dedicated utility facilities to ensure safe, reliable, sustainable and cost effective delivery of utility services and maintain the integrity of streets and other public infrastructure. Developer shall, at developer's sole expense, install or cause the installation of such interconnection facilities as may be necessary to connect the electrical distribution infrastructure within the project to the Moreno Valley Utility owned and controlled electric distribution system.

MVU-3 For all new projects, existing Moreno Valley Utility electrical infrastructure shall be preserved in place. The developer will be responsible, at developer expense, for any and all costs associated with the relocation of any of Moreno Valley Utility's underground electrical distribution facilities, as determined by Moreno Valley Utility, which may be in conflict with any developer planned construction on the project site.

POLICE DEPARTMENT

Standard Conditions

PD1. Prior to the start of any construction, temporary security fencing shall be erected. The fencing shall be a minimum of six (6) feet high with locking, gated access and shall remain through the duration of construction. Security fencing is required if there is: construction, unsecured structures, unenclosed storage of materials and/or equipment, and/or the condition of the site constitutes a public hazard as determined by the Public Works Department. If security fencing is required, it shall remain in place until the project is completed or the above conditions no longer exist. (DC 9.08.080)

PD2. (GP) Prior to the issuance of grading permits, a temporary project identification sign shall be erected on the site in a secure and visible manner. The sign shall be conspicuously posted at the site and remain in place until occupancy of the project. The sign shall include the following:

a. The name (if applicable) and address of the development.

b. The developer's name, address, and a 24-hour emergency telephone number. (DC 9.08.080)

PD3. (CO) Prior to the issuance of a Certificate of Occupancy, an Emergency Contact information Form for the project shall be completed at the permit counter of the Community and Economic Development Department - Building Division for routing to the Police Department. (DC 9.08.080)

PD4. Addresses needs to be in plain view visible from the street and visible at night. It needs to have a backlight, so the address will reflect at night or a lighted address will be sufficient.

PARKS AND COMMUNITY SERVICES DEPARTMENT

The following items are Parks and Community Services Department Conditions of Approval for TTM 37001. This project shall be completed at no cost to any Government Agency. All questions regarding Parks and Community Services Department Conditions including but not limited to, intent, requests for change/modification, variance and/or request for extension of time shall be sought from the Parks and Community Services Department 951.413.3280. The applicant is fully responsible for communicating with the Parks and Community Services Department regarding comments provided.

SPECIFIC CONDITIONS:

PCS-1:

A. City multi-use trails are required for this development, per the Master Plan of Trails. All City trails shall be located on HOA owned lettered lots, with an easement to the Moreno Valley Community Services District for trail purposes. Vertical utilities or access cabinets shall not be located in the trail easement. Trail locations on the master plan are approximate and some deviations may be approved. However, trails must be accessible to future trails shown on the City's Master Plan of Trails. Any trail that deviates from the master plan shall be presented to the Recreation Trails Board for review/discussion. Changes to the City's Master Plan of Trails require an amendment to the General Plan. The applicant is responsible for any associated costs in preparing the General Plan Amendment.
B. Minimum City trail locations are: north side of Ironwood Street; west side of Oliver Street; south side of Juniper Street alignment or northern side of the property, connecting to the future trail perpendicular north. Fire access may be required along the Juniper Street aligned trail. Please see Fire Prevention for details. Fire access requires a flat clear width of 20' – 24'. All access points to this section of fire access/trail shall meet the minimum fire code.
C. Multi-use trail sections shall not span across street cul-de-sacs. 11' trails sections at these locations shall be off the street. Applicable City Standard Plans shall be utilized for all trails, access areas, and specifications.
D. Feeder trails are required in this development. Feeder trails shall be HOA owned and maintained. See the Planning Division for full details.
E. Applicant shall only utilize authorized City Standard Plans for trail design. Alternate design types shall be approved by Parks and Community Services. Unauthorized modification of City Standard Plans is prohibited.

PCS-2: Trail construction shall commence with street and sidewalk improvements. Trail improvements shall be completed and accepted prior to the issuance of the 126th building permit of the 181 total units.

STANDARD CONDITIONS:

PCS-SC-1 A restriction shall be placed on lots that back up to City/CSD owned or maintained parks, trails, bikeways, and landscaped areas, preventing openings or gates accessing the City/CSD owned or maintained property. This shall be documented through Covenants, Conditions, and Restrictions (CC&R's). A copy of the CC&R's with this restriction noted shall be submitted and approved by the Director of Parks and Community Services or his/her designee, prior to the recordation of the Final Map.

PCS-SC-2 Within the improvements for PCS, the applicant shall show all existing and planned easements on all maps and plans. Easements on City/CSD owned or maintained parks, trails, bikeways, and landscape shall be identified on each of these plans with the instrument number of the recorded easement.

PCS-SC-3 The following plans require PCS written approval: Tentative tract/parcel maps; rough grading plans (including all Delta changes); Final Map; precise grading plans; street improvement plans; traffic signal plans; fence and wall plans; landscape plans for areas adjacent to bikeways; trail improvement plans. PCS will not approve any permits without review and approval of the above items.

PCS-SC-4 Prior to recordation of the Final Map, the applicant shall post security to guarantee construction or modification of parks, trails and/or bikeways for the City/CSD. Copies of said documentation shall be provided to PCS, prior to the approval of the Final Map.

PCS-SC-5 Detailed final plans (mylars, PDF, and AutoCAD file on a DVD-R) for parks, trails/bikeways, fencing, and adjoining landscaped areas shall be submitted to and approved by the Director of Parks and Community Services, or his/her designee, prior to the issuance of any building permits. All plans are to include a profile showing grade changes.

PCS-SC-6 Applicable plan check and inspection fees shall be paid, per the approved City fee schedule.

GENERAL CONDITIONS:

PCS-GC-1 This project may be required to supply a funding source for the continued maintenance, enhancement, and or retrofit of neighborhood parks, open spaces, linear parks, and/or trails systems. This can be achieved through annexing into Community Facilities District No. 1 (Park Maintenance). Please contact the Special Districts Division at 951.413.3480 or specialdistricts@moval.org to complete the annexation process.

PCS-GC-2 The parcel(s) associated with this project have been incorporated into the Moreno Valley Community Services District Zone A (Parks and Community Services). All assessable parcels therein shall be subject to the annual Zone 'A' charge for operations and capital improvements. Proof of such shall be supplied to Parks and Community Services upon Final Map and at Building Permits.

PCS-GC-3 This project is subject to current Development Impact Fees, at time of building permit issuance.

PCS-GC-4 This project is subject to current Quimby Fees, at time of building permit issuance.

Ironwood Village

Design Guidelines

Tract 37001

January 2017

Ironwood Village

Design Guidelines

Tract 37001

January 2017

Prepared For:

GLOBAL
INVESTMENT & DEVELOPMENT

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URBAN
CROSSROADS

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Ironwood Village Design Guidelines:
Tentative Tract 31007

Project Location

The location of the *Ironwood Village* Tentative Tract Number 31007 (TTM 31007) is North of Ironwood Avenue, East of Nason Street, West of Oliver Street and the northern boundary is just north of the proposed Juniper Avenue alignment in the City of Moreno Valley, California. ***Please refer to Figure 1-1 Site Location.***

Purpose

The purpose of the *Ironwood Village* TTM 31007 Design Guidelines (site development regulations) is to provide cohesive design throughout the *Ironwood Village* project. Creating a diversity of housing choices not available with a standard tract map, the project will encourage a range of housing alternatives with a variety of lot sizes intermixed with trails, a park, trail head, open space areas and water quality features. The design guidelines will require a quality mix of products, while creating walkable neighborhood with access to trails and other outdoor recreation / open space opportunities. The *Ironwood Village* project will conserve the northwestern hillside areas and will not be building on that portion of the site. The project is designed to respect the existing topography, maintain rock outcroppings where feasible and provide a transition into the hillside areas. The Design Guidelines provide the development standards, architecture, and landscaping standards necessary to create this unique housing project within the City of Moreno Valley. The *Ironwood Village* project will provide a buffer with the appropriate use of natural open space, landscaping, trails, right-of-ways and fire access creating a pleasing visual transition between the existing rural residential uses. While providing for a suburban life-style in a cohesively planned community with amenities not commonly found in typical subdivisions. The proposed *Ironwood Village* anticipates one hundred eighty-one (181) units on approximately thirty-eight and one half (38.5) acres, along with approximately twenty-nine point three (29.3) acres of open space and basin areas, and an additional ten point six (10.6) acres of natural open space (i.e. hillsides and rock outcroppings) with a mix of lot sizes range from ten thousand (10,000) square feet minimum down to seven thousand two hundred (7,200) square feet minimum lot sizes.

Ironwood Village

Theme

The theme for *Ironwood Village* will be typical traditional California styles of architecture (i.e. Monterey, Spanish Colonial, Santa Barbara, Napa, & Tuscan.) The theme is broad enough to allow for a diversity of architectural and landscape details, elements and styles to create a cohesive but, unique residential community. The architecture and overall project theme allows for varied streetscapes, while keeping a consistent and welcoming community atmosphere that will be inviting and comfortable for the residents and visitors alike.

1. Site Planning and Design

The following section includes the *Ironwood Village* development standards that encourages innovative housing development, with a diversity of housing choices, not typically found in a standard housing tract. To ensure that the neighborhoods are interesting and varied in appearance, at least one (1) single-story design is required. The addition of a single-story elements help to create a mix of not only architectural styles but, an array of building heights and building articulation avoiding the creation of a monotonous streetscape. The project is designed to respect the existing topography and provide a transition to the steeper hillside areas, within and adjacent to the project site. ***Please refer to Figure 1- 2 Land Use Plan.***

a. Setbacks

Table 1-1 lists the development standards required for development within the *Ironwood Village* project area.

TABLE 1-1

Summary of Setback Requirements		
Minimum Lot Size (sq. ft. net area)	10,000 sf **(R3)**	7,200 sf **(R5)**
Minimum Lot Width	90'	70'
Minimum Lot width Cul-De-Sac / Knuckle Frontage	50'	50'
Minimum Lot Depth	100'	100'
Typical House Width		
Front Setbacks		
Minimum Typical Front yard setback	25'	20'
Minimum Front Facing Garage	25'	20'
Minimum Swing-in Garage	16'	16'

Rear Setbacks		
Minimum Rear	30'	15'
Side Setbacks		
Minimum Interior Side Yard	*combined 20'	**combined 15'
Minimum Street Side yard	15'	15'
Maximum Building Height		
Dwelling Unit Maximum two stories	35'	35'
Accessory Structures	35'	35'
Miscellaneous		
Maximum Lot Coverage	50%	50%
Minimum Dwelling Size, (sq. ft.)	1,250 sf	1,250 sf
Minimum Distance Between buildings	10'	10'

* Combined interior side yard setbacks of 20' shall be provided with a minimum of 5' on one side.
** Combined interior side yard setbacks of 15' shall be provided with a minimum of 5' on one side.

All of the setbacks are minimums unless noted as otherwise and shall be measured from the property line.

Side yard setbacks shall have a minimum of five feet (5′) of flat usable pad area in all conditions as measured to the center of any wall or fence, or top of slope, or toe of slope.

Vary front setbacks up to five feet (5′) to the extent flat useable pad depths exceed one-hundred ten feet (110′) (at their narrowest point) when possible.

Where feasible, center the house within the buildable pad width to maximize separation between adjacent houses.

Maximum lot coverage including garage shall be fifty percent (50%.)

Side-on garages are one of the optional architectural design elements that can increase the architectural variation, enhancing the project's overall visual appeal.

Figure 1- 3 10,000 sf building footprint (R3)

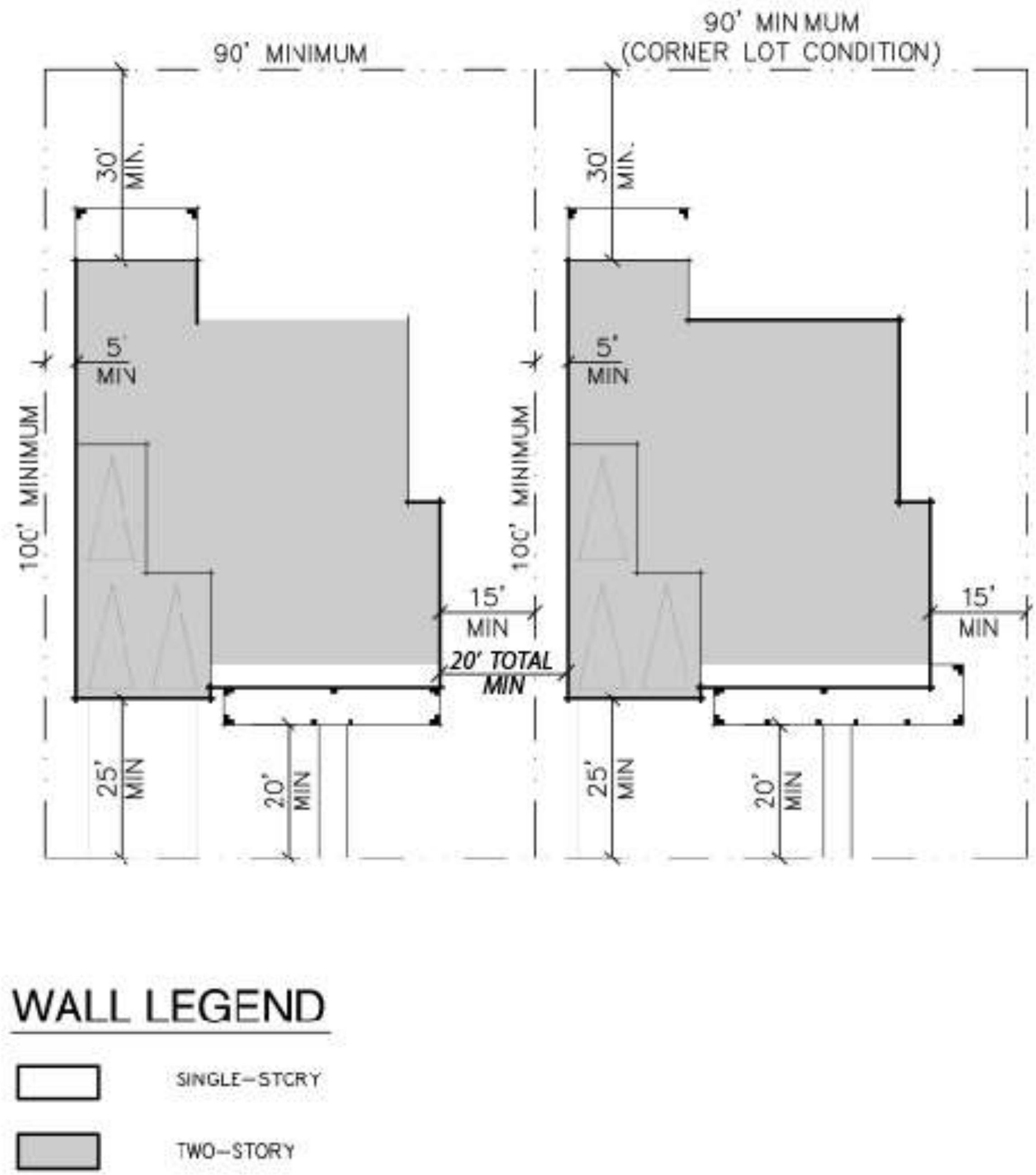
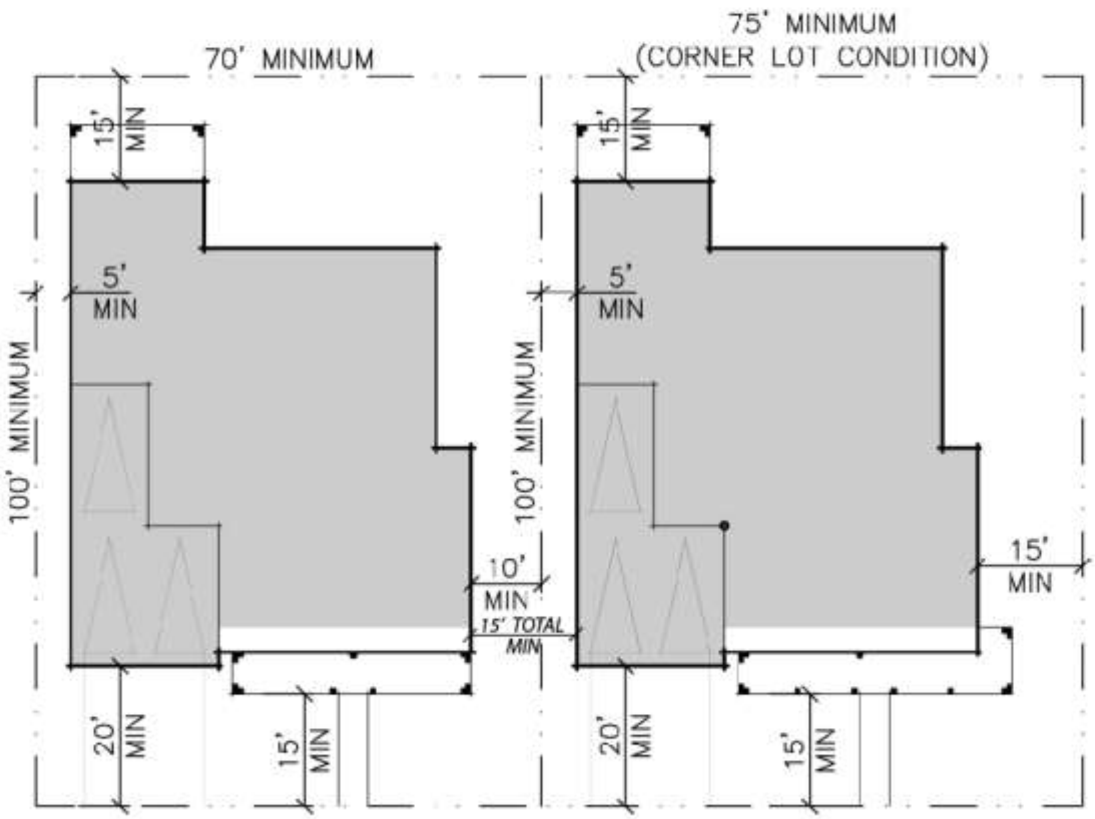


Figure 1- 4 7,200 sf building footprint (R5)



b. Plotting Requirements

A mix of dwelling unit sizes, floor plans, and elevations shall be provided (*Refer to Section 3 Architectural Style*).

To create a varied and unique streetscape, neither the same floor plan nor the same elevation style shall be plotted next to or directly across the street from itself. "Directly across the street" is defined as more than one half (½) of the narrower lot overlapping the wider lot across the street from the lot in question.

- Repetitive patterns of garage placement shall be avoided when possible.
- Unless street slope prevents otherwise, a left or right side on garage may not be plotted more than three (3) times in a row.
- Corner lots shall incorporate single-story elements into their design to minimize visual impacts.

2. Architectural Design

The *Ironwood Village* Architectural Design Guidelines are envisioned as just that "guidelines"; they are intentionally created to allow ultimate flexibility to the builder and are purely illustrative in character for the final buildout. The guidelines provide the builder with a palette of options of design features and elements to be mixed and matched to create a comprehensive project that has one personality throughout, although is not boring or repetitive. The actual detailed architectural design elements and details that will be used within the *Ironwood Village* community will be decided at time of buildout by the builder with approval by the City of Moreno Valley.

a. Design Principals

While these design guidelines suggest architectural styles, the styles utilized should be authentic and distinct. Traditional styles tend to have defining features that should be consistently implemented throughout the *Ironwood Village* development. These guidelines allow for updated styles as long as the defining features can be identified and applied to the floor plans.

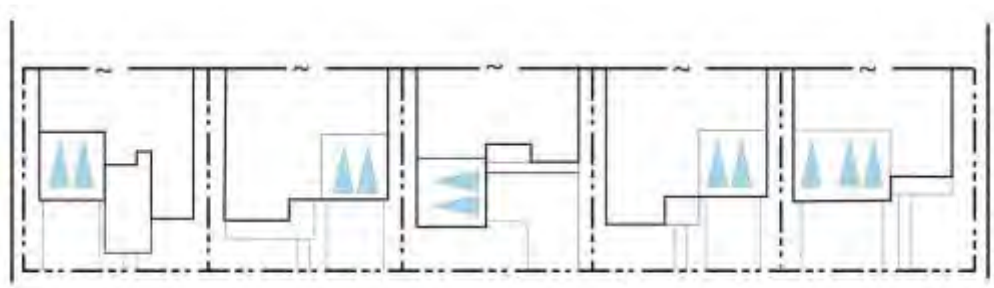
Architectural styles should be dictated by the massing of the floor plans and a certain style should not be forced upon every floor plan. By emphasizing authentic styles, these guidelines discourage similarity and uniformity of residential buildings. The street scene should be diverse as to form, massing, features, windows, front doors, garage doors, materials and colors.

As appropriate resource efficiency should influence architectural styles. The concept of resource efficiency includes reduction of wasteful elements in the design and construction of the house as well as conservation of energy, natural resources and water during occupancy of the home.

b. Form and Massing

Building mass and scale are key design elements that affect how a structure and the immediate surrounding areas are perceived. Controlling the mass of a building through design articulation of the building facades, attention to rooflines and variation in vertical and horizontal planes reduces the visual mass of a building. Building massing should be varied to provide interesting form, proportion and scale. Monolithic forms are discouraged; massing variety should be three dimensional. The perception of a buildings massing may be altered through the use of landscaping as well as the use of light and shadows.

Figure 2- 1 Varied Massing Diagram



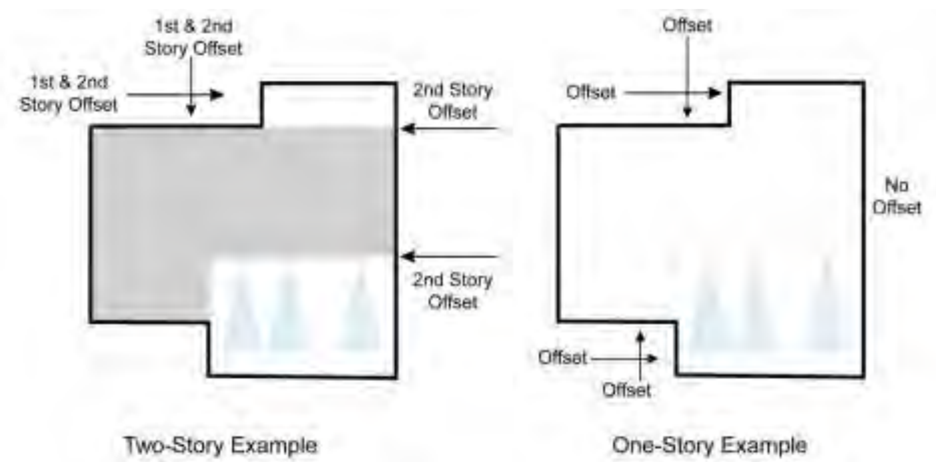
The Varied Massing Diagram is for illustrative purposes only, the floor plans and mix of two (2) and three (3) car garages may vary.

Design details should be included on the rear and sides of homes, creating four (4) sided architecture. Neighborhood housing should be arranged to create a varied appearance of building heights, articulation and setbacks for a comprehensive and integrated street scene.

Special design features (i.e. recessed entry ways, covered front porches, window and door articulation, variety of masonry accents, balcony's, courtyards, extended overhangs and varied building setbacks) are expected. General massing should vary perceptibly among the distinct floor plans. Together with variable setbacks, massing variation will create visual diversity along neighborhood streets.

- Every side of a two-story house must have at least one plane break "offset" at the first and/or second story in order to avoid monolithic elevations. A plane break must be at least two feet (2').
- Three (3) sides of a single-story floor plan must have at least one (1) plane break "offset". A plane break must be at least two feet (2').
- The floor area of a second story, including the stairs, may not exceed eighty percent (80%) of the floor area of the first story including the garage and any porch areas.
- Shadow patterns created by architectural details such as overhangs, projections and recesses of stories, balconies, reveals and/or awnings are encouraged, adding interest and aiding in climate control.

Figure 2-2 Example of Offsets



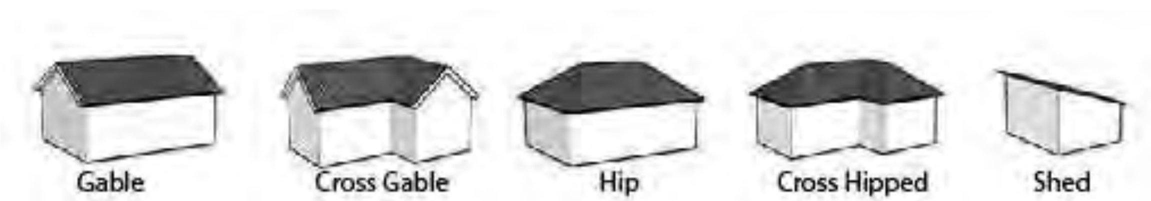
The Example Offsets are for illustrative purposes only, the floor plans and actual offsets may vary.

c. Roofs

Rows of homes backing onto a hillside are perceived by their contrast against the hillside area. The prevailing impact is the shape of the house and roofline. The house mass shall be varied to minimize the visual impact of similar housing silhouettes and similar ridge heights. This can be achieved by using a variety of roof structure designs such as; front-to-rear, side-to-side, gables and hipped roofs and/or by the introduction of single-story elements.

- Roof pitches should vary according to the architectural style. Primary roof pitches may be three to twelve (3:12), four to twelve (4:12), five to twelve (5:12) or six to twelve (6:12) (*for solar panel efficiency*). Secondary roof pitches can vary from primary roof pitches but only if such variation is consistent with the architectural style.
- To the extent they are consistent with an architectural style; hipped roofs are encouraged in order to accommodate solar panels and to cast shade over windows.
- Simplified rooflines are encouraged in order to accommodate integrated solar panels. Provide large enough unbroken roof planes to be sufficient to meet the state code for "solar zones."
- Eave depths should vary according to the architectural style and may range in depth from twelve to twenty-four inches (12 – 24").
- Porches and balconies are encouraged when consistent with the architectural style of the house. The minimum porch depth shall be five feet (5') to edge of the porch.

Figure 2-3 Varied roof examples



The variety of roof examples shown may be utilized for both single-story and two-story floor plans. These roof types are found within the architectural styles to be used within the *Ironwood Village* community.

d. Garage Orientation / Location and Design

The visual impact of three-car garages should be reduced wherever feasible. Although not necessarily depicted on the architectural elevations (see Section 3 Architectural Styles), the builder(s) of *Ironwood Village* will pay attention to the design, placement, and orientation of garages. Depending on the lot size, this can be achieved in a number of ways including but not limited to the following:

- Garage setback greater than the front of the house.
- Side-on a side-on garage shall have a minimum back-up area of twenty-eight feet (28'). (*Side-on garages are one of the optional architectural design elements that can increase the architectural variation, enhancing the project's overall visual appeal.)*
- Porte-cochere architectural element (covered parking area).
- Tandem garages allow for parking a boat or two vehicles (one behind the other) inside "one stall" of the garage that is twice the depth.
- Garage door details shall vary in manner that is consistent with the architectural style.
- Garage door windows are standard.
- Front-facing garages shall not be wider than sixty-five percent (65%) of the house width.
- Exclusive use of three-car front-facing garages in all floor plans is not permitted. Three-car front-facing garages may only be utilized if a single garage door is offset from the double garage door.

e. Architectural Elements

Architectural styles for *Ironwood Village* should be chosen in part as an opportunity to introduce a variety of exterior accent details and materials (i.e. brick, wood siding, masonry, metal, pre-cast concrete, timber, stucco or ceramic tile).

- Color schemes should be simple, attractive and consistent with the architectural style.
- Front door details shall vary according to architectural style.
- Feature window shapes shall vary according to architectural style.
- Acceptable roof materials include concrete tiles, and metal but exclude composition shingles and should be consistent with the architectural style of the building.

- Chimneys, which may cast shadows over solar panels, are optional and should be consistent with the architectural style.
- A minimum of two (2) photosensitive carriage lights per house are required and the style should vary according to architectural style.
- Shutters are not required; but to the extent they are used, shutter sizes should be proportional to the window and shutter styles should vary in accordance with the architectural style.
- Trim details from the front elevation should be applied to the sides and rear elevations of the house for continuity and vary in accordance with the architectural style.

f. Mechanical Equipment

All mechanical equipment for individual dwelling units (i.e. air conditioners, heating, cooling and ventilation equipment and/or all other such equipment) will not be roof mounted and shall be screened from surrounding properties and streets (by using screening, privacy fencing/walls and/or landscaping) and shall not be located in the front yard or street side yard outside of building setbacks.

Architectural Style

Architecture within *Ironwood Village* reflects the diversity of architectural styles found throughout California. The architectural elements and details provided within this Design Guidelines document are guidelines, not required details and/or elements. The implementation of modern interpretations of the historical architectural styles are allowed as appropriate.

The Architectural styles and the design elements shown in this document are purely for illustrative purposes and the actual product may vary. It is required that the chosen architectural styles be utilized and the elevations are identifiable and the street scene is varied. Generic box architecture that has an unidentifiable style or detailing is not permitted. The actual detailed architectural designs and details that will be used within the *Ironwood Village* community will be decided at time of buildout by the builder with approval by the City of Moreno Valley.

ARCHITECTURAL STYLES

Architectural Styles

Ironwood Village is envisioned as a community with a variety of home styles where architectural massing, roof forms, detailing, walls and landscape are integrated to reflect historic, regional, and climate-appropriate styles. Five styles have been chosen for the Ironwood Village community.

- Monterey
- Spanish Colonial
- Santa Barbara
- Napa
- Tuscan

ARCHITECTURAL STYLES

1. *Monterey*

The Monterey style emerged in the town of Monterey on California's central coast in the mid-19th Century. The style developed from a combination of two-story New England colonial house with an Adobe brick exterior. Later, the Monterey style was merged with elements from the Spanish Eclectic and Colonial Revival styles. Regardless of this evolution, the defining feature of the Monterey style remained the same: a prominent second-floor balcony.

Identifying Characteristics

- Simple 2-story building forms
- Cantilevered balconies on front facades
- Pot shelves and decorative vents

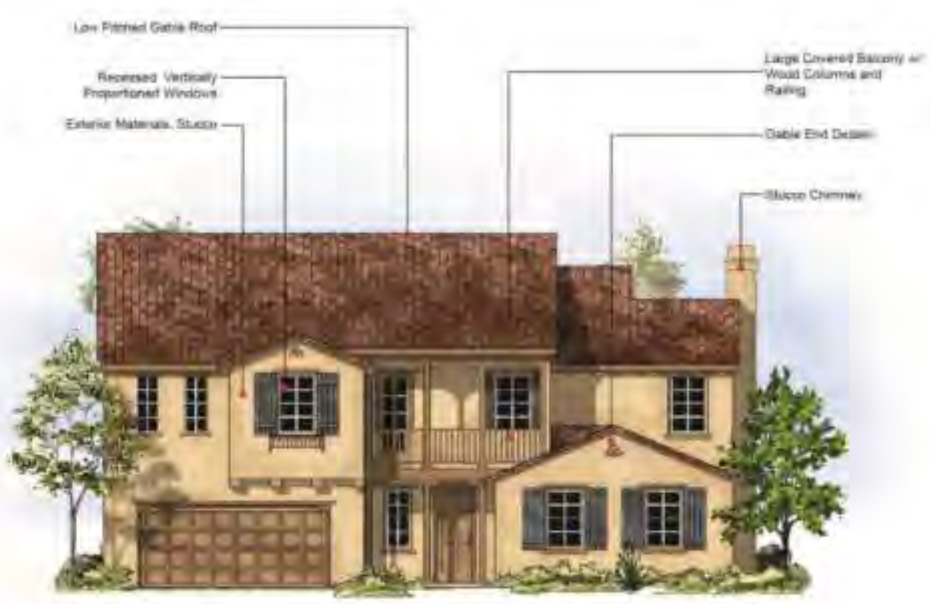


Figure 3-1 Monterey Style

ARCHITECTURAL STYLES

Style Elements	Required
Form	• Typically two stories with simple building massing
Roof	• Low pitched gable roofs (occasionally hipped), 3.5:12 to 4:12 • 12" to 24" overhangs • Shallow sloped, concrete 'S' tile roofs in variegated colors (red clay is predominant color) • Flat concrete shingle
Walls	• Stucco exterior walls, smooth to light sand finish • Brick or siding (shingle, or vertical board-and-batten) • First and second stories frequently have different finish materials, with wood over brick being most common
Windows	• Rectangular, vertically proportioned windows • Paired windows • Full length window opening onto balcony • Simple window trim
Details	• Wood balcony and railing • Decorative shaped rafter tails • Ornate chimney cap • Round tile attic vents • Shutters as occasional accents
Colors	• Whites, painted brick building color • White or dark brown trim


Cantilevered Second


Shutter and Window


Pot Shelves

Graphics shown are for illustrative purpose only

ARCHITECTURAL STYLES

2. *Spanish Colonial*

The Spanish Colonial style was popular during the 1920s and early 1930s. This style evolved in California and the southwest as an adaptation of Mission Revival infused with additional elements and details from Latin America. It is common in California, Arizona, Texas and Florida. The key elements of this style were adapted to the California lifestyle. Plans were informally organized around a courtyard with the front elevation simply articulated and detailed.

Identifying Characteristics

- Terra cotta or red concrete tile roofs
- Entry courtyards with gates
- Decorative elements, including wrought iron, clay vents, ceramic tiles, etc.

Figure 3-2 Spanish Colonial Style

ARCHITECTURAL STYLES

Style Elements	Required
Form	• One-and Two-story building massing, often asymmetrical in form
Roof	• Typical 4:12 roof pitch • Predominant gable and shed with tight rake and 12"-18" eaves • Full 'S' concrete tile • Limited use of conical roofs on circular towers
Walls	• Stucco exterior walls, smooth to light sand finish • Shaped stucco eave details
Windows	• Recessed Feature windows • Square, rectilinear or round accent window • Vertical proportioned windows • Simple window trim • Tile or pre-cast window trim at select locations
Details	• Decorative iron lanterns, sconces, hinges, railing and hardware • Fabric or metal awnings • Sculpted walls and chimneys • Gable end roof vents • Pre-cast concrete accents • Round pre-cast concrete columns, or stucco pilaster with decorative cornice trim
Colors	• Off-white or cream building color • Dark brown trim • Bright accent color on entry door, shutters and awnings

Decorative Tile

Recessed Window

Decorative Wrought Iron

Graphics shown are for illustrative purpose only

ARCHITECTURAL STYLES

3. *Santa Barbara*

This style was established in the City of Santa Barbara. After the devastating earthquake of 1925, the City adopted the Hispanic style as its official style. The Santa Barbara style has its roots in the Spanish colonial revival style. White-washed stucco walls are inherent to the Santa Barbara style, which also features boxy, simple forms, low-pitched gable roof form, and the use of wood and tile as accent details.

Identifying Characteristics

- Stucco with light sand finish
- Boxy, simple massing
- Fully rounded arch elements
- Deeply recessed wall fenestration and asymmetrical volumes grouped about courtyards
- Dark wood exposed rafter tails
- Wrought iron accents

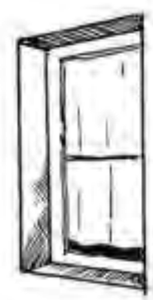
Figure 3-3 Santa Barbara Style

ARCHITECTURAL STYLES

Style Elements	Required
Form	• Boxy, simple massing • One- and two-story stacked elements • Recessed entry or covered porch
Roof	• Roof pitch: 4:12 to 5:12 • 0-6" rake and 18"-24" eaves • Full 'S' concrete tile • Hip or intersecting gable roof
Walls	• Stucco exterior walls, smooth to light sand finish • Stucco eave details
Windows	• Vertical multi-paned windows • Accent recessed window • Simple window trim
Details	• Decorative wrought iron accent details • Decorative shaped rafter tails • Sculpted walls and chimneys • Gable end roof vents • Full round arched arcades or openings • Juliette balconies
Colors	• Off-white and cream building color • Cream and earth tone trim • Dark colored eaves and fascia

Window Headers

Balcony



Recessed Windows

Graphics shown are for illustrative purpose only

ARCHITECTURAL STYLES

4. *Napa*

This style has evolved in California's Napa Valley. The architecture shares elements of California Eclectic and Mediterranean historical styles. To respond to the local climate environment, large overhangs are incorporated into the style in order to shield the house from sun in summer and warm the house in winter. Deep earth tone colors help to ground the Architecture and blend into the landscape design.

Identifying Characteristics

- Deep earth tone
- 'S'- shaped or flat concrete roof tiles
- Large overhang
- Stucco finish
- Masonry veneer accents

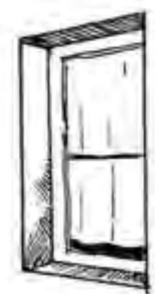
Figure 3-4 Napa Style

ARCHITECTURAL STYLES

Style Elements	Required
Form	• Informal arrangement of one- and two-story building forms
Roof	• Roof pitch: 4:12 to 6:12 • 12" to 24" overhangs at eaves • 6" to 12" overhangs at rakes • Full 'S' concrete tile or flat shingle w/ barrel tile hips/ridges • Main hip or gable roof with secondary shed or gable roofs over one-story elements
Walls	• Stucco finish with masonry veneer accents
Windows	• Recessed windows • Vertically oriented, multi-light window • Simple window trim
Details	• Decorative iron accents • Decorative shaped rafter tails • Pre-cast door or window trims
Colors	• Deep earth tone building color • Lighter or darker contrasting trim color • Dark or rich accent color

Window with Louvered Shutters

Overhang



Recessed Windows

Graphics shown are for illustrative purpose only

ARCHITECTURAL STYLES

5. *Tuscan*

The Tuscan style home originates from the Tuscany region of Italy and has become a highly sought-after style of architecture. The style represents the unique heritage of the region and is true to its original design created during the Middle Ages. Tuscan style homes incorporate accent materials such as stone, fieldstone, brick, or other rustic materials. Shed and hip roofs or occasional gable or cross gables help identify the Tuscan style as well.

Identifying Characteristics

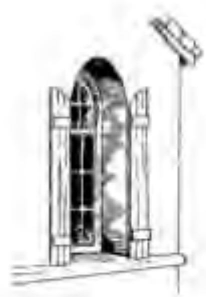
- Stucco wall materials with stone accent wall planes
- Typically shallower pitched hip or gable roofs with "S" tile
- Exposed rafter tails with decorative end cuts
- Front entries typically detailed with a pre-cast trim surround and wood head trim

Figure 3-5 Tuscan Style

ARCHITECTURAL STYLES

Style Elements	Required
Form	• Informal arrangement of one- and two-story building forms
Roof	• Low pitched roofs, 3:12 to 4:12 • Tight to 18" overhangs at eaves • Tight to 12" overhangs at rakes • Full 'S' concrete tile • Shed and hip roofs or occasional gable or cross gable
Walls	• Stucco exterior walls, smooth to light sand finish • Hill stone accents
Windows	• Recessed windows • Shaped window trim
Details	• Decorative "lacy" wrought iron grille work • Entry door patterns shall reflect architectural style of the building • Decorative iron accents • Decorative shutters and awnings • Arched windows or openings • Decorative shaped rafter tails
Colors	• Variety of rich earth tone building color • Lighter or darker contrasting trim color • Dark or bright accent color

Round Arches



Recessed Window

Decorative Balcony

Graphics shown are for illustrative purpose only

a. Variation Requirements

The variation requirements below have been determined by fixing the maximum average frequency of a given house at two (2) times per development. The frequency equals the number of lots in a planning area divided by the number of required house footprint combinations. These variation requirements, along with the mix requirements, will help to ensure development of an architecturally diverse community.

Table 2-1 Summary of Variation Requirements

Summary of Footprint Variation Requirements		
Number of Lots	**Minimum Footprints**	**Minimum Elevation Footprints**
181	6	6

Note: These minimum Footprints are per the City of Moreno Valley Municipal Code 9.16.130 (Table 9.16.130B)

If the project is split into two or more planning areas, ***Table 2-1 Summary of variation requirements*** for the revised number of lots will meet or exceed the City of Moreno Valley Municipal Code Section 9.16.130 Table B which applies to all projects within the City of Moreno Valley.

The table should be regarded as a minimum, reverse versions of each floor plan must be provided.

To minimize visual impact, corner residential structures shall be single-story or if two-story, shall incorporate single-story elements into the design. The short and low side of the home should be sited fronting the street corner.

b. Mix Requirements

A single floor plan may not be plotted with less than fifteen percent (15%) or more than a twenty-five percent (25%) frequency, unless otherwise directed to do so by City of Moreno Valley staff.

c. Colors and Materials

A range colors and textures of building materials are required to lend to the appearance of a varied street scene. The use of appropriate building materials and colors helps to maintain a specific architectural style, as well as providing a diverse neighborhood design. Material breaks, transitions and terminations should produce clear definitions of separation while maintaining a defined color and/or materials theme. This is important when transitioning from stucco and/or siding to masonry veneers. Colors and materials should visually blend with the hillsides. The actual colors and materials to be used within the *Ironwood Village* community will be decided at time of buildout by the builder with approval by the City of Moreno Valley.

3. Landscape Design

The conceptual landscape and planting design provides the identity to the *Ironwood Village* community that at time of buildout the builder shall comply with the ***City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code***. The plant palette for *Ironwood Village* will be appropriate to the project's climate. The landscaping shall be where appropriate drought tolerant/native vegetation and utilize water-conserving equipment including the installation of bubblers, drip systems, low volume sprays and/or smart irrigation controls when feasible.

Landscaping shall consist predominately of plant materials that include water efficient "drought tolerant", and/or native plants. The landscape areas shall be designed to promote water retention and allow runoff from impervious surfaces to permeable areas. Hardscape areas are recommended to be constructed with pervious surfaces where feasible to reduce run off and allow water percolation.

The landscape plan incorporates the water retention/detention/ water quality basins as well as the hillside areas that are to be conserved and the fuel modification areas as shown on TTM 37001. Project open space, fuel modification area, interior streets, interior trails and park will be maintained by the *Ironwood Village* Home Owners Association (HOA.) In addition, there are exterior multi-use trails along the roadways adjacent to the project, and a trail head (*located in the southeast corner of the project at Ironwood Avenue and*

Oliver Street) connecting to future City of Moreno Valley Proposed off-site trails; these will be maintained by the City of Moreno Valley. The drainages will be maintained by the City of Moreno Valley, however the water basins will be maintained by the *Ironwood Village* HOA (landscaping) . ***Please refer to Figure 4-1 Maintenance Responsibility***. The actual detailed landscape design and placement that will be used within the *Ironwood Village* community will be decided at time of buildout by the builder with approval by the City of Moreno Valley.

a. Community Landscape, Walls and Fencing

All of the *Ironwood Village's* community areas will be landscaped as appropriate per ***City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code***. The landscape will provide a cohesive appearance to the community and aid in the transition to and from adjacent areas. The visible *Ironwood Village* perimeter walls include a six feet (6') high block wall with pilasters and concrete block cap. Neighborhood walls will be six feet (6') high concrete masonry walls and vinyl privacy fencing in tan or white for residential privacy are to be a five feet six inches (5' 6") high, made with 6" vinyl tongue and groove with 7" top and bottom vinyl rails. Adjacent to the multi-use trails, a five feet (5') high, in tan or white three rail vinyl fence or a Three (3) Cable and Post fencing along the trails should be minimized, unless needed when out of "public view". Therefore, a trail may have no fence or a Three (3) cable and post fence, along the hilly trail sections if necessary the two trail fencing types are to be per City of Moreno Valley standards will define the trail areas. Top of slopes in the rear yards, a six feet (6') high view wall will be built; a low wall with tubular steel fencing on top will be provided. Tubular steel fencing will also be provided adjacent to water quality basins and the park per City of Moreno Valley standards. There will be an Entry monument located at the project entry into the project from Ironwood Avenue. In addition, there will be secondary entry monument at the Nason Street entry road and the Oliver Street entry road. ***Please refer to Figure 4- 2 Preliminary Wall/Fence Plan & Figure 4-4 Trails and Open Space Plan.***

The walls and fencing shall meet the following requirements as shown on ***Figure 4- 2 Preliminary Walls and Fence Plan.*** All of the public walls and fencing will be maintained by the *Ironwood Village* HOA. However, individual residential lot walls/ fences will be maintained by the homeowner. The Wall and Fence materials and colors will be decided at time of buildout by the builder with approval from the City of Moreno Valley.

Block Community Walls (*Perimeter Wall & Neighborhood Wall*)

- Block walls will be block or an approved alternative. This includes perimeter walls and private areas.
- Colored concrete caps at wall and pilaster tops shall match the color of the masonry.
- Perimeter wall pilasters will match the block material and color.
- Retaining walls will match the block wall conditions.
- Perimeter & neighborhood walls should have two feet (2′) wide square block pilasters which match the wall, with a two inch (2″) cap block.
- Perimeter walls should be four inches by six inches by sixteen inches (6″x 8″x 16″) stucco over regular CMU or split face CMU.
- Perimeter walls should have six inches by eight inches by sixteen inches (6″x 8″x 16″) split face CMU along the top edge of the wall.
- Perimeter walls should have fourteen inches (14″) Concrete Cap on top of the wall.
- Neighborhood walls should be four inches by eight inches by sixteen inches (4″x 8″x 16″) regular CMU.
- Entry Monuments with the Ironwood Village logo will be placed within the Ironwood Avenue, Nason Street and Oliver Street entrance road landscape setback areas. (*Exact design has not been determined at this time and will be determined at time of buildout by the builder and approved by the City of Moreno Valley*.)
- *Please refer to **Figure 4—3 Wall/Fence Details**.*

Rear Fencing on Slopes (*View Wall*)

- The "View Wall" low block wall twenty-four inches (24″) high lower wall will match the community block wall, with tubular steel fencing placed on top of the lower block wall.

- The view walls will be made with tubular steel fencing materials.
- View walls should have one and one-half inches (1 ½ ") square tubular steel tubing, top and bottom rails.
- View walls should have one inch (1") square steel tubing pickets set four and one-half inches (4 ½ ") on-center spacing.
- View walls should have two feet (2') wide square block pilasters which match the wall, with a two inch (2") cap block.
- View walls should be stucco over or split face CMU block six inches by eight inches by sixteen inches (6"x 8"x 16") regular CMU.
- View walls should have four inch (4") square tubular steel posts at property line corners, with a Newel Post Ball on top.
- View walls should be along the back of the lots, that back onto open space or other lots that back to open space areas but, not along trails.
- *Please refer to* ***Figure 4—3 Wall/Fence Details****.*

Interior Fencing (*Privacy Fence*)

- Interior privacy fencing will be tan or white vinyl for both interior property lines and fence return conditions.
- Interior fencing heights will vary but no lower than five feet six inches (5' 6") high.
- Privacy fencing should have five inches by five inches (5" x 5") Vinyl Post.
- Privacy fencing should have a domed cap on top of the post.
- Privacy fencing should have six inch (6") wide tongue and groove Vinyl or fencing that simulates tongue and groove.
- Privacy fencing should have two inches by seven inches (2" x 7") Top and Bottom vinyl rails.
- Vinyl privacy fencing will be tan or white.
- Gates will be constructed to match the tan or white interior vinyl privacy fence.
- *Please refer to* ***Figure 4—3 Wall/Fence Details****.*

Trail Fencing (*3 Rail Fence*)

- Trail fencing will be per City of Moreno Valley standards.
- Vinyl Ribbed Rails in tan or white.
- Five inches by five inches (5"x 5") Vinyl Posts in tan or white.

- Posts will be topped with post caps that match the vinyl posts in tan or white.
- Three rail fencing should have one and one-half inches by five and one-half inches (1 ½ x 5 ½ “) vinyl ribbed rails, spaced eleven inches to twelve and one-half inches (11” – 12 ½ “) apart.
- *Please refer to* ***Figure 4—3 Wall/Fence Details****.*

Trail Fencing (*3 Cable & Post Fence*)

- Trail fencing will be per City of Moreno Valley Standard MVGF-616-0.
- Galvanized Posts, Cable and Hardware.
- Posts 2” Standard Galvanized Post.
- Cable 1/4” Galvanized Cable.
- Posts will be topped with post caps that are driven fit.
- 5/16” Turnbuckle with 4 - ½ “ adjustment and 2 - ¼” Cable Clamps per end
- Three cable and post fencing should have cable spaced twelve inches (12”) apart.
- *Please refer to* ***Figure 4—3 Wall/Fence Details****.*

Basin / Open Space Fencing (*View Fence*)

- The view fencing will be made with tubular steel fencing materials.
- View Fencing should have one and one-half inches (1 ½ “) square tubular steel tubing, top and bottom rails.
- View fencing should have five-eight inches (5/8”) square steel tubing pickets set four and one-half inches (4 ½ “) on-center spacing.
- View fencing should have one and one-half inches (1 ½ “) square tubular steel posts set six feet (6’) on-center maximum spacing.
- View fencing should have four inch (4”) square tubular steel posts at property line corners, with a Newel Post Ball on top.
- View fencing should also be around the basins and other open space areas.
- *Please refer to* ***Figure 4—3 Wall/Fence Details****.*

b. Fuel Modification Requirements

On the north side of the *Ironwood Village* community are fuel modification zone areas. The removal and or preservation of plants/trees will be subject to review and approval by the City's fuel management officer. Maintenance of the fuel modification zone will be the responsibility of the *Ironwood Village* HOA. The twenty to twenty-four feet (20'– 24') wide fire access road and the multi-use trail that travels along the northern edge of the developed portion of the project, is built into the fuel modification zone for this project. All landscaping within *Ironwood Village* shall comply with the ***City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code***.

c. Trails

The multi-use trails interconnect the *Ironwood Villag*e project neighborhoods to the interior open spaces and park as well as to the future City of Moreno Valley's off-site trails system. A Trail Head will be located at the southeast corner of the Ironwood Village at Oliver Street and Ironwood Avenue. The Trail Head will connect to the exterior trail system along Ironwood Avenue and Oliver Street which connects to the interior trail system as well as to the off-site trails. There will be "nodes of interest" located along the central trail that leads from north to south to and from the neighborhood park. The "nodes of interest" may be but not limited to the following: scenic views, exercise equipment, benches, dog stations, drinking fountains, trash/recycling containers and/or other items along the project's trails. There are trail connections onto the central trail from trails leading off the adjacent cul-de-sacs. The central trail will have areas to rest and enjoy the outdoors within walking distance of home. In addition to the trails creating interconnectivity on site the project includes two (2) trail connections from Street "A" directly to Ironwood Avenue. These connections will provide view corridors from Ironwood Avenue into Ironwood Village as well as rest stops. The combination of trails and fire access located to the rear of the houses on the northern portion of the development are to be a minimum of twenty-four feet (20'– 24') wide per City of Moreno Valley standards. ***Please refer to Figure 4-4 Trails and Open Space Plan.***

Trails will provide connections through the central open space area and will branch off east and west along this north-south open space area, with additional trails connecting to neighborhood streets, and other trails. All the trails will loop throughout the *Ironwood Village* project and allows pedestrian connections to the park and the proposed City Trails north, east and west of the site. The trails will be built per City of Moreno Valley Standards. ***Please refer to Figure 4-4 Trails and Open Space Plan & Figure 4-5 Conceptual Trails Section.***

i. Trail Head

A Trail Head will be located within lot "M", adjacent to the corner of Oliver Street and Ironwood Avenue, parking will be on-street parking along Oliver Street. The Trail Head may include but is not limited to the following amenities: bench seating, covered picnic area, trash/recycling receptacles, dog station, water fountain, hitching post, horse watering station and/or exercise equipment. The actual Trail Head amenities will be decided at time of buildout by the builder with approval from the City of Moreno Valley. ***Please refer to Figure 4—8 Conceptual Trail Head.***

ii. Ironwood Avenue Trail Connections

There are two (2) Trail connections to Ironwood Avenue from Street "A" within the *Ironwood Village* project. The first trail connection is located between lots 13 & 14 and is a part of lot "K", this trail will cross the water basin with a bridge and a pedestrian walkway. The design and materials of the bridge will be determined at time of buildout by the builder with approval from City of Moreno Valley. The second trail connection is located between lots 5 & 6 and crosses between lot "K" and lot "M". The trail connections will be pedestrian walkways that will allow direct access from the project interior to the exterior trails along Ironwood Avenue. One of the trail connections bulbs/flares out on the Ironwood Avenue end of the connection, allowing room for enhanced landscaping and, seating areas and/or other amenities. Each of these trail connections may include but is not limited to the following amenities: bench seating, trash/recycling receptacles, dog station, shade structure and/or water fountain. The actual Trail Connection amenities will be decided at time of buildout by the builder with approval from the City of Moreno Valley. ***Please refer to Figure 4--9 Trails Connectivity and Figure 4-10 Ironwood Pedestrian Connections.***

All landscaping within *Ironwood Village* shall comply with the ***City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code***.

d. Hillside Nature Area

The hillside nature / open space areas are to be left undeveloped or minimally developed on the northwest and northeastern areas along the northern most project boundaries as shown on TTM 31007. ***Please refer to Figure 4-4 Trails and Open Space Plan .***These areas will be conserved as natural open space to help preserve the scenic views of the hillsides from the City of Moreno Valley. These areas will not be landscaped and/or watered the area will be maintained as is, unless otherwise required by the City of Moreno Valley. The hillside nature / open space areas creates a "natural" transition between the developed and undeveloped areas and, may include the fuel modification vegetation clearance zone and/or fire access/trail. The hillside areas will help to buffer and transition the project from the surrounding land uses to the proposed *Ironwood Village* community. Preserving the hillside areas for scenic and transitional reasons allows for some of the natural rock outcroppings as well as the existing off-site trails to remain intact.

e. Open Space

The *Ironwood Village* open space areas that are not to remain as natural vegetation will be planted as appropriate to the project's climate. The landscaping shall be where appropriate drought tolerant or native plants and utilize water-conserving equipment including the installation of bubblers, drip systems, low volume sprays and/or smart irrigation controls when feasible. No detailed plant palettes have been proposed within this document due to the currently evolving nature of the water conservation measures in the State of California. All landscaping within *Ironwood Village* shall comply with the ***City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code***.

Landscaping shall consist predominately of plant materials that include water efficient "drought tolerant" and native plants. Landscape areas shall be designed to promote water retention and allow runoff from impervious surfaces. Hardscape areas are recommended to be constructed with pervious surfaces where feasible to reduce run off and allow water percolation. ***Please refer to Figure 4-4 Trails and Open Space Plan.***

f. Park

The *Ironwood Village* park is located centrally within to the project, allowing residents to walk to the park safely using the project wide inter-looping trails system. The park may include but not limited to: bench seating, an open play area, Bocce ball courts, ½ court basketball, volleyball court, exercise equipment, picnic area and/or a tot lot "children's play equipment". The actual park amenities will be decided at time of buildout by the builder with approval from the City of Moreno Valley. ***Please refer to Figure 4--6 Conceptual Park Plan.***

The park areas will be planted as appropriate to the project's climate. The landscaping shall be where appropriate drought tolerant and utilize water-conserving equipment including the installation of bubblers, drip systems, low volume sprays and/or smart irrigation controls when feasible. No detailed plant palettes have been proposed within this document due to the currently evolving nature of the water conservation measures in the State of California. All landscaping within *Ironwood Village* shall comply with the ***City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code***.

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g. Basins

The basins within *Ironwood Village* community are located along the southern edge of the project site. The basins will not only provide a necessary job for retaining water on-site to prevent run-off, they also provide a transition and visual buffer to the existing residences south of Ironwood Avenue. The basins make the transition softer and more visually appealing by having landscaping and open space, instead of walls and roof tops. The basins will be planted as appropriate to the project's climate. The landscaping shall be where appropriate drought tolerant and utilize water-conserving equipment including the installation of bubblers, drip systems, low volume sprays and/or smart irrigation controls when feasible. No detailed plant palettes have been proposed within this document due to the currently evolving nature of the water conservation measures in the State of California. All landscaping within *Ironwood Village* shall comply with the ***City of Moreno Valley's Landscape and Irrigation Standards Section 9.17.030 of the Municipal Code***.

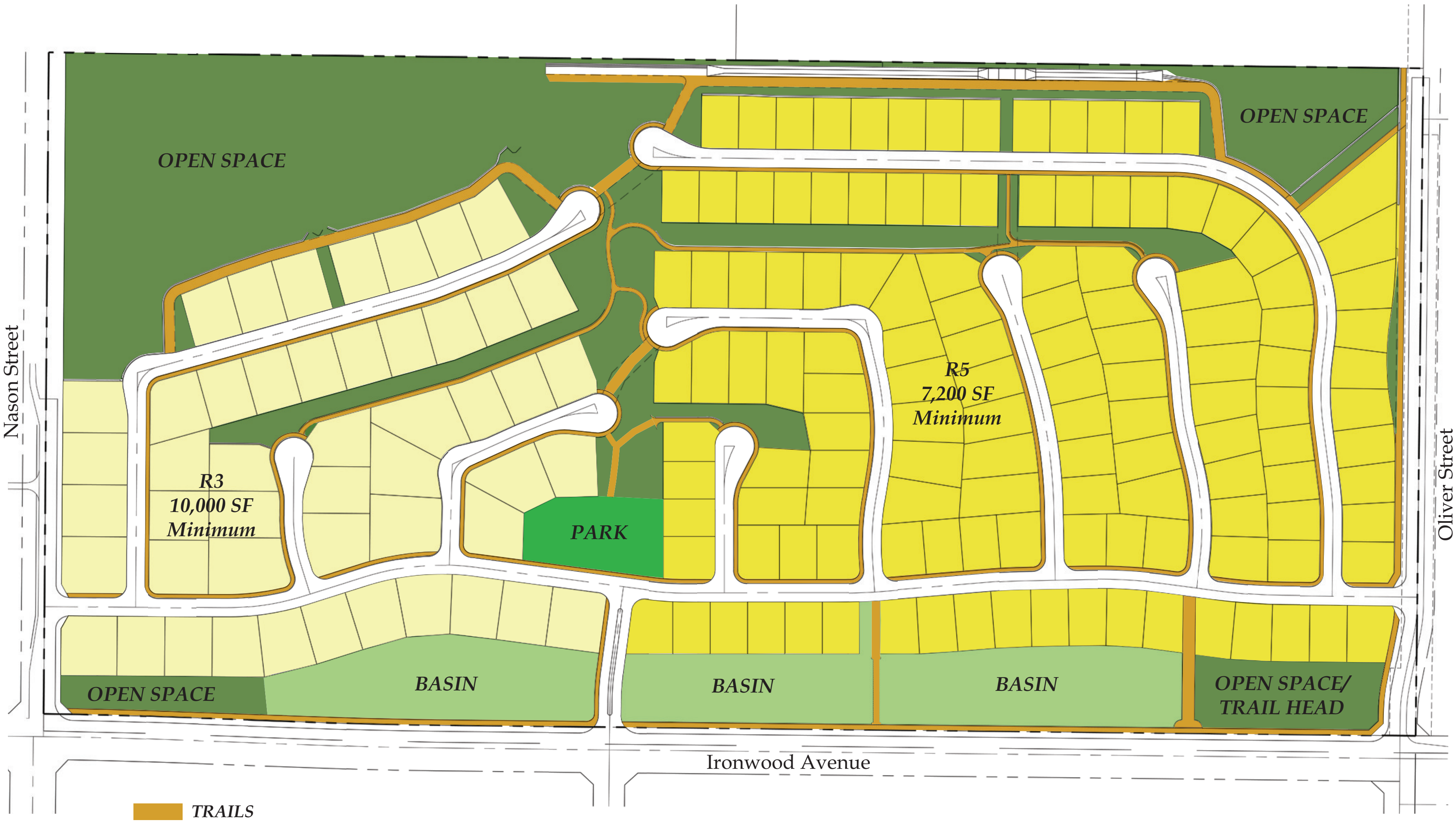
Landscaping shall consist predominately of plant materials that include water efficient "drought tolerant" native plants. Landscape areas shall be designed to promote water retention and allow runoff from impervious surfaces. Hardscape areas are recommended to be constructed with pervious surfaces where feasible to reduce run off and allow water percolation. ***Please refer to Figure 4-- 7 Typical Basin Section.***

Ironwood Village Design Guidelines

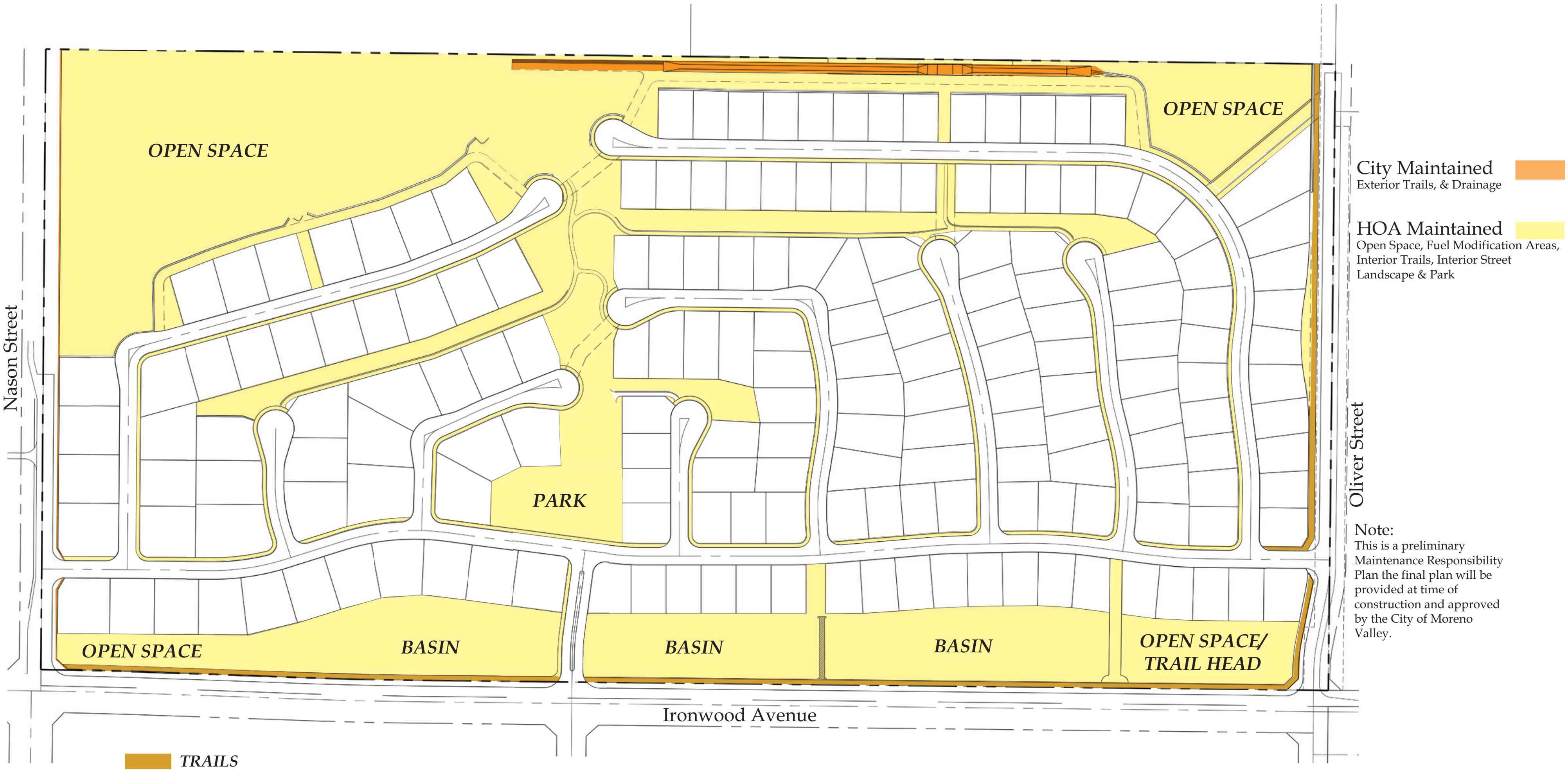
FIGURES

Site Location Map
Figure 1-1

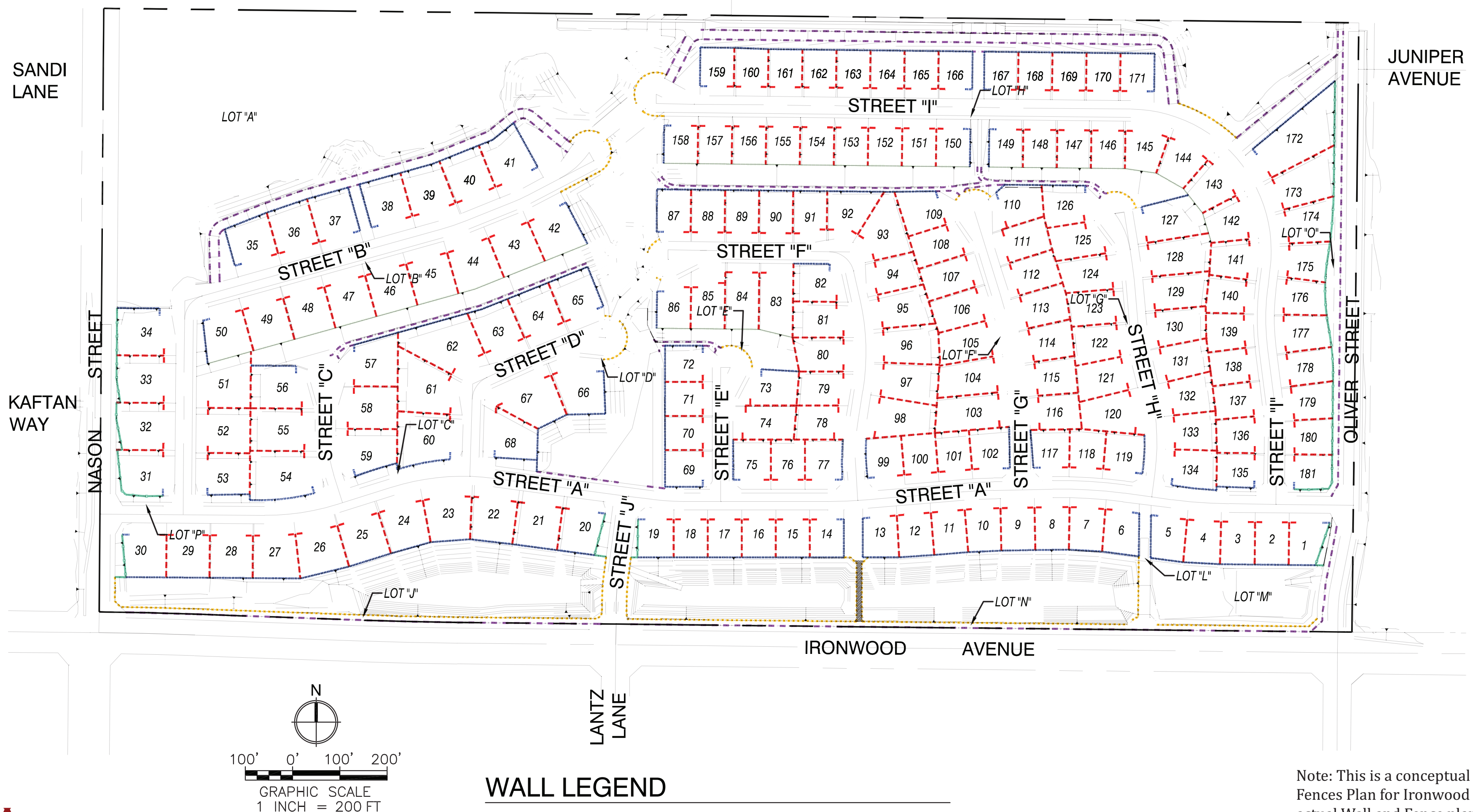
Conceptual Land Use Plan
Figure 1-2



Maintenance Responsibility Plan
Figure 4-1



Preliminary Wall / Fence Plan
Figure 4-2



WALL LEGEND

PERIMETER WALL	3 RAIL FENCE or 3 CABLE & POST FENCE
NEIGHBORHOOD WALL	VIEW FENCE
VIEW WALL	PRIVACY FENCE

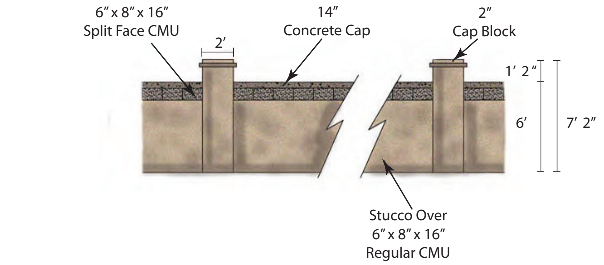
Note: This is a conceptual Wall and Fences Plan for Ironwood Village the actual Wall and Fence plan may differ at time of construction with approval by the City of Moreno Valley.

Anderson Consulting Engineers, Inc.

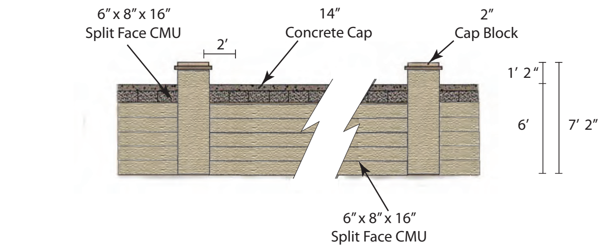
Conceptual Wall & Fencing

Figure 4-3

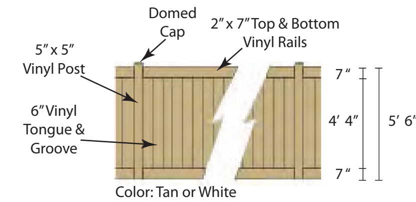
Perimeter Wall



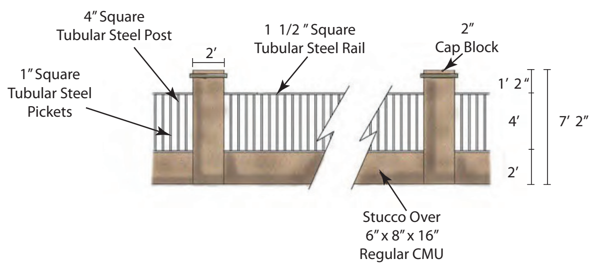
Perimeter Wall



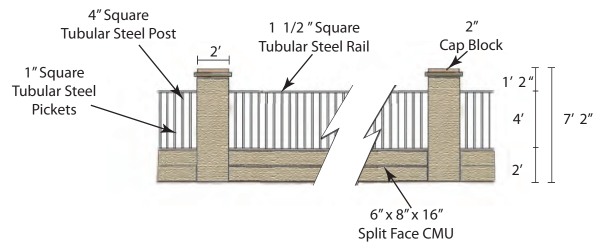
Vinyl Privacy Fence



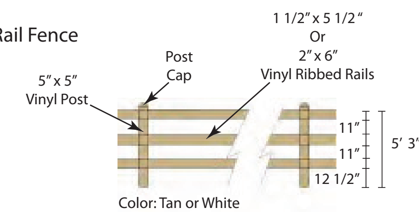
View Wall



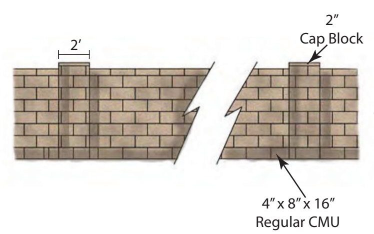
View Wall



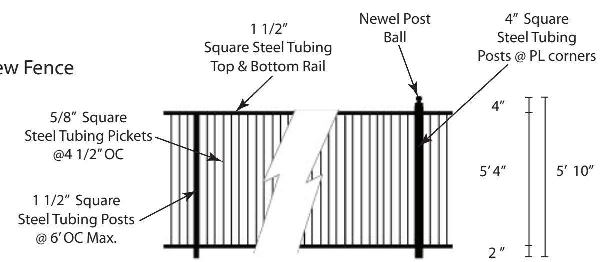
Vinyl 3-Rail Fence



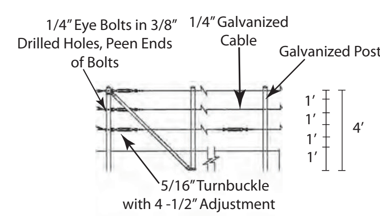
Neighborhood Wall



View Fence



3-Cable & Post Fence



Note: 3 Cable & Post:
To Be Constructed Per
City of Moreno Valley
Standard MVGF-616-0 or
Current Standard at Time

Note: Perimeter and View Walls - May be Split Face CMU, or Stucco over Regular CMU.

The Wall materials will be determined at time of contstruction with approval by the City of Moreno Valley.

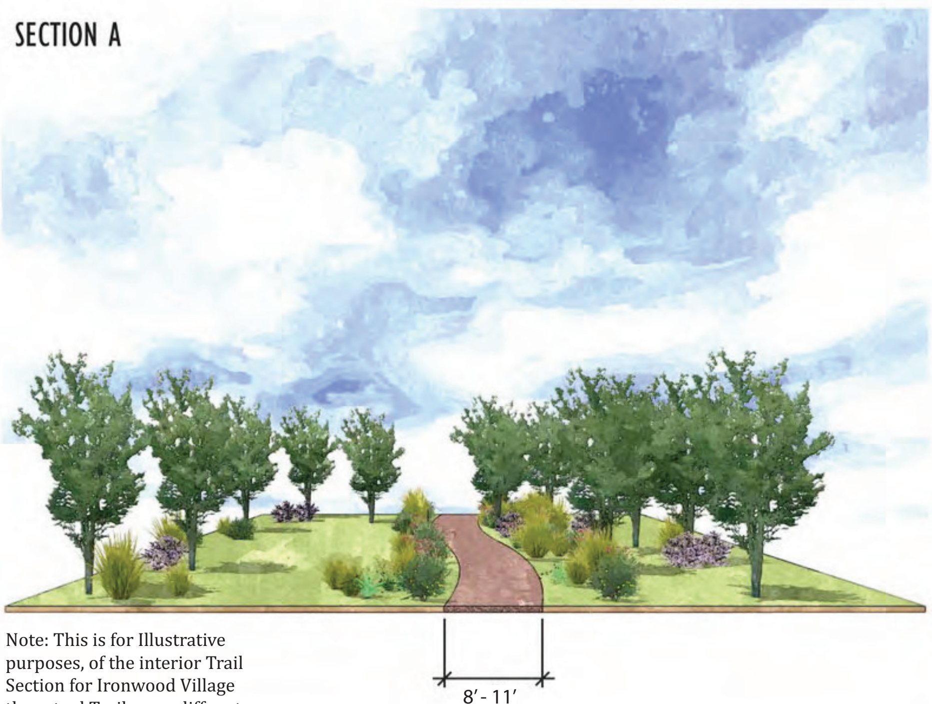
Trails and Open Space Plan

Figure 4-4

Note: This is a conceptual Trails and Open Space Plan for Ironwood Village the actual Trails and Open Space may differ at time of construction with approval by the City of Moreno Valley.

Conceptual Trail Section
Figure 4-5

SECTION A



Note: This is for Illustrative purposes, of the interior Trail Section for Ironwood Village the actual Trails may differ at time of construction with approval by the City of Moreno Valley.

IRONWOOD

GLOBAL
INVESTMENT & DEVELOPMENT

CONCEPTUAL TRAIL SECTION

Moreno Valley, CA

KTGY # 20150218 09.16.2015

KTGY Group, Inc.
Architecture+Planning
17922 Fitch
Irvine, CA 92614
949.851.2133
ktgy.com

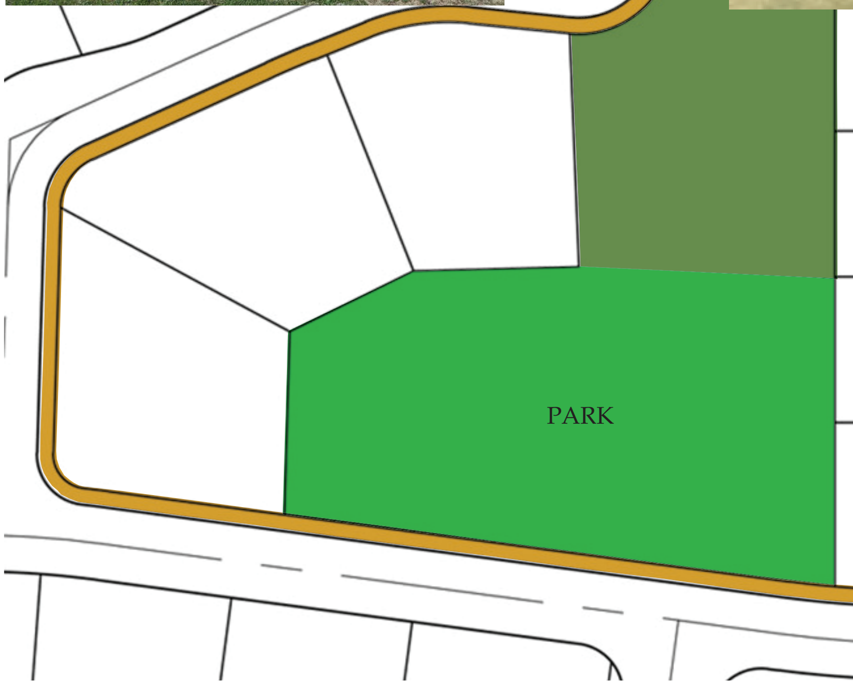
Conceptual Park Plan
Figure 4-6

BBQ & Picnic Area

1/2 Court Basketball

Childrens Play Area

Covered Picnic Table



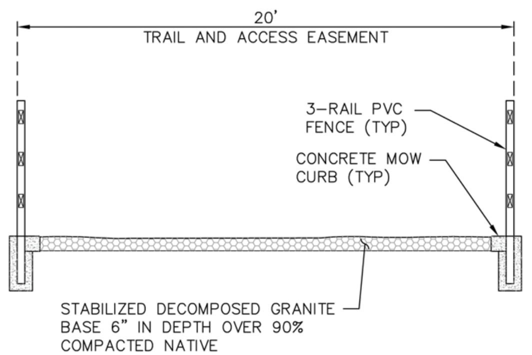
Volleyball Court

The photos are samples of the amenities that could be included in the Park area. The actual design / style and location of the amenities may change, other amenities could be used in-lieu of those indicated in this exhibit.

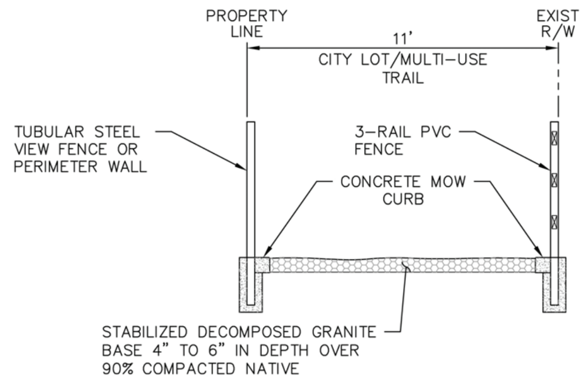
Bike Rack

Note: This is a Conceptual Park Plan for Ironwood Village the actual Park may differ at time of construction with approval by the City of Moreno Valley.

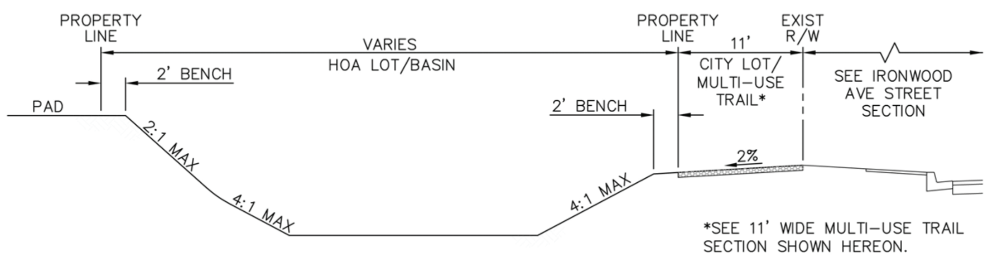
Trails and Basin Sections
Figure 4-7



<u>20' WIDE MULTI-USE TRAIL WITH FIRE ACCESS</u>
STD. MVGF-610I-0
NOT TO SCALE



<u>11' WIDE MULTI-USE TRAIL</u>
MODIFIED STD. MVGF-610A-0
NOT TO SCALE



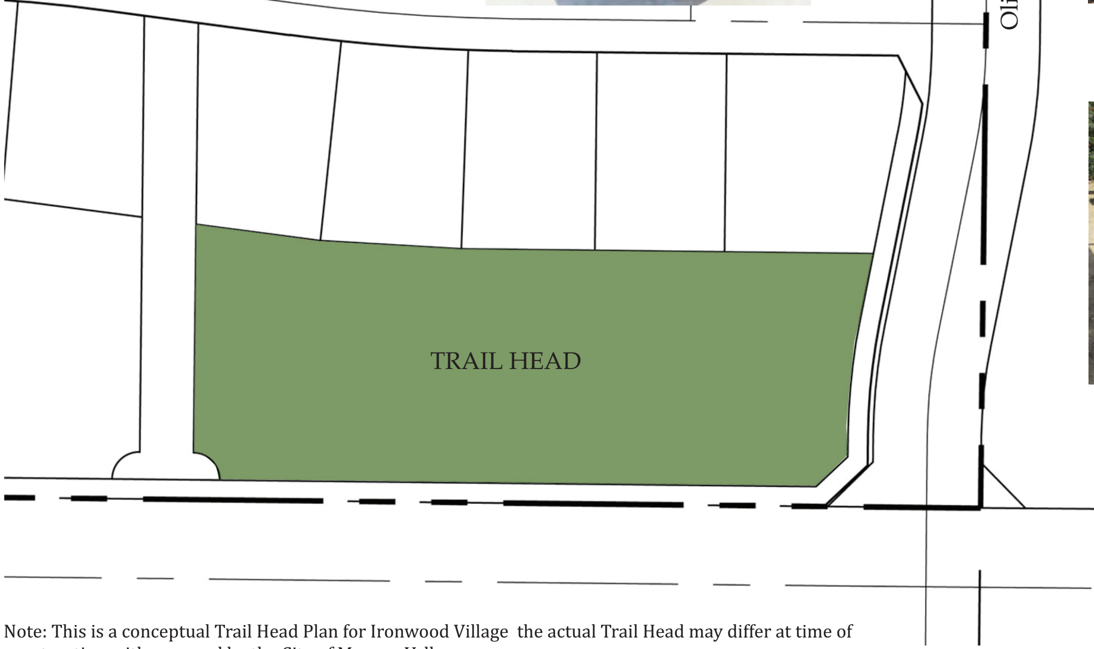
<u>SECTION "A-A"</u>
SOUTHERN BASINS AND
IRONWOOD AVENUE
NOT TO SCALE

Note:
These are typical Sections for the trails and the basins the final plans will be provided at time of construction and approved by the City of Moreno Valley.

Conceptual Trail Head
Figure 4-8

Bike Rack

Bench Seating



Shaded Picnic Area

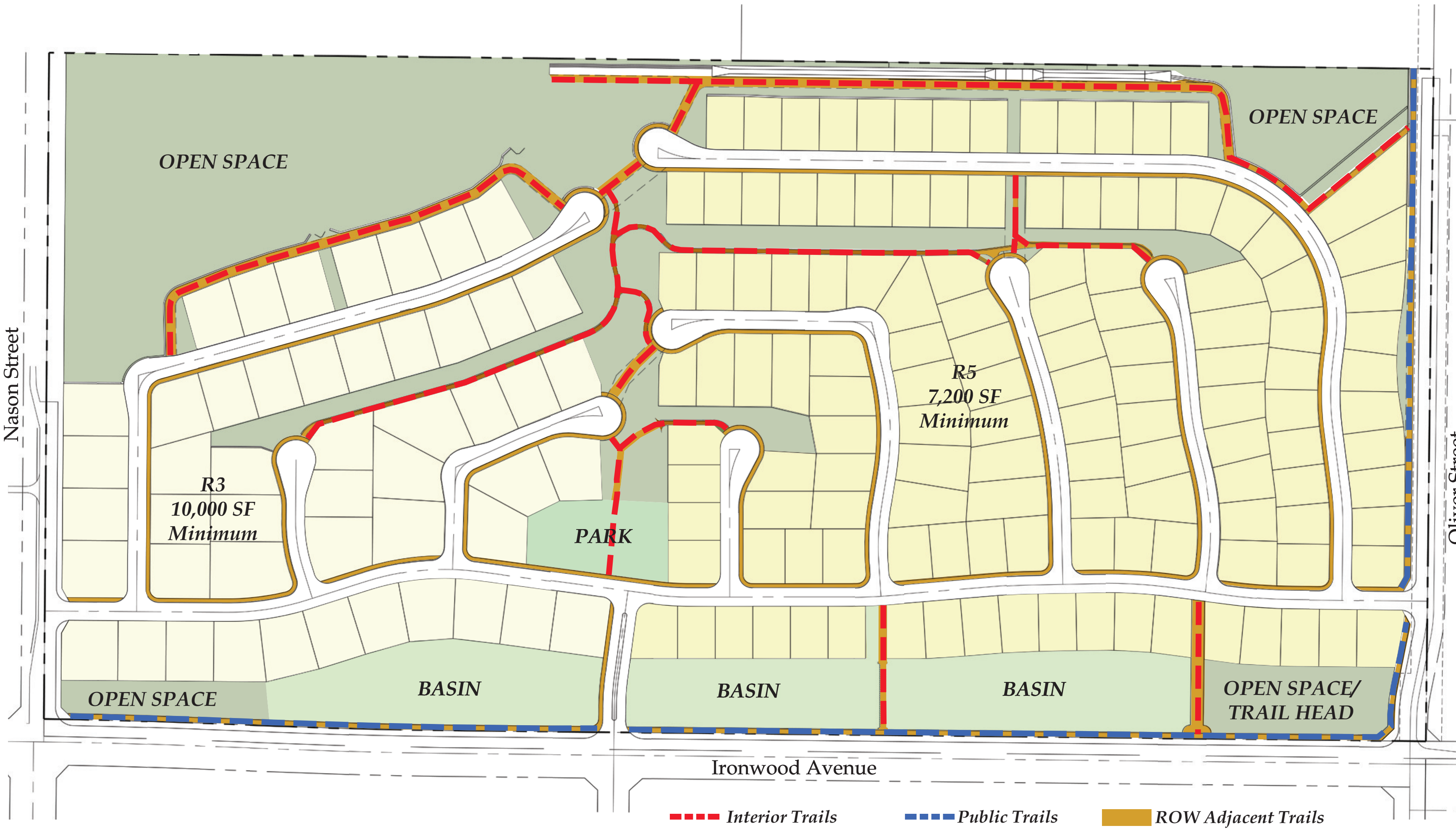
Hitching Post & Picnic Area

Drinking Fountain

Note: This is a conceptual Trail Head Plan for Ironwood Village the actual Trail Head may differ at time of construction with approval by the City of Moreno Valley.
Photo Samples are for Illustrative Purposes, the actual amenities and locations may vary.
All parking for the Trail Head will be on-street parking along Oliver Street.

The photos are samples of the amenities that could be included in the Trail Head area. The actual design / style and location of the amenities may change, other amenities could be used in-lieu of those indicated in this exhibit.

Trails Connectivity
Figure 4-9



Note: This is a conceptual Trails Connectivity for Ironwood Village the actual Trail Connectivity may differ at time of construction with approval by the City of Moreno Valley.

Ironwood Pedestrian Connections
Figure 4-10

Bike Rack

Bench Seating

Drinking Fountain

Dog Station

Trash/Recycling Containers

Note: These are conceptual amenities for the Ironwood Pedestrian Connections, the actual amenities may differ at time of construction with approval by the City of Moreno Valley.
Photo Samples are for Illustrative Purposes, the actual amenities and locations may vary.

The photos are samples of the amenities that could be included at the Ironwood Pedestrian Connections. The actual design / style and location of the amenities may change, other amenities could be used in-lieu of those indicated in this exhibit.

URBAN CROSSROADS

Ironwood Residential (TTM No. 37001)

Air Quality Impact Analysis

City of Moreno Valley

Prepared by:

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(949) 660-1994 x217

Jessica Wang
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(949) 660-1994 x234

August 31, 2015

09387-03 AQ Report

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APPENDICES

LIST OF EXHIBITS

LIST OF TABLES

LIST OF ABBREVIATED TERMS

(1)	Reference
µg/m3	Microgram per Cubic Meter
AADT	Annual Average Daily Trips
AQIA	Air Quality Impact Analysis
AQMD	Air Quality Management District
AQMP	Air Quality Management Plan
ARB	California Air Resources Board
BACM	Best Available Control Measures
CAA	Federal Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
DPM	Diesel Particulate Matter
EPA	Environmental Protection Agency
LST	Localized Significance Threshold
NAAQS	National Ambient Air Quality Standards
NO2	Nitrogen Dioxide
NOx	Oxides of Nitrogen
Pb	Lead
PM10	Particulate Matter 10 microns in diameter or less
PM2.5	Particulate Matter 2.5 microns in diameter or less
PPM	Parts Per Million
Project	Ironwood Residential (TTM No. 37001)
ROG	Reactive Organic Gases
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SIPs	State Implementation Plans

SRA	Source Receptor Area
TAC	Toxic Air Contaminant
TIA	Traffic Impact Analysis
TOG	Total Organic Gases
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

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EXECUTIVE SUMMARY

Short-Term Construction

For regional emissions, the Project would not exceed the numerical thresholds of significance established by the South Coast Air Quality Management District (SCAQMD). Thus a less than significant impact will occur.

Additionally, emissions during construction activity will not exceed the SCAQMD's localized significance threshold. Therefore, a less than significant impact would occur.

Project construction-source emissions would not conflict with the applicable Air Quality Management Plan (AQMP).

Established requirements addressing construction equipment operations, and construction material use, storage, and disposal requirements act to minimize odor impacts that may result from construction activities. Moreover, construction-source odor emissions would be temporary, short-term, and intermittent in nature and would not result in persistent impacts that would affect substantial numbers of people. Potential construction-source odor impacts are therefore considered less-than-significant.

Long-Term Operational

For regional emissions, the Project would not exceed the numerical thresholds of significance established by the SCAQMD. Thus a less than significant impact would occur for Project-related operational-source emissions without the application of mitigation measures.

Project operational-source emissions would not result in or cause a significant localized air quality impact as discussed in the operational LSTs section of this report. The proposed Project would not result in a significant CO "hotspot" as a result of Project related traffic during ongoing operations, nor would the Project result in a significant adverse health impact as discussed in Section 3.8, thus a less than significant impact to sensitive receptors during operational activity is expected.

Project operational-source emissions would not conflict with the AQMP.

Substantial odor-generating sources include land uses such as agricultural activities, feedlots, wastewater treatment facilities, landfills or various heavy industrial uses. The Project does not propose any such uses or activities that would result in potentially significant operational-source odor impacts. Potential sources of operational odors generated by the Project would include disposal of miscellaneous residential refuse. Moreover, SCAQMD Rule 402 acts to prevent occurrences of odor nuisances (1) . Consistent with City requirements, all Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with solid waste regulations. Potential operational-source odor impacts are therefore considered less-than-significant.

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1 INTRODUCTION

This report presents the results of the air quality impact analysis (AQIA) prepared by Urban Crossroads, Inc., for the Ironwood Residential Project (referred to as "Project"), which is located north of Ironwood Avenue, east of Nason Street, and west of Oliver Street in the City of Moreno Valley as shown on Exhibit 1-A.

The purpose of this AQIA is to evaluate the potential impacts to air quality associated with construction and operation of the proposed Project, and recommend measures to mitigate impacts considered potentially significant in comparison to established regulatory thresholds.

1.1 PROJECT OVERVIEW

The Project is proposed to consist of 181 single family, detached residential dwelling units as shown on Exhibit 1-B. For the purposes of this AQIA, it is assumed that the Project will be constructed and at full occupancy by 2020.

EXHIBIT 1-A: LOCATION MAP

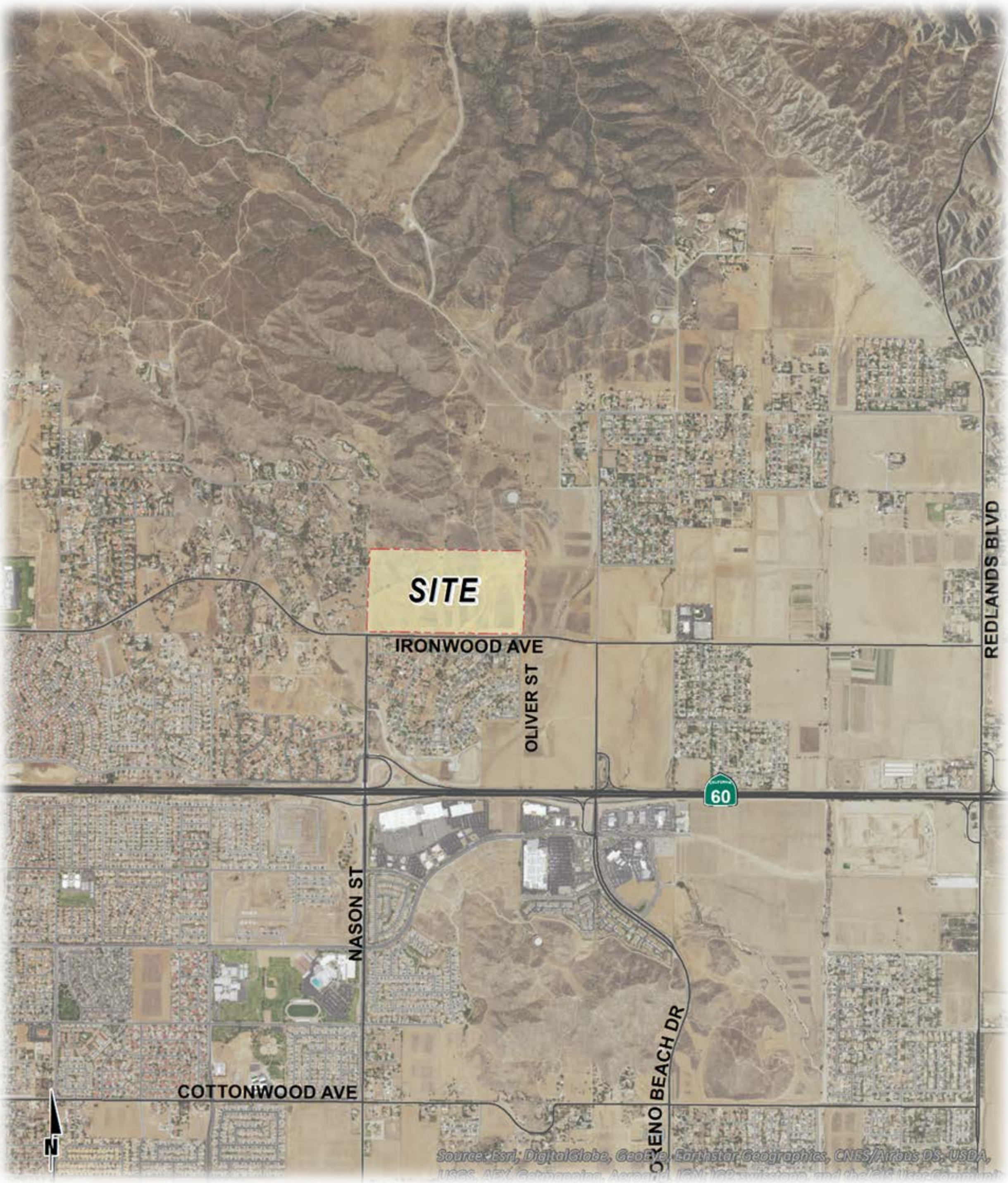
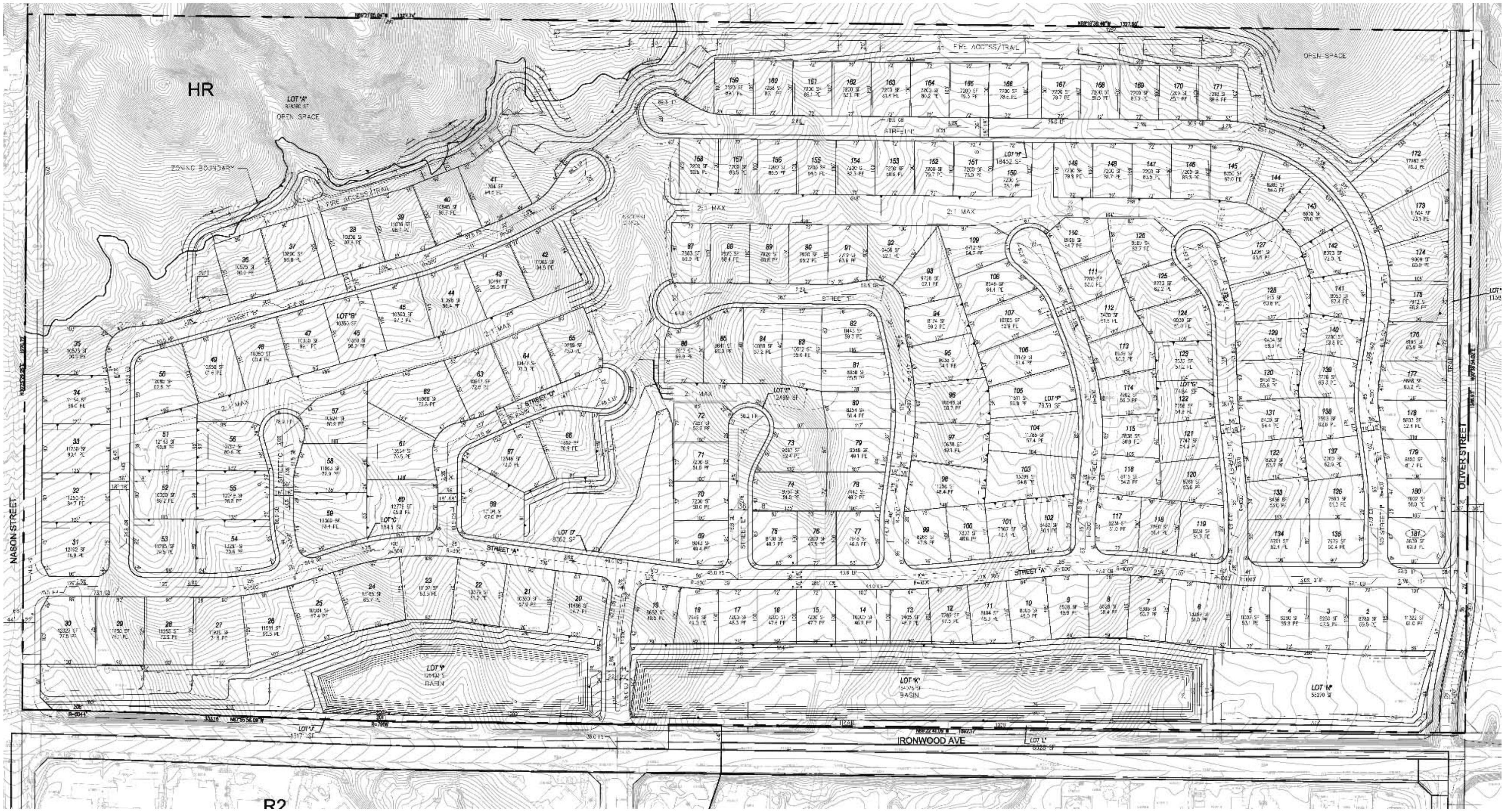


EXHIBIT 1-B: PRELIMINARY SITE PLAN



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2 AIR QUALITY SETTING

This section provides an overview of the existing air quality conditions in the Project area and region.

2.1 SOUTH COAST AIR BASIN

The Project site is located in the South Coast Air Basin (SCAB) within the jurisdiction of SCAQMD (2). The SCAQMD was created by the 1977 Lewis-Presley Air Quality Management Act, which merged four county air pollution control bodies into one regional district. Under the Act, the SCAQMD is responsible for bringing air quality in areas under its jurisdiction into conformity with federal and state air quality standards. As discussed above, the Project site is located within the South Coast Air Basin, a 6,745-square mile subregion of the SCAQMD, which includes portions of Los Angeles, Riverside, and San Bernardino Counties, and all of Orange County. The larger South Coast district boundary includes 10,743 square miles.

The SCAB is bound by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east. The Los Angeles County portion of the Mojave Desert Air Basin is bound by the San Gabriel Mountains to the south and west, the Los Angeles / Kern County border to the north, and the Los Angeles / San Bernardino County border to the east. The Riverside County portion of the Salton Sea Air Basin is bound by the San Jacinto Mountains in the west and spans eastward up to the Palo Verde Valley.

2.2 REGIONAL CLIMATE

The regional climate has a substantial influence on air quality in the SCAB. In addition, the temperature, wind, humidity, precipitation, and amount of sunshine influence the air quality.

The annual average temperatures throughout the SCAB vary from the low to middle 60s (degrees Fahrenheit). Due to a decreased marine influence, the eastern portion of the SCAB shows greater variability in average annual minimum and maximum temperatures. January is the coldest month throughout the SCAB, with average minimum temperatures of 47°F in downtown Los Angeles and 36°F in San Bernardino. All portions of the SCAB have recorded maximum temperatures above 100°F.

Although the climate of the SCAB can be characterized as semi-arid, the air near the land surface is quite moist on most days because of the presence of a marine layer. This shallow layer of sea air is an important modifier of SCAB climate. Humidity restricts visibility in the SCAB, and the conversion of sulfur dioxide to sulfates is heightened in air with high relative humidity. The marine layer provides an environment for that conversion process, especially during the spring and summer months. The annual average relative humidity within the SCAB is

71 percent along the coast and 59 percent inland. Since the ocean effect is dominant, periods of heavy early morning fog are frequent and low stratus clouds are a characteristic feature. These effects decrease with distance from the coast.

More than 90 percent of the SCAB's rainfall occurs from November through April. The annual average rainfall varies from approximately nine inches in Riverside to fourteen inches in downtown Los Angeles. Monthly and yearly rainfall totals are extremely variable. Summer rainfall usually consists of widely scattered thunderstorms near the coast and slightly heavier shower activity in the eastern portion of the SCAB with frequency being higher near the coast.

Due to its generally clear weather, about three-quarters of available sunshine is received in the SCAB. The remaining one-quarter is absorbed by clouds. The ultraviolet portion of this abundant radiation is a key factor in photochemical reactions. On the shortest day of the year there are approximately 10 hours of possible sunshine, and on the longest day of the year there are approximately 14 1/2 hours of possible sunshine.

The importance of wind to air pollution is considerable. The direction and speed of the wind determines the horizontal dispersion and transport of the air pollutants. During the late autumn to early spring rainy season, the SCAB is subjected to wind flows associated with the traveling storms moving through the region from the northwest. This period also brings five to ten periods of strong, dry offshore winds, locally termed "Santa Anas" each year. During the dry season, which coincides with the months of maximum photochemical smog concentrations, the wind flow is bimodal, typified by a daytime onshore sea breeze and a nighttime offshore drainage wind. Summer wind flows are created by the pressure differences between the relatively cold ocean and the unevenly heated and cooled land surfaces that modify the general northwesterly wind circulation over southern California. Nighttime drainage begins with the radiational cooling of the mountain slopes. Heavy, cool air descends the slopes and flows through the mountain passes and canyons as it follows the lowering terrain toward the ocean. Another characteristic wind regime in the SCAB is the "Catalina Eddy," a low level cyclonic (counterclockwise) flow centered over Santa Catalina Island which results in an offshore flow to the southwest. On most spring and summer days, some indication of an eddy is apparent in coastal sections.

In the SCAB, there are two distinct temperature inversion structures that control vertical mixing of air pollution. During the summer, warm high-pressure descending (subsiding) air is undercut by a shallow layer of cool marine air. The boundary between these two layers of air is a persistent marine subsidence/inversion. This boundary prevents vertical mixing which effectively acts as an impervious lid to pollutants over the entire SCAB. The mixing height for the inversion structure is normally situated 1,000 to 1,500 feet above mean sea level.

A second inversion-type forms in conjunction with the drainage of cool air off the surrounding mountains at night followed by the seaward drift of this pool of cool air. The top of this layer forms a sharp boundary with the warmer air aloft and creates nocturnal radiation inversions. These inversions occur primarily in the winter, when nights are longer and onshore flow is weakest. They are typically only a few hundred feet above mean sea level. These inversions effectively trap pollutants, such as NOX and CO from vehicles, as the pool of cool air drifts seaward. Winter is therefore a period of high levels of primary pollutants along the coastline.

2.3 WIND PATTERNS AND PROJECT LOCATION

The distinctive climate of the Project area and the SCAB is determined by its terrain and geographical location. The Basin is located in a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean in the southwest quadrant with high mountains forming the remainder of the perimeter.

Wind patterns across the south coastal region are characterized by westerly and southwesterly on-shore winds during the day and easterly or northeasterly breezes at night. Winds are characteristically light although the speed is somewhat greater during the dry summer months than during the rainy winter season.

2.4 EXISTING AIR QUALITY

Existing air quality is measured at established SCAQMD air quality monitoring stations. Monitored air quality is evaluated and in the context of ambient air quality standards. These standards are the levels of air quality that are considered safe, with an adequate margin of safety, to protect the public health and welfare. National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) currently in effect, as well health effects of each pollutant regulated under these standards are shown in Table 2-1 (3).

The determination of whether a region's air quality is healthful or unhealthful is determined by comparing contaminant levels in ambient air samples to the state and federal standards presented in Table 2-1. The air quality in a region is considered to be in attainment by the state if the measured ambient air pollutant levels for O3, CO, SO2, NO2, PM10, and PM2.5 are not equaled or exceeded at any time in any consecutive three-year period; and the federal standards (other than O3, PM10, PM2.5, and those based on annual averages or arithmetic mean) are not exceeded more than once per year. The O3 standard is attained when the fourth highest eight-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when 99 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

TABLE 2-1: AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)	1 Hour	0.09 ppm (180 $\mu g/m^3$)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 $\mu g/m^3$)		0.075 ppm (147 $\mu g/m^3$)		
Respirable Particulate Matter (PM10)[8]	24 Hour	50 $\mu g/m^3$	Gravimetric or Beta Attenuation	150 $\mu g/m^3$	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 $\mu g/m^3$		—		
Fine Particulate Matter (PM2.5)[8]	24 Hour	—	—	35 $\mu g/m^3$	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 $\mu g/m^3$	Gravimetric or Beta Attenuation	12.0 $\mu g/m^3$	15 $\mu g/m^3$	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[9]	1 Hour	0.18 ppm (339 $\mu g/m^3$)	Gas Phase Chemiluminescence	100 ppb (188 $\mu g/m^3$)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 $\mu g/m^3$)		0.053 ppm (100 $\mu g/m^3$)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[10]	1 Hour	0.25 ppm (655 $\mu g/m^3$)	Ultraviolet Fluorescence	75 ppb (196 $\mu g/m^3$)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 $\mu g/m^3$)	
	24 Hour	0.04 ppm (105 $\mu g/m^3$)		0.14 ppm (for certain areas)[10]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[10]	—	
Lead[11,12]	30 Day Average	1.5 $\mu g/m^3$	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 $\mu g/m^3$ (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 $\mu g/m^3$		
Visibility Reducing Particles[13]	8 Hour	See footnote 13	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 $\mu g/m^3$	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 $\mu g/m^3$)	Ultraviolet Fluorescence			
Vinyl Chloride[11]	24 Hour	0.01 ppm (26 $\mu g/m^3$)	Gas Chromatography			

See footnotes at: http://www.arb.ca.gov/research/aaqs/aaqs2.pdf

For more information please call ARB-PIO at (916) 322-2990

California Air Resources Board (6/4/13)

Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

2.5 REGIONAL AIR QUALITY

The SCAQMD monitors levels of various criteria pollutants at 30 monitoring stations throughout the air district. In 2013, the federal and state ambient air quality standards (NAAQS and CAAQS) were exceeded on one or more days for ozone, PM10, and PM2.5 at most monitoring locations (4). No areas of the SCAB exceeded federal or state standards for NO2, SO2, CO, sulfates or lead. See Table 2-2 for attainment designations for the SCAB (5). Appendix 3.2 provides geographic representation of the state and federal attainment status for applicable criteria pollutants within the SCAB.

2.6 LOCAL AIR QUALITY

Relative to the Project site, the nearest long-term air quality monitoring site for Ozone (O_3) and Particulate Matter ≤ 10 Microns (PM_{10}) is the South Coast Air Quality Management District Perris monitoring station (SRA 24), located approximately 11.25 miles south of the Project site (6). The nearest long-term air quality monitoring site in relation to the project for Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), and Ultra-Fine Particulates ($PM_{2.5}$) is carried out by the Metropolitan Riverside County 2 monitoring station (SRA 23), located approximately 12 miles west of the project site. It should be noted that the Metropolitan Riverside County 2 monitoring stations were utilized in lieu of the Perris monitoring station only where data was not available from the nearest monitoring site.

The most recent three (3) years of data available is shown on Table 2-3 and identifies the number of days ambient air quality standards were exceeded for the study area, which is was considered to be representative of the local air quality at the Project site (7). Additionally, data for SO2 has been omitted as attainment is regularly met in the South Coast Air Basin and few monitoring stations measure SO2 concentrations.

Criteria pollutants are pollutants that are regulated through the development of human health based and/or environmentally based criteria for setting permissible levels. Criteria pollutants, their typical sources, and effects are identified below:

- Carbon Monoxide (CO): Is a colorless, odorless gas produced by the incomplete combustion of carbon-containing fuels, such as gasoline or wood. CO concentrations tend to be the highest during the winter morning, when little to no wind and surface-based inversions trap the pollutant at ground levels. Because CO is emitted directly from internal combustion engines, unlike ozone, motor vehicles operating at slow speeds are the primary source of CO in the Basin. The highest ambient CO concentrations are generally found near congested transportation corridors and intersections.
- Sulfur Dioxide (SO2): Is a colorless, extremely irritating gas or liquid. It enters the atmosphere as a pollutant mainly as a result of burning high sulfur-content fuel oils and coal and from chemical processes occurring at chemical plants and refineries. When SO2 oxidizes in the atmosphere, it forms sulfates (SO4). Collectively, these pollutants are referred to as sulfur oxides (SOX).

TABLE 2-2: ATTAINMENT STATUS OF CRITERIA POLLUTANTS IN THE SOUTH COAST AIR BASIN (SCAB)

Criteria Pollutant	State Designation	Federal Designation
Ozone - 1hour standard	Nonattainment	No Standard
Ozone - 8 hour standard	Nonattainment	Nonattainment
PM_{10}	Nonattainment	Attainment
$PM_{2.5}$	Nonattainment	Nonattainment
Carbon Monoxide	Attainment	Attainment
Nitrogen Dioxide	Attainment	Unclassified/Attainment
Sulfur Dioxide	Attainment	Attainment
Lead[1]	Attainment	Attainment

Source: State/Federal designations were taken from http://www.arb.ca.gov/desig/adm/adm.htm
Note: See Appendix 3.2 for a detailed map of State/National Area Designations within the South Coast Air Basin

[1] The Federal nonattainment designation for lead is only applicable towards the Los Angeles County portion of the SCAB.

TABLE 2-3: PROJECT AREA AIR QUALITY MONITORING SUMMARY 2011-2013

Pollutant	Standard	Year		
		2011	2012	2013
Ozone (O_3)				
Maximum 1-Hour Concentration (ppm)		0.125	0.111	0.108
Maximum 8-Hour Concentration (ppm)		0.112	0.093	0.090
Number of Days Exceeding State 1-Hour Standard	> 0.09 ppm	44	28	--
Number of Days Exceeding State 8-Hour Standard	> 0.07 ppm	77	64	--
Number of Days Exceeding Federal 1-Hour Standard	> 0.12 ppm	2	0	0
Number of Days Exceeding Federal 8-Hour Standard	> 0.075 ppm	54	46	34
Number of Days Exceeding Health Advisory	≥ 0.15 ppm	0	0	0
Carbon Monoxide (CO)				
Maximum 1-Hour Concentration (ppm)		--	--	--
Maximum 8-Hour Concentration (ppm)		1.5	1.5	1.6
Number of Days Exceeding State 1-Hour Standard	> 20 ppm	--	--	0
Number of Days Exceeding Federal / State 8-Hour Standard	> 9.0 ppm	0	0	0
Number of Days Exceeding Federal 1-Hour Standard	> 35 ppm	--	--	0
Nitrogen Dioxide (NO_2)				
Maximum 1-Hour Concentration (ppm)		0.0571	0.0603	0.058
Annual Arithmetic Mean Concentration (ppm)		0.0169	0.0165	--
Number of Days Exceeding State 1-Hour Standard	> 0.18 ppm	0	0	0
Particulate Matter ≤ 10 Microns (PM_{10})				
Maximum 24-Hour Concentration (μg/m^3)		65	62	70
Annual Arithmetic Mean (μg/m^3)		29.2	26.5	--
Number of Samples		60	60	57
Number of Samples Exceeding State Standard	> 50 μg/m^3	3	1	--
Number of Samples Exceeding Federal Standard	> 150 μg/m^3	0	0	0
Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$)				
Maximum 24-Hour Concentration (μg/m^3)		51.6	30.2	53.7
Annual Arithmetic Mean (μg/m^3)		11.8	11.4	11.28
Number of Samples		112	104	117
Number of Samples Exceeding Federal 24-Hour Standard	> 35 μg/m^3	2	0	1

-- = data not available from SCAQMD

- Nitrogen Oxides (Oxides of Nitrogen, or NOx): Nitrogen oxides (NOx) consist of nitric oxide (NO), nitrogen dioxide (NO2) and nitrous oxide (N2O) and are formed when nitrogen (N2) combines with oxygen (O2). Their lifespan in the atmosphere ranges from one to seven days for nitric oxide and nitrogen dioxide, to 170 years for nitrous oxide. Nitrogen oxides are typically created during combustion processes, and are major contributors to smog formation and acid deposition. NO2 is a criteria air pollutant, and may result in numerous adverse health effects; it absorbs blue light, resulting in a brownish-red cast to the atmosphere and reduced visibility. Of the seven types of nitrogen oxide compounds, NO2 is the most abundant in the atmosphere. As ambient concentrations of NO2 are related to traffic density, commuters in heavy traffic may be exposed to higher concentrations of NO2 than those indicated by regional monitors.
- Ozone (O3): Is a highly reactive and unstable gas that is formed when volatile organic compounds (VOCs) and nitrogen oxides (NOX), both byproducts of internal combustion engine exhaust, undergo slow photochemical reactions in the presence of sunlight. Ozone concentrations are generally highest during the summer months when direct sunlight, light wind, and warm temperature conditions are favorable to the formation of this pollutant.
- PM10 (Particulate Matter less than 10 microns): A major air pollutant consisting of tiny solid or liquid particles of soot, dust, smoke, fumes, and aerosols. The size of the particles (10 microns or smaller, about 0.0004 inches or less) allows them to easily enter the lungs where they may be deposited, resulting in adverse health effects. PM10 also causes visibility reduction and is a criteria air pollutant.
- PM2.5 (Particulate Matter less than 2.5 microns): A similar air pollutant consisting of tiny solid or liquid particles which are 2.5 microns or smaller (which is often referred to as fine particles). These particles are formed in the atmosphere from primary gaseous emissions that include sulfates formed from SO2 release from power plants and industrial facilities and nitrates that are formed from NOX release from power plants, automobiles and other types of combustion sources. The chemical composition of fine particles highly depends on location, time of year, and weather conditions. PM2.5 is a criteria air pollutant.
- Volatile Organic Compounds (VOC): Volatile organic compounds are hydrocarbon compounds (any compound containing various combinations of hydrogen and carbon atoms) that exist in the ambient air. VOCs contribute to the formation of smog through atmospheric photochemical reactions and/or may be toxic. Compounds of carbon (also known as organic compounds) have different levels of reactivity; that is, they do not react at the same speed or do not form ozone to the same extent when exposed to photochemical processes. VOCs often have an odor, and some examples include gasoline, alcohol, and the solvents used in paints. Exceptions to the VOC designation include: carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate. VOCs are a criteria pollutant since they are a precursor to O3, which is a criteria pollutant. The SCAQMD uses the terms VOC and ROG (see below) interchangeably.
- Reactive Organic Gases (ROG): Similar to VOC, Reactive Organic Gases (ROG) are also precursors in forming ozone. Smog is formed when ROG and nitrogen oxides react in the presence of sunlight. ROGs are a criteria pollutant since they are a precursor to O3, which is a criteria pollutant. The SCAQMD uses the terms ROG and VOC (see previous) interchangeably.
- Lead (Pb): Lead is a heavy metal that is highly persistent in the environment. In the past, the primary source of lead in the air was emissions from vehicles burning leaded gasoline. As a result of the removal of lead from gasoline, there have been no violations at any of the SCAQMD's regular air monitoring stations since 1982. Currently, emissions of lead are largely

limited to stationary sources such as lead smelters. It should be noted that the Project is not anticipated to generate a quantifiable amount of lead emissions. Lead is a criteria air pollutant.

Health Effects of Air Pollutants

Ozone

Individuals exercising outdoors, children, and people with preexisting lung disease, such as asthma and chronic pulmonary lung disease, are considered to be the most susceptible sub-groups for ozone effects. Short-term exposure (lasting for a few hours) to ozone at levels typically observed in Southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. Elevated ozone levels are associated with increased school absences. In recent years, a correlation between elevated ambient ozone levels and increases in daily hospital admission rates, as well as mortality, has also been reported. An increased risk for asthma has been found in children who participate in multiple sports and live in communities with high ozone levels.

Ozone exposure under exercising conditions is known to increase the severity of the responses described above. Animal studies suggest that exposure to a combination of pollutants that includes ozone may be more toxic than exposure to ozone alone. Although lung volume and resistance changes observed after a single exposure diminish with repeated exposures, biochemical and cellular changes appear to persist, which can lead to subsequent lung structural changes.

Carbon Monoxide

Individuals with a deficient blood supply to the heart are the most susceptible to the adverse effects of CO exposure. The effects observed include earlier onset of chest pain with exercise, and electrocardiograph changes indicative of decreased oxygen supply to the heart. Inhaled CO has no direct toxic effect on the lungs, but exerts its effect on tissues by interfering with oxygen transport and competing with oxygen to combine with hemoglobin present in the blood to form carboxyhemoglobin (COHb). Hence, conditions with an increased demand for oxygen supply can be adversely affected by exposure to CO. Individuals most at risk include fetuses, patients with diseases involving heart and blood vessels, and patients with chronic hypoxemia (oxygen deficiency) as seen at high altitudes.

Reduction in birth weight and impaired neurobehavioral development have been observed in animals chronically exposed to CO, resulting in COHb levels similar to those observed in smokers. Recent studies have found increased risks for adverse birth outcomes with exposure to elevated CO levels; these include pre-term births and heart abnormalities.

Particulate Matter

A consistent correlation between elevated ambient fine particulate matter (PM10 and PM2.5) levels and an increase in mortality rates, respiratory infections, number and severity of asthma attacks and the number of hospital admissions has been observed in different parts of the United States and various areas around the world. In recent years, some studies have reported an association between long-term exposure to air pollution dominated by fine particles and increased mortality, reduction in life-span, and an increased mortality from lung cancer.

Daily fluctuations in PM2.5 concentration levels have also been related to hospital admissions for acute respiratory conditions in children, to school and kindergarten absences, to a decrease in respiratory lung volumes in normal children, and to increased medication use in children and adults with asthma. Recent studies show lung function growth in children is reduced with long-term exposure to particulate matter.

The elderly, people with pre-existing respiratory or cardiovascular disease, and children appear to be more susceptible to the effects of high levels of PM10 and PM2.5.

Nitrogen Dioxide

Population-based studies suggest that an increase in acute respiratory illness, including infections and respiratory symptoms in children (not infants), is associated with long-term exposure to NO2 at levels found in homes with gas stoves, which are higher than ambient levels found in Southern California. Increase in resistance to air flow and airway contraction is observed after short-term exposure to NO2 in healthy subjects. Larger decreases in lung functions are observed in individuals with asthma or chronic obstructive pulmonary disease (e.g., chronic bronchitis, emphysema) than in healthy individuals, indicating a greater susceptibility of these sub-groups.

In animals, exposure to levels of NO2 considerably higher than ambient concentrations results in increased susceptibility to infections, possibly due to the observed changes in cells involved in maintaining immune functions. The severity of lung tissue damage associated with high levels of ozone exposure increases when animals are exposed to a combination of ozone and NO2.

Sulfur Dioxide

A few minutes of exposure to low levels of SO2 can result in airway constriction in some asthmatics, all of whom are sensitive to its effects. In asthmatics, increase in resistance to air flow, as well as reduction in breathing capacity leading to severe breathing difficulties, are observed after acute exposure to SO2. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO2.

Animal studies suggest that despite SO2 being a respiratory irritant, it does not cause substantial lung injury at ambient concentrations. However, very high levels of exposure can cause lung edema (fluid accumulation), lung tissue damage, and sloughing off of cells lining the respiratory tract.

Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient SO2 levels. In these studies, efforts to separate the effects of SO2 from those of fine particles have not been successful. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.

Lead

Fetuses, infants, and children are more sensitive than others to the adverse effects of Pb exposure. Exposure to low levels of Pb can adversely affect the development and function of the central nervous system, leading to learning disorders, distractibility, inability to follow simple commands, and lower intelligence quotient. In adults, increased Pb levels are associated with increased blood pressure.

Pb poisoning can cause anemia, lethargy, seizures, and death; although it appears that there are no direct effects of Pb on the respiratory system. Pb can be stored in the bone from early age environmental exposure, and elevated blood Pb levels can occur due to breakdown of bone tissue during pregnancy, hyperthyroidism (increased secretion of hormones from the thyroid gland) and osteoporosis (breakdown of bony tissue). Fetuses and breast-fed babies can be exposed to higher levels of Pb because of previous environmental Pb exposure of their mothers.

Odors

The science of odor as a health concern is still new. Merely identifying the hundreds of VOCs that cause odors poses a big challenge. Offensive odors can potentially affect human health in several ways. First, odorant compounds can irritate the eye, nose, and throat, which can reduce respiratory volume. Second, studies have shown that the VOCs that cause odors can stimulate sensory nerves to cause neurochemical changes that might influence health, for instance, by compromising the immune system. Finally, unpleasant odors can trigger memories or attitudes linked to unpleasant odors, causing cognitive and emotional effects such as stress.

2.7 REGULATORY BACKGROUND

2.7.1 FEDERAL REGULATIONS

The U.S. EPA is responsible for setting and enforcing the NAAQS for O3, CO, NOx, SO2, PM10, PM2.5, and lead (8). The U.S. EPA has jurisdiction over emissions sources that are under the authority of the federal government including aircraft, locomotives, and emissions sources outside state waters (Outer Continental Shelf). The U.S. EPA also establishes emission standards for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission requirements of the CARB.

The Federal Clean Air Act (CAA) was first enacted in 1955, and has been amended numerous times in subsequent years (1963, 1965, 1967, 1970, 1977, and 1990). The CAA establishes the federal air quality standards, the NAAQS, and specifies future dates for achieving compliance (9). The CAA also mandates that states submit and implement State Implementation Plans (SIPs) for local areas not meeting these standards. These plans must include pollution control measures that demonstrate how the standards will be met.

The 1990 amendments to the CAA that identify specific emission reduction goals for areas not meeting the NAAQS require a demonstration of reasonable further progress toward attainment and incorporate additional sanctions for failure to attain or to meet interim milestones. The sections of the CAA most directly applicable to the development of the Project site include Title I (Non-Attainment Provisions) and Title II (Mobile Source Provisions). Title I provisions were established with the goal of attaining the NAAQS for the following criteria pollutants O3, NO2, SO2, PM10, CO, PM2.5, and lead. The NAAQS were amended in July 1997 to include an additional standard for O3 and to adopt a NAAQS for PM2.5. Table 2-1 (previously presented) provides the NAAQS within the basin.

Mobile source emissions are regulated in accordance with Title II provisions. These provisions require the use of cleaner burning gasoline and other cleaner burning fuels such as methanol and natural gas. Automobile manufacturers are also required to reduce tailpipe emissions of hydrocarbons and nitrogen oxides (NOx). NOx is a collective term that includes all forms of nitrogen oxides (NO, NO2, NO3) which are emitted as byproducts of the combustion process.

2.7.2 CALIFORNIA REGULATIONS

The CARB, which became part of the California EPA in 1991, is responsible for ensuring implementation of the California Clean Air Act (AB 2595), responding to the federal CAA, and for regulating emissions from consumer products and motor vehicles. The California CAA mandates achievement of the maximum degree of emissions reductions possible from vehicular and other mobile sources in order to attain the state ambient air quality standards by the earliest practical date. The CARB established the CAAQS for all pollutants for which the federal government has NAAQS and, in addition, establishes standards for sulfates, visibility, hydrogen sulfide, and vinyl chloride. However at this time, hydrogen sulfide and vinyl chloride are not measured at any monitoring stations in the SCAB because they are not considered to be a regional air quality problem. Generally, the CAAQS are more stringent than the NAAQS (10) (3).

Local air quality management districts, such as the SCAQMD, regulate air emissions from commercial and light industrial facilities. All air pollution control districts have been formally designated as attainment or non-attainment for each CAAQS.

Serious non-attainment areas are required to prepare air quality management plans that include specified emission reduction strategies in an effort to meet clean air goals. These plans are required to include:

- Application of Best Available Retrofit Control Technology to existing sources;
- Developing control programs for area sources (e.g., architectural coatings and solvents) and indirect sources (e.g. motor vehicle use generated by residential and commercial development);
- A District permitting system designed to allow no net increase in emissions from any new or modified permitted sources of emissions;
- Implementing reasonably available transportation control measures and assuring a substantial reduction in growth rate of vehicle trips and miles traveled;
- Significant use of low emissions vehicles by fleet operators;
- Sufficient control strategies to achieve a five percent or more annual reduction in emissions or 15 percent or more in a period of three years for ROGs, NOx, CO and PM10. However, air basins

may use alternative emission reduction strategy that achieves a reduction of less than five percent per year under certain circumstances.

2.7.3 AIR QUALITY MANAGEMENT PLANNING

Currently, the NAAQS and CAAQS are exceeded in most parts of the SCAB. In response, the SCAQMD has adopted a series of Air Quality Management Plans (AQMPs) to meet the state and federal ambient air quality standards (11). AQMPs are updated regularly in order to more effectively reduce emissions, accommodate growth, and to minimize any negative fiscal impacts of air pollution control on the economy. A detailed discussion on the AQMP and Project consistency with the AQMP is provided in Section 3.9.

2.8 EXISTING PROJECT SITE AIR QUALITY CONDITIONS

Existing air quality conditions at the Project site would generally reflect ambient monitored conditions as presented previously at Table 2-3.

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3 PROJECT AIR QUALITY IMPACT

3.1 INTRODUCTION

The Project has been evaluated to determine if it will violate an air quality standard or contribute to an existing or projected air quality violation. Additionally, the Project has been evaluated to determine if it will result in a cumulatively considerable net increase of a criteria pollutant for which the SCAB is non-attainment under an applicable federal or state ambient air quality standard. The significance of these potential impacts is described in the following section.

3.2 STANDARDS OF SIGNIFICANCE

The criteria used to determine the significance of potential Project-related air quality impacts are taken from the Initial Study Checklist in Appendix G of the State CEQA Guidelines (14 California Code of Regulations §§15000, et seq.). Based on these thresholds, a project would result in a significant impact related to air quality if it would (12):

- Conflict with or obstruct implementation of the applicable air quality plan.
- Violate any air quality standard or contribute to an existing or projected air quality violation.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone precursors).
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.

The SCAQMD has also developed regional and localized significance thresholds for other regulated pollutants, as summarized at Table 3-1 (13). The SCAQMD's CEQA Air Quality Significance Thresholds (March 2011) indicate that any projects in the SCAB with daily emissions that exceed any of the indicated thresholds should be considered as having an individually and cumulatively significant air quality impact.

TABLE 3-1: MAXIMUM DAILY EMISSIONS THRESHOLDS

Pollutant	Construction	Operations
Regional Thresholds		
NOx	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM10	150 lbs/day	150 lbs/day
PM2.5	55 lbs/day	55 lbs/day
Sox	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day
Localized Thresholds		
NOx	236.67lbs/day	n/a
PM10	11.00 lbs/day	n/a
PM2.5	6.67 lbs/day	n/a
CO	1,345.67 lbs/day	n/a

3.3 PROJECT-RELATED SOURCES OF POTENTIAL IMPACT

Land uses such as the Project affect air quality through construction-source and operational-source emissions.

On October 2, 2013, the SCAQMD in conjunction with the California Air Pollution Control Officers Association (CAPCOA) released the latest version of the California Emissions Estimator Model™ (CalEEMod™) v2013.2.2. The purpose of this model is to calculate construction-source and operational-source criteria pollutant (NO_x, VOC, PM_{10}, $PM_{2.5}$, SO_x, and CO) and greenhouse gas (GHG) emissions from direct and indirect sources; and quantify applicable air quality and GHG reductions achieved from mitigation measures (17). Accordingly, the latest version of CalEEMod™ has been used for this Project to determine construction and operational air quality emissions. Output from the model runs for both construction and operational activity are provided in Appendix 3.1.

3.4 CONSTRUCTION EMISSIONS

Construction activities associated with the Project will result in emissions of CO, VOCs, NOx, SOx, PM10, and PM2.5. Construction related emissions are expected from the following construction activities:

- Grading
- Paving

- Building Construction
- Architectural Coatings (Painting)
- Construction Workers Commuting

Construction is expected to commence in March 2017 and will last through July 2020. Construction duration by phase is shown on Table 3-2. The construction schedule utilized in the analysis represents a "worst-case" analysis scenario should construction occur any time after the respective dates since emission factors for construction decrease as the analysis year increases. The duration of construction activity and associated equipment represents a reasonable approximation of the expected construction fleet as required per CEQA guidelines. Site specific construction fleet may vary due to specific project needs at the time of construction. The duration of construction activity and associated construction equipment was estimated based on consultation the applicant. Please refer to specific detailed modeling inputs/outputs contained in Appendix 3.1 of this analysis. A detailed summary of construction equipment assumptions by phase is provided at Table 3-3.

Dust is typically a major concern during rough grading activities. Because such emissions are not amenable to collection and discharge through a controlled source, they are called "fugitive emissions". Fugitive dust emissions rates vary as a function of many parameters (soil silt, soil moisture, wind speed, area disturbed, number of vehicles, depth of disturbance or excavation, etc.). The CalEEMod model was utilized to calculate fugitive dust emissions resulting from this phase of activity.

Construction emissions for construction worker vehicles traveling to and from the Project site, as well as vendor trips (construction materials delivered to the Project site) were estimated based on information CalEEMod model defaults.

TABLE 3-2: CONSTRUCTION DURATION

Phase	Start Date	End Date	Duration (working days)
Grading	3/1/2017	6/13/2017	75
Paving	6/14/2017	8/29/2017	55
Building Construction	8/30/2017	3/31/2020	675
Architectural Coatings	12/1/2017	7/2/2020	675

TABLE 3-3: CONSTRUCTION EQUIPMENT ASSUMPTIONS

Activity	Equipment	Number	Hours Per Day
Grading	Excavators	2	8
	Graders	1	8
	Water Trucks	1	8
	Rubber Tired Dozers	1	8
	Scrapers	2	8
	Tractors/Loaders/Backhoes	2	8
Paving	Pavers	2	8
	Paving Equipment	2	8
	Rollers	2	8
Building Construction	Cranes	1	8
	Forklifts	3	8
	Generator Sets	1	8
	Tractors/Loaders/Backhoes	3	8
	Welders	1	8
Architectural Coatings	Air Compressors	1	8

3.4.1 CONSTRUCTION EMISSIONS SUMMARY

The estimated maximum daily construction emissions are summarized on Table 3-4. Detailed construction model outputs are presented in Appendix 3.1. Under the assumed scenarios, emissions resulting from the Project construction will not exceed any criteria pollutant thresholds established by the SCAQMD. Therefore, a less than significant impact would occur and no mitigation is required.

TABLE 3-4: EMISSIONS SUMMARY OF OVERALL CONSTRUCTION

Year	Emissions (pounds per day)					
	VOC	NOx	CO	SOx	PM10	PM2.5
2017	6.87	76.97	50.90	0.07	7.27	4.81
2018	5.87	19.94	18.26	0.03	1.45	1.15
2019	5.64	17.48	18.00	0.03	1.30	1.00
2020	5.50	16.12	17.89	0.03	1.20	0.91
Maximum Daily Emissions	**6.87**	**76.97**	**50.9**	**0.07**	**7.27**	**4.81**
SCAQMD Regional Threshold	75	100	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

3.5 OPERATIONAL EMISSIONS

Operational activities associated with the proposed Project will result in emissions of ROG, NOX, CO, SOX, PM10, and PM2.5. Operational emissions would be expected from the following primary sources:

- Area Source Emissions
- Energy Source Emissions
- Mobile Source Emissions

3.5.1 AREA SOURCE EMISSIONS

Architectural Coatings

Over a period of time the buildings that are part of this Project will be subject to emissions resulting from the evaporation of solvents contained in paints, varnishes, primers, and other surface coatings as part of Project maintenance. The emissions associated with architectural coatings were calculated using the CalEEMod model.

Consumer Products

Consumer products include, but are not limited to detergents, cleaning compounds, polishes, personal care products, and lawn and garden products. Many of these products contain organic compounds which when released in the atmosphere can react to form ozone and other photochemically reactive pollutants. The emissions associated with use of consumer products were calculated based on defaults provided within the CalEEMod model.

Hearths/Fireplaces

The emissions associated with use of hearths/fireplaces were calculated based on assumptions provided in the CalEEMod model. The Project is required to comply with SCAQMD Rule 445, which prohibits the use of wood burning stoves and fireplaces in new development. In order to account for the requirements of this Rule, the unmitigated CalEEMod model estimates were adjusted to remove wood burning stoves and fireplaces. As the project is required to comply with SCAQMD Rule 445, the removal of wood burning stoves and fireplaces is not considered "mitigation" although it must be identified as such in CalEEMod in order to treat the case appropriately.

Landscape Maintenance Equipment

Landscape maintenance equipment would generate emissions from fuel combustion and evaporation of unburned fuel. Equipment in this category would include lawnmowers, shedders/grinders, blowers, trimmers, chain saws, and hedge trimmers used to maintain the landscaping of the Project. The emissions associated with landscape maintenance equipment were calculated based on assumptions provided in the CalEEMod model.

3.5.2 ENERGY SOURCE EMISSIONS

Combustion Emissions Associated with Natural Gas and Electricity

Electricity and natural gas are used by almost every project. Criteria pollutant emissions are emitted through the generation of electricity and consumption of natural gas. However, because electrical generating facilities for the Project area are located either outside the region (state) or offset through the use of pollution credits (RECLAIM) for generation within the SCAB, criteria pollutant emissions from offsite generation of electricity is generally excluded from the evaluation of significance and only natural gas use is considered. The emissions associated with natural gas use were calculated using the CalEEMod model.

3.5.3 MOBILE SOURCE EMISSIONS

Vehicles

Project operational (vehicular) impacts are dependent on both overall daily vehicle trip generation and the effect of the Project on peak hour traffic volumes and traffic operations in the vicinity of the Project. The Project related operational air quality impacts derive primarily from vehicle trips generated by the Project. Trip characteristics available from the report, Ironwood Residential Traffic Impact Analysis (Urban Crossroads 2015) were utilized in this analysis (14). A vehicle fleet mix consistent with the Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol was used as shown in Table 3-5 (15). This fleet mix was utilized as it is more appropriate than the CalEEMod default fleet mix for residential land uses.

TABLE 3-5: PROJECT FLEET MIX

Vehicle Type	Fleet Mix %
Light Duty Autos	69 %
Light Duty Trucks	19.4 %
Medium Duty Trucks	6.4 %
Heavy Duty Trucks	4.7 %
Motorcycles	0.5 %

Fugitive Dust Related to Vehicular Travel

Vehicles traveling on paved roads would be a source of fugitive emissions due to the generation of road dust inclusive of tire wear particulates. The emissions estimates for travel on paved roads were calculated using the CalEEMod model.

3.5.4 OPERATIONAL EMISSIONS SUMMARY

Operational-source emissions are summarized on Table 3-6. Project operational-source emissions would not exceed applicable SCAQMD regional thresholds of significance. Therefore, a less than significant impact would occur and no mitigation is required.

TABLE 3-6: SUMMARY OF PEAK OPERATIONAL EMISSIONS

Operational Activities – Summer Scenario	Emissions (pounds per day)					
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Area Source	7.96	0.17	15.00	7.90E-04	0.33	0.33
Energy Source	0.17	1.46	0.62	0.01	0.12	0.12
Mobile	4.73	15.86	58.67	0.18	13.45	3.84
Total Maximum Daily Emissions	**12.86**	**17.49**	**74.29**	**0.19**	**13.90**	**4.29**
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Operational Activities – Winter Scenario	Emissions (pounds per day)					
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Area Source	7.96	0.17	15	7.90E-04	0.33	0.33
Energy Source	0.17	1.46	0.62	9.32E-03	0.12	0.12
Mobile	4.63	16.37	50.7	0.17	13.45	3.85
Total Maximum Daily Emissions	**12.76**	**18.00**	**66.32**	**0.18**	**13.90**	**4.30**
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

3.6 LOCALIZED SIGNIFICANCE - CONSTRUCTION ACTIVITY

BACKGROUND ON LOCALIZED SIGNIFICANCE THRESHOLD (LST) DEVELOPMENT

The analysis makes use of methodology included in the SCAQMD *Final Localized Significance Threshold Methodology* (Methodology) (19). The SCAQMD has established that impacts to air quality are significant if there is a potential to contribute or cause localized exceedances of the federal and/or state ambient air quality standards (NAAQS/CAAQS). Collectively, these are referred to as Localized Significance Thresholds (LSTs).

The significance of localized emissions impacts depends on whether ambient levels in the vicinity of any given project are above or below State standards. In the case of CO and NO2, if ambient levels are below the standards, a project is considered to have a significant impact if project emissions result in an exceedance of one or more of these standards. If ambient levels already exceed a state or federal standard, then project emissions are considered significant if they increase ambient concentrations by a measurable amount. This would apply to PM10 and PM2.5; both of which are non-attainment pollutants.

The SCAQMD established LSTs in response to the SCAQMD Governing Board's Environmental Justice Initiative I-4. LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard at the nearest residence or sensitive receptor. The SCAQMD states that lead agencies can use the LSTs as another indicator of significance in its air quality impact analyses.

LSTs were developed in response to environmental justice and health concerns raised by the public regarding exposure of individuals to criteria pollutants in local communities. To address the issue of localized significance, the SCAQMD adopted LSTs that show whether a project would cause or contribute to localized air quality impacts and thereby cause or contribute to potential localized adverse health effects. The analysis makes use of methodology included in the SCAQMD *Final Localized Significance Threshold Methodology* (LST Methodology) (16).

APPLICABILITY OF LSTS FOR THE PROJECT

For this Project, the appropriate Source Receptor Area (SRA) for the LST is the Perris monitoring station (SRA 24). LSTs apply to carbon monoxide (CO), nitrogen dioxide (NO2), particulate matter ≤ 10 microns (PM10), and particulate matter ≤ 2.5 microns (PM2.5). The SCAQMD produced look-up tables for projects less than or equal to 5 acres in size.

In order to determine the appropriate methodology for determining localized impacts that could occur as a result of Project-related construction, the following process is undertaken:

- The CalEEMod model is utilized to determine the maximum daily on-site emissions that will occur during construction activity.
- The SCAQMD's Fact Sheet for Applying CalEEMod to Localized Significance Thresholds (21) is used to determine the maximum site acreage that is actively disturbed based on the construction equipment fleet and equipment hours as estimated in CalEEMod.
- If the total acreage disturbed is less than or equal to five acres per day, then the SCAQMD's screening look-up tables are utilized to determine if a Project has the potential to result in a significant impact (the SCAQMD recommends that Projects exceeding the screening look-up tables undergo dispersion modeling to determine actual impacts). The look-up tables establish a maximum daily emissions threshold in pounds per day that can be compared to CalEEMod outputs.
- If the total acreage disturbed is greater than five acres per day, then the SCAQMD recommends dispersion modeling to be conducted to determine the actual pollutant concentrations for applicable LSTs in the air. In other words, the maximum daily on-site emissions as calculated in CalEEMod are modeled via air dispersion modeling to calculate the actual concentration in the air (e.g., parts per million or micrograms per cubic meter) in order to determine if any applicable thresholds are exceeded.

EMISSIONS CONSIDERED

SCAQMD's Methodology clearly states that "off-site mobile emissions from the Project should NOT be included in the emissions compared to LSTs (17)." Therefore, for purposes of the construction LST analysis only emissions included in the CalEEMod "on-site" emissions outputs were considered.

MAXIMUM DAILY DISTURBED-ACREAGE

Table 3-6 is used to determine the maximum daily disturbed-acreage for use in determining the applicability of the SCAQMD's LST look-up tables. Based on Table 3-7, the proposed Project could actively disturb approximately 4.0 acres per day and thus would not exceed the 5 acre per day limit established by the SCAQMD's LST look-up tables. Site specific construction fleet may vary due to specific project needs at the time of construction. The SCAQMD produced look-up tables for projects less than or equal to 5 acres in size; since the Project does not exceed a disturbance area of 5 acres in size, SCAQMD LST look-up tables will be used to determine localized impacts consistent with SCAQMD protocol.

TABLE 3-7 MAXIMUM DAILY DISTURBED-ACREAGE

Construction Phase	Equipment Type	Equipment Quantity	Acres grader per 8 hour day	Operating Hours per Day	Acres graded per day
Grading	Crawler Tractors	2	0.5	8	1
	Graders	1	0.5	8	0.5
	Rubber Tired Dozers	1	0.5	8	0.5
	Scrapers	2	1.0	8	2
Total acres graded per day					4.0
Applicable LST Mass Rate Look-up Table					4.0

Receptors

The nearest sensitive receptor land use is located immediately adjacent to the Project site to the west. Notwithstanding, the *Methodology* explicitly states that "*It is possible that a project may have receptors closer than 25 meters. Projects with boundaries located closer than 25 meters to the nearest receptor should use the LSTs for receptors located at 25 meters* (18)." Accordingly, LSTs for receptors at 25 meters are utilized in this analysis and provide for a conservative i.e. "health protective" standard of care.

Impacts

Emissions during construction activity will not exceed any of the SCAQMD's localized significance thresholds. Table 3-8 identifies the localized impacts at the nearest receptor location in the vicinity of the Project. A less than significant impact would occur and no mitigation is required.

TABLE 3-8: LOCALIZED SIGNIFICANCE SUMMARY CONSTRUCTION

On-Site Grading Emissions	Emissions (pounds per day)			
	NO_x	CO	PM_{10}	$PM_{2.5}$
Maximum Daily Emissions	**76.87**	**49.73**	**7.01**	**4.74**
SCAQMD Localized Threshold	236	1,345.67	11	6.67
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**

3.7 LOCALIZED SIGNIFICANCE – LONG-TERM OPERATIONAL ACTIVITY

The proposed project involves the construction and operation of 181 single family detached units. According to SCAQMD LST methodology, LSTs would apply to the operational phase of a proposed project, if the project includes stationary sources, or attracts mobile sources that may spend long periods queuing and idling at the site (e.g., warehouse or transfer facilities). The proposed project does not include such uses, and thus, due to the lack of stationary source emissions, no long-term localized significance threshold analysis is needed.

3.8 CO "HOT SPOT" ANALYSIS

As discussed below, the Project would not result in potentially adverse CO concentrations or "hot spots." Further, detailed modeling of Project-specific carbon monoxide (CO) "hot spots" is not needed to reach this conclusion.

It has long been recognized that adverse localized CO concentrations ("hot spots") are caused by vehicular emissions, primarily when idling at congested intersections. In response, vehicle emissions standards have become increasingly stringent in the last twenty years. Currently, the allowable CO emissions standard in California is a maximum of 3.4 grams/mile for passenger cars (there are requirements for certain vehicles that are more stringent). With the turnover of older vehicles, introduction of cleaner fuels, and implementation of increasingly sophisticated and efficient emissions control technologies, CO concentrations in the Project vicinity have steadily declined, as indicated by historical emissions data presented previously at Table 2-3.

A CO "hotspot" would occur if an exceedance of the state one-hour standard of 20 ppm or the eight-hour standard of 9 ppm were to occur. At the time of the 1993 Handbook, the SCAB was designated nonattainment under the California AAQS and National AAQS for CO (19). As identified within SCAQMD's 2003 AQMP and the 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan), peak carbon monoxide concentrations in the SCAB were a result of unusual meteorological and topographical conditions and not a result of congestion at a particular intersection (19). To establish a more accurate record of baseline CO concentrations affecting the SCAB, a CO "hot spot" analysis was conducted in 2003 for four busy intersections in Los Angeles at the peak morning and afternoon time periods. This hot spot analysis did not predict any violation of CO standards, as shown on Table 3-9. Traffic volumes generating the CO concentrations for the analysis are shown on Table 3-10. It can therefore be reasonably concluded that projects (such as the proposed Ironwood Residential (TTM No. 37001) development) that are not subject to the extremes in vehicle volumes and vehicle congestion that was evidenced in the 2003 Los Angeles hot spot analysis would similarly not create or result in CO hot spots. Similar considerations are also employed by other Air Districts when evaluating potential CO concentration impacts. More specifically, the Bay Area Air Quality Management District (BAAQMD) concludes that under existing and future vehicle emission rates, a given project would have to increase traffic volumes at a single intersection by more than 44,000 vehicles per hour—or 24,000 vehicles per hour where vertical and/or horizontal air does not mix—in order to generate a significant CO impact (20). The proposed Project considered herein would not produce the volume of traffic required to generate a CO hotspot either in the context of the 2003 Los Angeles hot spot study, or based on representative BAAQMD CO threshold considerations (see Table 3-11). Therefore, CO hotspots are not an environmental impact of concern for the proposed Project. Localized air quality impacts related to mobile-source emissions would therefore be less than significant.

TABLE 3-9: CO MODEL RESULTS

Intersection Location	Morning 1-hour	Afternoon 1-hour	8-hour
Wilshire-Veteran	4.6	3.5	4.2
Sunset-Highland	4	4.5	3.9
La Cienega-Century	3.7	3.1	5.8
Long Beach-Imperial	3	3.1	9.3

Source: 2003 AQMP
Notes: ppm: parts per million. Federal 1-hour standard is 35 ppm and the deferral 8-hour standard is 9.0 ppm.

TABLE 3-10: TRAFFIC VOLUMES

Intersection Location	Eastbound (AM/PM)	Westbound (AM/PM)	Southbound (AM/PM)	Northbound (AM/PM)	Total (AM/PM)
Wilshire-Veteran	4,954/2,069	1,830/3,317	721/1,400	560/933	8,062/7,719
Sunset-Highland	1,417/1,764	1,342/1,540	2,304/1,832	1,551/2,238	6,614/5,374
La Cienega-Century	2,540/2,243	1,890/2,728	1,384/2,029	821/1,674	6,634/8,674
Long Beach-Imperial	1,217/2,020	1,760/1,400	479/944	756/1,150	4,212/5,514

Source: 2003 AQMP
Notes: ppm: parts per million. Federal 1-hour standard is 35 ppm and the deferral 8-hour standard is 9.0 ppm.

TABLE 3-11: PROJECT PEAK HOUR TRAFFIC VOLUMES

Intersection Location	Northbound (AM/PM)	Southbound (AM/PM)	Eastbound (AM/PM)	Westbound (AM/PM)	Total (AM/PM)
Nason St & Ironwood Av	13/35	535/438	396/427	608/674	1,552/1,574
Nason St & SR-60 WB Ramps / Elder Av	419/578	773/693	710/676	113/197	2,015/2,144
Nason St & SR-60 EB Ramps	1,035/1,218	1,160/1,308	311/227	--/--	2,506/2,753
Lantz Ln & Ironwood Av	10/37	11/24	387/389	383/398	791/848

Source: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis (Urban Crossroads, Inc., 2014).

3.9 AIR QUALITY MANAGEMENT PLANNING

The Project site is located within the SCAB, which is characterized by relatively poor air quality. The SCAQMD has jurisdiction over an approximately 10,743 square-mile area consisting of the four-county Basin and the Los Angeles County and Riverside County portions of what use to be referred to as the Southeast Desert Air Basin. In these areas, the SCAQMD is principally responsible for air pollution control, and works directly with the Southern California Association of Governments (SCAG), county transportation commissions, local governments, as well as state and federal agencies to reduce emissions from stationary, mobile, and indirect sources to meet state and federal ambient air quality standards.

Currently, these state and federal air quality standards are exceeded in most parts of the Basin. In response, the SCAQMD has adopted a series of Air Quality Management Plans (AQMPs) to meet the state and federal ambient air quality standards. AQMPs are updated regularly in order to more effectively reduce emissions, accommodate growth, and to minimize any negative fiscal impacts of air pollution control on the economy.

The Final 2012 AQMP was adopted by the AQMD Governing Board on December 7, 2012 (21) (11). The 2012 AQMP incorporates the latest scientific and technological information and planning assumptions, including the 2012 Regional Transportation Plan/Sustainable Communities Strategy and updated emission inventory methodologies for various source categories.

Similar to the 2007 AQMP, the 2012 AQMP was based on assumptions provided by both CARB and SCAG in the latest available EMFAC model for the most recent motor vehicle and demographics information, respectively. The air quality levels projected in the 2012 AQMP are based on several assumptions. For example, the 2012 AQMP has assumed that development associated with general plans, specific plans, residential projects, and wastewater facilities will be constructed in accordance with population growth projections identified by SCAG in its 2012 RTP. The 2012 AQMP also has assumed that such development projects will implement strategies to reduce emissions generated during the construction and operational phases of development. The Project's consistency with the 2012 AQMP is discussed as follows:

Criteria for determining consistency with the AQMP are defined in Chapter 12, Section 12.2 and Section 12.3 of the SCAQMD's CEQA Air Quality Handbook (1993) (22). These indicators are discussed below:

- Consistency Criterion No. 1: The proposed Project will not result in an increase in the frequency or severity of existing air quality violations or cause or contribute to new violations, or delay the timely attainment of air quality standards or the interim emissions reductions specified in the AQMP.

<u>Construction Impacts</u>

Consistency Criterion No. 1 refers to violations of the CAAQS and NAAQS. CAAQS and NAAQS violations would occur LSTs were exceeded. As evaluated as part of the Project LST analysis (previously presented), the Project's localized construction-source emissions would not exceed applicable LSTs.

Operational Impacts

The Project regional analysis demonstrates that Project operational-source emissions would not exceed applicable thresholds, and would therefore not result in or cause violations of the CAAQS and NAAQS.

On the basis of the preceding discussion, the Project is determined to be consistent with the first criterion.

- Consistency Criterion No. 2: The Project will not exceed the assumptions in the AQMP based on the years of Project build-out phase.

Overview

The 2012 AQMP demonstrates that the applicable ambient air quality standards can be achieved within the timeframes required under federal law. Growth projections from local general plans adopted by cities in the district are provided to the Southern California Association of Governments (SCAG), which develops regional growth forecasts, which are then used to develop future air quality forecasts for the AQMP. Development consistent with the growth projections in City of Moreno Valley General Plan is considered to be consistent with the AQMP.

Construction Impacts

Peak day emissions generated by construction activities are largely independent of land use assignments, but rather are a function of development scope and maximum area of disturbance. Irrespective of the site's land use designation, development of the site to its maximum potential would likely occur, with disturbance of the entire site occurring during construction activities.

Operational Impacts

The Project proposes a residential land use which is generally consistent current zoning and land use designations. Although the Project is proposing a zone change to allow for a more dense development, it should be noted that the proposed residential development would not exceed regional thresholds for operational emissions, and would therefore be considered to have a less than significant impact. As such, development proposed by the Project is generally consistent with the growth projections in the General Plan and is therefore considered to be consistent with the AQMP.

On the basis of the preceding discussion, the Project is determined to be consistent with the second criterion.

AQMP Consistency Conclusion

The Project would not result in or cause NAAQS or CAAQS violations. The Project's proposed land use designation for the subject site does not materially affect the uses allowed or increase the development intensities as reflected in the adopted General Plan. The Project is therefore considered to be consistent with the AQMP.

3.10 POTENTIAL IMPACTS TO SENSITIVE RECEPTORS

The potential impact of Project-generated air pollutant emissions at sensitive receptors has also been considered. Sensitive receptors can include uses such as long term health care facilities, rehabilitation centers, and retirement homes. Residences, schools, playgrounds, child care centers, and athletic facilities can also be considered as sensitive receptors.

Results of the LST analysis indicate that the Project will not exceed the SCAQMD localized significance thresholds during construction. Therefore sensitive receptors would not be subject to a significant air quality impact during Project construction.

Results of the LST analysis indicate that the Project will not exceed the SCAQMD localized significance thresholds during operational activity. The proposed Project would not result in a CO "hotspot" as a result of Project related traffic during ongoing operations, nor would the Project result in a significant adverse health impact as discussed in Section 3.8. Thus a less than significant impact to sensitive receptors during operational activity is expected.

3.11 ODORS

The potential for the Project to generate objectionable odors has also been considered. Land uses generally associated with odor complaints include:

- Agricultural uses (livestock and farming)
- Wastewater treatment plants
- Food processing plants
- Chemical plants
- Composting operations
- Refineries
- Landfills
- Dairies
- Fiberglass molding facilities

The Project does not contain land uses typically associated with emitting objectionable odors. Potential odor sources associated with the proposed Project may result from construction equipment exhaust and the application of asphalt and architectural coatings during construction activities and the temporary storage of typical solid waste (refuse) associated with the proposed Project's (long-term operational) uses. Standard construction requirements would minimize odor impacts from construction. The construction odor emissions would be temporary, short-term, and intermittent in nature and would cease upon completion of the respective phase of construction and is thus considered less than significant. It is expected that Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with the City's solid waste regulations. The proposed Project would also be required to comply with SCAQMD Rule 402 to prevent occurrences of public nuisances. Therefore, odors associated with the proposed Project construction and operations would be less than significant and no mitigation is required.

3.12 Cumulative Impacts

The Project area is designated as an extreme non-attainment area for ozone and a non-attainment area for PM_{10} and $PM_{2.5}$.

Criterion 1; Regional Analysis

Construction Impacts

The Project-specific evaluation of emissions presented in the preceding analysis demonstrates that Project construction-source air pollutant emissions will not result in exceedances of regional thresholds. Therefore, project construction-source emission would be considered less than significant

Operational Impacts

Project operational-source emissions will not exceed applicable SCAQMD regional thresholds. Per SCAQMD significance guidance, these impacts at the Project level are also considered cumulatively less than significant impact persisting over the life of the Project.

Criterion 2; List Approach

A list approach is used, in accordance with Section 15130(b) of the CEQA Guidelines, which states the following:

> *The following elements are necessary to an adequate discussion of significant cumulative impacts: 1) Either: (A) A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency, or (B) A summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or area wide conditions contributing to the cumulative impact.*

The SCAQMD has recognized that there is typically insufficient information to quantitatively evaluate the cumulative contributions of multiple projects because each project applicant has no control over nearby projects. Nevertheless, the potential cumulative impacts from the Project and other projects are discussed below. A cumulative project list was developed for this analysis and is shown in Table 3-12.

Related projects could contribute to an existing or projected air quality exceedance because the Basin is currently nonattainment for ozone, PM10, and PM2.5. With regard to determining the significance of the contribution from the Project, the SCAQMD recommends that any given project's potential contribution to cumulative impacts should be assessed using the same significance criteria as for project-specific impacts. Therefore, this analysis assumes that individual projects that do not generate operational or construction emissions that exceed the SCAQMD's recommended daily thresholds for project-specific impacts would also not cause a commutatively considerable increase in emissions for those pollutants for which the Basin is in nonattainment, and, therefore, would not be considered to have a significant, adverse air quality impact. Alternatively, individual project-related construction and operational emissions that exceed SCAQMD thresholds for project-specific impacts would be considered cumulatively considerable. As previously noted, the Project will not exceed the applicable SCAQMD regional threshold for construction and operational-source emissions. As such, the Project will not result in a cumulatively significant impact.

TABLE 3-12: CUMULATIVE DEVELOPMENT LIST

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
1	PA 06-0152 & PA 06-0153 (First Park Nandina I & II)	High-Cube Warehouse	1,182.918	TSF
2	Integra Pacific Industrial Facility	High-Cube Warehouse	880.000	TSF
3A	PA 08-0072 (Overton Moore Properties)	High-Cube Warehouse	520.000	TSF
3B	Harbor Freight Expansion	High-Cube Warehouse	1,279.910	TSF
4	PA 04-0063 (Centerpointe Buildings 8 and 9)	General Light Industrial	361.384	TSF
5	PA 07-0035; PA 07-0039 (Moreno Valley Industrial Park)	General Light Industrial	204.657	TSF
		High-Cube Warehouse	409.920	TSF
6	PA 07-0079 (Indian Business Park)	High-Cube Warehouse	1,560.046	TSF
7	PA 08-0047-0052 (Komar Cactus Plaza)[3]	Hotel	110	RMS
		Fast Food w/Drive Thru	8.000	TSF
		Commercial	42.400	TSF
8	First Inland Logistics Center	High-Cube Warehouse	400.130	TSF
9	TM 33607	Condo/Townhomes	52	DU
10	PA 08-0093 (Centerpointe Business Park II)	General Light Industrial	99.988	TSF
11	PA 06-0021; PA 06-0022; PA 06-0048; PA 06-0049 (Komar Investments)	Warehousing	2,057.400	TSF
12A	PA 06-0017 (Ivan Devries)	Industrial Park	569.200	TSF
12B	Modular Logistics (Dorado Property)	High-Cube Warehouse	1,109.378	TSF
13	PA 09-0004 (Vogel)	High-Cube Warehouse	1,616.133	TSF
14	TM 34748	SFDR	135	DU
15	First Nandina Logistics Center	High-Cube Warehouse	1,450.000	TSF
16	PA 09-0031	Gas Station	12	VFP
17	First Park Nandina III	High-Cube Warehouse	691.960	TSF
	Moreno Valley Commerce Park	High-Cube Warehouse	354.321	TSF
18	March Business Center	General Light Industrial	16.732	TSF
		Warehousing	87.429	TSF
		High-Cube Warehouse	1,380.246	TSF
19A	TM 33810	SFDR	16	DU
19B	TM 34151	SFDR	37	DU
20	373K Industrial Facility	High-Cube Warehouse	373.030	TSF
21	TM 32716	SFDR	57	DU
22	TM 32917	Condo/Townhomes	227	DU
23	TM 33417	Condo/Townhomes	60	DU
24	TM 34988	Condo/Townhomes	271	DU
25A	TM 34216	Condo/Townhomes	39	DU
25B	TM 34681	Condo/Townhomes	49	DU
25C	PA 08-0079-0081 (Winco Foods)	Discount Supermarket	95.440	TSF
		Specialty Retail	14.800	TSF

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
26	Moreno Beach Marketplace (Lowe's)	Commercial Retail	175.000	TSF
	Auto Mall Specific Plan (Planning Area C)	Commercial Retail	304.500	TSF
	Westridge	High-Cube Warehouse	937.260	TSF
	ProLogis	High-Cube Warehouse	1,916.190	TSF
		Warehousing	328.448	TSF
	World Logistics Center	High-Cube Warehouse	41,400.000	TSF
		Warehousing	200.000	TSF
		Gas Station w/ Market	12	VFP
		Existing SFDR	7	DU
27	March Lifecare Campus Specific Plan[4]	Medical Offices	190.000	TSF
		Commercial Retail	210.000	TSF
		Research & Education	200.000	TSF
		Hospital	50	Beds
		Institutional Residential	660	Beds
28	Alessandro Metrolink Station	Light Rail Transit Station	300	SP
29	Airport Master Plan	Airport Use	559.000	TSF
30	Meridian Business Park North	Industrial Park	5,985.000	TSF
31	SP 341; PP 21552 (Majestic Freeway Business Center)	High-Cube Warehouse	6,200.000	TSF
32	PP 20699 (Oleander Business Park)	Warehousing	1,206.710	TSF
33	Ramona Metrolink Station	Light Rail Transit Station	300	SP
34	PP 22925 (Amstar/Kaliber Development)	Office (258.102 TSF)	258.102	TSF
		Warehousing	409.312	TSF
		General Light Industrial	42.222	TSF
		Retail	10.000	TSF
35	P07-1028 (Alessandro Business Park)	General Light Industrial	662.018	TSF
	Alessandro and Gorgonio	Fast Food w/Drive Thru	4.050	TSF
	2100 Alessandro Boulevard	Vocational School	11.505	TSF
36	P 05-0113 (IDI)	High-Cube Warehouse	1,750.000	TSF
37	P 05-0192 (Oakmont I)	High-Cube Warehouse	697.600	TSF
38	P 05-0477	High-Cube Warehouse	462.692	TSF
39	Rados Distribution Center	High-Cube Warehouse	1,200.000	TSF
40	Investment Development Services (IDS) II	High-Cube Warehouse	350.000	TSF
41	P 07-09-0018	Warehousing	170.000	TSF
42	P 07-07-0029 (Oakmont II)	High-Cube Warehouse	1,600.000	TSF
43	TR 32707	SFDR	137	DU
44	TR 34716	SFDR	318	DU
45	P 05-0493 (Ridge I)	High-Cube Warehouse	700.000	TSF
46	Ridge II	High-Cube Warehouse	2,000.000	TSF

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
47	Harvest Landing Specific Plan	SFDR	717	DU
		Condo/Townhomes	1,139	DU
		Sports Park	16.700	AC
		Business Park	1,233.401	TSF
		Shopping Center	73.181	TSF
	Perris Marketplace	Shopping Center	450.000	TSF
48	P 06-0411 (Concrete Batch Plant)	Manufacturing	2.000	TSF
49	Jordan Distribution	High-Cube Warehouse	378.000	TSF
50	Aiere	High-Cube Warehouse	642.000	TSF
51	P 08-11-0005; P 08-11-0006 (Starcrest)	High-Cube Warehouse	454.088	TSF
52A	Stratford Ranch Specific Plan	High-Cube Warehouse	1,725.411	TSF
52B	Stratford Ranch Specific Plan	High-Cube Warehouse	480.000	TSF
		General Light Industrial	120.000	TSF
53	PP 18908	General Light Industrial	133.000	TSF
54	Tract 33869	SFDR	39.000	DU
55	PP 16976	General Light Industrial	85.000	TSF
56	PP 21144	Industrial Park	190.802	TSF
57	Quail Ranch Specific Plan	Private School (K-12)	300	STU
		Golf Course	18	Holes
		Hotel	500	ROOMS
		Specialty Retail	66.667	TSF
		General office	66.667	TSF
		Assisted Living	500	Beds
		Senior Living (Detached)	200	DU
		SFDR	600	DU
58	a TR 32460 (Sussex Capital)	SFDR	57	DU
	b TR 32459 (Sussex Capital)	SFDR	11	DU
	c TR 30411 (Pacific Communities)	SFDR	24	DU
	d TR 33962 (Pacific Scene Homes)	SFDR	31	DU
	e TR 30998 (Pacific Communities)	SFDR	47	DU
59	a Westridge Commerce Center	High-Cube Warehouse	937.260	TSF
	b P06-158 (Gascon)	Commercial Retail	116.360	TSF
	c Auto Mall Specific Plan (PAC)	Commercial Retail	304.500	TSF
	d ProLogis	Warehousing	367.000	TSF
		High-Cube Warehouse	1,901.000	TSF
	e TR 35823 (Stowe Passco)	SFDR	261	DU
		Apartments	216	DU
60	TR 36340	SFDR	275	DU

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
61	a TR 31771 (Sanchez)	SFDR	25	DU
	b TR 34397 (Winchester Associates)	SFDR	52	DU
	c TR 32645 (Winchester Associates)	SFDR	53	DU
62	Lowe's (Moreno Beach Marketplace)	Home Improvement Store	175.000	TSF
63	a Convenience Store/ Fueling Station	Gas Station w/ Market	30.750	TSF
	b Senior Assisted Living	Assisted Living Units	139	DU
	c TR 31590 (Winchester Associates)	SFDR	96	DU
	d TR 32548 (Gabel, Cook & Associates)	SFDR	107	DU
	e 26th Corp. & Granite Capitol	SFDR	32	DU
	f TR 32218 (Whitney)	SFDR	63	DU
	g Moreno Marketplace	Commercial Retail	93.788	TSF
	h Medical Plaza	Medical Offices	311.633	TSF
64	a Moreno Medical Campus	Medical Offices	80.000	TSF
	b Aqua Bella Specific Plan	SFDR	2,922	DU
	c TR 34329 (Granite Capitol)	SFDR	90	DU
	d Cresta Bella	General Office	30.000	TSF
65	a Villages of Lakeview	SFDR	860	DU
		Condo/Townhomes	1,920	DU
		Elementary School	1,200	STU
		Commercial Retail	100.000	TSF
		Soccer Complex	12	Fields
		City Park	8.900	AC
		County Park	8.100	AC
		Regional Park	107.100	AC
	b Motte Lakeview Ranch	SFDR	847	DU
		Condo/Townhomes	686	DU
		Apartments	467	DU
		Elementary School	650	STU
		Middle School	300	STU
		Commercial Retail	120.000	TSF
		Regional Park	177.000	AC
66	Gateway Area Specific Plan	Commercial Retail	255.000	AC
		General Office	510.000	AC
		Business Park	595.000	AC
		Residential	340.000	AC
67	Moreno Valley Industrial Center (Industrial Area SP)	General Light Industrial	354.810	TSF
68	Centerpointe Business Park	General Light Industrial	356.000	TSF
69	ProLogis/Rolling Hills Ranch Industrial	Heavy Industrial	2,565.684	TSF
70	P05-0493	Logistics	597.370	TSF

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
71	P07-0102; and P09-0416, -0418, -0419	General Light Industrial	652.018	TSF
	Alessandro Bl. (APN 263-091-008; 263-100-019; 263-100-005; P14-0841 to 0848)	Commercial and Industrial Complex	101.580	TSF
72	Moreno Valley Shopping Center	Free Standing Discount Store	189.520	TSF
		Gas Station w/ Market / Car Wash	16	VFP
73	TR 31305 / Richmond American	Residential	87	DU
74	TR 32505 / DR Horton	Residential	72	DU
75	TR 34329 / Granite Capitol	Residential	90	DU
76	TR 31814 / Moreno Valley Investors	Residential	60	DU
77	TR 33771 / Creative Design Associates	Residential	12	DU
78	TR 35663 / Kha	Residential	12	DU
79	TR 22180 / Young Homes	Residential	140	DU
80	TR 32515	Residential	161	DU
81	TR 32142	Residential	81	DU
82	Heartland	Residential	922	DU
83	San Michele Industrial Center (Industrial Area SP)	General Light Industrial	865.960	TSF
84	Hidden Canyon	General Light Industrial	2,890.000	TSF
85	Starcrest, P011-0005; 08-11-0006	General Light Industrial	454.088	TSF
86	Commercial Medical Plaza	Medical Offices	311.633	TSF
87	Mountain Bridge Regional Commercial Community	Commercial	1,853.251	TSF
88	Jack Rabbit Trail	Residential	2,000	DU
89	The Preserve / Legacy Highlands SP	Commercial	595.901	TSF
		Residential	3,412	DU
90	South Perris Industrial Phase 1	Logistics	787.700	TSF
91	South Perris Industrial Phase 2	Logistics	3,448.734	TSF
92	South Perris Industrial Phase 3	Logistics	3,166.857	TSF
93	P 04-0343	Warehousing	41.650	TSF
94	P 06-0228	General Light Industrial	149.738	TSF
95	P 06-0378	Senior Housing	429	DU
96	P 11-09-0011	Retail	80.000	TSF
97	P 12-05-0013	Apartments	75	DU
98	P 12-10-0005	High-Cube Warehouse	1,463.887	TSF
99	TR 30850	Residential	496	DU
100	TR 30973	Residential	35	DU
101	TR 31225	Residential	57	DU
102	TR 31226	Residential	82	DU
103	TR 31240	Residential	114	DU
104	TR 31407	Residential	243	DU
105	TR 31650	SFDR	61	DU

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
106	TR 31659	SFDR	161	DU
107	TR 32041	Residential	122	DU
108	TR 32406	SFDR	15	DU
109	TR 33193	Townhomes	94	DU
110	TR 33338	Residential	75	DU
111	California Baptist University Specific Plan	University	157	AC
112	Canyon Springs Specific Plan	Hospital	280	BEDS
		Medical-Dental Office	370	TSF
		Senior Adult Housing-Attached	234	DU
		Assisted Living	267	BEDS
113	Citrus Business Park Specific Plan	Industrial Business Park	49	AC
114	Downtown Specific Plan	Residential	5,000	DU
115	Hunter Business Park	Industrial	1,300	AC
116	La Sierra University Specific Plan	Mixed-Use		
117	Magnolia Avenue Specific Plan	Mixed-Use/Very High Residential	1,473	AC
118	Marketplace Specific Plan	Commercial Retail/Office	200	AC
119	Mission Grove Specific Plan	Business/Office Park	56.79	AC
		Commercial Retail	68.12	AC
		High Density Residential	53.77	AC
		Low Density Residential	78.38	AC
		Medium Density Residential	155.31	AC
120	Orangecrest Specific Plan	Rural Residential	2.13	AC
		Business/Office Park	2.70	AC
		Commercial Retail	138.96	AC
		High Density Residential	13.70	AC
		Low Density Residential	540.76	AC
		Medium Density Residential	1,217.80	AC
		Public Facilities/Institutions	121.59	AC
		Public Park	59.51	AC
121	Rancho La Sierra Specific Plan	SFDR	598	DU
122	Riverside Auto Center Specific Plan	Auto Center		
123	Riverwalk Vista Specific Plan	Residential	402	DU

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
124	Sycamore Canyon Specific Plan	Hillside Residential	41.83	AC
		Low Density Residential	97.28	AC
		Medium Density Residential	14.84	AC
		Very Low Density Residential	884.22	AC
		Public Park	27.85	AC
125	Sycamore Canyon Business Park Specific Plan	Business/Office Park	847.15	AC
		Commercial Retail	10.32	AC
126	Sycamore-Highlands Specific Plan	Commercial Retail	14.63	AC
		High Density Residential	52.18	AC
		Medium Density Residential	99.11	AC
		Public Facilities	1.56	AC
		Public Park	144.17	AC
		Very Low Density Residential	49.09	AC
127	University Avenue Specific Plan	Mixed-Use	Varies	
128	807 Blaine Street (P09-0717; P09-0718)	Apartments	55	DU
129	2340 Fourteenth Street (P09-0808; P08-0809)	Senior Housing	134	BEDS
130	10938 Magnolia Avenue (P10-0083)	Pharmacy	14.064	TSF
131	6287 Day Street (P10-0090; P10-0091)	Gas Station	2	VFP
	2570 Canyon Springs Parkway (P08-0274; P08-0275)	Bank w/ Drive Thru	2.746	TSF
	6211 Valley Springs Parkway (Steak 'N Shake Restaurant; P14-0536)	Fast Food w/Drive Thru	3.750	TSF
132	N. of Van Buren Boulevard; W. of Wood Street (P10-0808; P10-0708)	Fast Food w/Drive Thru	2.361	TSF
133	3439 Arlington Avenue (P12-0234)	Fitness Club	9.600	TSF
134	NWC of Riverwalk Parkway and Flat Rock Drive (P12-0019; P12-0156; P12-0158)	Convenience Store	2.400	TSF
		Coffee Shop	3.946	TSF
135	3875 Dawes Street (P10-0438; Magnolia Garden Condominiums)	Condo/Townhomes	62	DU
136	5938-5944 Grand Avenue (P12-0266; P12-0267; P12-0268)	Senior Housing	37	DU
137	4901 La Sierra Avenue (P11-0627; P11-0628; P11-0777; P11-0778)	Gas Station	4.100	TSF
138	4250 Van Buren Boulevard (P12-0605; P12-0606)	Gas Station	1.776	TSF
139	360 Alessandro Boulevard (P12-0419; P12-0557; P12-0558; P12-0559)	Bank	3.858	TSF
140	2831 Mary Street (P12-0761; P12-0442 P12-0443; P12-0444)	Pharmacy	56.101	TSF
141	2450 Market Street (P13-0087; P13-0262)	Apartments	77	DU
142	6091 Victoria Avenue (P13-0432)	Day Care	1.831	TSF
143	6692 Indiana Avenue (P13-0159; P13-0160)	Gas Station	2.958	TSF
144	4824 Jones Avenue (P13-0181; P13-0182)	Church	23.124	TSF

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
145	2586 University avenue (P13-0650; P13-0651)	Bed and Breakfast	3.618	TSF
146	18580 Van Buren Boulevard (P08-0402; P13-0822)	Auto Repair Shop	8.142	TSF
147	4247 Van Buren Boulevard (P13-0785; P13-0787)	Church Expansion	12.166	TSF
148	SWC of Lurin Avenue and Wood Road (P06-0900; P08-0269; P08-0270; TTM 32301)	SFDR	20	DU
149	8616 California Avenue (P08-0084; PM 35852)	Condo/Townhomes	21	DU
150	19811 Lurin Avenue (P06-1355; TM 33480)	SFDR	32	DU
151	APN:266140029, 030 (P06-1396; Mariposa Avenue; TM 33481)	SFDR	25	DU
152	APN:266140002, 021, 022 (P06-1404; Lurin Avenue; TM 33482)	SFDR	29	DU
153	3719 Strong Street (P05-0269; P08-0416; TM 33550)	SFDR	9	DU
154	1006 & 1008 Clark Street (P06-0782; TM 34908)	SFDR	15	DU
155	E. of Gratton St., W. of Corsica Av., N. of Van Buren Bl. (P05-1528; P09-0087; TM 34509)	SFDR	50	DU
156	NWC of Dominion Avenue and Division Street (P08-0396; P08-0397; P08-0398; P08-0399; TM 35620)	Condo/Townhomes	36	DU
157	6639 Hillside Avenue (P08-0727; PM 35901)	Industrial	5	LOTS
158	19985 Van Buren Boulevard (P10-0118; Gless Ranch)	Commercial Retail	425.447	TSF
159	3990 Reynolds Road (P12-0021; P12-0022; P12-0074; PM 36442)	Condo/Townhomes	102	DU
160	NEC of Martha Way & Everest Avenue (P13-0389; TM 36579)	SFDR	5	DU
161	4325, 4335, 4345, 4355, 4375 Adams Street (P13-0723; P13-0724; P13-0725; TM 36654)	SFDR	62	DU
162	5200 Van Buren Boulevard (P09-0600; P09-0601; Walmart Expansion)	Free Standing Discount Store	22.272	TSF
163	11500 Magnolia Avenue (P10-0406; P10-0407; P10-0408)	Apartments	168	DU
164	9241 & 9265 Audrey Avenue (P12-0184; P12-0185; P12-0187; Azar Plaza)	Commercial Retail	6.150	TSF
165	2325 Cottonwood Avenue (P12-0507; P12-0508; P12-0509; P12-0510)	High-Cube Warehouse	235.741	TSF
166	1710 Main Street (P12-0717)	Family Dollar Store	8.039	TSF
167	2861 Mary Street (P12-0442; P12-0443; P12-0444)	Shopping Center	56.101	TSF
168	3545 Central Avenue (P12-0741; P12-0743)	Riverside Plaza Renovations	35	AC
169	5731, 5741, 5761 & 5797 Pickler Street (P13-0198; P13-0199; P13-0200; P13-0201)	Apartments	30	DU
170	3705 Tyler Street (P13-0501; P13-0502)	Restaurant	6.000	TSF
171	6570 Magnolia Avenue; 3739 & 3747 Central Avenue (P13-0196; P13-0197)	Fast Food w/Drive Thru	3.795	TSF
172	5940-5980 Sycamore Canyon Boulevard (P13-0553; P13-0554; P13-0583; P14-0065)	Apartments	275	DU
173	SEC Sycamore Canyon Boulevard & Box Springs Road (P13-0607; P13-0608; P0609; P13-0854)	General Light Industrial	171.616	TSF
174	3742 Park Sierra Avenue (P13-0912; P13-0913)	Fitness Club	45.000	TSF

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
175	474 Palmyrita Avenue (P13-0956; P13-0959; P13-0960; P13-0963; P13-0964; P13-0965; P13-0966)	High-Cube Warehouse	1,461.449	TSF
176	Park Sierra Avenue (P14-0026; P14-0027)	Fast Food w/Drive Thru	3.500	TSF
177	E. of Commerce St., between Mission Inn Av. and Ninth St. (P14-0045; P14-0046; P14-0047; P14-0048; P14-0049)	Apartments	208	DU
178	4445 Magnolia Avenue (P13-0207; P13-0208; P13-0209; P13-0210; P13-0211)	Hospital Expansion	Varies	
179	SR-91/Van Buren Commercial	Commercial Retail	23.565	TSF
180	6465 Sycamore Canyon Boulevard	Health Club	4.000	TSF
181	Edgemont Street, South of Eucalyptus Av.	Apartments	112	DU
182	14601 Dauchy Av. - TM 36370 (P12-0601; P12-0697; P12-0698)	SFDR	10	DU
	TM 32180 (P07-1073)	SFDR	9	DU
	18875 Moss Road	SFDR	8	DU
	South of Clarke St., west of Crystal View Terrace (PM 34583' {09-0141; P09-173)	SFDR	3	DU
183	Freeway Business Center (March JPA)	High-Cube Warehouse	710	TSF
184	28860 Professor's Fun IV, LLC/Winchester Associates, Inc.	SFDR	9	DU
185	20636 Pacific Communities	SFDR	67	DU
186	31297 Randy McFarland	SFDR	7	DU
187	31394 Pigeon Pass, Ltd.	SFDR	78	DU
188	31442 SKG Pacific Enterprises Inc.	SFDR	63	DU
189	31517 Professors Prop Six/Winchester Assoc.	SFDR	83	DU
190	31621 Peter Sanchez	SFDR	25	DU
191	32005 Red Hill Village, LLC	SFDR	214	DU
192	32126 Salvador Torres	SFDR	35	DU
193	32194 Arman Pezeshkifar	SFDR	32	DU
194	32408 Sanstone Inc.	SFDR	80	DU
195	32844 Winchester Associates	SFDR	17	DU
196	32978 Focus Estates	SFDR	19	DU
197	33024 Adam Wislar	SFDR	8	DU
198	33275 Jose Guzman	SFDR	4	DU
199	33388 SCH Development, LLC	SFDR	16	DU
200	33436 Winchester Associates	SFDR	105	DU
201	33626 Kincaid Development, Inc.	SFDR	23	DU
202	33963 Rance Garrett	SFDR	31	DU
203	34043 RM3 Building and Development	SFDR	12	DU
204	31621 Beazer Homes	SFDR	274	DU
205	30268 Pacific Communities	SFDR	83	DU
206	31414 GRF - Majestic Hills	SFDR	31	DU
207	31494 Winchester Associates	SFDR	12	DU
208	32715 GFR - Trinity	SFDR	30	DU

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
209	33256 Granite Homes	SFDR	79	DU
210	32711 Isaac Genah	SFDR	9	DU
211	35530 Moreno Gilman 650, LLC-Quail Ranch	SFDR	1,105	DU
212	35534 Leedco Engineers	SFDR	12	DU
213	36436 CV Communities	SFDR	159	DU
214	36401 Continental East Fund III, LLC	SFDR	92	DU
215	32215 Winchester Associates "Scottish Village"	MFDR	194	DU
216	32756 Jimmy Lee	MFDR	24	DU
217	35369 Tason Myers Property	MFDR	12	DU
218	35414 Lincoln Property Co. Southwest	MFDR	240	DU
219	35769 Michael Chen	MFDR	16	DU
220	PA08-0013 Palm Desert Development "Rancho Dorado North"	MFDR	80	DU
221	PA09-0006 Jim Nydam	MFDR	15	DU
222	35861 Frederick Homes	MFDR	24	DU
223	36038 Alessandro Village Plaza, LLC	MFDR	96	DU
224	35304 Jimmy Lee	MFDR	12	DU
225	Alessandro & Lasselle	Shopping Center	140	TSF
226	Burger King - Fast-Food - 24800 Sunnymead	Fast Food w/Drive Thru	--	TSF
227	Nightclub	Retail	11	TSF
	Aerosports Trampoline Park	Recreation Community Center	34.5	TSF
228	Food 4 Less - Fueling Station	Gas Station with Convenience Market	16	VFS
229	Lakeshore Village Marketplace	Shopping Center	140	TSF
230	El Paso (food court)	Fast Food no Drive Thru	--	TSF
231	Potato Corner	Fast Food no Drive Thru	--	TSF
232	O'Reilly Automotive	Automobile Parts Sale	7.5	TSF
233	O'Reilly Automotive	Automobile Parts Sale	7.5	TSF
234	Restaurant	Restaurant	9	TSF
235	Rancho Belago Plaza - Retail	Retail	14	TSF
236	24-Hour Fitness	Fitness Club	--	TSF
	Rivals Sports Bar & Grill	Restaurant	--	TSF
237	Walmart	Free Standing Discount Store	193	TSF
238	Yum Yum Donut Shop	Coffee/Donut Shop w/o Drive-Thru	4.35	TSF
239	Hawthorn Inn & Suites	Hotel	79	RMS
240	Sleep Inn Suites	Hotel	66	RMS
241	Fresenius Medical Care Center	Medical Offices	12	TSF
242	Integrated Care Communities	Nursing Home	44	TSF
243	Kaiser Permanente - Emergency Room Expansion	Medical Offices	--	TSF

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
244	Moreno Valley Professional Center	General Office	84	TSF
245	Olivewood Plaza - Office Building	General Office	23	TSF
246	Renaissance Village of Moreno Valley	Senior Adult Housing-Attached	140	DU
247	Riverside County Office Building	General Office	52	TSF
248	Gateway Business Park	Residential Condo/Townhouse	34	DU
249	Shaw Development	High-Cube Warehouse	367	TSF
250	IDS/Real Estate Group - Nandina Distribution Center	High-Cube Warehouse	697	TSF
251	Stoneridge Town Centre - Vacant Restaurant	Restaurant	5,700	TSF
252	Moreno Valley Logistics Center	High-Cube Warehouse	1,332	TSF
		Warehousing	371	TSF

[1] SFDR = Single Family Detached Residential ; MFDR = Multi-Family Detached Residential
[2] DU = Dwelling Units; TSF = Thousand Square Feet; SP = Spaces; VFP = Vehicle Fueling Positions
[3] Source: Cactus Avenue and Commerce Center Drive Commercial Center TIA, Urban Crossroads, Inc., December 9, 2008 (Revised).
[4] Source: March Lifecare Campus Specific Plan Traffic Impact Analysis, Mountain Pacific, Inc., May 2009 (Revised).

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4 FINDINGS & CONCLUSIONS

4.1 CONSTRUCTION-SOURCE EMISSIONS

For regional emissions, the Project would not exceed the numerical thresholds of significance established by the South Coast Air Quality Management District (SCAQMD). Thus a less than significant impact will occur.

Additionally, emissions during construction activity will not exceed the SCAQMD's localized significance threshold. Therefore, a less than significant impact would occur.

Project construction-source emissions would not conflict with the applicable Air Quality Management Plan (AQMP).

Established requirements addressing construction equipment operations, and construction material use, storage, and disposal requirements act to minimize odor impacts that may result from construction activities. Moreover, construction-source odor emissions would be temporary, short-term, and intermittent in nature and would not result in persistent impacts that would affect substantial numbers of people. Potential construction-source odor impacts are therefore considered less-than-significant.

4.2 OPERATIONAL-SOURCE EMISSIONS

For regional emissions, the Project would not exceed the numerical thresholds of significance established by the SCAQMD. Thus a less than significant impact would occur for Project-related operational-source emissions without the application of mitigation measures.

Project operational-source emissions would not result in or cause a significant localized air quality impact as discussed in the operational LSTs section of this report. The proposed Project would not result in a significant CO "hotspot" as a result of Project related traffic during ongoing operations, nor would the Project result in a significant adverse health impact as discussed in Section 3.8, thus a less than significant impact to sensitive receptors during operational activity is expected.

Project operational-source emissions would not conflict with the AQMP.

Substantial odor-generating sources include land uses such as agricultural activities, feedlots, wastewater treatment facilities, landfills or various heavy industrial uses. The Project does not propose any such uses or activities that would result in potentially significant operational-source odor impacts. Potential sources of operational odors generated by the Project would include disposal of miscellaneous residential refuse. Moreover, SCAQMD Rule 402 acts to prevent occurrences of odor nuisances (1) . Consistent with City requirements, all Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with solid waste regulations. Potential operational-source odor impacts are therefore considered less-than-significant.

4.3 STANDARD REGULATORY REQUIREMENTS/BEST AVAILABLE CONTROL MEASURES (BACMS)

Measures listed below (or equivalent language) shall appear on all Project grading plans, construction specifications and bid documents, and the City shall ensure such language is incorporated prior to issuance of any development permits.

SCAQMD Rules that are currently applicable during construction activity for this Project include but are not limited to: Rule 1113 (Architectural Coatings) (23); Rule 431.2 (Low Sulfur Fuel) (24); Rule 403 (Fugitive Dust) (25); and Rule 1186 / 1186.1 (Street Sweepers) (26). It should be noted that BACMs are not mitigation as they are standard regulatory requirements.

BACM AQ-1

The following measures shall be incorporated into Project plans and specifications as implementation of Rule 403 (4):

- All clearing, grading, earth-moving, or excavation activities shall cease when winds exceed 25 mph per SCAQMD guidelines in order to limit fugitive dust emissions.
- The contractor shall ensure that all disturbed unpaved roads and disturbed areas within the Project are watered at least three (3) times daily during dry weather. Watering, with complete coverage of disturbed areas, shall occur at least three times a day, preferably in the mid-morning, afternoon, and after work is done for the day.
- The contractor shall ensure that traffic speeds on unpaved roads and Project site areas are reduced to 15 miles per hour or less

4.4 CONSTRUCTION AND OPERATIONAL-SOURCE AIR POLLUTANT EMISSIONS MITIGATION MEASURES

No significant impacts were identified and no mitigation measures are required.

5 REFERENCES

1. **South Coast Air Quality Management District.** RULE 402. Nuisance. [Online] May 7, 1976. [Cited: September 17, 2013.] http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-402.pdf?sfvrsn=4.
2. —. Southern California Air Basins. [Online] [Cited: September 17, 2014.] http://www.aqmd.gov/docs/default-source/default-document-library/map-of-jurisdiction.pdf.
3. **Environmental Protection Agency.** National Ambient Air Quality Standards (NAAQS). [Online] 1990. [Cited: September 17, 2014.] http://www.epa.gov/air/criteria.html.
4. —. Monitor Values Report. [Online] [Cited: September 17, 2014.] http://www.epa.gov/airdata/ad_rep_mon.html.
5. **Air Resources Board.** Air Quality Standards and Area Designations. [Online] 2013. [Cited: September 17, 2014.] http://www.arb.ca.gov/desig/desig.htm.
6. **South Coast Air Quality Management District.** *Air Quality Reporting.* [pdf] Diamond Bar : Sierra Wade Associates, 1999.
7. **Environmental Protection Agency.** Monitor Values Report. [Online] [Cited: November 13, 2013.] http://www.epa.gov/airdata/ad_rep_mon.html.
8. —. National Ambient Air Quality Standards (NAAQS). [Online] 1990. [Cited: November 13, 2013.] http://www.epa.gov/air/criteria.html.
9. —. Air Pollution and the Clean Air Act. [Online] [Cited: September 17, 2014.] http://www.epa.gov/air/caa/.
10. **Air Resources Board.** California Ambient Air Quality Standards (CAAQS). [Online] 2009. [Cited: September 17, 2014.] http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm.
11. **South Coast Air Quality Management District.** 2012 Air Quality Management Plan (AQMP). [Online] 2012. [Cited: September 17, 2014.] http://www.aqmd.gov/home/library/clean-air-plans/air-quality-mgt-plan/final-2012-air-quality-management-plan.
12. **California Environmental Quality Act.** Checklist. [Online] [Cited: September 17, 2014.] http://ceres.ca.gov/ceqa/guidelines/Appendix_G.html.
13. **South Coast Air Quality Management District.** Greenhouse Gases (GHG) CEQA Significance Thresholds. [Online] [Cited: September 17, 2014.] http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/ghg-significance-thresholds.
14. **Urban Crossroads, Inc.** *Ironwood Residential Traffic Impact Analysis.* Irvine : s.n., 2015.
15. **California Department of Transportation.** *Transportation Project-Level Carbon Monoxed Protocol.* 1997. UCD-ITS-RR-92-21.
16. **Lake Environmental.** US EPA Models. *Lake Environmental.* [Online] http://www.weblakes.com/download/us_epa.html.
17. **South Coast Air Quality Management District.** *Localized Significance Thresholds Methodology.* s.l. : South Coast Air Quality Managment District, 2003.
18. —. *Localized Significance Thresholds Methodology.* s.l. : South Coast Air Quality Managment District, 2003.

19. —. 2003 Air Quality Management Plan. [Online] 2003. http://www.aqmd.gov/aqmp/aqmd03aqmp.htm.
20. **Bay Area Air Quality Management District.** [Online] http://www.baaqmd.gov/.
21. **South Coast Air Quality Management District.** 2012 Air Quality Management Plan (AQMP). [Online] 2012. [Cited: November 13, 2013.] http://www.aqmd.gov/aqmp/2012aqmp/draft/index.html.
22. **South coast Air Quality Management District.** CEQA Air Quality Handbook (1993). [Online] 1993. [Cited: September 17, 2014.] http://www.aqmd.gov/ceqa/oldhdbk.html.
23. **South Coast Air Quality Management District.** RULE 1113. Architectural Coatings. [Online] http://www.aqmd.gov/rules/reg/reg11/r1113.pdf.
24. —. RULE 431.2. Sulfur Content of Liquid Fuels. [Online] http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-431-2.pdf?sfvrsn=4.
25. —. RULE 403. Fugitive Dust. [Online] http://www.aqmd.gov/docs/default-source/rule-book/rule-iv/rule-403.pdf?sfvrsn=4.
26. —. RULE 1186. PM10 Emissions From Paved and Unpaved Roads, and Livestock Operations. [Online] http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1186-1-less-polluting-sweepers.pdf?sfvrsn=4.

6 CERTIFICATION

The contents of this air study report represent an accurate depiction of the environmental impacts associated with the proposed Ironwood Residential (TTM No. 37001) Project. The information contained in this air quality impact assessment report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 660-1994 ext. 217.

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EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May, 2010

Bachelor of Arts in Environmental Analysis and Design
University of California, Irvine • June, 2006

PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Planned Communities and Urban Infill – Urban Land Institute • June, 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April, 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August, 2007
AB2588 Regulatory Standards – Trinity Consultants • November, 2006
Air Dispersion Modeling – Lakes Environmental • June, 2006

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APPENDIX 3.1:

CALEEMOD EMISSIONS MODEL OUTPUTS

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Ironwood Residential- Construction

Riverside-South Coast County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	181.00	Dwelling Unit	58.77	325,800.00	518

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	10			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	466.91	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44.

Land Use - Project unit count is based on information provided by the applicant

Construction Phase - Based on consultation with the applicant

Off-road Equipment - 8 hour work days

Off-road Equipment - 8 hour work days

Off-road Equipment - Water truck added

Off-road Equipment -

Grading -

Vehicle Trips - Construction run only

Woodstoves - Construction run only

Energy Use - Construction run only

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	75.00	675.00
tblConstructionPhase	NumDays	1,110.00	55.00
tblConstructionPhase	NumDays	110.00	75.00
tblConstructionPhase	NumDays	75.00	675.00
tblConstructionPhase	PhaseEndDate	11/1/2022	7/2/2020
tblConstructionPhase	PhaseStartDate	4/1/2020	12/1/2017
tblEnergyUse	LightingElect	1,608.84	0.00
tblEnergyUse	NT24E	5,089.81	0.00
tblEnergyUse	NT24NG	5,950.14	0.00
tblEnergyUse	T24E	980.99	0.00
tblEnergyUse	T24NG	27,816.78	0.00
tblFireplaces	NumberGas	153.85	0.00
tblFireplaces	NumberNoFireplace	18.10	0.00
tblFireplaces	NumberWood	9.05	0.00
tblOffRoadEquipment	HorsePower	400.00	189.00
tblOffRoadEquipment	LoadFactor	0.38	0.50
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblProjectCharacteristics	CO2IntensityFactor	630.89	466.91
tblProjectCharacteristics	OperationalYear	2014	2020
tblVehicleTrips	ST_TR	10.08	0.00
tblVehicleTrips	SU_TR	8.77	0.00
tblVehicleTrips	WD_TR	9.57	0.00
tblWoodstoves	NumberCatalytic	9.05	0.00
tblWoodstoves	NumberNoncatalytic	9.05	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	6.8734	76.9652	50.8978	0.0729	8.9304	3.6333	12.5637	3.6647	3.3426	7.0073	0.0000	7,383.1397	7,383.1397	2.1972	0.0000	7,429.2804
2018	5.8714	19.9399	18.2567	0.0300	0.3130	1.1413	1.4542	0.0830	1.0660	1.1490	0.0000	2,907.5965	2,907.5965	0.7460	0.0000	2,923.2626
2019	5.6358	17.4763	18.0018	0.0300	0.3130	0.9830	1.2960	0.0830	0.9181	1.0011	0.0000	2,860.6053	2,860.6053	0.7412	0.0000	2,876.1703
2020	5.5022	16.1164	17.8914	0.0300	0.3130	0.8888	1.2018	0.0830	0.8296	0.9126	0.0000	2,801.0934	2,801.0934	0.7379	0.0000	2,816.5891
Total	**23.8828**	**130.4978**	**105.0477**	**0.1629**	**9.8693**	**6.6464**	**16.5157**	**3.9137**	**6.1563**	**10.0700**	**0.0000**	**15,952.4349**	**15,952.4349**	**4.4223**	**0.0000**	**16,045.3024**

2.1 Overall Construction (Maximum Daily Emission)

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	6.8734	76.9652	50.8978	0.0729	3.6397	3.6333	7.2730	1.4708	3.3426	4.8135	0.0000	7,383.1397	7,383.1397	2.1972	0.0000	7,429.2804
2018	5.8714	19.9399	18.2567	0.0300	0.3130	1.1413	1.4542	0.0830	1.0660	1.1490	0.0000	2,907.5965	2,907.5965	0.7460	0.0000	2,923.2626
2019	5.6358	17.4763	18.0018	0.0300	0.3130	0.9830	1.2960	0.0830	0.9181	1.0011	0.0000	2,860.6053	2,860.6053	0.7412	0.0000	2,876.1703
2020	5.5022	16.1164	17.8914	0.0300	0.3130	0.8888	1.2018	0.0830	0.8296	0.9126	0.0000	2,801.0934	2,801.0934	0.7379	0.0000	2,816.5891
Total	**23.8828**	**130.4978**	**105.0477**	**0.1629**	**4.5786**	**6.6464**	**11.2250**	**1.7198**	**6.1563**	**7.8761**	**0.0000**	**15,952.4349**	**15,952.4349**	**4.4223**	**0.0000**	**16,045.3024**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**53.61**	**0.00**	**32.03**	**56.06**	**0.00**	**21.79**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.6052	0.1733	14.9824	7.9000e-004		0.0824	0.0824		0.0824	0.0824	0.0000	26.8880	26.8880	0.0262	0.0000	27.4386
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**7.6052**	**0.1733**	**14.9824**	**7.9000e-004**	**0.0000**	**0.0824**	**0.0824**	**0.0000**	**0.0824**	**0.0824**	**0.0000**	**26.8880**	**26.8880**	**0.0262**	**0.0000**	**27.4386**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.6052	0.1733	14.9824	7.9000e-004		0.0824	0.0824		0.0824	0.0824	0.0000	26.8880	26.8880	0.0262	0.0000	27.4386
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**7.6052**	**0.1733**	**14.9824**	**7.9000e-004**	**0.0000**	**0.0824**	**0.0824**	**0.0000**	**0.0824**	**0.0824**	**0.0000**	**26.8880**	**26.8880**	**0.0262**	**0.0000**	**27.4386**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	3/1/2017	6/13/2017	5	75	
2	Building Construction	Building Construction	6/14/2017	8/29/2017	5	55	
3	Paving	Paving	8/30/2017	3/31/2020	5	675	
4	Architectural Coating	Architectural Coating	12/1/2017	7/2/2020	5	675	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 187.5

Acres of Paving: 0

Residential Indoor: 659,745; Residential Outdoor: 219,915; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Excavators	2	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Off-Highway Trucks	1	8.00	189	0.50
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Scrapers	2	8.00	361	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Cranes	1	8.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	125	0.42
Paving	Paving Equipment	2	8.00	130	0.36
Paving	Rollers	2	8.00	80	0.38
Architectural Coating	Air Compressors	1	8.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	9	23.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	65.00	19.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	13.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	6.7945	76.8719	49.7264	0.0698		3.6317	3.6317		3.3412	3.3412		7,138.038 8	7,138.038 8	2.1871		7,183.967 5
Total	**6.7945**	**76.8719**	**49.7264**	**0.0698**	**8.6733**	**3.6317**	**12.3051**	**3.5965**	**3.3412**	**6.9377**		**7,138.038 8**	**7,138.038 8**	**2.1871**		**7,183.967 5**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0789	0.0934	1.1714	3.0800e-003	0.2571	1.5600e-003	0.2587	0.0682	1.4400e-003	0.0696		245.1010	245.1010	0.0101		245.3130
Total	**0.0789**	**0.0934**	**1.1714**	**3.0800e-003**	**0.2571**	**1.5600e-003**	**0.2587**	**0.0682**	**1.4400e-003**	**0.0696**		**245.1010**	**245.1010**	**0.0101**		**245.3130**

3.2 Grading - 2017

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Fugitive Dust					3.3826	0.0000	3.3826	1.4026	0.0000	1.4026			0.0000			0.0000
Off-Road	6.7945	76.8719	49.7264	0.0698		3.6317	3.6317		3.3412	3.3412	0.0000	7,138.038 8	7,138.038 8	2.1871		7,183.967 5
Total	**6.7945**	**76.8719**	**49.7264**	**0.0698**	**3.3826**	**3.6317**	**7.0143**	**1.4026**	**3.3412**	**4.7438**	**0.0000**	**7,138.038 8**	**7,138.038 8**	**2.1871**		**7,183.967 5**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0789	0.0934	1.1714	3.0800e-003	0.2571	1.5600e-003	0.2587	0.0682	1.4400e-003	0.0696		245.1010	245.1010	0.0101		245.3130
Total	**0.0789**	**0.0934**	**1.1714**	**3.0800e-003**	**0.2571**	**1.5600e-003**	**0.2587**	**0.0682**	**1.4400e-003**	**0.0696**		**245.1010**	**245.1010**	**0.0101**		**245.3130**

3.3 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.3022	28.5087	19.3714	0.0287		1.9099	1.9099		1.7914	1.7914		2,831.309 4	2,831.309 4	0.7084		2,846.185 3
Total	**3.3022**	**28.5087**	**19.3714**	**0.0287**		**1.9099**	**1.9099**		**1.7914**	**1.7914**		**2,831.309 4**	**2,831.309 4**	**0.7084**		**2,846.185 3**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1333	1.4461	1.5584	3.9900e-003	0.1195	0.0277	0.1473	0.0342	0.0255	0.0597		394.6541	394.6541	2.5200e-003		394.7069
Worker	0.2231	0.2639	3.3105	8.7200e-003	0.7266	4.4200e-003	0.7310	0.1927	4.0700e-003	0.1968		692.6766	692.6766	0.0285		693.2758
Total	**0.3564**	**1.7100**	**4.8688**	**0.0127**	**0.8461**	**0.0322**	**0.8782**	**0.2268**	**0.0296**	**0.2564**		**1,087.330 7**	**1,087.330 7**	**0.0311**		**1,087.982 7**

Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

3.3 Building Construction - 2017

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Off-Road	3.3022	28.5087	19.3714	0.0287		1.9099	1.9099		1.7914	1.7914	0.0000	2,831.3094	2,831.3094	0.7084		2,846.1853
Total	**3.3022**	**28.5087**	**19.3714**	**0.0287**		**1.9099**	**1.9099**		**1.7914**	**1.7914**	**0.0000**	**2,831.3094**	**2,831.3094**	**0.7084**		**2,846.1853**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1333	1.4461	1.5584	3.9900e-003	0.1195	0.0277	0.1473	0.0342	0.0255	0.0597		394.6541	394.6541	2.5200e-003		394.7069
Worker	0.2231	0.2639	3.3105	8.7200e-003	0.7266	4.4200e-003	0.7310	0.1927	4.0700e-003	0.1968		692.6766	692.6766	0.0285		693.2758
Total	**0.3564**	**1.7100**	**4.8688**	**0.0127**	**0.8461**	**0.0322**	**0.8782**	**0.2268**	**0.0296**	**0.2564**		**1,087.3307**	**1,087.3307**	**0.0311**		**1,087.9827**

Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

3.4 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9074	20.2964	14.7270	0.0223		1.1384	1.1384		1.0473	1.0473		2,281.0588	2,281.0588	0.6989		2,295.7360
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9074**	**20.2964**	**14.7270**	**0.0223**		**1.1384**	**1.1384**		**1.0473**	**1.0473**		**2,281.0588**	**2,281.0588**	**0.6989**		**2,295.7360**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0515	0.0609	0.7640	2.0100e-003	0.1677	1.0200e-003	0.1687	0.0445	9.4000e-004	0.0454		159.8484	159.8484	6.5800e-003		159.9867
Total	**0.0515**	**0.0609**	**0.7640**	**2.0100e-003**	**0.1677**	**1.0200e-003**	**0.1687**	**0.0445**	**9.4000e-004**	**0.0454**		**159.8484**	**159.8484**	**6.5800e-003**		**159.9867**

3.4 Paving - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9074	20.2964	14.7270	0.0223		1.1384	1.1384		1.0473	1.0473	0.0000	2,281.058 8	2,281.058 8	0.6989		2,295.736 0
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9074**	**20.2964**	**14.7270**	**0.0223**		**1.1384**	**1.1384**		**1.0473**	**1.0473**	**0.0000**	**2,281.058 8**	**2,281.058 8**	**0.6989**		**2,295.736 0**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0515	0.0609	0.7640	2.0100e-003	0.1677	1.0200e-003	0.1687	0.0445	9.4000e-004	0.0454		159.8484	159.8484	6.5800e-003		159.9867
Total	**0.0515**	**0.0609**	**0.7640**	**2.0100e-003**	**0.1677**	**1.0200e-003**	**0.1687**	**0.0445**	**9.4000e-004**	**0.0454**		**159.8484**	**159.8484**	**6.5800e-003**		**159.9867**

3.4 Paving - 2018

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Off-Road	1.6114	17.1628	14.4944	0.0223		0.9386	0.9386		0.8635	0.8635		2,245.269 5	2,245.269 5	0.6990		2,259.948 1
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6114**	**17.1628**	**14.4944**	**0.0223**		**0.9386**	**0.9386**		**0.8635**	**0.8635**		**2,245.269 5**	**2,245.269 5**	**0.6990**		**2,259.948 1**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0464	0.0551	0.6911	2.0100e-003	0.1677	1.0000e-003	0.1687	0.0445	9.3000e-004	0.0454		153.7834	153.7834	6.0900e-003		153.9112
Total	**0.0464**	**0.0551**	**0.6911**	**2.0100e-003**	**0.1677**	**1.0000e-003**	**0.1687**	**0.0445**	**9.3000e-004**	**0.0454**		**153.7834**	**153.7834**	**6.0900e-003**		**153.9112**

3.4 Paving - 2018

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Off-Road	1.6114	17.1628	14.4944	0.0223		0.9386	0.9386		0.8635	0.8635	0.0000	2,245.2695	2,245.2695	0.6990		2,259.9481
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6114**	**17.1628**	**14.4944**	**0.0223**		**0.9386**	**0.9386**		**0.8635**	**0.8635**	**0.0000**	**2,245.2695**	**2,245.2695**	**0.6990**		**2,259.9481**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0464	0.0551	0.6911	2.0100e-003	0.1677	1.0000e-003	0.1687	0.0445	9.3000e-004	0.0454		153.7834	153.7834	6.0900e-003		153.9112
Total	**0.0464**	**0.0551**	**0.6911**	**2.0100e-003**	**0.1677**	**1.0000e-003**	**0.1687**	**0.0445**	**9.3000e-004**	**0.0454**		**153.7834**	**153.7834**	**6.0900e-003**		**153.9112**

3.4 Paving - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4259	14.9353	14.3652	0.0223		0.8094	0.8094		0.7447	0.7447		2,208.9731	2,208.9731	0.6989		2,223.6499
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4259**	**14.9353**	**14.3652**	**0.0223**		**0.8094**	**0.8094**		**0.7447**	**0.7447**		**2,208.9731**	**2,208.9731**	**0.6989**		**2,223.6499**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0426	0.0503	0.6330	2.0100e-003	0.1677	1.0000e-003	0.1687	0.0445	9.3000e-004	0.0454		148.0543	148.0543	5.6800e-003		148.1736
Total	**0.0426**	**0.0503**	**0.6330**	**2.0100e-003**	**0.1677**	**1.0000e-003**	**0.1687**	**0.0445**	**9.3000e-004**	**0.0454**		**148.0543**	**148.0543**	**5.6800e-003**		**148.1736**

3.4 Paving - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4259	14.9353	14.3652	0.0223		0.8094	0.8094		0.7447	0.7447	0.0000	2,208.9731	2,208.9731	0.6989		2,223.6499
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4259**	**14.9353**	**14.3652**	**0.0223**		**0.8094**	**0.8094**		**0.7447**	**0.7447**	**0.0000**	**2,208.9731**	**2,208.9731**	**0.6989**		**2,223.6499**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0426	0.0503	0.6330	2.0100e-003	0.1677	1.0000e-003	0.1687	0.0445	9.3000e-004	0.0454		148.0543	148.0543	5.6800e-003		148.1736
Total	**0.0426**	**0.0503**	**0.6330**	**2.0100e-003**	**0.1677**	**1.0000e-003**	**0.1687**	**0.0445**	**9.3000e-004**	**0.0454**		**148.0543**	**148.0543**	**5.6800e-003**		**148.1736**

3.4 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3301	13.7845	14.3523	0.0223		0.7390	0.7390		0.6799	0.6799		2,160.7571	2,160.7571	0.6988		2,175.4326
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.3301**	**13.7845**	**14.3523**	**0.0223**		**0.7390**	**0.7390**		**0.6799**	**0.6799**		**2,160.7571**	**2,160.7571**	**0.6988**		**2,175.4326**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0397	0.0465	0.5878	2.0100e-003	0.1677	1.0000e-003	0.1687	0.0445	9.3000e-004	0.0454		142.0030	142.0030	5.3600e-003		142.1155
Total	**0.0397**	**0.0465**	**0.5878**	**2.0100e-003**	**0.1677**	**1.0000e-003**	**0.1687**	**0.0445**	**9.3000e-004**	**0.0454**		**142.0030**	**142.0030**	**5.3600e-003**		**142.1155**

3.4 Paving - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3301	13.7845	14.3523	0.0223		0.7390	0.7390		0.6799	0.6799	0.0000	2,160.757 1	2,160.757 1	0.6988		2,175.432 6
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.3301**	**13.7845**	**14.3523**	**0.0223**		**0.7390**	**0.7390**		**0.6799**	**0.6799**	**0.0000**	**2,160.757 1**	**2,160.757 1**	**0.6988**		**2,175.432 6**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0397	0.0465	0.5878	2.0100e-003	0.1677	1.0000e-003	0.1687	0.0445	9.3000e-004	0.0454		142.0030	142.0030	5.3600e-003		142.1155
Total	**0.0397**	**0.0465**	**0.5878**	**2.0100e-003**	**0.1677**	**1.0000e-003**	**0.1687**	**0.0445**	**9.3000e-004**	**0.0454**		**142.0030**	**142.0030**	**5.3600e-003**		**142.1155**

Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

3.5 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.7752					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.4431	2.9134	2.4908	3.9600e-003		0.2311	0.2311		0.2311	0.2311		375.2641	375.2641	0.0396		376.0961
Total	**4.2183**	**2.9134**	**2.4908**	**3.9600e-003**		**0.2311**	**0.2311**		**0.2311**	**0.2311**		**375.2641**	**375.2641**	**0.0396**		**376.0961**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0446	0.0528	0.6621	1.7400e-003	0.1453	8.8000e-004	0.1462	0.0385	8.1000e-004	0.0394		138.5353	138.5353	5.7100e-003		138.6552
Total	**0.0446**	**0.0528**	**0.6621**	**1.7400e-003**	**0.1453**	**8.8000e-004**	**0.1462**	**0.0385**	**8.1000e-004**	**0.0394**		**138.5353**	**138.5353**	**5.7100e-003**		**138.6552**

3.5 Architectural Coating - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.7752					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.4431	2.9134	2.4908	3.9600e-003		0.2311	0.2311		0.2311	0.2311	0.0000	375.2641	375.2641	0.0396		376.0961
Total	**4.2183**	**2.9134**	**2.4908**	**3.9600e-003**		**0.2311**	**0.2311**		**0.2311**	**0.2311**	**0.0000**	**375.2641**	**375.2641**	**0.0396**		**376.0961**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0446	0.0528	0.6621	1.7400e-003	0.1453	8.8000e-004	0.1462	0.0385	8.1000e-004	0.0394		138.5353	138.5353	5.7100e-003		138.6552
Total	**0.0446**	**0.0528**	**0.6621**	**1.7400e-003**	**0.1453**	**8.8000e-004**	**0.1462**	**0.0385**	**8.1000e-004**	**0.0394**		**138.5353**	**138.5353**	**5.7100e-003**		**138.6552**

3.5 Architectural Coating - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.7752					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3982	2.6743	2.4723	3.9600e-003		0.2007	0.2007		0.2007	0.2007		375.2647	375.2647	0.0357		376.0135
Total	**4.1734**	**2.6743**	**2.4723**	**3.9600e-003**		**0.2007**	**0.2007**		**0.2007**	**0.2007**		**375.2647**	**375.2647**	**0.0357**		**376.0135**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0402	0.0477	0.5989	1.7400e-003	0.1453	8.7000e-004	0.1462	0.0385	8.1000e-004	0.0393		133.2789	133.2789	5.2800e-003		133.3897
Total	**0.0402**	**0.0477**	**0.5989**	**1.7400e-003**	**0.1453**	**8.7000e-004**	**0.1462**	**0.0385**	**8.1000e-004**	**0.0393**		**133.2789**	**133.2789**	**5.2800e-003**		**133.3897**

3.5 Architectural Coating - 2018

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Archit. Coating	3.7752					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3982	2.6743	2.4723	3.9600e-003		0.2007	0.2007		0.2007	0.2007	0.0000	375.2647	375.2647	0.0357		376.0135
Total	**4.1734**	**2.6743**	**2.4723**	**3.9600e-003**		**0.2007**	**0.2007**		**0.2007**	**0.2007**	**0.0000**	**375.2647**	**375.2647**	**0.0357**		**376.0135**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0402	0.0477	0.5989	1.7400e-003	0.1453	8.7000e-004	0.1462	0.0385	8.1000e-004	0.0393		133.2789	133.2789	5.2800e-003		133.3897
Total	**0.0402**	**0.0477**	**0.5989**	**1.7400e-003**	**0.1453**	**8.7000e-004**	**0.1462**	**0.0385**	**8.1000e-004**	**0.0393**		**133.2789**	**133.2789**	**5.2800e-003**		**133.3897**

3.5 Architectural Coating - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.7752					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3553	2.4472	2.4551	3.9600e-003		0.1717	0.1717		0.1717	0.1717		375.2641	375.2641	0.0317		375.9297
Total	**4.1305**	**2.4472**	**2.4551**	**3.9600e-003**		**0.1717**	**0.1717**		**0.1717**	**0.1717**		**375.2641**	**375.2641**	**0.0317**		**375.9297**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0369	0.0436	0.5486	1.7400e-003	0.1453	8.7000e-004	0.1462	0.0385	8.0000e-004	0.0393		128.3137	128.3137	4.9200e-003		128.4171
Total	**0.0369**	**0.0436**	**0.5486**	**1.7400e-003**	**0.1453**	**8.7000e-004**	**0.1462**	**0.0385**	**8.0000e-004**	**0.0393**		**128.3137**	**128.3137**	**4.9200e-003**		**128.4171**

3.5 Architectural Coating - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.7752					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3553	2.4472	2.4551	3.9600e-003		0.1717	0.1717		0.1717	0.1717	0.0000	375.2641	375.2641	0.0317		375.9297
Total	**4.1305**	**2.4472**	**2.4551**	**3.9600e-003**		**0.1717**	**0.1717**		**0.1717**	**0.1717**	**0.0000**	**375.2641**	**375.2641**	**0.0317**		**375.9297**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0369	0.0436	0.5486	1.7400e-003	0.1453	8.7000e-004	0.1462	0.0385	8.0000e-004	0.0393		128.3137	128.3137	4.9200e-003		128.4171
Total	**0.0369**	**0.0436**	**0.5486**	**1.7400e-003**	**0.1453**	**8.7000e-004**	**0.1462**	**0.0385**	**8.0000e-004**	**0.0393**		**128.3137**	**128.3137**	**4.9200e-003**		**128.4171**

Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

3.5 Architectural Coating - 2020

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Archit. Coating	3.7752					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3229	2.2451	2.4419	3.9600e-003		0.1479	0.1479		0.1479	0.1479		375.2641	375.2641	0.0291		375.8742
Total	**4.0981**	**2.2451**	**2.4419**	**3.9600e-003**		**0.1479**	**0.1479**		**0.1479**	**0.1479**		**375.2641**	**375.2641**	**0.0291**		**375.8742**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0344	0.0403	0.5094	1.7400e-003	0.1453	8.7000e-004	0.1462	0.0385	8.1000e-004	0.0393		123.0693	123.0693	4.6400e-003		123.1668
Total	**0.0344**	**0.0403**	**0.5094**	**1.7400e-003**	**0.1453**	**8.7000e-004**	**0.1462**	**0.0385**	**8.1000e-004**	**0.0393**		**123.0693**	**123.0693**	**4.6400e-003**		**123.1668**

3.5 Architectural Coating - 2020

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Archit. Coating	3.7752					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3229	2.2451	2.4419	3.9600e-003		0.1479	0.1479		0.1479	0.1479	0.0000	375.2641	375.2641	0.0291		375.8742
Total	**4.0981**	**2.2451**	**2.4419**	**3.9600e-003**		**0.1479**	**0.1479**		**0.1479**	**0.1479**	**0.0000**	**375.2641**	**375.2641**	**0.0291**		**375.8742**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0344	0.0403	0.5094	1.7400e-003	0.1453	8.7000e-004	0.1462	0.0385	8.1000e-004	0.0393		123.0693	123.0693	4.6400e-003		123.1668
Total	**0.0344**	**0.0403**	**0.5094**	**1.7400e-003**	**0.1453**	**8.7000e-004**	**0.1462**	**0.0385**	**8.1000e-004**	**0.0393**		**123.0693**	**123.0693**	**4.6400e-003**		**123.1668**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.457065	0.068684	0.178597	0.172280	0.046891	0.007460	0.012475	0.043976	0.000902	0.001056	0.006515	0.000828	0.003272

4.4 Fleet Mix

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	7.6052	0.1733	14.9824	7.9000e-004		0.0824	0.0824		0.0824	0.0824	0.0000	26.8880	26.8880	0.0262	0.0000	27.4386
Unmitigated	7.6052	0.1733	14.9824	7.9000e-004		0.0824	0.0824		0.0824	0.0824	0.0000	26.8880	26.8880	0.0262	0.0000	27.4386

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Consumer Products	6.4508					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.4562	0.1733	14.9824	7.9000e-004		0.0824	0.0824		0.0824	0.0824		26.8880	26.8880	0.0262		27.4386
Architectural Coating	0.6982					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**7.6052**	**0.1733**	**14.9824**	**7.9000e-004**		**0.0824**	**0.0824**		**0.0824**	**0.0824**	**0.0000**	**26.8880**	**26.8880**	**0.0262**	**0.0000**	**27.4386**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Consumer Products	6.4508					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.4562	0.1733	14.9824	7.9000e-004		0.0824	0.0824		0.0824	0.0824		26.8880	26.8880	0.0262		27.4386
Architectural Coating	0.6982					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**7.6052**	**0.1733**	**14.9824**	**7.9000e-004**		**0.0824**	**0.0824**		**0.0824**	**0.0824**	**0.0000**	**26.8880**	**26.8880**	**0.0262**	**0.0000**	**27.4386**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Ironwood Residential- Construction

Riverside-South Coast County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	181.00	Dwelling Unit	58.77	325,800.00	518

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	10			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	466.91	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44.

Land Use - Project unit count is based on information provided by the applicant

Construction Phase - Based on consultation with the applicant

Off-road Equipment - 8 hour work days

Off-road Equipment - 8 hour work days

Off-road Equipment - Water truck added

Off-road Equipment -

Grading -

Vehicle Trips - Construction run only

Woodstoves - Construction run only

Energy Use - Construction run only

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	75.00	675.00
tblConstructionPhase	NumDays	1,110.00	55.00
tblConstructionPhase	NumDays	110.00	75.00
tblConstructionPhase	NumDays	75.00	675.00
tblConstructionPhase	PhaseEndDate	11/1/2022	7/2/2020
tblConstructionPhase	PhaseStartDate	4/1/2020	12/1/2017
tblEnergyUse	LightingElect	1,608.84	0.00
tblEnergyUse	NT24E	5,089.81	0.00
tblEnergyUse	NT24NG	5,950.14	0.00
tblEnergyUse	T24E	980.99	0.00
tblEnergyUse	T24NG	27,816.78	0.00
tblFireplaces	NumberGas	153.85	0.00
tblFireplaces	NumberNoFireplace	18.10	0.00
tblFireplaces	NumberWood	9.05	0.00
tblOffRoadEquipment	HorsePower	400.00	189.00
tblOffRoadEquipment	LoadFactor	0.38	0.50
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblProjectCharacteristics	CO2IntensityFactor	630.89	466.91
tblProjectCharacteristics	OperationalYear	2014	2020
tblVehicleTrips	ST_TR	10.08	0.00
tblVehicleTrips	SU_TR	8.77	0.00
tblVehicleTrips	WD_TR	9.57	0.00
tblWoodstoves	NumberCatalytic	9.05	0.00
tblWoodstoves	NumberNoncatalytic	9.05	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	6.8696	76.9712	50.7328	0.0726	8.9304	3.6333	12.5637	3.6647	3.3426	7.0073	0.0000	7,361.9969	7,361.9969	2.1972	0.0000	7,408.1377
2018	5.8670	19.9464	18.0716	0.0297	0.3130	1.1413	1.4542	0.0830	1.0660	1.1490	0.0000	2,882.8127	2,882.8127	0.7460	0.0000	2,898.4788
2019	5.6317	17.4822	17.8298	0.0297	0.3130	0.9830	1.2960	0.0830	0.9181	1.0011	0.0000	2,836.7148	2,836.7148	0.7412	0.0000	2,852.2799
2020	5.4984	16.1217	17.7298	0.0297	0.3130	0.8888	1.2018	0.0830	0.8296	0.9126	0.0000	2,778.1538	2,778.1538	0.7379	0.0000	2,793.6494
Total	**23.8666**	**130.5215**	**104.3640**	**0.1617**	**9.8693**	**6.6464**	**16.5157**	**3.9137**	**6.1563**	**10.0700**	**0.0000**	**15,859.6781**	**15,859.6781**	**4.4223**	**0.0000**	**15,952.5457**

2.1 Overall Construction (Maximum Daily Emission)

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	6.8696	76.9712	50.7328	0.0726	3.6397	3.6333	7.2730	1.4708	3.3426	4.8135	0.0000	7,361.996 9	7,361.996 9	2.1972	0.0000	7,408.137 6
2018	5.8670	19.9464	18.0716	0.0297	0.3130	1.1413	1.4542	0.0830	1.0660	1.1490	0.0000	2,882.812 7	2,882.812 7	0.7460	0.0000	2,898.478 8
2019	5.6317	17.4822	17.8298	0.0297	0.3130	0.9830	1.2960	0.0830	0.9181	1.0011	0.0000	2,836.714 8	2,836.714 8	0.7412	0.0000	2,852.279 8
2020	5.4984	16.1217	17.7298	0.0297	0.3130	0.8888	1.2018	0.0830	0.8296	0.9126	0.0000	2,778.153 8	2,778.153 8	0.7379	0.0000	2,793.649 4
Total	**23.8666**	**130.5215**	**104.3640**	**0.1617**	**4.5786**	**6.6464**	**11.2250**	**1.7198**	**6.1563**	**7.8761**	**0.0000**	**15,859.67 81**	**15,859.67 81**	**4.4223**	**0.0000**	**15,952.54 57**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**53.61**	**0.00**	**32.03**	**56.06**	**0.00**	**21.79**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.6052	0.1733	14.9824	7.9000e-004		0.0824	0.0824		0.0824	0.0824	0.0000	26.8880	26.8880	0.0262	0.0000	27.4386
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**7.6052**	**0.1733**	**14.9824**	**7.9000e-004**	**0.0000**	**0.0824**	**0.0824**	**0.0000**	**0.0824**	**0.0824**	**0.0000**	**26.8880**	**26.8880**	**0.0262**	**0.0000**	**27.4386**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.6052	0.1733	14.9824	7.9000e-004		0.0824	0.0824		0.0824	0.0824	0.0000	26.8880	26.8880	0.0262	0.0000	27.4386
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**7.6052**	**0.1733**	**14.9824**	**7.9000e-004**	**0.0000**	**0.0824**	**0.0824**	**0.0000**	**0.0824**	**0.0824**	**0.0000**	**26.8880**	**26.8880**	**0.0262**	**0.0000**	**27.4386**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	3/1/2017	6/13/2017	5	75	
2	Building Construction	Building Construction	6/14/2017	8/29/2017	5	55	
3	Paving	Paving	8/30/2017	3/31/2020	5	675	
4	Architectural Coating	Architectural Coating	12/1/2017	7/2/2020	5	675	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 187.5

Acres of Paving: 0

Residential Indoor: 659,745; Residential Outdoor: 219,915; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Excavators	2	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Off-Highway Trucks	1	8.00	189	0.50
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Scrapers	2	8.00	361	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Cranes	1	8.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	125	0.42
Paving	Paving Equipment	2	8.00	130	0.36
Paving	Rollers	2	8.00	80	0.38
Architectural Coating	Air Compressors	1	8.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	9	23.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	65.00	19.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	13.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2017

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Fugitive Dust					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	6.7945	76.8719	49.7264	0.0698		3.6317	3.6317		3.3412	3.3412		7,138.0388	7,138.0388	2.1871		7,183.9675
Total	**6.7945**	**76.8719**	**49.7264**	**0.0698**	**8.6733**	**3.6317**	**12.3051**	**3.5965**	**3.3412**	**6.9377**		**7,138.0388**	**7,138.0388**	**2.1871**		**7,183.9675**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0751	0.0994	1.0064	2.8200e-003	0.2571	1.5600e-003	0.2587	0.0682	1.4400e-003	0.0696		223.9582	223.9582	0.0101		224.1702
Total	**0.0751**	**0.0994**	**1.0064**	**2.8200e-003**	**0.2571**	**1.5600e-003**	**0.2587**	**0.0682**	**1.4400e-003**	**0.0696**		**223.9582**	**223.9582**	**0.0101**		**224.1702**

3.2 Grading - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.3826	0.0000	3.3826	1.4026	0.0000	1.4026			0.0000			0.0000
Off-Road	6.7945	76.8719	49.7264	0.0698		3.6317	3.6317		3.3412	3.3412	0.0000	7,138.0388	7,138.0388	2.1871		7,183.9675
Total	**6.7945**	**76.8719**	**49.7264**	**0.0698**	**3.3826**	**3.6317**	**7.0143**	**1.4026**	**3.3412**	**4.7438**	**0.0000**	**7,138.0388**	**7,138.0388**	**2.1871**		**7,183.9675**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0751	0.0994	1.0064	2.8200e-003	0.2571	1.5600e-003	0.2587	0.0682	1.4400e-003	0.0696		223.9582	223.9582	0.0101		224.1702
Total	**0.0751**	**0.0994**	**1.0064**	**2.8200e-003**	**0.2571**	**1.5600e-003**	**0.2587**	**0.0682**	**1.4400e-003**	**0.0696**		**223.9582**	**223.9582**	**0.0101**		**224.1702**

3.3 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.3022	28.5087	19.3714	0.0287		1.9099	1.9099		1.7914	1.7914		2,831.3094	2,831.3094	0.7084		2,846.1853
Total	**3.3022**	**28.5087**	**19.3714**	**0.0287**		**1.9099**	**1.9099**		**1.7914**	**1.7914**		**2,831.3094**	**2,831.3094**	**0.7084**		**2,846.1853**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1419	1.4814	1.7931	3.9600e-003	0.1195	0.0280	0.1475	0.0342	0.0257	0.0599		391.2278	391.2278	2.6100e-003		391.2826
Worker	0.2123	0.2808	2.8442	7.9600e-003	0.7266	4.4200e-003	0.7310	0.1927	4.0700e-003	0.1968		632.9252	632.9252	0.0285		633.5244
Total	**0.3542**	**1.7622**	**4.6372**	**0.0119**	**0.8461**	**0.0324**	**0.8785**	**0.2268**	**0.0298**	**0.2566**		**1,024.1530**	**1,024.1530**	**0.0311**		**1,024.8070**

3.3 Building Construction - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.3022	28.5087	19.3714	0.0287		1.9099	1.9099		1.7914	1.7914	0.0000	2,831.309 4	2,831.309 4	0.7084		2,846.185 3
Total	**3.3022**	**28.5087**	**19.3714**	**0.0287**		**1.9099**	**1.9099**		**1.7914**	**1.7914**	**0.0000**	**2,831.309 4**	**2,831.309 4**	**0.7084**		**2,846.185 3**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1419	1.4814	1.7931	3.9600e-003	0.1195	0.0280	0.1475	0.0342	0.0257	0.0599		391.2278	391.2278	2.6100e-003		391.2826
Worker	0.2123	0.2808	2.8442	7.9600e-003	0.7266	4.4200e-003	0.7310	0.1927	4.0700e-003	0.1968		632.9252	632.9252	0.0285		633.5244
Total	**0.3542**	**1.7622**	**4.6372**	**0.0119**	**0.8461**	**0.0324**	**0.8785**	**0.2268**	**0.0298**	**0.2566**		**1,024.153 0**	**1,024.153 0**	**0.0311**		**1,024.807 0**

3.4 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9074	20.2964	14.7270	0.0223		1.1384	1.1384		1.0473	1.0473		2,281.058 8	2,281.058 8	0.6989		2,295.736 0
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9074**	**20.2964**	**14.7270**	**0.0223**		**1.1384**	**1.1384**		**1.0473**	**1.0473**		**2,281.058 8**	**2,281.058 8**	**0.6989**		**2,295.736 0**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0490	0.0648	0.6563	1.8400e-003	0.1677	1.0200e-003	0.1687	0.0445	9.4000e-004	0.0454		146.0597	146.0597	6.5800e-003		146.1979
Total	**0.0490**	**0.0648**	**0.6563**	**1.8400e-003**	**0.1677**	**1.0200e-003**	**0.1687**	**0.0445**	**9.4000e-004**	**0.0454**		**146.0597**	**146.0597**	**6.5800e-003**		**146.1979**

3.4 Paving - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9074	20.2964	14.7270	0.0223		1.1384	1.1384		1.0473	1.0473	0.0000	2,281.058 8	2,281.058 8	0.6989		2,295.736 0
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9074**	**20.2964**	**14.7270**	**0.0223**		**1.1384**	**1.1384**		**1.0473**	**1.0473**	**0.0000**	**2,281.058 8**	**2,281.058 8**	**0.6989**		**2,295.736 0**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0490	0.0648	0.6563	1.8400e-003	0.1677	1.0200e-003	0.1687	0.0445	9.4000e-004	0.0454		146.0597	146.0597	6.5800e-003		146.1979
Total	**0.0490**	**0.0648**	**0.6563**	**1.8400e-003**	**0.1677**	**1.0200e-003**	**0.1687**	**0.0445**	**9.4000e-004**	**0.0454**		**146.0597**	**146.0597**	**6.5800e-003**		**146.1979**

3.4 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6114	17.1628	14.4944	0.0223		0.9386	0.9386		0.8635	0.8635		2,245.2695	2,245.2695	0.6990		2,259.9481
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6114**	**17.1628**	**14.4944**	**0.0223**		**0.9386**	**0.9386**		**0.8635**	**0.8635**		**2,245.2695**	**2,245.2695**	**0.6990**		**2,259.9481**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0440	0.0585	0.5919	1.8400e-003	0.1677	1.0000e-003	0.1687	0.0445	9.3000e-004	0.0454		140.5063	140.5063	6.0900e-003		140.6342
Total	**0.0440**	**0.0585**	**0.5919**	**1.8400e-003**	**0.1677**	**1.0000e-003**	**0.1687**	**0.0445**	**9.3000e-004**	**0.0454**		**140.5063**	**140.5063**	**6.0900e-003**		**140.6342**

3.4 Paving - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6114	17.1628	14.4944	0.0223		0.9386	0.9386		0.8635	0.8635	0.0000	2,245.2695	2,245.2695	0.6990		2,259.9481
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6114**	**17.1628**	**14.4944**	**0.0223**		**0.9386**	**0.9386**		**0.8635**	**0.8635**	**0.0000**	**2,245.2695**	**2,245.2695**	**0.6990**		**2,259.9481**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0440	0.0585	0.5919	1.8400e-003	0.1677	1.0000e-003	0.1687	0.0445	9.3000e-004	0.0454		140.5063	140.5063	6.0900e-003		140.6342
Total	**0.0440**	**0.0585**	**0.5919**	**1.8400e-003**	**0.1677**	**1.0000e-003**	**0.1687**	**0.0445**	**9.3000e-004**	**0.0454**		**140.5063**	**140.5063**	**6.0900e-003**		**140.6342**

3.4 Paving - 2019

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Off-Road	1.4259	14.9353	14.3652	0.0223		0.8094	0.8094		0.7447	0.7447		2,208.9731	2,208.9731	0.6989		2,223.6499
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4259**	**14.9353**	**14.3652**	**0.0223**		**0.8094**	**0.8094**		**0.7447**	**0.7447**		**2,208.9731**	**2,208.9731**	**0.6989**		**2,223.6499**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0404	0.0534	0.5408	1.8400e-003	0.1677	1.0000e-003	0.1687	0.0445	9.3000e-004	0.0454		135.2559	135.2559	5.6800e-003		135.3751
Total	**0.0404**	**0.0534**	**0.5408**	**1.8400e-003**	**0.1677**	**1.0000e-003**	**0.1687**	**0.0445**	**9.3000e-004**	**0.0454**		**135.2559**	**135.2559**	**5.6800e-003**		**135.3751**

3.4 Paving - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4259	14.9353	14.3652	0.0223		0.8094	0.8094		0.7447	0.7447	0.0000	2,208.9731	2,208.9731	0.6989		2,223.6499
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4259**	**14.9353**	**14.3652**	**0.0223**		**0.8094**	**0.8094**		**0.7447**	**0.7447**	**0.0000**	**2,208.9731**	**2,208.9731**	**0.6989**		**2,223.6499**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0404	0.0534	0.5408	1.8400e-003	0.1677	1.0000e-003	0.1687	0.0445	9.3000e-004	0.0454		135.2559	135.2559	5.6800e-003		135.3751
Total	**0.0404**	**0.0534**	**0.5408**	**1.8400e-003**	**0.1677**	**1.0000e-003**	**0.1687**	**0.0445**	**9.3000e-004**	**0.0454**		**135.2559**	**135.2559**	**5.6800e-003**		**135.3751**

3.4 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3301	13.7845	14.3523	0.0223		0.7390	0.7390		0.6799	0.6799		2,160.7571	2,160.7571	0.6988		2,175.4326
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.3301**	**13.7845**	**14.3523**	**0.0223**		**0.7390**	**0.7390**		**0.6799**	**0.6799**		**2,160.7571**	**2,160.7571**	**0.6988**		**2,175.4326**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0376	0.0493	0.5012	1.8400e-003	0.1677	1.0000e-003	0.1687	0.0445	9.3000e-004	0.0454		129.7139	129.7139	5.3600e-003		129.8264
Total	**0.0376**	**0.0493**	**0.5012**	**1.8400e-003**	**0.1677**	**1.0000e-003**	**0.1687**	**0.0445**	**9.3000e-004**	**0.0454**		**129.7139**	**129.7139**	**5.3600e-003**		**129.8264**

3.4 Paving - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.3301	13.7845	14.3523	0.0223		0.7390	0.7390		0.6799	0.6799	0.0000	2,160.757 1	2,160.757 1	0.6988		2,175.432 6
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.3301**	**13.7845**	**14.3523**	**0.0223**		**0.7390**	**0.7390**		**0.6799**	**0.6799**	**0.0000**	**2,160.757 1**	**2,160.757 1**	**0.6988**		**2,175.432 6**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0376	0.0493	0.5012	1.8400e-003	0.1677	1.0000e-003	0.1687	0.0445	9.3000e-004	0.0454		129.7139	129.7139	5.3600e-003		129.8264
Total	**0.0376**	**0.0493**	**0.5012**	**1.8400e-003**	**0.1677**	**1.0000e-003**	**0.1687**	**0.0445**	**9.3000e-004**	**0.0454**		**129.7139**	**129.7139**	**5.3600e-003**		**129.8264**

3.5 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.7752					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.4431	2.9134	2.4908	3.9600e-003		0.2311	0.2311		0.2311	0.2311		375.2641	375.2641	0.0396		376.0961
Total	**4.2183**	**2.9134**	**2.4908**	**3.9600e-003**		**0.2311**	**0.2311**		**0.2311**	**0.2311**		**375.2641**	**375.2641**	**0.0396**		**376.0961**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0425	0.0562	0.5688	1.5900e-003	0.1453	8.8000e-004	0.1462	0.0385	8.1000e-004	0.0394		126.5850	126.5850	5.7100e-003		126.7049
Total	**0.0425**	**0.0562**	**0.5688**	**1.5900e-003**	**0.1453**	**8.8000e-004**	**0.1462**	**0.0385**	**8.1000e-004**	**0.0394**		**126.5850**	**126.5850**	**5.7100e-003**		**126.7049**

Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

3.5 Architectural Coating - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.7752					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.4431	2.9134	2.4908	3.9600e-003		0.2311	0.2311		0.2311	0.2311	0.0000	375.2641	375.2641	0.0396		376.0961
Total	**4.2183**	**2.9134**	**2.4908**	**3.9600e-003**		**0.2311**	**0.2311**		**0.2311**	**0.2311**	**0.0000**	**375.2641**	**375.2641**	**0.0396**		**376.0961**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0425	0.0562	0.5688	1.5900e-003	0.1453	8.8000e-004	0.1462	0.0385	8.1000e-004	0.0394		126.5850	126.5850	5.7100e-003		126.7049
Total	**0.0425**	**0.0562**	**0.5688**	**1.5900e-003**	**0.1453**	**8.8000e-004**	**0.1462**	**0.0385**	**8.1000e-004**	**0.0394**		**126.5850**	**126.5850**	**5.7100e-003**		**126.7049**

3.5 Architectural Coating - 2018

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Archit. Coating	3.7752					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3982	2.6743	2.4723	3.9600e-003		0.2007	0.2007		0.2007	0.2007		375.2647	375.2647	0.0357		376.0135
Total	**4.1734**	**2.6743**	**2.4723**	**3.9600e-003**		**0.2007**	**0.2007**		**0.2007**	**0.2007**		**375.2647**	**375.2647**	**0.0357**		**376.0135**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0382	0.0507	0.5130	1.5900e-003	0.1453	8.7000e-004	0.1462	0.0385	8.1000e-004	0.0393		121.7721	121.7721	5.2800e-003		121.8830
Total	**0.0382**	**0.0507**	**0.5130**	**1.5900e-003**	**0.1453**	**8.7000e-004**	**0.1462**	**0.0385**	**8.1000e-004**	**0.0393**		**121.7721**	**121.7721**	**5.2800e-003**		**121.8830**

3.5 Architectural Coating - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.7752					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3982	2.6743	2.4723	3.9600e-003		0.2007	0.2007		0.2007	0.2007	0.0000	375.2647	375.2647	0.0357		376.0135
Total	**4.1734**	**2.6743**	**2.4723**	**3.9600e-003**		**0.2007**	**0.2007**		**0.2007**	**0.2007**	**0.0000**	**375.2647**	**375.2647**	**0.0357**		**376.0135**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0382	0.0507	0.5130	1.5900e-003	0.1453	8.7000e-004	0.1462	0.0385	8.1000e-004	0.0393		121.7721	121.7721	5.2800e-003		121.8830
Total	**0.0382**	**0.0507**	**0.5130**	**1.5900e-003**	**0.1453**	**8.7000e-004**	**0.1462**	**0.0385**	**8.1000e-004**	**0.0393**		**121.7721**	**121.7721**	**5.2800e-003**		**121.8830**

3.5 Architectural Coating - 2019

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Archit. Coating	3.7752					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3553	2.4472	2.4551	3.9600e-003		0.1717	0.1717		0.1717	0.1717		375.2641	375.2641	0.0317		375.9297
Total	**4.1305**	**2.4472**	**2.4551**	**3.9600e-003**		**0.1717**	**0.1717**		**0.1717**	**0.1717**		**375.2641**	**375.2641**	**0.0317**		**375.9297**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0350	0.0463	0.4687	1.5900e-003	0.1453	8.7000e-004	0.1462	0.0385	8.0000e-004	0.0393		117.2217	117.2217	4.9200e-003		117.3251
Total	**0.0350**	**0.0463**	**0.4687**	**1.5900e-003**	**0.1453**	**8.7000e-004**	**0.1462**	**0.0385**	**8.0000e-004**	**0.0393**		**117.2217**	**117.2217**	**4.9200e-003**		**117.3251**

3.5 Architectural Coating - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.7752					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3553	2.4472	2.4551	3.9600e-003		0.1717	0.1717		0.1717	0.1717	0.0000	375.2641	375.2641	0.0317		375.9297
Total	**4.1305**	**2.4472**	**2.4551**	**3.9600e-003**		**0.1717**	**0.1717**		**0.1717**	**0.1717**	**0.0000**	**375.2641**	**375.2641**	**0.0317**		**375.9297**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0350	0.0463	0.4687	1.5900e-003	0.1453	8.7000e-004	0.1462	0.0385	8.0000e-004	0.0393		117.2217	117.2217	4.9200e-003		117.3251
Total	**0.0350**	**0.0463**	**0.4687**	**1.5900e-003**	**0.1453**	**8.7000e-004**	**0.1462**	**0.0385**	**8.0000e-004**	**0.0393**		**117.2217**	**117.2217**	**4.9200e-003**		**117.3251**

3.5 Architectural Coating - 2020

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Archit. Coating	3.7752					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3229	2.2451	2.4419	3.9600e-003		0.1479	0.1479		0.1479	0.1479		375.2641	375.2641	0.0291		375.8742
Total	**4.0981**	**2.2451**	**2.4419**	**3.9600e-003**		**0.1479**	**0.1479**		**0.1479**	**0.1479**		**375.2641**	**375.2641**	**0.0291**		**375.8742**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0326	0.0428	0.4344	1.5900e-003	0.1453	8.7000e-004	0.1462	0.0385	8.1000e-004	0.0393		112.4187	112.4187	4.6400e-003		112.5162
Total	**0.0326**	**0.0428**	**0.4344**	**1.5900e-003**	**0.1453**	**8.7000e-004**	**0.1462**	**0.0385**	**8.1000e-004**	**0.0393**		**112.4187**	**112.4187**	**4.6400e-003**		**112.5162**

3.5 Architectural Coating - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	3.7752					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3229	2.2451	2.4419	3.9600e-003		0.1479	0.1479		0.1479	0.1479	0.0000	375.2641	375.2641	0.0291		375.8742
Total	**4.0981**	**2.2451**	**2.4419**	**3.9600e-003**		**0.1479**	**0.1479**		**0.1479**	**0.1479**	**0.0000**	**375.2641**	**375.2641**	**0.0291**		**375.8742**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0326	0.0428	0.4344	1.5900e-003	0.1453	8.7000e-004	0.1462	0.0385	8.1000e-004	0.0393		112.4187	112.4187	4.6400e-003		112.5162
Total	**0.0326**	**0.0428**	**0.4344**	**1.5900e-003**	**0.1453**	**8.7000e-004**	**0.1462**	**0.0385**	**8.1000e-004**	**0.0393**		**112.4187**	**112.4187**	**4.6400e-003**		**112.5162**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.457065	0.068684	0.178597	0.172280	0.046891	0.007460	0.012475	0.043976	0.000902	0.001056	0.006515	0.000828	0.003272

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	7.6052	0.1733	14.9824	7.9000e-004		0.0824	0.0824		0.0824	0.0824	0.0000	26.8880	26.8880	0.0262	0.0000	27.4386
Unmitigated	7.6052	0.1733	14.9824	7.9000e-004		0.0824	0.0824		0.0824	0.0824	0.0000	26.8880	26.8880	0.0262	0.0000	27.4386

Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.6982					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	6.4508					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.4562	0.1733	14.9824	7.9000e-004		0.0824	0.0824		0.0824	0.0824		26.8880	26.8880	0.0262		27.4386
Total	**7.6052**	**0.1733**	**14.9824**	**7.9000e-004**		**0.0824**	**0.0824**		**0.0824**	**0.0824**	**0.0000**	**26.8880**	**26.8880**	**0.0262**	**0.0000**	**27.4386**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Consumer Products	6.4508					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.4562	0.1733	14.9824	7.9000e-004		0.0824	0.0824		0.0824	0.0824		26.8880	26.8880	0.0262		27.4386
Architectural Coating	0.6982					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**7.6052**	**0.1733**	**14.9824**	**7.9000e-004**		**0.0824**	**0.0824**		**0.0824**	**0.0824**	**0.0000**	**26.8880**	**26.8880**	**0.0262**	**0.0000**	**27.4386**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Ironwood Residential- Operation

Riverside-South Coast County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	181.00	Dwelling Unit	58.77	325,800.00	518

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	10			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	466.91	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44.

Land Use - Project unit count is based on information provided by the applicant

Construction Phase - Operation run only

Off-road Equipment - 8 hour work days

Off-road Equipment - Operation run only

Grading -

Vehicle Trips - Weekday TR based on the Ironwood Residential TIA. Weekend TR based on the ITE Trip Generation Manual (code 210)

Woodstoves - No wood stoves, all natural gas fireplaces

Energy Use - Title-24 Electricity Energy Intensity and Title-24 Natural Gas Energy Intensity were adjusted by 36.4% and 6.5% respectively, to reflect 2013 Title 24 requirements. Source: Impact Analysis California's 2013 Building Energy Efficiency Standards (CEC 2013)

Construction Off-road Equipment Mitigation -

Vechicle Emission Factors - Based on Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol

Vechicle Emission Factors - Based on Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol

Vechicle Emission Factors - Based on Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	110.00	1.00
tblEnergyUse	T24E	980.99	623.91
tblEnergyUse	T24NG	27,816.78	26,008.69
tblFireplaces	NumberGas	153.85	181.00
tblFireplaces	NumberNoFireplace	18.10	0.00
tblFireplaces	NumberWood	9.05	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	630.89	466.91
tblProjectCharacteristics	OperationalYear	2014	2020

tblVehicleEF	HHD	0.04	0.05
tblVehicleEF	HHD	0.04	0.05
tblVehicleEF	HHD	0.04	0.05
tblVehicleEF	LDA	0.46	0.69
tblVehicleEF	LDA	0.46	0.69
tblVehicleEF	LDA	0.46	0.69
tblVehicleEF	LDT1	0.07	0.10
tblVehicleEF	LDT1	0.07	0.10
tblVehicleEF	LDT1	0.07	0.10
tblVehicleEF	LDT2	0.18	0.10
tblVehicleEF	LDT2	0.18	0.10
tblVehicleEF	LDT2	0.18	0.10
tblVehicleEF	LHD1	0.05	0.00
tblVehicleEF	LHD1	0.05	0.00
tblVehicleEF	LHD1	0.05	0.00
tblVehicleEF	LHD2	7.4600e-003	0.00
tblVehicleEF	LHD2	7.4600e-003	0.00
tblVehicleEF	LHD2	7.4600e-003	0.00
tblVehicleEF	MCY	6.5150e-003	5.0000e-003
tblVehicleEF	MCY	6.5150e-003	5.0000e-003
tblVehicleEF	MCY	6.5150e-003	5.0000e-003
tblVehicleEF	MDV	0.17	0.00
tblVehicleEF	MDV	0.17	0.00
tblVehicleEF	MDV	0.17	0.00
tblVehicleEF	MH	3.2720e-003	0.00
tblVehicleEF	MH	3.2720e-003	0.00
tblVehicleEF	MH	3.2720e-003	0.00
tblVehicleEF	MHD	0.01	0.06

tblVehicleEF	MHD	0.01	0.06
tblVehicleEF	MHD	0.01	0.06
tblVehicleEF	OBUS	9.0200e-004	0.00
tblVehicleEF	OBUS	9.0200e-004	0.00
tblVehicleEF	OBUS	9.0200e-004	0.00
tblVehicleEF	SBUS	8.2800e-004	0.00
tblVehicleEF	SBUS	8.2800e-004	0.00
tblVehicleEF	SBUS	8.2800e-004	0.00
tblVehicleEF	UBUS	1.0560e-003	0.00
tblVehicleEF	UBUS	1.0560e-003	0.00
tblVehicleEF	UBUS	1.0560e-003	0.00
tblVehicleTrips	ST_TR	10.08	9.91
tblVehicleTrips	SU_TR	8.77	8.62
tblVehicleTrips	WD_TR	9.57	9.52
tblWoodstoves	NumberCatalytic	9.05	0.00
tblWoodstoves	NumberNoncatalytic	9.05	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.9566	0.1733	15.0015	7.9000e-004		0.3251	0.3251		0.3226	0.3226	0.0000	3,859.8292	3,859.8292	0.0997	0.0703	3,883.7064
Energy	0.1709	1.4605	0.6215	9.3200e-003		0.1181	0.1181		0.1181	0.1181		1,864.4797	1,864.4797	0.0357	0.0342	1,875.8266
Mobile	4.6290	16.3712	50.6989	0.1689	13.0796	0.3705	13.4500	3.5043	0.3413	3.8456		12,988.6716	12,988.6716	0.3436		12,995.8865
Total	**12.7565**	**18.0050**	**66.3220**	**0.1791**	**13.0796**	**0.8137**	**13.8933**	**3.5043**	**0.7820**	**4.2862**	**0.0000**	**18,712.9804**	**18,712.9804**	**0.4790**	**0.1045**	**18,755.4195**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.9566	0.1733	15.0015	7.9000e-004		0.3251	0.3251		0.3226	0.3226	0.0000	3,859.8292	3,859.8292	0.0997	0.0703	3,883.7064
Energy	0.1709	1.4605	0.6215	9.3200e-003		0.1181	0.1181		0.1181	0.1181		1,864.4797	1,864.4797	0.0357	0.0342	1,875.8266
Mobile	4.6290	16.3712	50.6989	0.1689	13.0796	0.3705	13.4500	3.5043	0.3413	3.8456		12,988.6716	12,988.6716	0.3436		12,995.8865
Total	**12.7565**	**18.0050**	**66.3220**	**0.1791**	**13.0796**	**0.8137**	**13.8933**	**3.5043**	**0.7820**	**4.2862**	**0.0000**	**18,712.9804**	**18,712.9804**	**0.4790**	**0.1045**	**18,755.4195**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	1/1/2016	1/1/2016	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Excavators	0	8.00	162	0.38
Grading	Graders	0	8.00	174	0.41
Grading	Rubber Tired Dozers	0	8.00	255	0.40
Grading	Scrapers	0	8.00	361	0.48
Grading	Tractors/Loaders/Backhoes	0	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

3.2 Grading - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Grading - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	4.6290	16.3712	50.6989	0.1689	13.0796	0.3705	13.4500	3.5043	0.3413	3.8456		12,988.6716	12,988.6716	0.3436		12,995.8865
Unmitigated	4.6290	16.3712	50.6989	0.1689	13.0796	0.3705	13.4500	3.5043	0.3413	3.8456		12,988.6716	12,988.6716	0.3436		12,995.8865

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	1,723.12	1,793.71	1560.22	5,843,100	5,843,100
Total	1,723.12	1,793.71	1,560.22	5,843,100	5,843,100

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.690000	0.097000	0.097000	0.000000	0.000000	0.000000	0.064000	0.047000	0.000000	0.000000	0.005000	0.000000	0.000000

4.4 Fleet Mix

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.1709	1.4605	0.6215	9.3200e-003		0.1181	0.1181		0.1181	0.1181		1,864.4797	1,864.4797	0.0357	0.0342	1,875.8266
NaturalGas Unmitigated	0.1709	1.4605	0.6215	9.3200e-003		0.1181	0.1181		0.1181	0.1181		1,864.4797	1,864.4797	0.0357	0.0342	1,875.8266

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	15848.1	0.1709	1.4605	0.6215	9.3200e-003		0.1181	0.1181		0.1181	0.1181		1,864.4797	1,864.4797	0.0357	0.0342	1,875.8266
Total		**0.1709**	**1.4605**	**0.6215**	**9.3200e-003**		**0.1181**	**0.1181**		**0.1181**	**0.1181**		**1,864.4797**	**1,864.4797**	**0.0357**	**0.0342**	**1,875.8266**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	15.8481	0.1709	1.4605	0.6215	9.3200e-003		0.1181	0.1181		0.1181	0.1181		1,864.4797	1,864.4797	0.0357	0.0342	1,875.8266
Total		**0.1709**	**1.4605**	**0.6215**	**9.3200e-003**		**0.1181**	**0.1181**		**0.1181**	**0.1181**		**1,864.4797**	**1,864.4797**	**0.0357**	**0.0342**	**1,875.8266**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	7.9566	0.1733	15.0015	7.9000e-004		0.3251	0.3251		0.3226	0.3226	0.0000	3,859.8292	3,859.8292	0.0997	0.0703	3,883.7064
Unmitigated	7.9566	0.1733	15.0015	7.9000e-004		0.3251	0.3251		0.3226	0.3226	0.0000	3,859.8292	3,859.8292	0.0997	0.0703	3,883.7064

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.6982					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	6.4508					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.3514	2.0000e-005	0.0192	0.0000		0.2428	0.2428		0.2402	0.2402	0.0000	3,832.9412	3,832.9412	0.0735	0.0703	3,856.2678
Landscaping	0.4562	0.1733	14.9824	7.9000e-004		0.0824	0.0824		0.0824	0.0824		26.8880	26.8880	0.0262		27.4386
Total	**7.9566**	**0.1733**	**15.0015**	**7.9000e-004**		**0.3251**	**0.3251**		**0.3226**	**0.3226**	**0.0000**	**3,859.8292**	**3,859.8292**	**0.0997**	**0.0703**	**3,883.7064**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.6982					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	6.4508					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.3514	2.0000e-005	0.0192	0.0000		0.2428	0.2428		0.2402	0.2402	0.0000	3,832.941 2	3,832.941 2	0.0735	0.0703	3,856.267 8
Landscaping	0.4562	0.1733	14.9824	7.9000e-004		0.0824	0.0824		0.0824	0.0824		26.8880	26.8880	0.0262		27.4386
Total	**7.9566**	**0.1733**	**15.0015**	**7.9000e-004**		**0.3251**	**0.3251**		**0.3226**	**0.3226**	**0.0000**	**3,859.829 2**	**3,859.829 2**	**0.0997**	**0.0703**	**3,883.706 4**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Ironwood Residential- Operation

Riverside-South Coast County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	181.00	Dwelling Unit	58.77	325,800.00	518

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	10			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	466.91	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44.

Land Use - Project unit count is based on information provided by the applicant

Construction Phase - Operation run only

Off-road Equipment - 8 hour work days

Off-road Equipment - Operation run only

Grading -

Vehicle Trips - Weekday TR based on the Ironwood Residential TIA. Weekend TR based on the ITE Trip Generation Manual (code 210)

Woodstoves - No wood stoves, all natural gas fireplaces

Energy Use - Title-24 Electricity Energy Intensity and Title-24 Natural Gas Energy Intensity were adjusted by 36.4% and 6.5% respectively, to reflect 2013 Title 24 requirements. Source: Impact Analysis California's 2013 Building Energy Efficiency Standards (CEC 2013)

Construction Off-road Equipment Mitigation -

Vechicle Emission Factors - Based on Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol

Vechicle Emission Factors - Based on Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol

Vechicle Emission Factors - Based on Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	110.00	1.00
tblEnergyUse	T24E	980.99	623.91
tblEnergyUse	T24NG	27,816.78	26,008.69
tblFireplaces	NumberGas	153.85	181.00
tblFireplaces	NumberNoFireplace	18.10	0.00
tblFireplaces	NumberWood	9.05	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	630.89	466.91
tblProjectCharacteristics	OperationalYear	2014	2020

tblVehicleEF	HHD	0.04	0.05
tblVehicleEF	HHD	0.04	0.05
tblVehicleEF	HHD	0.04	0.05
tblVehicleEF	LDA	0.46	0.69
tblVehicleEF	LDA	0.46	0.69
tblVehicleEF	LDA	0.46	0.69
tblVehicleEF	LDT1	0.07	0.10
tblVehicleEF	LDT1	0.07	0.10
tblVehicleEF	LDT1	0.07	0.10
tblVehicleEF	LDT2	0.18	0.10
tblVehicleEF	LDT2	0.18	0.10
tblVehicleEF	LDT2	0.18	0.10
tblVehicleEF	LHD1	0.05	0.00
tblVehicleEF	LHD1	0.05	0.00
tblVehicleEF	LHD1	0.05	0.00
tblVehicleEF	LHD2	7.4600e-003	0.00
tblVehicleEF	LHD2	7.4600e-003	0.00
tblVehicleEF	LHD2	7.4600e-003	0.00
tblVehicleEF	MCY	6.5150e-003	5.0000e-003
tblVehicleEF	MCY	6.5150e-003	5.0000e-003
tblVehicleEF	MCY	6.5150e-003	5.0000e-003
tblVehicleEF	MDV	0.17	0.00
tblVehicleEF	MDV	0.17	0.00
tblVehicleEF	MDV	0.17	0.00
tblVehicleEF	MH	3.2720e-003	0.00
tblVehicleEF	MH	3.2720e-003	0.00
tblVehicleEF	MH	3.2720e-003	0.00
tblVehicleEF	MHD	0.01	0.06

tblVehicleEF	MHD	0.01	0.06
tblVehicleEF	MHD	0.01	0.06
tblVehicleEF	OBUS	9.0200e-004	0.00
tblVehicleEF	OBUS	9.0200e-004	0.00
tblVehicleEF	OBUS	9.0200e-004	0.00
tblVehicleEF	SBUS	8.2800e-004	0.00
tblVehicleEF	SBUS	8.2800e-004	0.00
tblVehicleEF	SBUS	8.2800e-004	0.00
tblVehicleEF	UBUS	1.0560e-003	0.00
tblVehicleEF	UBUS	1.0560e-003	0.00
tblVehicleEF	UBUS	1.0560e-003	0.00
tblVehicleTrips	ST_TR	10.08	9.91
tblVehicleTrips	SU_TR	8.77	8.62
tblVehicleTrips	WD_TR	9.57	9.52
tblWoodstoves	NumberCatalytic	9.05	0.00
tblWoodstoves	NumberNoncatalytic	9.05	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.9566	0.1733	15.0015	7.9000e-004		0.3251	0.3251		0.3226	0.3226	0.0000	3,859.8292	3,859.8292	0.0997	0.0703	3,883.7064
Energy	0.1709	1.4605	0.6215	9.3200e-003		0.1181	0.1181		0.1181	0.1181		1,864.4797	1,864.4797	0.0357	0.0342	1,875.8266
Mobile	4.7270	15.8633	53.0077	0.1805	13.0796	0.3688	13.4483	3.5043	0.3397	3.8440		13,787.7169	13,787.7169	0.3426		13,794.9124
Total	**12.8545**	**17.4971**	**68.6308**	**0.1906**	**13.0796**	**0.8120**	**13.8915**	**3.5043**	**0.7804**	**4.2847**	**0.0000**	**19,512.0257**	**19,512.0257**	**0.4781**	**0.1045**	**19,554.4454**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.9566	0.1733	15.0015	7.9000e-004		0.3251	0.3251		0.3226	0.3226	0.0000	3,859.8292	3,859.8292	0.0997	0.0703	3,883.7064
Energy	0.1709	1.4605	0.6215	9.3200e-003		0.1181	0.1181		0.1181	0.1181		1,864.4797	1,864.4797	0.0357	0.0342	1,875.8266
Mobile	4.7270	15.8633	53.0077	0.1805	13.0796	0.3688	13.4483	3.5043	0.3397	3.8440		13,787.7169	13,787.7169	0.3426		13,794.9124
Total	**12.8545**	**17.4971**	**68.6308**	**0.1906**	**13.0796**	**0.8120**	**13.8915**	**3.5043**	**0.7804**	**4.2847**	**0.0000**	**19,512.0257**	**19,512.0257**	**0.4781**	**0.1045**	**19,554.4454**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	1/1/2016	1/1/2016	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Excavators	0	8.00	162	0.38
Grading	Graders	0	8.00	174	0.41
Grading	Rubber Tired Dozers	0	8.00	255	0.40
Grading	Scrapers	0	8.00	361	0.48
Grading	Tractors/Loaders/Backhoes	0	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Grading - 2016

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Grading - 2016

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	4.7270	15.8633	53.0077	0.1805	13.0796	0.3688	13.4483	3.5043	0.3397	3.8440		13,787.7169	13,787.7169	0.3426		13,794.9124
Unmitigated	4.7270	15.8633	53.0077	0.1805	13.0796	0.3688	13.4483	3.5043	0.3397	3.8440		13,787.7169	13,787.7169	0.3426		13,794.9124

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	1,723.12	1,793.71	1560.22	5,843,100	5,843,100
Total	1,723.12	1,793.71	1,560.22	5,843,100	5,843,100

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.690000	0.097000	0.097000	0.000000	0.000000	0.000000	0.064000	0.047000	0.000000	0.000000	0.005000	0.000000	0.000000

4.4 Fleet Mix

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.1709	1.4605	0.6215	9.3200e-003		0.1181	0.1181		0.1181	0.1181		1,864.4797	1,864.4797	0.0357	0.0342	1,875.8266
NaturalGas Unmitigated	0.1709	1.4605	0.6215	9.3200e-003		0.1181	0.1181		0.1181	0.1181		1,864.4797	1,864.4797	0.0357	0.0342	1,875.8266

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	15848.1	0.1709	1.4605	0.6215	9.3200e-003		0.1181	0.1181		0.1181	0.1181		1,864.4797	1,864.4797	0.0357	0.0342	1,875.8266
Total		**0.1709**	**1.4605**	**0.6215**	**9.3200e-003**		**0.1181**	**0.1181**		**0.1181**	**0.1181**		**1,864.4797**	**1,864.4797**	**0.0357**	**0.0342**	**1,875.8266**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	15.8481	0.1709	1.4605	0.6215	9.3200e-003		0.1181	0.1181		0.1181	0.1181		1,864.4797	1,864.4797	0.0357	0.0342	1,875.8266
Total		**0.1709**	**1.4605**	**0.6215**	**9.3200e-003**		**0.1181**	**0.1181**		**0.1181**	**0.1181**		**1,864.4797**	**1,864.4797**	**0.0357**	**0.0342**	**1,875.8266**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	7.9566	0.1733	15.0015	7.9000e-004		0.3251	0.3251		0.3226	0.3226	0.0000	3,859.8292	3,859.8292	0.0997	0.0703	3,883.7064
Unmitigated	7.9566	0.1733	15.0015	7.9000e-004		0.3251	0.3251		0.3226	0.3226	0.0000	3,859.8292	3,859.8292	0.0997	0.0703	3,883.7064

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.6982					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	6.4508					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.3514	2.0000e-005	0.0192	0.0000		0.2428	0.2428		0.2402	0.2402	0.0000	3,832.9412	3,832.9412	0.0735	0.0703	3,856.2678
Landscaping	0.4562	0.1733	14.9824	7.9000e-004		0.0824	0.0824		0.0824	0.0824		26.8880	26.8880	0.0262		27.4386
Total	**7.9566**	**0.1733**	**15.0015**	**7.9000e-004**		**0.3251**	**0.3251**		**0.3226**	**0.3226**	**0.0000**	**3,859.8292**	**3,859.8292**	**0.0997**	**0.0703**	**3,883.7064**

Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.6982					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	6.4508					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.3514	2.0000e-005	0.0192	0.0000		0.2428	0.2428		0.2402	0.2402	0.0000	3,832.941 2	3,832.941 2	0.0735	0.0703	3,856.267 8
Landscaping	0.4562	0.1733	14.9824	7.9000e-004		0.0824	0.0824		0.0824	0.0824		26.8880	26.8880	0.0262		27.4386
Total	**7.9566**	**0.1733**	**15.0015**	**7.9000e-004**		**0.3251**	**0.3251**		**0.3226**	**0.3226**	**0.0000**	**3,859.829 2**	**3,859.829 2**	**0.0997**	**0.0703**	**3,883.706 4**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

APPENDIX 3.2:

STATE/FEDERAL ATTAINMENT STATUS OF CRITERIA POLLUTANTS

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2013
Area Designations for State Ambient Air Quality Standards
OZONE

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

2013
Area Designations for State Ambient Air Quality Standards
PM10

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

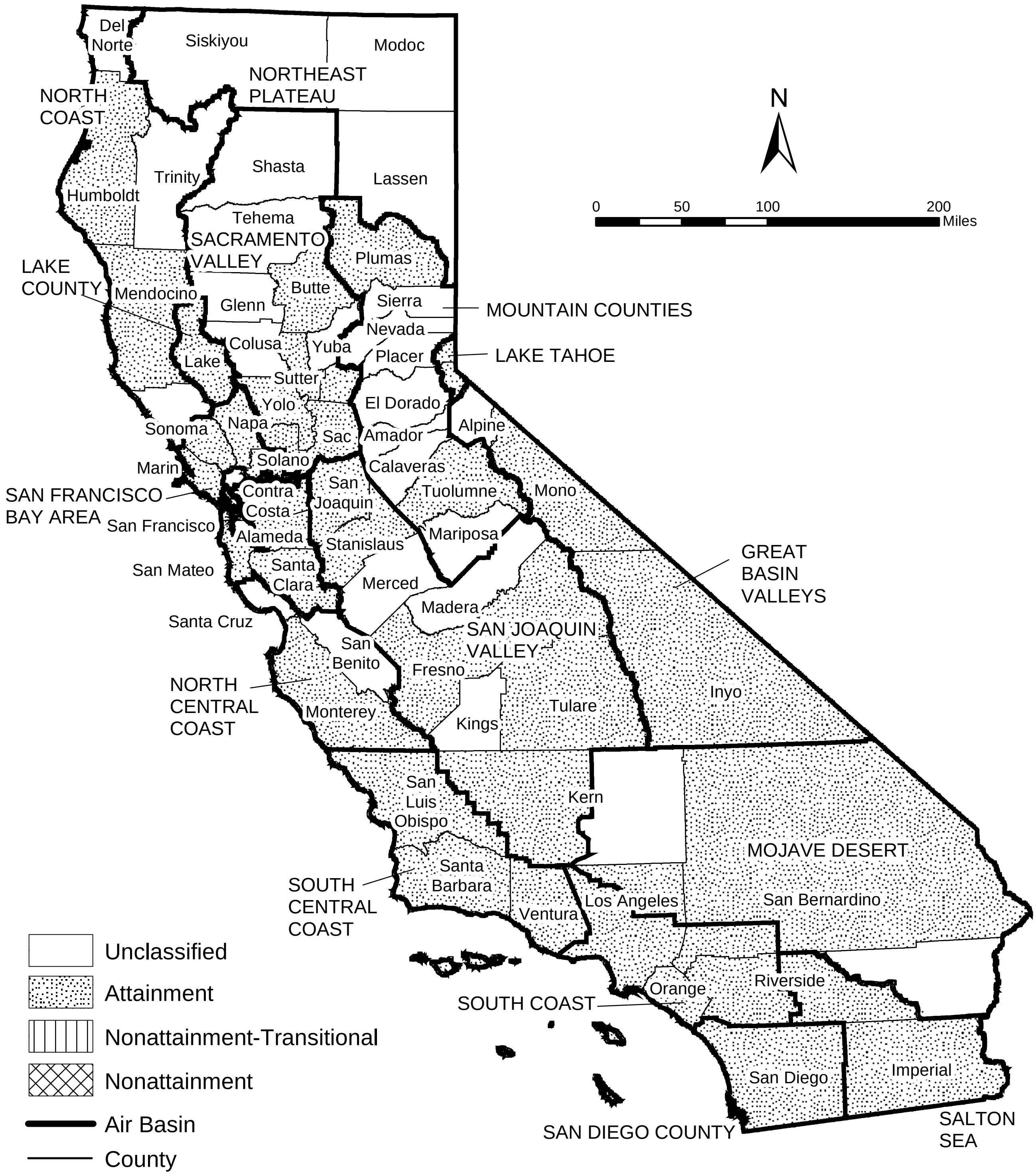
Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

2013
Area Designations for State Ambient Air Quality Standards
PM2.5

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

2013
Area Designations for State Ambient Air Quality Standards CARBON MONOXIDE



Source Date:
June 2013
Air Quality Planning Branch, AQPSD

2013
Area Designations for State Ambient Air Quality Standards NITROGEN DIOXIDE

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

2013
Area Designations for State Ambient Air Quality Standards SULFUR DIOXIDE

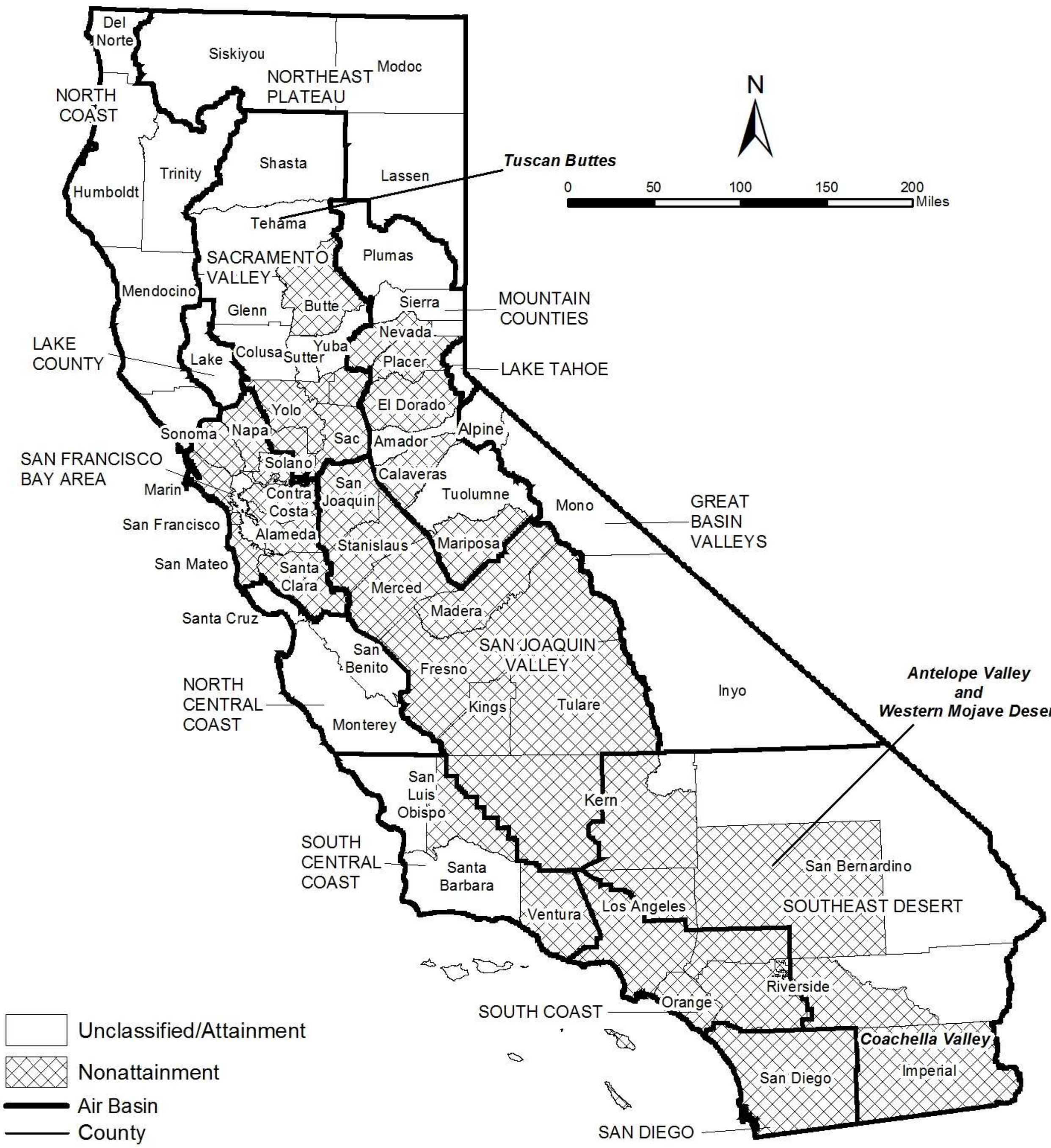
Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

2013
Area Designations for State Ambient Air Quality Standards LEAD

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

Area Designations for National Ambient Air Quality Standards 8-HOUR OZONE



Source Date:
June 2013
Air Quality Planning Branch, AQPSD

Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Area Designations for National Ambient Air Quality Standards PM10

Source Date:
September 2013
Air Quality Planning Branch, AQPSD

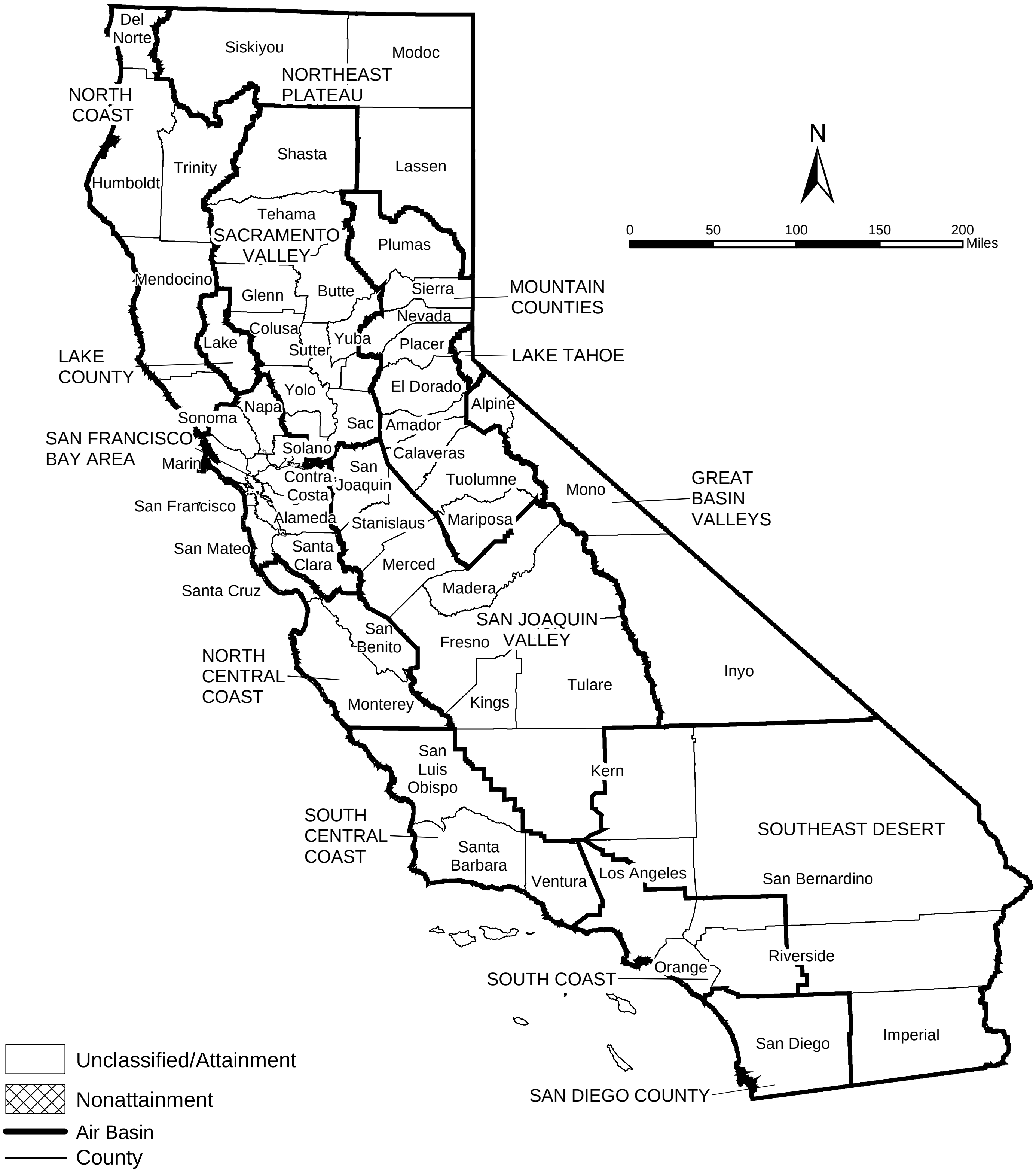
Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Area Designations for National Ambient Air Quality Standards PM2.5

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Area Designations for National Ambient Air Quality Standards CARBON MONOXIDE



Source Date:
June 2013
Air Quality Planning Branch, AQPSD

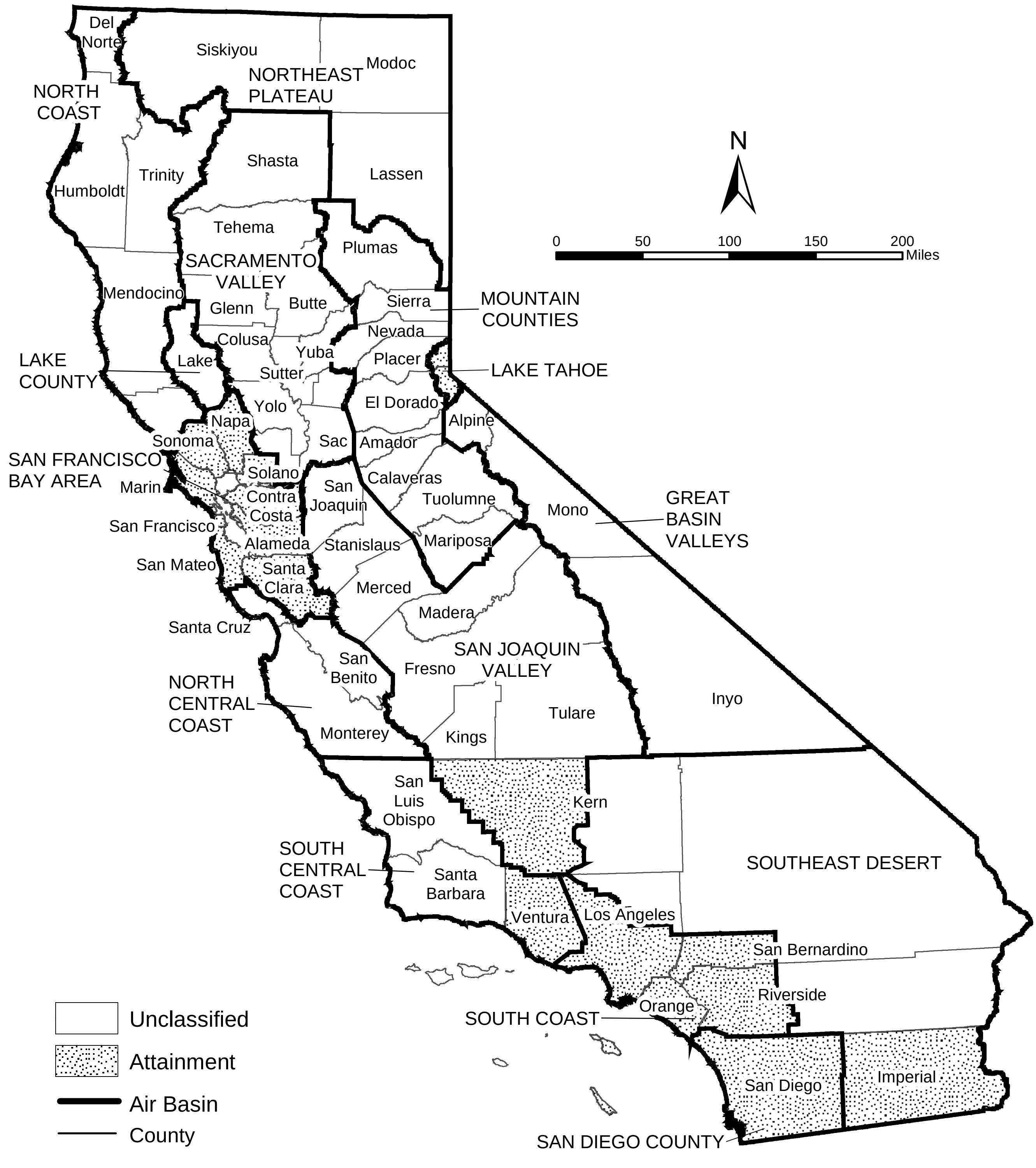
Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Area Designations for National Ambient Air Quality Standards NITROGEN DIOXIDE

Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

Area Designations for National Ambient Air Quality Standards SULFUR DIOXIDE



Source Date:
June 2013
Air Quality Planning Branch, AQPSD

Attachment: Air Quality Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Area Designations for National Ambient Air Quality Standards LEAD

Unclassified/Attainment

Nonattainment

Air Basin

County

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

IRONWOOD VILLAGE

Biological Resources Assessment

Prepared for
1BH1 LLC

August 2016

ESA PCR

IRONWOOD VILLAGE

Biological Resources Assessment

Prepared for
1BH1 LLC

August 2016

ESA PCR

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TABLE OF CONTENTS
Biological Resources Assessment

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APPENDICES

List of Figures

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1.0 INTRODUCTION

1.1 Background and Purpose

This report presents the findings of a Biological Resources Assessment & Western Riverside County Multiple Species Habitat Conservation Plan Consistency Analysis conducted by **ESA PCR** for the approximately 78.48-acre project site proposed for development of a single-family residential development associated with Assessor's Parcel Number (APN) 473-160-004 and approximately 10.57-acre off-site areas (collectively, the "study area"). The study area is located directly northeast of the intersection of Ironwood Avenue and Nason Street within the City of Moreno Valley, in Riverside County, California. The purpose of this study is to satisfy the requirements of the Western Riverside County Multiple Species Habitat Conservation (MSHCP), the California Environmental Quality Act (CEQA), and to supplement subsequent regulatory applications pursuant to Sections 404 and 401 of the Clean Water Act (CWA) and Section 1602 of the California Fish & Game Code (CF&G).

1.2 Sources

This Biological Resources Assessment & MSHCP Consistency Analysis (collectively, the "BRA") is based on information compiled through field reconnaissance and appropriate reference materials. A general biological survey, vegetation mapping, and investigation of jurisdictional waters and wetlands was conducted by ESA PCR. Focused surveys for special-status plant species and burrowing owl (*Athene cunicularia*) were also conducted. The information sources used in preparation of this BRA are provided in Section 9, *References*.

1.3 Study Area Location

The approximately 78.48-acre on-site study area and approximately10.57-acre off-site study areas are regionally situated north of State Route (SR) 60 and northeast of Interstate (I) 215 (**Figure 1**, *Regional Map*). Specifically, the study area is located northeast of the intersection of Ironwood Avenue and Nason Street in the City of Moreno Valley. The on-site and off-site project study areas are depicted on the U.S. Geological Survey (USGS) 7.5' Sunnymead topographic quadrangle (S34, T2S, R3W & S3, T3S, R3W) (USGS, 1967; Earth Survey, 2015), as shown in **Figure 2**, *Vicinity Map.* The specific location of each project study area is depicted on **Figure 3**, *Study Areas*. Off-site study areas associated with four types of proposed project improvements include manufactured slopes, road improvements, a sewer line extension, and water line extensions and described in detail below:

Manufactured Slopes (West & East) – There are two (2) off-site study area locations proposed to support manufactured slopes, including one area adjacent to Nason Street (West) and a second area adjacent to the eastern boundary of the project site (East).

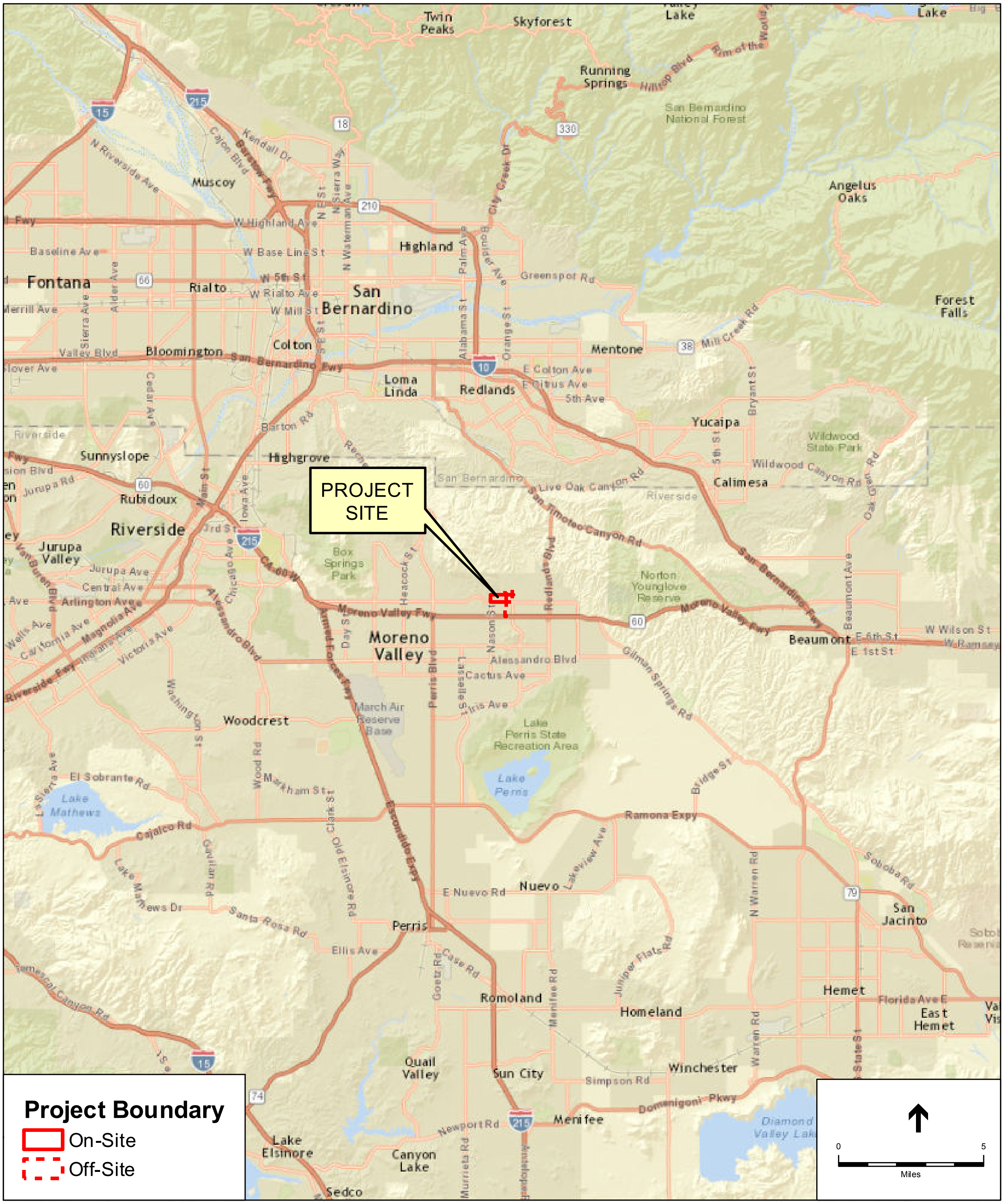
Road Improvements – There is one (1) road improvement area proposed between the area located directly north of Ironwood Avenue and south of the project site boundary.

Sewer Line – The sewer line is proposed to connect at the southeast corner of the project site at the intersection of Ironwood Avenue and Oliver Street and extend south along Oliver Avenue, ultimately ending at the SR-60 freeway.

Water line (Proposed and Alternatives) – Although the exact location of the final water line extension is still unknown, one proposed alignment and two (2) alternative alignments were assessed as part of the off-site project study areas. The Proposed Water Line would commence at the intersection of Ironwood Avenue and Oliver Street and extend east along Ironwood Avenue, continuing north along Moreno Beach Drive, and terminating at the intersection of Moreno Beach Drive and Kalmia Avenue. Water Line Alternative 1 would connect the water line at the northeast corner of the project site and extend north to an existing off-site water tower. Water Line Alternative 2 would commence at the northeastern corner of the project site and extend east toward the intersection of Moreno Beach Drive and Juniper Avenue.

1.4 Scope of Study

The scope of this BRA encompasses descriptions of the project, methods of study, and existing site conditions including vegetation communities and the potential for special-status biological resources, followed by an evaluation of impacts to special-status biological resources pursuant to CEQA thresholds and compliance with the Western Riverside County MSHCP. Avoidance, minimization, and/or mitigation measures are proposed to reduce any potential adverse effects to biological resources to less than significant under CEQA where appropriate.

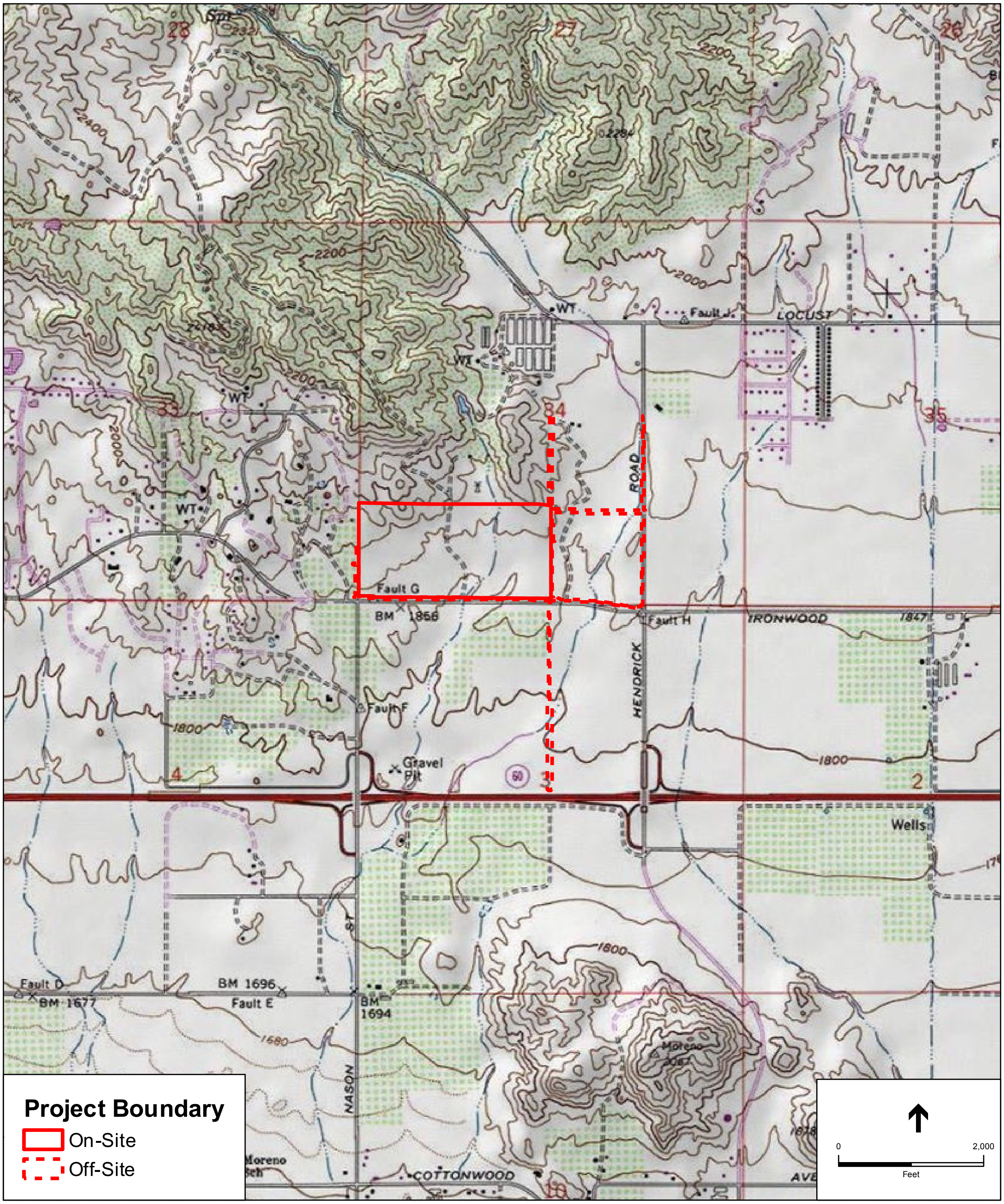


SOURCE: ESRI Street Map, 2009.

Ironwood Village Project
Figure 1
Regional Map

ESA PCR

Attachment: Biological Resources Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))



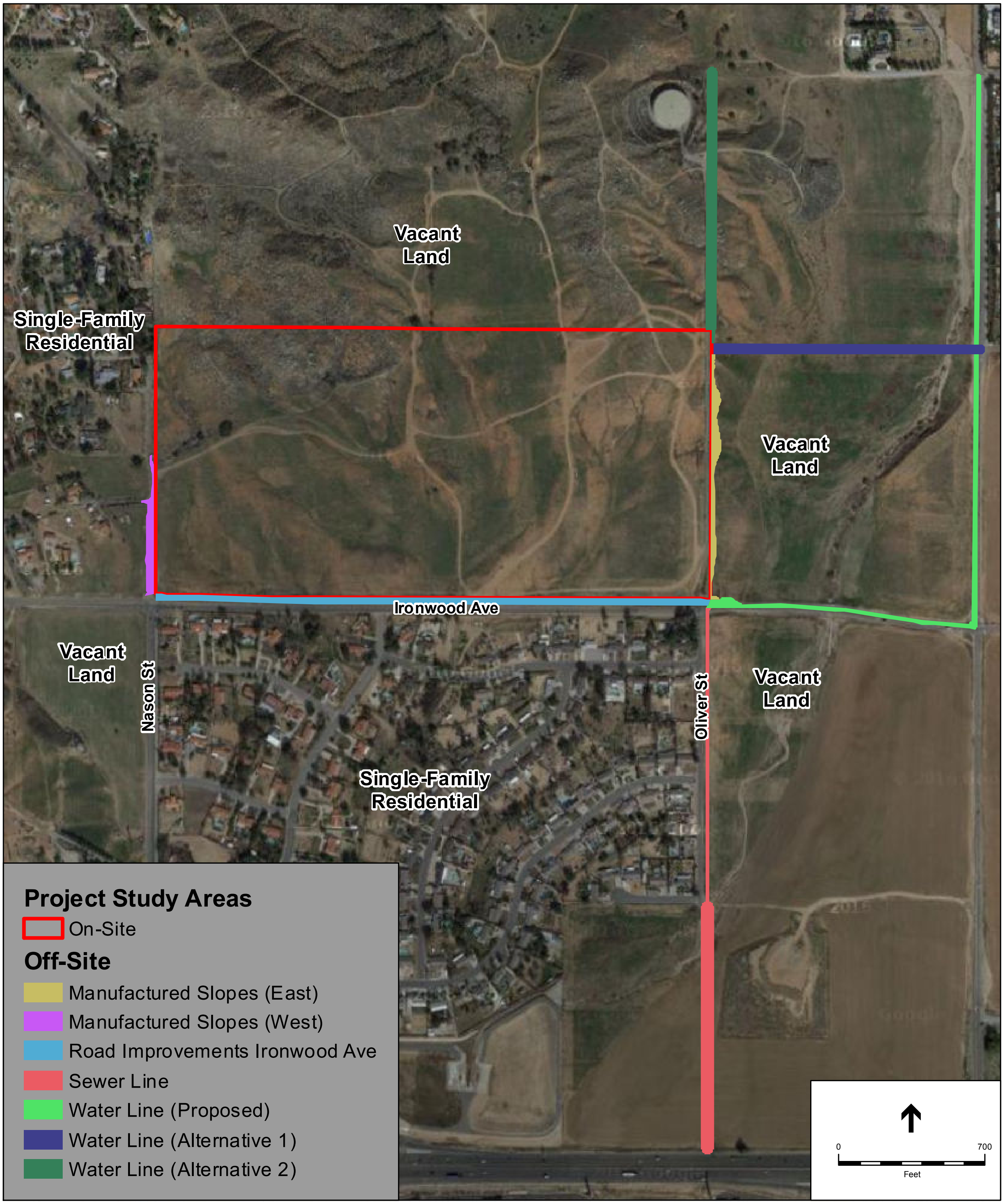
SOURCE: USGS Topographic Series (Sunnymead, CA).

Ironwood Village Project

Figure 2

Vicinity Map

ESA PCR



SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project
Figure 3
Study Areas

FSA PCR

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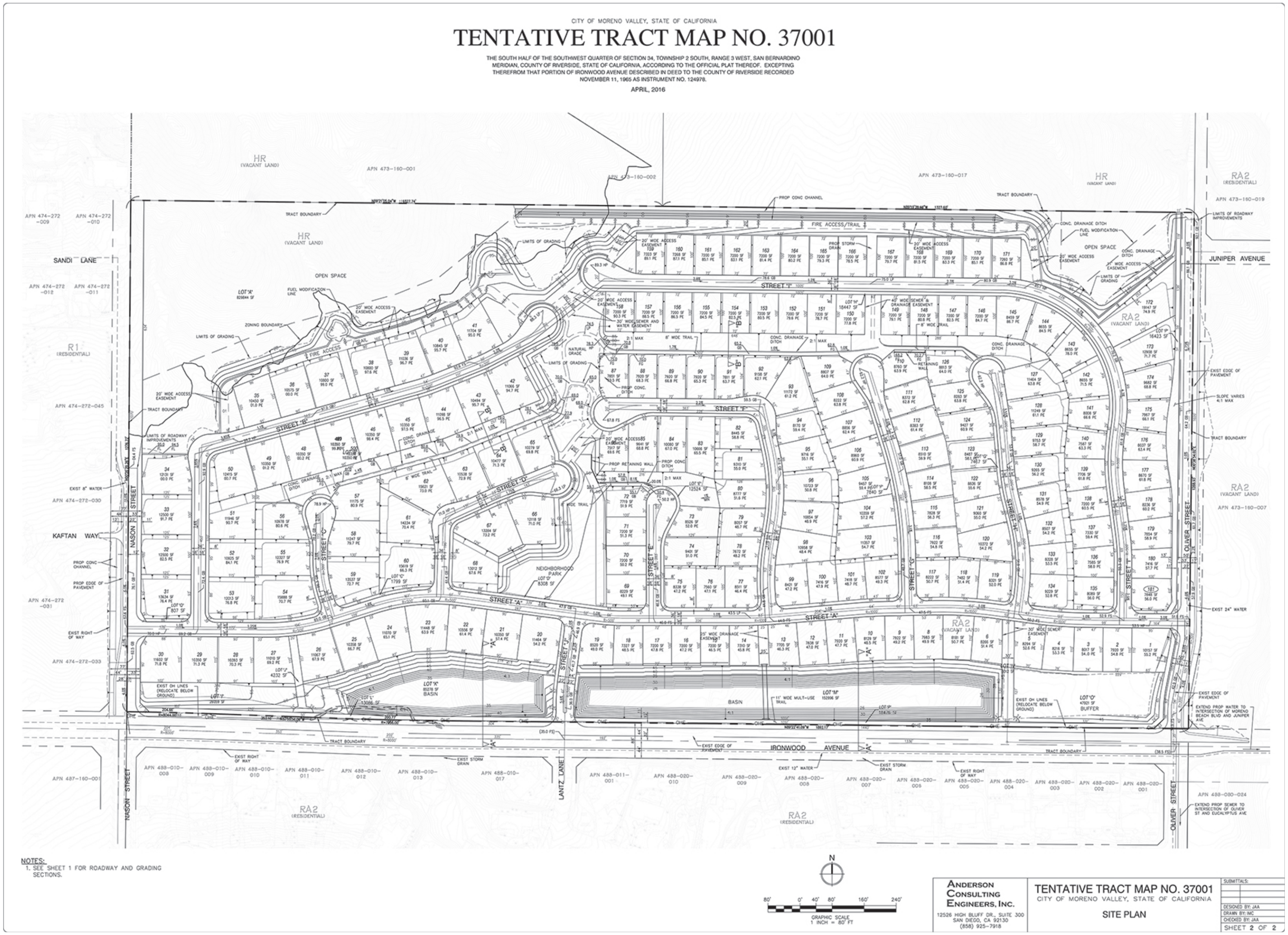
2.0 PROJECT DESCRIPTION

2.1 Project Description

The 78.48-acre project site is a proposed single-family residential development occupying approximately 38.5 acres, as shown in (**Figure 4**, *Site Plan*). The remaining acreage will be open space areas, which will consist of community open space areas that will be planted as appropriate to the project's climate and avoided areas in the northwestern and northeastern corner of the project site, which encompass native vegetation and rock outcroppings that will be preserved. Per Figure 3, there are four types of off-site areas associated with the project totaling 10.57 acres, including manufactured slope areas, road improvements, sewer line extension, and water line extensions (proposed and alternative). Sewer and water lines will be extended onto the site from existing utilities. Primary access to the development would occur from Ironwood Avenue between Nason Street and Oliver Street, immediately opposite from and north of Lantz Lane. Secondary access would be provided by driveways on both Nason Street and Oliver Street just north of Ironwood Avenue.

2.2 Project Avoidance

The project study areas consist primarily of non-native vegetation characterized by ruderal vegetation and disturbed areas that consist of little to no vegetation. There are some areas that support native plant communities, such as Riversidean sage scrub and brittlebush scrub, which predominantly reside in the northwestern corner of the on-site study area. The project proposes avoidance of the northwestern and northeastern corners of the on-site study area, which are located on hillsides that transition into the foothills of the Badlands mountain range located to the north of the project site. These avoided areas will be maintained as natural open space to preserve the scenic views of the hillsides from the City of Moreno Valley. The project on- and off-site study areas also support two drainage systems, which include Drainage A and Drainage Complex B, approximately 40% of which will be avoided.



SOURCE: Anderson Consulting Engineers, Inc., 2016

Ironwood Village Project
Figure 4
Site Plan

ESA PCR

3.0 METHODS OF STUDY

3.1 Approach

This BRA is based on information compiled through field reconnaissance and appropriate reference materials. Surveys included a general biological survey and vegetation mapping; an investigation of jurisdictional waters; focused plant surveys; and focused burrowing owl surveys.

3.2 Literature Review

Assessment of the study area began with a review of relevant literature on the biological resources of the study area and surrounding vicinity. The California Natural Diversity Database (CNDDB), a California Department of Fish and Wildlife (CDFW) species account database, was reviewed for all pertinent information regarding the localities of known observations of special-status species and habitats in the vicinity of the study area (CDFW, 2015). The vicinity of the study area included the following USGS topographic quadrangles: San Bernardino South, Redlands, Yucaipa, Riverside East, El Casco, Steele Peak, Perris, and Lakeview. Federal register listings, protocols, and species data provided by the United States Fish and Wildlife Service (USFWS) (USFWS, 2015a), CDFW and the California Native Plant Society (CNPS, 2015) were reviewed in conjunction with anticipated Federally and State listed species potentially occurring within the vicinity. Other data sources reviewed include USFWS critical habitat maps (USFWS, 2015b) and United States Department of Agriculture Natural Resources Conservation Service (NRCS) soils mapping (NRCS, 2015). In addition, numerous regional flora and fauna field guides were utilized to assist in the identification of species and suitable habitats, in addition to relevant local policies such as the *Western Riverside County Multiple Species Habitat Conservation Plan* (MSHCP) (Dudek & Associates, 2003). A list of all relevant references reviewed is included in Section 9.0, *References*.

3.3 Field Investigations

A general biological survey and vegetation mapping was conducted by ESA PCR Senior Biologist Ezekiel Cooley on September 19, 2014 and investigations of jurisdictional waters were conducted by Principal Regulatory Scientist Amir Morales on September 19 and December 10, 2014. The observed vegetation communities, jurisdictional features, and other biological features or species observations of interest were mapped on aerial photographs. Biological surveys were conducted over all on-site and off-site study areas, with special attention to sensitive habitats such as those suitable for the burrowing owl and those areas potentially supporting special-status flora. The only exception is an off-site study area located directly east of the project study area proposed to support manufactured slopes. The eastern manufactured slopes support suitable habitat for special-status plant species and a spring focused survey has not yet been conducted. As such, a mitigation measure addressing the potential for special-status plants to occur within this off-site area is included in Section 7.2.1 of this BRA. The following summarizes the extent of focused surveys conducted within the study areas identified on Figure 3.

Focused plant surveys were conducted within:

- the project site and off-site road improvement and sewer line areas on May 13, 2015 by ESA PCR Biologists Ezekiel Cooley, Amy Lee, and Lauren Singleton and on July 20, 2015 by Amy Lee;
- the off-site proposed and alternative water line areas on May 23 and July 5, 2016 by Amy Lee; and
- the off-site manufactured slope areas on July 5, 2016 by Amy Lee. However, a spring focused plant survey has not been conducted within the off-site manufactured slope area located directly east of the site.

Focused burrowing owl surveys were conducted within:

- the project site and off-site manufactured slopes, road improvement, proposed water line, and sewer line areas from May to July 2015 by ESA PCR Biologists Ezekiel Cooley, Amy Lee, and Lauren Singleton; and
- the alternative off-site water line areas from April to July 2016 by Amy Lee and Lauren Singleton.

During the course of all field visits, an inventory of plant and wildlife species observed was compiled. The methods for these field investigations are described in detail below.

3.3.1 Plant Community Mapping

Plant communities were mapped directly in the field utilizing a 125-scale (1”=125’) aerial photograph focusing on dominant plant species. Plant community names, codes, and descriptions follow *A Manual of California Vegetation, Second Edition* (Sawyer, Keeler-Wolf, and Evens, 2009) or Holland’s *Preliminary Descriptions of the Terrestrial Natural Communities of California* (1986). The California Natural Community Code (CaCodes) or Holland’s Element Code is in parentheses next to each community name, when applicable. After completing the fieldwork, the plant community polygons were digitized using Geographic Information System (GIS) technology to calculate acreages.

3.3.2 Sensitive Habitats

Sensitive habitats are listed by CDFW on their *List of Vegetation Alliances and Associations* (CDFW, 2010).[1] Communities on this list are given a Global (G) and State (S) rarity ranking on a scale of 1 to 5, where communities with a ranking of 5 are the most common and communities

[1] *Available online at: http://www.dfg.ca.gov/biogeodata/vegcamp/natural_comm_list.asp*

with a ranking of 1 are the rarest and of the highest priority to preserve. These high priority communities are denoted on the CDFW list with asterisks. For the purpose of this report, sensitive habitats are those communities that have a state ranking of S3 or rarer. Any sensitive habitats located on the study area were identified based on the mapped natural communities (see section 3.3.1, *Plant Community Mapping*).

3.3.3 General Plant Inventory

All plant species observed during the general and focused surveys were either identified in the field or collected and later identified using taxonomic keys. Plant taxonomy follows Baldwin (2012). Common plant names, when not available from Baldwin, were taken from Munz (1974) and/or Clarke (2007). Since common names vary significantly between references, scientific names are included upon initial mention of each species; common names consistent throughout the report are employed thereafter. All plant species observed were recorded in field notes. Special-status plant species are discussed below in section 3.3.4, *Special-status Plant Species*.

3.3.4 Special-status Plant Species

The potential for special-status plant species was assessed based upon the known occurrence of species in the area as identified from CDFW, USFWS and CNPS databases (see Section 3.2, *Literature Review*), and the presence or absence of suitable habitat within the study area based on plant community mapping (see section 3.3.1, *Plant Community Mapping*). Suitable habitat was defined as areas with appropriate vegetation communities, soils and/or topography (elevation at MSL) to support the species based on known occurrences in those habitats and/or CDFW and CNPS documented habitat descriptions for the species. The definitions of suitable habitat were then compared against the vegetation mapping conducted for the study area and local knowledge. A table of special-status plant species for which potentially suitable habitat occurs within the study area was prepared, and the potential for occurrence for each species was determined following completion of the vegetation mapping conducted during the field survey.

Due to the presence of potentially suitable habitat, focused plant surveys were conducted on the project site and off-site road improvement and sewer line areas by ESA PCR biologists Ezekiel Cooley, Amy Lee, and Lauren Singleton on May 13, 2015 and by Amy Lee on July 20, 2015. Focused plant surveys were also conducted on the off-site water line areas by Amy Lee on March 23, 2016 and July 5, 2016. Although a summer focused plant survey was conducted within the manufactured slope areas on July 5, 2016 by Amy Lee, a spring survey has not yet been performed in these areas. The manufactured slope area located west of the project boundary does not support suitable habitat for plants associated with the spring survey requirement. However, the manufactured slope area located east of the project boundary does require completion of a spring focused plant survey as summarized in Section 7.1.2 below. All focused plant surveys conducted to date were implemented in accordance with published agency guidelines (CDFW, 2009; CDFW, 2000a; and USFWS, 2000) and during the appropriate blooming periods of potential plant species to ensure detection of any special-status plants.

3.3.5 General Wildlife Inventory

All wildlife species observed within the study area, as well as any diagnostic sign (call, tracks, nests, scat, remains, or other sign), were recorded in field notes. Binoculars and regional field guides were utilized for the identification of wildlife, as necessary. Wildlife taxonomy follows Stebbins (2003) and California Herps (2015) for amphibians and reptiles, the American Ornithologists' Union (1998) for birds, and Jameson and Peeters (1988) for mammals. Since common names vary significantly between references, scientific names are included upon initial mention of each species; common names consistent throughout the report are employed thereafter. All wildlife species detected were recorded in field notes. Special-status wildlife species are discussed below in section 3.3.6, *Special-status Wildlife Species*.

3.3.6 Special-status Wildlife Species

The potential for special-status wildlife species was assessed based upon the known occurrence of species in the area as identified from CDFW and USFWS databases (see section 3.2, *Literature Review*), and the presence or absence of suitable habitat within the study area based on plant community mapping (see section 3.3.1, *Plant Community Mapping*). Suitable habitat was defined as areas with appropriate vegetation communities and/or topography (elevation at MSL) to support the species based on known occurrences in those habitats and/or CDFW and USFWS documented habitat descriptions for the species. The definitions of suitable habitat were then compared against the vegetation mapping conducted for the study area as well as local knowledge. A table of special-status wildlife species for which potentially suitable habitat occurs within the study area was prepared, and the potential for occurrence for each species was determined following completion of the vegetation mapping conducted during the field survey.

Due to the presence of potentially suitable habitat and MSHCP requirements, focused surveys were conducted for burrowing owl. A summary of the survey methodology is provided below; a separate survey report was also prepared following completion of the focused surveys. No other focused surveys were conducted for special-status wildlife species.

Burrowing Owl

The study area supports potentially suitable habitat for burrowing owl. As such, focused surveys for burrowing owl were conducted on the project site and off-site manufactured slopes, road improvement, proposed water line, and sewer line areas by ESA PCR biologists Ezekiel Cooley, Amy Lee, and Lauren Singleton on May 13; June 3; and July 2 and 27, 2015. Focused burrowing owl surveys were conducted within the off-site alternative water areas by Lauren Singleton on April 28, 2016 and by Amy Lee on May 23; June 9; and July 7, 2016. Step I and Step II surveys for burrowing owls were conducted on the project site and off-site areas in accordance with the County of Riverside's *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area* (County of Riverside, 2006). Step I is a Habitat Assessment and Step II consists of Locating Burrows and Burrowing Owls.

Suitable habitat was identified during the Step I Habitat Assessment, which was conducted by Ezekiel Cooley on September 19, 2014 during the general biological survey, including disturbed, low-growing vegetation; bare ground; and a few small fossorial mammal burrows. Suitable habitat included disturbed, low-growing vegetation; bare ground; and a few small fossorial mammal burrows. Due to the presence of suitable habitat identified during the Step I survey, Step II surveys were conducted within the study area plus a 150-meter (approximately 500 feet) buffer zone around the perimeter of the study area (collectively, the “survey area”). Step II surveys focused on the detection of BUOW individuals, small fossorial mammal burrows potentially suitable for BUOW, and BUOW diagnostic sign (e.g., molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance). Transects were utilized, spaced no more than 100 feet apart, to allow 100 percent visual coverage of the ground surface. The four surveys were conducted during the burrowing owl breeding season (March 1 to August 31) on separate days between two hours before sunset to one hour after or one hour before sunrise to two hours after.[2]

3.3.7 Regional Connectivity/Wildlife Movement Corridor

An analysis of wildlife movement was conducted based on information compiled from the literature, analysis of aerial photographs and topographic maps, direct observations made in the field during survey work, and an analysis of existing wildlife movement functions. Relative to corridor issues, the focus of this assessment was to determine if the change of the existing land use within the study area would have significant impacts on the regional wildlife movement associated with the study area as well as the immediate vicinity.

The Western Riverside County MSHCP was reviewed to identify any linkage or Core Areas proposed for preservation on the study area (Dudek & Associates, 2003). Additionally, the South Coast Missing Linkages: A Wildland Network for the South Coast Ecoregion document was reviewed (South Coast Wildlands, 2008).

3.3.8 Investigation of Jurisdictional Waters

A jurisdictional determination of existing on-site drainage and wetland features was conducted by ESA PCR Principal Regulatory Scientist Amir Morales on September 19 and December 10, 2014. The purpose of the delineation was to assess the location, extent and acreage of “waters of the U.S.” and/or wetlands under the jurisdiction of the U.S. Army Corps of Engineers (USACE) and Regional Water Quality Control Board (RWQCB), and the limits of streambed and associated riparian habitat under the jurisdiction of CDFW. All areas were delineated using the protocol stipulated by CDFW under Section 1600-1607 of the California Fish and Wildlife Code, and by the USACE and RWQCB under Section 404 and Section 401 of the Clean Water Act (CWA), respectively. No potential for wetlands or other special aquatic sites were observed within project study areas. Therefore, a wetland delineation using the procedures stipulated in the USACE Wetland Delineation Manual (Environmental Laboratory, 1987) and Arid West Supplement (USACE, 2008a and USACE, 2008b) were not performed or warranted for this project.

2 For projects within the Western Riverside County MSHCP plan area, it has been PCR’s experience that the County of Riverside has preferred that Step II surveys be conducted at least one week apart.

The potential for USACE jurisdictional "waters of the U.S." was based primarily on the presence or absence of jurisdictional field indicators consistent with the USACE guidelines (USACE, 2008a) such as the presence of an OHWM and/or secondary indicators of hydrology, including evidence of the deposition of debris, scour, sediment sorting, and changes in vegetation. The extent of CDFW jurisdiction was assessed based on the limits of the defined bed and bank and includes riparian streambed associated vegetation, where applicable. If these criteria were met, data was collected to estimate the length and width of jurisdictional features potentially regulated by the resource agencies. Upon completion of the field work, documentation of all jurisdictional wetlands, waters, and streambed were completed. The documentation included a map illustrating the location, extent and acreage of all jurisdictional features. Downstream surface connections to known USACE jurisdictional waters were also evaluated in the field and by using satellite imagery and mapping, for the purpose of establishing a connection (i.e. federal nexus) to "waters of the U.S.," where applicable. The results of the ESA PCR jurisdictional assessment are subject to review and approval by the resource agencies as part of future regulatory permits for the project, if required.

4.0 EXISTING CONDITIONS

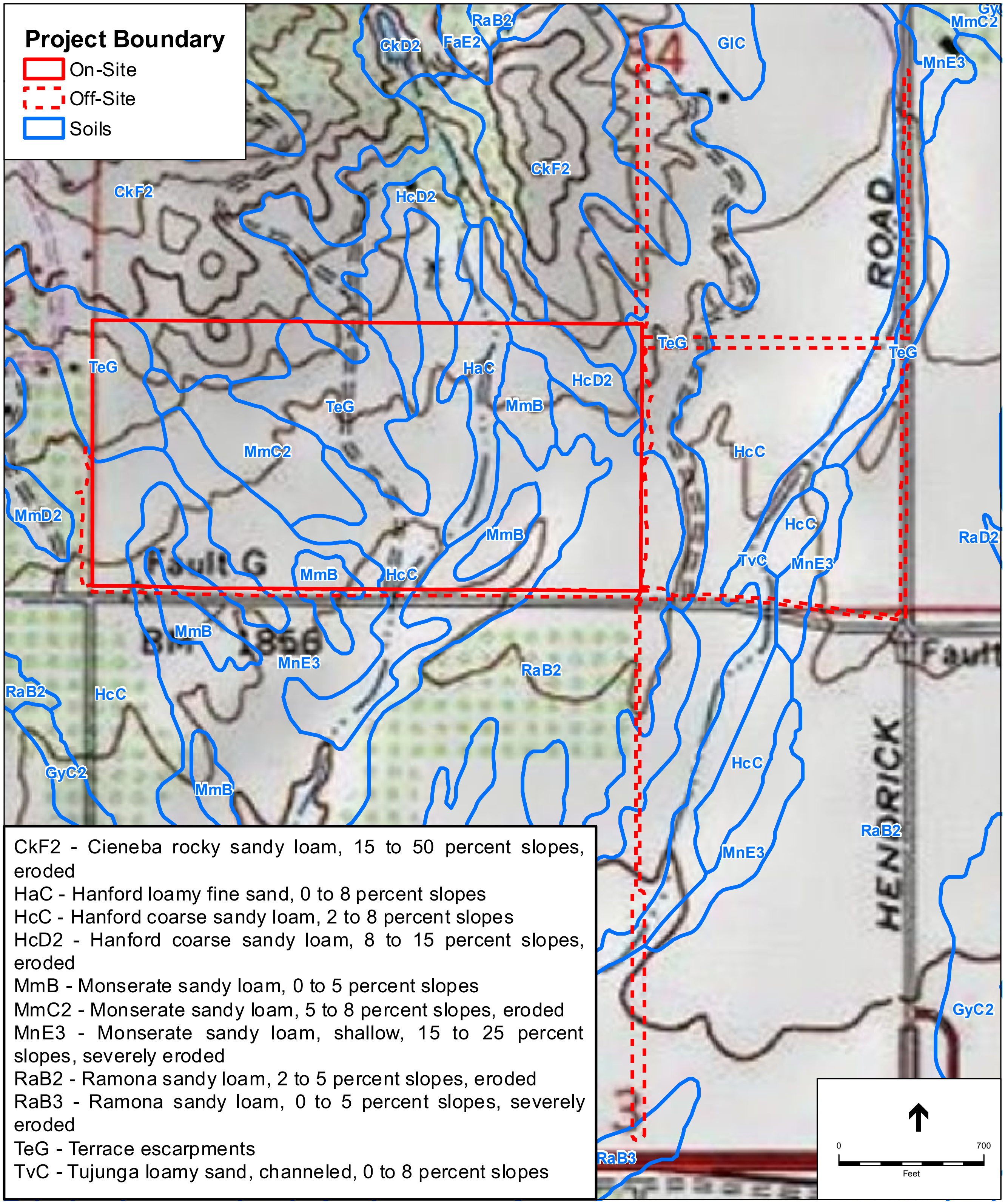
4.1 Characteristics of the Study Area and Surrounding Area

4.1.1 On-Site Characteristics

The approximately 79-acre project site and the 10.57-acre off-site areas are located in the City of Moreno Valley in Riverside County. The project site consists primarily of non-native vegetation characterized by ruderal vegetation and disturbed areas that consist of little to no vegetation. There are some areas that support native plant communities, such as Riversidean sage scrub and brittlebush scrub, which predominantly reside in the northwestern corner of the project site. The study area supports two drainage systems observed to support field indicators associated with USACE, RWQCB, and CDFW (collectively "the resource agencies") jurisdictional waters, referred to in this report as Drainage A and Drainage Complex B, although only Drainage A occurs on-site. The topography on-site is generally flat with gently rolling hills throughout the project site and steeper rock outcrops on the northwest corner. On-site elevations range from the lowest of approximately 1,830 feet above mean sea level (MSL) along the southern boundary of the project site to a high of approximately 1,975 feet above MSL along the northwest boundary of the site. On-site mapped soils in the project area include nine soil types as follows (NRCS, 2015), as shown in **Figure 5**, *Soils Map*:

- Cieneba rocky sandy loam, 15 to 50 percent slopes, eroded;
- Hanford loamy fine sand, 0 to 8 percent slopes;
- Hanford coarse sandy loam, 2 to 8 percent slopes;
- Hanford coarse sandy loam, 8 to 15 percent slopes, eroded;
- Monserate sandy loam, 0 to 5 percent slopes;
- Monserate sandy loam, 5 to 8 percent slopes, eroded ;
- Monserate sandy loam, shallow, 15 to 25 percent slopes, severely eroded;
- Ramona sandy loam, 2 to 5 percent slopes, eroded; and
- Terrace escarpments.

Immediate surrounding land uses include residential development to the south and west and vacant land to the north and east. The entire project site is within the Reche Canyon/Badlands Area Plan of the MSHCP (**Figure 6**, *Relationship to the MSHCP*).

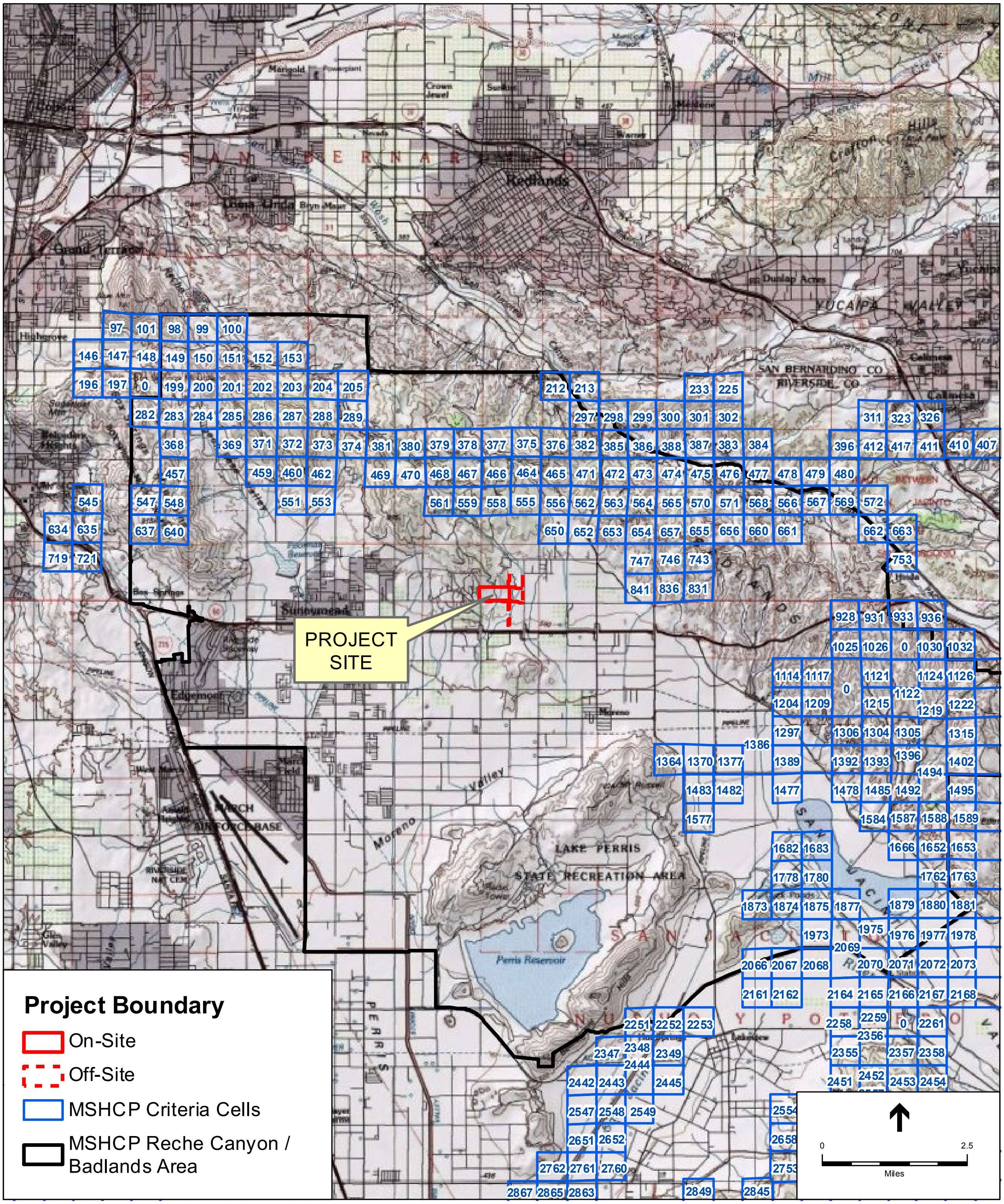


CkF2 - Cieneba rocky sandy loam, 15 to 50 percent slopes, eroded
HaC - Hanford loamy fine sand, 0 to 8 percent slopes
HcC - Hanford coarse sandy loam, 2 to 8 percent slopes
HcD2 - Hanford coarse sandy loam, 8 to 15 percent slopes, eroded
MmB - Monserate sandy loam, 0 to 5 percent slopes
MmC2 - Monserate sandy loam, 5 to 8 percent slopes, eroded
MnE3 - Monserate sandy loam, shallow, 15 to 25 percent slopes, severely eroded
RaB2 - Ramona sandy loam, 2 to 5 percent slopes, eroded
RaB3 - Ramona sandy loam, 0 to 5 percent slopes, severely eroded
TeG - Terrace escarpments
TvC - Tujunga loamy sand, channeled, 0 to 8 percent slopes

SOURCE: USGS Topographic Series (Sunnymead, CA), USDA NRCS SSURGO.

Ironwood Village Project
Figure 5
Soils Map

ESA PCR



SOURCE: USGS Topographic Series; MSHCP.

Ironwood Village Project
Figure 6
Relationship to the MSHCP

ESA PCR

Attachment: Biological Resources Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

4.1.2 Off-Site Characteristics

The 10.57-acre off-site areas include the proposed manufactured slopes, road improvements, sewer line, and water line areas. The off-site areas are dominated by ruderal vegetation and disturbed areas with only a small acreage of native brittlebush scrub and Riversidean sage scrub. The off-site areas also support some areas of sparsely vegetated river wash areas. A portion of Drainage A and the entirety of Drainage Complex B occurs within the off-site area. The topography of the off-site areas is generally flat with the exception of the proposed northern water line area near an existing water tank, which consists of a fairly steep east-facing slope supporting some native vegetation and rocky outcrops. Elevations within the off-site areas range from the lowest of approximately 1,793 feet above MSL at the southern end of the proposed sewer line to a high of approximately 1,948 feet above MSL at the steepest portion of the proposed water line area. Off-site mapped soils in the project area include seven soil types as follows (NRCS, 2015), as shown in Figure 5:

- Cieneba rocky sandy loam, 15 to 50 percent slopes, eroded;
- Hanford course sandy loam, 2 to 8 percent slopes;
- Monserate sandy loam, shallow, 15 to 25 percent slopes, severely eroded
- Ramona sandy loam, 0 to 5 percent slopes, severely eroded;
- Ramona sandy loam, 2 to 5 percent slopes, eroded;
- Terrace escarpments; and
- Tujunga loamy sand, channeled, 0 to 8 percent slopes.

Land uses immediately surrounding the off-site sewer line include a residential community to the west, SR-60 to the south, and vacant land to the north and east. Land uses immediately surrounding the potential water line areas include residential development to the north, east, and southwest and vacant land to the south and west. Since the proposed manufactured slope areas are directly adjacent to the project site, surrounding land uses are identical to those described in section 4.1.1 above.

4.2 Plant Communities

Descriptions of each of the plant communities found within the study area are provided below, with CDFW CaCodes or Holland Element Codes in parentheses next to each community name. The locations of each of the plant communities are shown in **Figure 7**, *Plant Communities*. **Table 1**, *Plant Communities*, lists each of the plant communities observed, as well as the acreage within the study area. Representative photographs of plant communities found within the study area are included in **Figures 8a** and **8b**, *Site Photographs*.

TABLE 1
PLANT COMMUNITIES

Plant Communities	On-site (acres)	Off-site (acres)
Brittlebush Scrub	2.34	0.27
Brittlebush Scrub/Ruderal	0.31	0.21
Buckwheat Scrub/Ruderal	0.09	0.04
Laurel Sumac Scrub/Ruderal	0.78	-
Riversidean Sage Scrub	3.10	0.12
Riversidean Sage Scrub/Ruderal	-	0.07
Rock Outcrop/Riversidean Sage Scrub	2.15	-
River Wash	-	0.05
Ruderal	38.04	2.50
Ruderal/Brittlebush Scrub	-	0.04
Ruderal/Riversidean Sage Scrub	2.29	0.43
Disturbed	28.68	4.18
Developed	0.70	2.66
Total	**78.48**	**10.57**

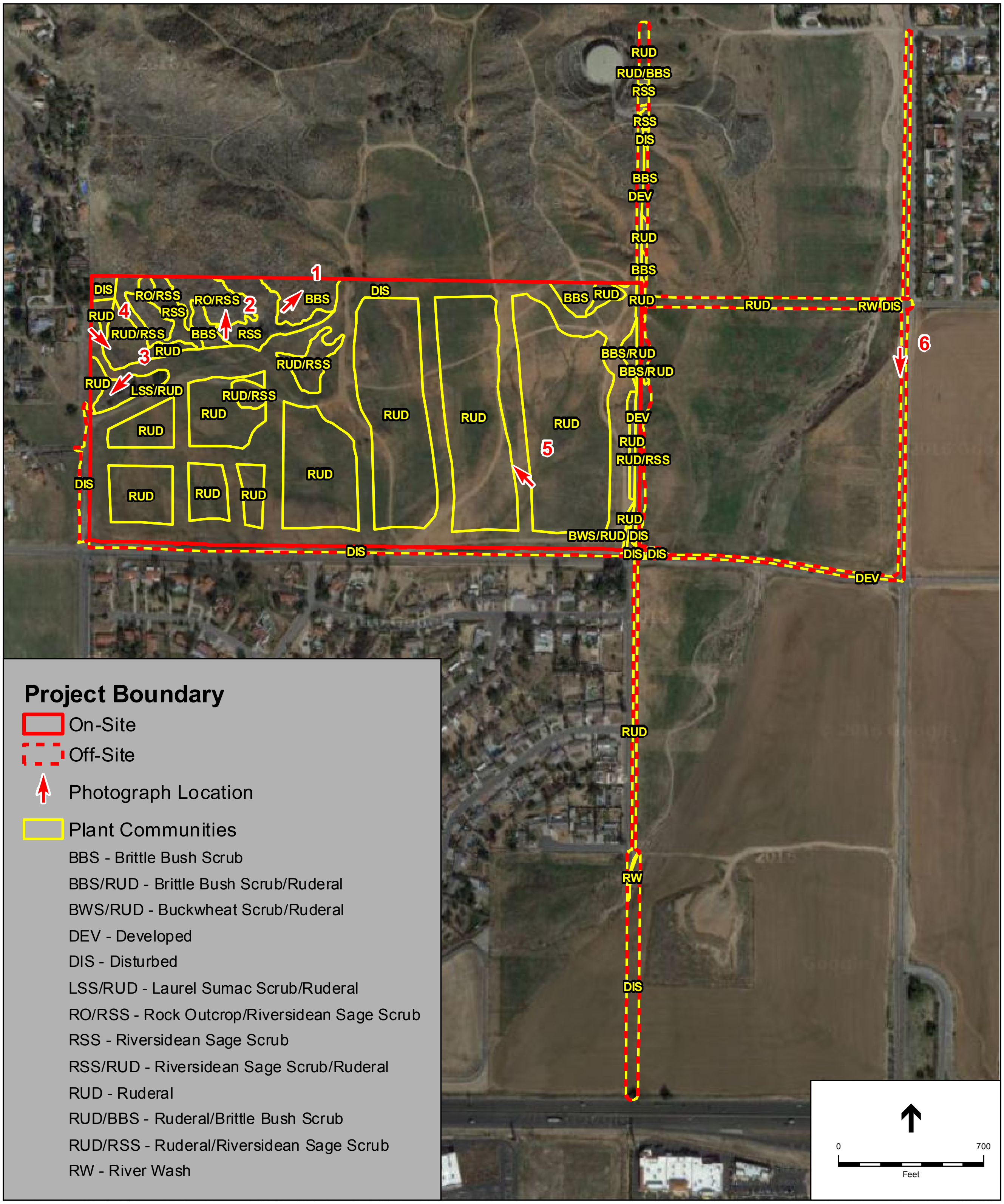
SOURCE: ESA PCR, 2016

4.2.1 Brittlebush Scrub (CaCode 33.030.00)

Brittlebush scrub is a drought tolerant subtype of Riversidean sage scrub dominated by an almost monotypic community of brittlebush (*Encelia farinosa*). Associated species observed within this community included sparsely growing California buckwheat (*Eriogonum fasciculatum*), California sagebrush (*Artemisia californica*), and chia (*Salvia columbariae*). Brittlebush scrub on-site occurs primarily in two patches on the northwestern corner of the project site and a smaller patch in the northeastern corner, comprising approximately 2.34 acres on-site. There is also a small patch of this community located within the off-site water line areas, occupying approximately 0.27 acre off-site.

4.2.2 Brittlebush Scrub/Ruderal (CaCode 33.030.00/Not Applicable)

Brittlebush scrub/ruderal is dominated by species found within the brittlebush scrub community (primarily brittlebush) with interspersed ruderal species. In addition to brittlebush, associated native species found in this community included native species such as blue elderberry (*Sambucus nigra ssp. caerulea*), common fiddleneck (*Amsinckia intermedia*), dove weed (*Croton setigerus*), mule fat (*Baccharis salicifolia*), pinebush (*Ericameria pinifolia*), and western ragweed (*Ambrosia psilostachya*). The ruderal community is described in further detail below (see section 4.2.9). Brittlebush scrub/ruderal occurs on-site in a small area along the eastern boundary in the northeastern portion of the project site and comprises approximately 0.31 acre. There is also a small patch of this community located within the eastern manufactured slope area, occupying approximately 0.21 acre off-site.



SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project

Figure 7

Plant Communities

ESA PCR

Attachment: Biological Resources Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

PHOTOGRAPH 1. View of the brittlebush scrub community, facing northeast.

PHOTOGRAPH 2. View of the rock outcrop/Riversidean sage scrub community, facing north.

PHOTOGRAPH 3. View of the ruderal community in foreground and the laurel sumac scrub/ruderal community in the background to the left, facing southwest.

Note: Refer to Figure 7 for photograph locations.

SOURCE: ESA PCR, 2016

Ironwood Village Project

Figure 8a

Site Photographs

ESA PCR

PHOTOGRAPH 4. View of the ruderal/Riversidean sage scrub community, facing southeast.

PHOTOGRAPH 5. View of the ruderal community, facing northwest.

PHOTOGRAPH 6. View of the ruderal community within the off-site water line extension area, facing south.

Note: Refer to Figure 7 for photograph locations.

SOURCE: ESA PCR, 2016

Ironwood Village Project
Figure 8b
Site Photographs

ESA PCR

4.2.3 Buckwheat Scrub/Ruderal (CaCode 32.040.02/Not Applicable)

Buckwheat scrub/ruderal community is dominated by California buckwheat (*Eriogonum fasciculatum*) and other species commonly associated with the buckwheat scrub community, including pinebush and brittlebush. This community also supports interspersed areas of ruderal vegetation; the ruderal community is described in further detail below (see section 4.2.9). Buckwheat scrub/ruderal community occurs within one small patch on-site (0.09 acre) and within the off-site eastern manufactured slope area (0.04 acre).

4.2.4 Laurel Sumac Scrub/Ruderal (CaCode 45.455.00/Not Applicable)

Laurel sumac scrub/ruderal is primarily composed of those species found within the laurel sumac scrub community, which is dominated by laurel sumac (*Malosma laurina*) and often associated with other drought-tolerant shrubs, such as California buckwheat or black sage (*Salvia mellifera*). While this community largely consists of species found within the laurel sumac scrub community, ruderal species are interspersed throughout the community. The ruderal community is described in further detail below (see section 4.2.9). Laurel sumac scrub/ruderal community occurs in one area along the western boundary and comprises approximately 0.78 acre on-site only.

4.2.5 Riversidean Sage Scrub (Holland Element Code 32700)

Riversidean sage scrub is characterized by low growing shrubs adapted to semi-arid Mediterranean climate, and are most often found on steep or low gradient slopes that are rarely flooded. This community is fairly open and dominated by California sagebrush, California buckwheat, , and foxtail chess. Other associated species include pinebush, brittlebush, and caterpillar phacelia (*Phacelia cicutaria*). The Riversidean sage scrub community occurs in two patches on the northwestern corner of the project site and comprises approximately 3.10 acres on-site. There is also a small patch of this community located within the off-site water line areas, occupying approximately 0.12 acre off-site.

4.2.6 Riversidean Sage Scrub/Ruderal (Holland Element Code 32700/ Not Applicable)

Riversidean sage scrub/ruderal is primarily composed of those species found within the Riversidean sage scrub community, which is described in section 4.2.5 above. While this community largely consists of species found within the Riversidean sage scrub community, ruderal species are interspersed throughout the community. The ruderal community is described in further detail below (see section 4.2.9). Riversidean sage scrub/ruderal community occurs in one area along the western boundary and comprises approximately 0.07 acre off-site only.

4.2.7 Rock Outcrop/Riversidean Sage Scrub (Not Applicable/Element Code 32700)

Rock outcrop/Riversidean sage scrub includes rock outcrop areas, which consist of rocky, sparsely vegetated areas typically found along the hillsides on the northwest corner of the project site, and is interspersed with vegetation that is characteristic of the Riversidean sage scrub community described in section 4.2.5 above. Additional associated species observed in the rock outcrop/Riversidean sage scrub communities on-site included cane cholla (*Cylindropuntia californica* var. *parkeri*) and two-color rabbit tobacco (*Pseudognaphalium bicolor*). There are two patches of rock outcrop/Riversidean sage scrub on the northwestern corner of the project site, which occupies approximately 2.15 acres on-site only.

4.2.8 River Wash (Not Applicable)

River wash consists of prevailingly coarse-textured but variable material, ranging from sand to gravel. It usually is flood-swept, though it may lie slightly above present overflows. The sandy areas are loose with some silt and other fine materials. Sparse vegetation within the river wash areas include giant reed (*Arundo donax*), flatspine bur ragweed (*Ambrosia acanthicarpa*), pucturevine (*Tribulus terrestris*), and common sunflower (*Helianthus anuus*). River wash areas comprise approximately 0.05 acre off-site only associated with the mainstem Drainage B within the sewer line and water line areas.

4.2.9 Ruderal (Not Applicable)

Ruderal vegetation is found in areas heavily disturbed by human activities, such as roadsides, graded fields, and manufactured slopes. Within the study area, ruderal species observed include cheeseweed (*Malva parviflora*), cudweed aster (*Corethrogyne filaginifolia*), foxtail chess (*Bromus madritensis* ssp. *rubens*), gum tree (*Eucalyptus* sp.), London rocket (*Sisymbrium irio*), Mediterranean schismus (*Schismus barbatus*), Mexican palo verde (*Parkinsonia aculeata*), ripgut grass (*Bromus diandrus*), shortpod mustard (*Hirschfeldia incana*), tocalote (*Centaurea melitensis*), tree tobacco (*Nicotiana glauca*), wild oat (*Avena* sp.), and wild radish (*Raphanus raphanistrum*). Ruderal areas dominant the project site and comprised approximately 38.04 acres on-site. The ruderal community is also prominent throughout the off-site areas, totaling 2.50 acres.

4.2.10 Ruderal/Brittlebush Scrub (Not Applicable/ CaCode 33.030.00)

Ruderal/brittlebush scrub is dominated by ruderal, weedy species but exhibit sparse, remnant species associated with the brittlebush scrub community. The brittlebush scrub and ruderal communities are described above in sections 4.2.1 and 4.2.9, respectively. Only one small ruderal/brittlebush scrub patch was observed within the water line area, consisting of approximately 0.04 acre off-site only.

4.2.11 Ruderal/Riversidean Sage Scrub (Not Applicable/Holland Element Code 32700)

Ruderal/Riversidean sage scrub is dominated by ruderal, weedy species but exhibit sparse, remnant species associated with the Riversidean sage scrub community. The Riversidean sage scrub and ruderal communities are described above in sections 4.2.5 and 4.2.9, respectively. The ruderal/Riversidean sage scrub community occupies the northwestern corner and the center of the project site, consisting of approximately 2.29 acres on-site. This community also occurs within the eastern manufactured slope area, consisting of approximately 0.43 acre off-site.

4.2.12 Disturbed (Not Applicable)

Disturbed areas are heavily affected by human activities, including dirt roads, graded fields, and manufactured slopes; as a consequence, these areas support little to no vegetation. While ruderal areas comprise the majority of the project site, disturbed areas account for much of the remaining space occupying approximately 28.68 acres on-site. Disturbed areas dominate the off-site areas, consisting of 4.18 acres.

4.2.13 Developed (Not Applicable)

Developed areas are associated with an unpaved access road that occurs along the eastern boundary of the project site and off-site manufactured slope areas. Developed areas occupied approximately 0.70 acre on-site and 2.66 acres off-site.

4.3 General Plant Inventory

The plant communities discussed above are comprised of numerous plant species. Observations regarding the plant species present were made during the field visits to the study area, and a list of all plant species observed is provided in **Appendix A**, *Floral and Faunal Compendium*. Special-status plant species occurring or potentially occurring within the study area are discussed below in section 4.7.5, *Special-status Plant Species*.

4.4 General Wildlife Inventory

The plant communities discussed above provide habitat for common wildlife species. Observations regarding the wildlife species present were made during the field visits to the study area, and a list of all species observed is provided in **Appendix A**. Special-status wildlife species occurring or potentially occurring are discussed below in section 4.7.6, *Special-status Wildlife Species*.

4.5 Wildlife Movement

4.5.1 Overview

Wildlife corridors link together areas of suitable habitat that are otherwise separated by rugged terrain, changes in vegetation, or human disturbance. The fragmentation of open space areas by urbanization creates isolated "islands" of wildlife habitat. In the absence of habitat linkages that allow movement to adjoining open space areas, various studies have concluded that some wildlife species, especially the larger and more mobile mammals, will not likely persist over time in fragmented or isolated habitat areas because they prohibit the infusion of new individuals and genetic material (MacArthur and Wilson, 1967; Soulé, 1987; Harris and Gallagher, 1989; Bennett, 1990).

Corridors effectively act as links between different populations of a species. A group of smaller populations (termed "demes") linked together via a system of corridors is termed a "metapopulation." The long-term health of each deme within the metapopulation is dependent upon its size and the frequency of interchange of individuals (immigration vs. emigration). The smaller the deme, the more important immigration becomes, because prolonged inbreeding with the same individuals can reduce genetic variability. Immigrant individuals that move into the deme from adjoining demes mate with individuals and supply that deme with new genes and gene combinations that increases overall genetic diversity. An increase in a population's genetic variability is generally associated with an increase in a population's health and long-term viability.

Corridors mitigate the effects of habitat fragmentation by: (1) allowing animals to move between remaining habitats, which allows depleted populations to be replenished and promotes genetic diversity; (2) providing escape routes from fire, predators, and human disturbances, thus reducing the risk that catastrophic events (such as fires or disease) will result in population or local species extinction; and (3) serving as travel routes for individual animals as they move within their home ranges in search of food, water, mates, and other needs (Noss, 1983; Fahrig and Merriam, 1985; Simberloff and Cox, 1987; Harris and Gallagher, 1989).

Wildlife movement activities usually fall into one of three movement categories: (1) dispersal (e.g., juvenile animals from natal areas, individuals extending range distributions); (2) seasonal migration; and, (3) movements related to home range activities (foraging for food or water, defending territories, searching for mates, breeding areas, or cover). Although the nature of each of these types of movement is species specific, large open spaces will generally support a diverse wildlife community representing all types of movement. Each type of movement may also be represented at a variety of scales from non-migratory movement of amphibians, reptiles, and some birds on a "local" level to home ranges encompassing many square-miles for large mammals moving on a "regional" level. A number of terms have been used in various wildlife movement studies, such as "wildlife corridor," "travel route," and "wildlife crossing" to refer to areas in which wildlife move from one area to another. To clarify the meaning of these terms and facilitate the discussion on wildlife movement in this study, these terms are defined as follows:

<u>Travel Route</u>: A landscape feature (such as a ridgeline, drainage, canyon, or riparian strip) within a larger natural habitat area that is used frequently by animals to facilitate movement and provide access to necessary resources (e.g., water, food, cover, den areas). The travel route is generally preferred because it provides the least amount of topographic resistance in moving from one area to another; it contains adequate food, water, and/or cover while moving between habitat areas; and provides a relatively direct link between target habitat areas.

Wildlife Corridor: A piece of habitat, usually linear in nature, that connects two or more habitat patches that would otherwise be fragmented or isolated from one another. Wildlife corridors are usually bounded by urban land areas or other areas unsuitable for wildlife. The corridor generally contains suitable cover, food, and/or water to support species and facilitate movement while in the corridor. Larger, landscape-level corridors (often referred to as "habitat or landscape linkages") can provide both transitory and resident habitat for a variety of species.

Wildlife Crossing: A small, narrow area, relatively short in length and generally constricted in nature, that allows wildlife to pass under or through an obstacle or barrier that otherwise hinders or prevents movement. Crossings typically are manmade and include culverts, underpasses, drainage pipes, and tunnels to provide access across or under roads, highways, pipelines, or other physical obstacles. These are often "choke points" along a movement corridor.

4.5.2 Wildlife Movement Within the Study Area

As previously described, wildlife movement activities occur at a variety of scales from a "local" level to a "regional" level. Regional movement through the study area is restricted due to the urbanization of the region and the proximity to a major freeway (SR-60) (refer to **Figure 9**, *Regional Aerial Photograph*). The study area is immediately surrounded by residential development to the south and west. Although there is vacant land directly to the north and east of the study area, the land to the east is highly disturbed and mostly cleared of natural vegetation and there are a number of residential communities adjacent to the eastern boundary of the vacant land. Additionally, the study area is located about 0.5 mile to north of the SR-60. Although regional movement through this area is likely limited, there is some potential for local movement through the study area via the open area directly to the north which comprises the foothills of the Badlands. Although the study area connects to the open area to the north, the study area is dominated by ruderal and disturbed areas with limited native vegetation.

The project site only supports one ephemeral drainage that conveys minor road runoff from Ironwood Avenue with no associated vegetation (Drainage A), which is unlikely to facilitate wildlife movement. Additionally, Drainage A initiates on-site and meanders for approximately 396 linear feet before exiting the project site via a culvert beneath Ironwood Avenue. Drainage Complex B occurs within the off-site areas and comprises the mainstem Drainage B, which is a USGS mapped blueline stream, and five small tributaries (Drainages B1 through B5). The mainstem Drainage B does support some ruderal and non-native vegetation (e.g. giant reed). Drainage B appears to initiate in the foothills of the Badlands to the north of the off-site areas and becomes channelized just west of the off-site sewer line area.

SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project
Figure 9
Regional Aerial Photograph

FSA PCR

Due to the limited vegetation within Drainage B and lack of connection to suitable habitat downstream due to development, Drainage B is not expected to function as a wildlife movement corridor. The smaller tributaries (Drainages B1 through B5) are also ephemeral drainages with limited upland vegetation, which initiate at the peak of a small ridge upstream from the off-site water line area and appear to support little to no surface connection to the mainstem Drainage B likely due to decades of disturbance from agriculture and/or weed abatement activities. Drainage B5 does not appear to support any natural watershed and appears to be relict in nature. Vegetation within the drainage appears to be supported by artificial discharges from the water tank blow-off pipe observed at the headwaters of Drainage B5. Due to the limited vegetation and watershed, as well as the disturbed nature of the downstream areas off-site, the tributaries do not facilitate wildlife movement through the study area.

The study area is not within any Core or Linkage areas as identified by the MSHCP (Dudek & Associates, 2003). There is one proposed linkage (Proposed Linkage 4) approximately 2.1 miles to the north of the study area and one existing core (Core H) roughly 4.0 miles to the south of the study area. Proposed Linkage 4 would include upland habitat within Reche Canyon and provide connection to Box Springs Reserve, the Badlands, and San Bernardino County. The open area directly to the north of the study area does directly connect to Proposed Linkage 4. Existing Core H includes Lake Perris State Recreation Area and San Jacinto Wildlife Area. There is no direct connection from the study area to Core H, which are separated by urban development. The study area is not within any linkages identified by the South Coast Missing Linkages report; the nearest linkage design identified is for the San Bernardino–San Jacinto Connection located approximately 3.5 miles to the east (South Coast Wildlands, 2008). Since the study area is not identified as a linkage by the MSHCP or South Coast Wildlands, and it does not support habitat that connects two or more habitat patches that would otherwise be fragmented or isolated from one another, the study area is not considered a wildlife corridor. The study area may provide limited opportunities for wildlife movement, more likely for local wildlife movement as described below.

Movement on a smaller or "local" scale could occur within the study area for species that are less restricted in movement pathway requirements or are adapted to urban areas (e.g., raccoon [*Procyon lotor*], stripped skunk [*Mephitis mephitis*], coyote [*Canis latrans*], and bird species in general). Habitat within the study area is dominated by ruderal and disturbed areas with some portions supporting native vegetation, including brittlebush scrub, buckwheat scrub, and Riversidean sage scrub. As such, it likely supports some wildlife movement within the study area and/or nearby areas for foraging and shelter. Data gathered from the biological survey indicates that the study area contains habitat that supports common species of invertebrates, reptiles, birds, and small mammals. The home range and average dispersal distance of many of these species may be entirely contained within the study area and immediate vicinity.

Populations of animals such as insects, reptiles, small mammals, and a few bird species may find all their resource requirements without moving far or outside of the study area at all. Occasionally, individuals expanding their home range or dispersing from their parental range could attempt to move outside of the study area, if feasible, based on the surrounding restrictions to movement from development (see above). Bird species may fly over the development and freeways to utilize the study area for foraging, although this is expected to be limited due to the high level of human activity in the region and higher quality foraging habitats in nearby open areas with less human disturbance, particularly the Badlands to the north.

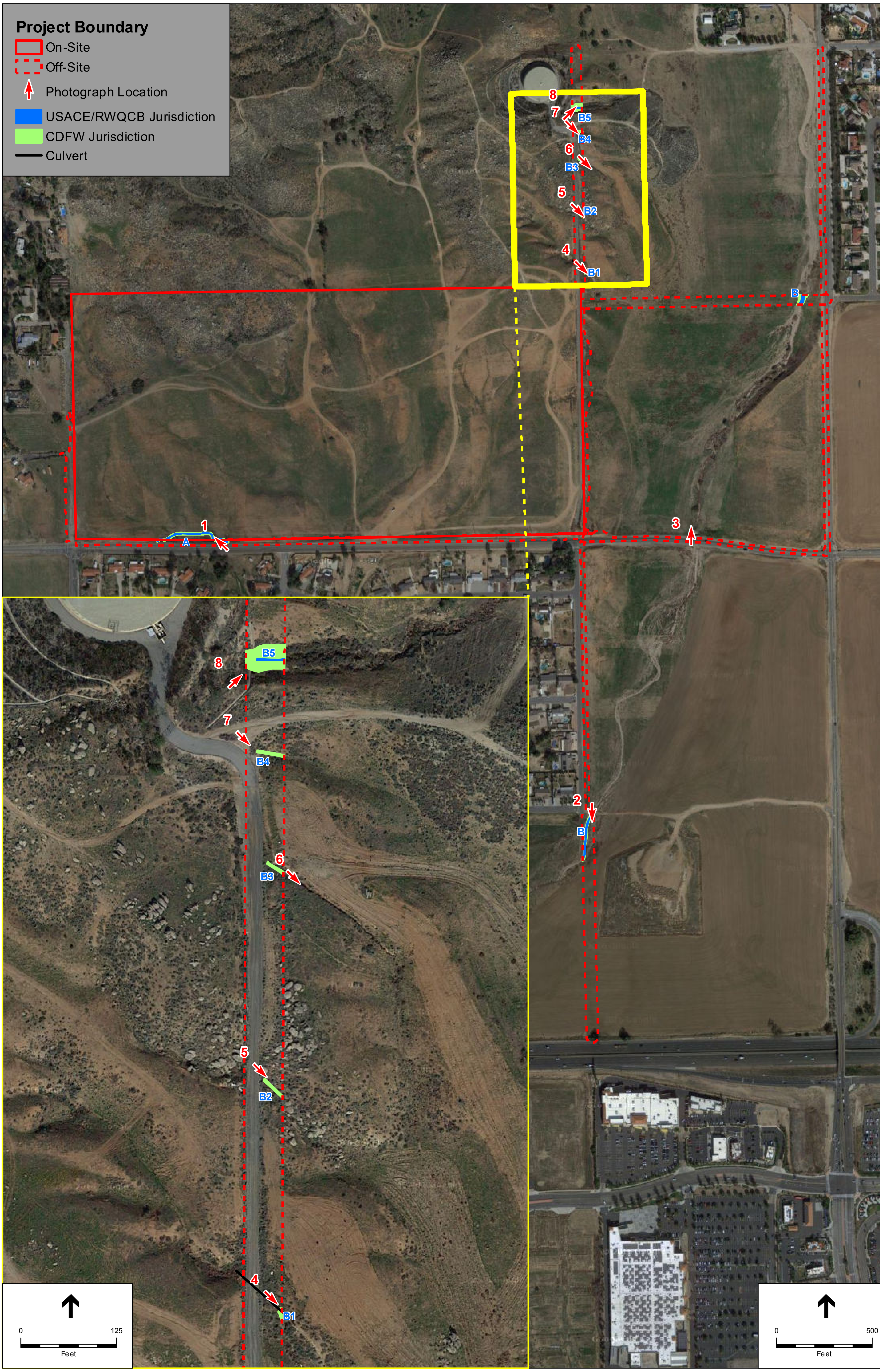
In summary, the study area may support live-in and movement habitat for species on a local scale (i.e., some live-in and at least marginal movement habitat for invertebrates, reptiles, birds, and small mammal species). However, due to surrounding development, the proximity to the I-60 freeway, and the ephemeral nature and limited watershed of the drainages, the study area likely provides little to no function to facilitate movement for wildlife species on a regional scale and it is not identified as a regionally important dispersal or seasonal migration corridor by the MSHCP or by South Coast Wildlands.

4.6 Jurisdictional Waters

An investigation of on- and off-site jurisdictional waters was performed by Amir Morales, Principal Regulatory Scientist, on September 19, 2014. An additional site visit was conducted by Amir Morales on December 10, 2014 following a series of storm events that occurred on December 2, 3, and 4, 2014 totaling nearly two inches of rain in that period.[3] Based on the results of the investigation, Drainage A and Drainage Complex B (Drainages B & B1through B5) were determined to support a total of approximately 0.057 acre of USACE/RWQCB "waters of the U.S." and 0.165 acre of CDFW jurisdictional streambed (**Figure 10**, *Jurisdictional Features*). A summary of jurisdictional features assessed within the study area is provided in **Table 2**, *Jurisdictional Features*. Photographs of drainage features are provided as **Figures 11a** and **11b**, *Drainage Photographs*.

The study area is located within rolling valley topography located southeast of Reche Canyon and south/southwest of The Badlands mountain range. The study area is located within the San Jacinto Watershed and generally drains toward the south, eventually reaching the Perris Valley Storm Drain which ultimately reaches the San Jacinto River and then Canyon Lake. The USGS Sunnymead topographic Quadrangle depicts a blueline stream originating in the foothills to the north with headwaters located approximately 2,000 linear feet from the on-site study area. The mapped blueline drainage feature enters the project site near the center of the northern project boundary and bisects the property. The property has been subjected to seasonal dry-farming and/or weed abatement activities for several decades. Based on the jurisdictional assessments performed by ESA PCR, no discernible streambed or indicators of flow were observed within the area historically mapped as a blueline drainage feature during the September 19, 2014 jurisdictional delineation. In order to determine if jurisdictional field indicators reestablish following moderate rain events, Amir Morales returned to investigate the site following a series of early December 2014 storm events yielding nearly 2-inches of rain over three consecutive days. In our experience, this amount of rain would have reestablished some evidence of flow capable of eroding a streambed and/or supporting some jurisdictional field indicators based on the USACE's arid delineation guidelines.

[3] Based on WeatherCurrents.com precipitation data accessed at http://weathercurrents.com/morenovalley/ArchiveDec2014.do obtained on July 26, 2016.



SOURCE: Google Maps, 2015.

Ironwood Village Project
Figure 10
Jurisdictional Features

ESA PCR

TABLE 2
JURISDICTIONAL FEATURES

Drainage (Study Area)	Length (ft)	USACE/ RWQCB (acres)	CDFW (acres)	Flow Classification
A (On-Site)	285	0.023	0.046	Ephemeral
A (Off-Site)	111	0.007	0.013	Ephemeral
Drainage A Subtotal	***396***	***0.030***	***0.059***	
B (Off-Site)	306	0.026	0.069	Ephemeral
B1 (Off-Site)[b]	0[a]	N/A	0.001	Ephemeral
B2 (Off-Site)[b]	32	N/A	0.001	Ephemeral
B3 (Off-Site)[b]	25	N/A	0.001	Ephemeral
B4 (Off-Site)[b]	34	N/A	0.001	Ephemeral
B5 (Off-Site)	35	0.002	0.033	Ephemeral
Drainage Complex B Subtotal	***432***	***0.028***	***0.106***	
Total	**828**	**0.058**	**0.165**	

[a] Less than one linear foot of jurisdiction occurs within Drainage B1 as the majority of the drainage within the off-site study area is associated with an existing corrugated metal pipe that was not quantified.

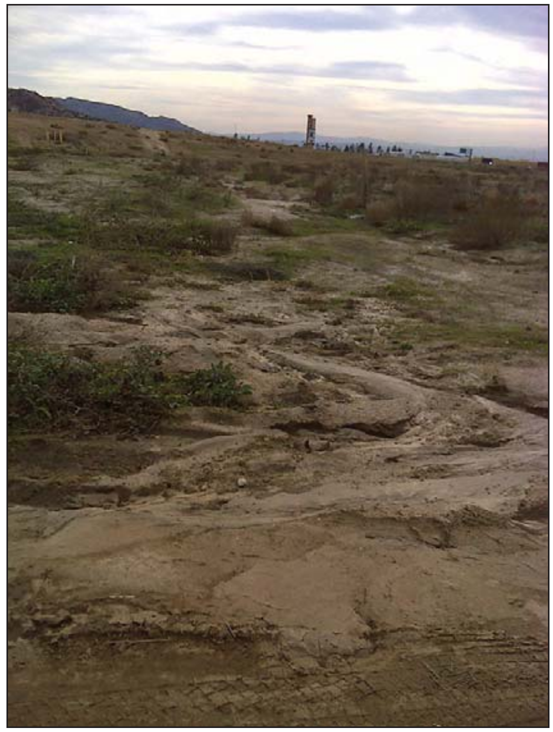
[b] Drainage did not support jurisdictional field indicators associated with "waters of the U.S" regulated by the USACE and RWQCB pursuant to the Clean Water Act.

SOURCE: ESA PCR, 2014

However, no ordinary water mark, sediment deposition/sorting, debris wracks, bed/bank, streambed associated vegetation, or other jurisdictional field indicators were observed immediately following the consecutive rain events. As a result, it was determined that no jurisdiction occurs within the area mapped as a blueline drainage feature within the study area.

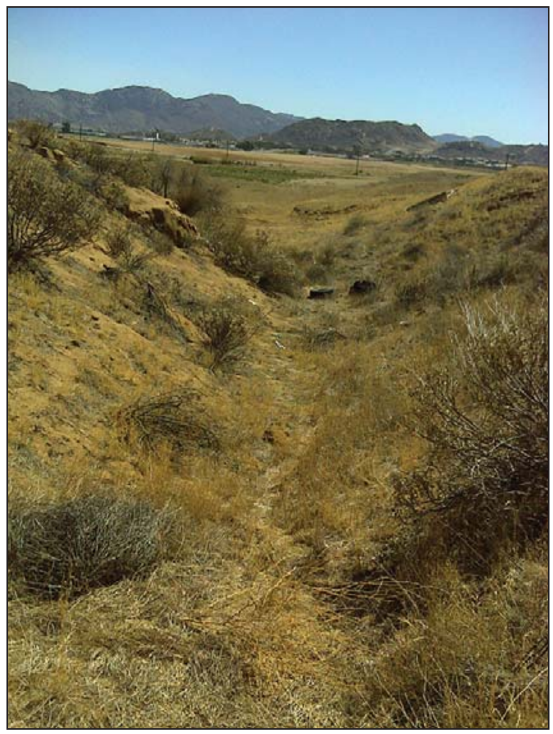
It was noted that the USGS Sunnymead Quadrangle depicts a small water feature at the off-site headwaters, located approximately 2,000 linear feet north of the site where the blueline feature initiates. As such, it is feasible that the mapped water feature is associated with a historic stock pond, which may have supported a small drainage that ultimately extended to the project study area when water was historically discharged from the feature and/or significant storm events caused it to overflow. However, based on review of current aerial imagery in Google Earth, no water feature appears to persist within the off-site headwaters in the current condition capable of supporting a discernible streambed. Consequently, the only jurisdictional feature identified within the on-site study area during the December 2014 site visit is a minor roadside ditch identified as Drainage A. Jurisdiction within the off-site study areas is limited to a mainstem drainage identified as Drainage B, and Drainage Complex B which is comprised of tributary Drainages B1through B5. No riparian and/or hydrophytic vegetation communities were observed on the study area that would warrant the need for a formal wetland analysis. Therefore, no jurisdictional wetlands or special aquatic sites were determined to occur within the project study areas. The following provides a summary of jurisdictional drainage features identified within the project study areas:

PHOTOGRAPH 1. View of Drainage A, facing northwest (upstream).



PHOTOGRAPH 2. View of Drainage B within the off-site sewer line area, facing south (downstream).

PHOTOGRAPH 3. View of Drainage B within the off-site water line area, facing north (upstream).



PHOTOGRAPH 4. View of Drainage B1, facing southeast (downstream).

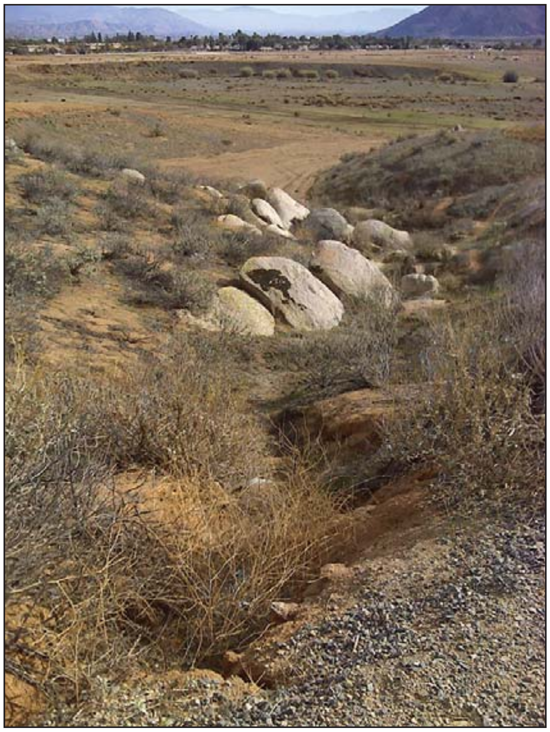
Note: Refer to Figure 10 for photograph locations.

SOURCE: ESA PCR, 2016

Ironwood Village Project

Figure 11a
Drainage Photographs

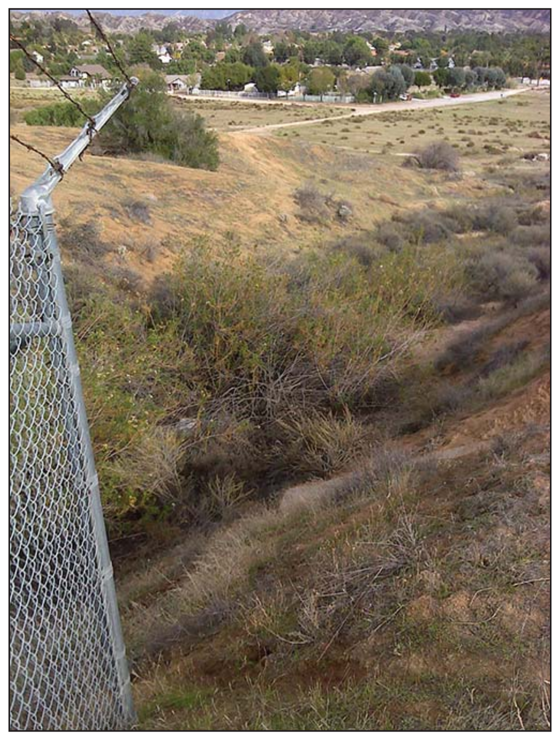
ESA PCR



PHOTOGRAPH 5. View of Drainage B2, facing southeast (downstream).

PHOTOGRAPH 6. View of Drainage B3, facing southeast (downstream).

PHOTOGRAPH 7. View of Drainage B4, facing southeast (downstream).



PHOTOGRAPH 8. View of Drainage B5, facing northeast (downstream).

Note: Refer to Figure 10 for photograph locations.

SOURCE: ESA PCR, 2016

Ironwood Village Project

Figure 11b

Drainage Photographs

ESA PCR

4.6.1 Drainage A

Drainage A is an unvegetated roadside ditch that establishes only when rain events generate sufficient runoff from Ironwood Avenue to erode a small channel through sandy disturbed soils. The ephemeral ditch enters the Ironwood Avenue Right-of-Way within the off-site study area then enters the on-site study area along the southern project boundary, extending for approximately 285 linear feet. The ditch then enters a corrugated metal pipe (CMP) beneath Ironwood Avenue which is ultimately conveyed through the rural residential development to the south and into a water quality basin adjacent to SR-60. Drainage A ranged from 2 to 3 feet in jurisdictional channel width and contains sandy loam soils that are periodically disturbed by weed abatement activities. A photograph of Drainage A is provided in Figure 11a.

Drainage A within the on-and off-site study area supports a total of approximately 396 linear feet of ephemeral unvegetated roadside ditch, containing 0.023 acre of on-site and 0.007 acre of off-site non-wetland USACE "waters of the U.S" totaling 0.030 acre, as well as 0.46 acre of on-site and 0.013 acre of off-site CDFW jurisdictional streambed totaling 0.059 acre.

4.6.2 Drainage Complex B

4.6.2.1 Drainage B

Drainage B is an ephemeral sandy wash that originates off-site approximately 2 miles to the northwest along Reche Canyon Road. The drainage meanders along the road until it reaches the valley floor extending across Trust Way, crossing Kalmia Avenue, and then conveys runoff along the west side of Moreno Beach Drive for approximately a quarter-mile prior to crossing the off-site Water Line Alternative 1. The drainage feature then extends south/southwest for another quarter-mile before entering a culvert beneath Ironwood Avenue and meandering for another quarter-mile prior to entering the off-site sewer line study area. Drainage B then continues for approximately 700 linear feet toward the southwest ultimately entering a detention basin located directly northeast of the Nason Street exit of SR-60. Drainage B within the off-site study areas ranges from approximately 4-10 feet in USACE/CDFW channel width and is entirely unvegetated. Soils within the wash are comprised of loamy sands of the Tujunga series consistent with the mapping by NRCS. Photographs of Drainage B are provided in Figure 11a.

Drainage B within the off-site sewer line and Water Line Alternative 1 total approximately 306 linear feet of unvegetated ephemeral sandy wash totaling approximately 0.026 acre of non-wetland USACE/RWQCB "waters of the U.S." and 0.069 acre of CDFW jurisdictional streambed.

4.6.2.2 Drainages B1- B5

Drainages B1through B5 are minor ephemeral drainages that with the exception of Drainage B5 (which appears to accept flow from a water tank bypass pipe) function to drain a very limited watershed west of the existing water district road that runs parallel to the eastern boundary of the project site. Drainage B5 appears to support flows from two small slope v-ditches as well as a pipe at its headwaters that appears to drain the existing water tank directly to the west, and was likely formed by controlled releases from the water tank structure. Otherwise, no natural watershed capable eroding such an incised drainage feature occurs upstream. Drainages B1 through B3 have small CMP culverts that convey limited runoff west of the water district road and support very weak indicators of flow and/or bed and bank. Drainage B4 does not support a pipe culvert rather a small pipe that drains surface flow from a small v-ditch directly west of the road. No discernible indicators associated with "waters of the U.S." such as an ordinary high water mark, sediment deposition/sorting, debris wracks, streambed associated vegetation, or other USACE jurisdictional field indicators indicative of the arid southwest region were observed within Drainages B1-B4 immediately following the consecutive rain events of early December 2014. However, Drainages B1 through B4 do support topographic low points with banks typical of headwater swales. Drainage B5 was presumed to support USACE/RWQCB jurisdiction due to the presence of an ordinary high water mark, which ultimately became indiscernible after approximately 1,000 linear feet. Given the reasonable proximity to Drainage B5 observed in the field in light of periodic disturbance to the sandy soils from weed abatement activities, Drainage B5 was presumed to be regulated as "waters of the U.S." Drainages B1through B5 were all presumed to support CDFW jurisdictional streambed.

Drainages B1 through B4 exhibit sparse upland scrub vegetation and ruderal grasses and are otherwise unvegetated. Drainage B5 supports a small patch of mule fat along approximately 15 linear feet of the headwaters directly downstream of the water tank pipe and mostly upland scrub vegetation beyond. Drainages B1through B5 contain CDFW jurisdictional channel widths ranging from 0.5 to 3 feet, while Drainage B5 exhibits USACE jurisdiction averaging approximately 2 feet in channel width and a CDFW channel width approximately averaging 10 feet. Drainage Complex B drainage features all were observed to support sandy loam soils. Photographs of Drainage Complex B are provided in Figures 11a and 11b.

Drainage B5 within the Water Line Alternative 2 study area totals approximately 0.002 acre of non-wetland ephemeral "waters of the U.S." regulated by the USACE/RWQCB. Drainage Complex B (Drainages B1 through B5) total approximately 0.037 acre of CDFW jurisdictional streambed and associated vegetation.

4.7 Special-status Biological Resources

The following discussion describes the plant and wildlife species present, or potentially present, within the study area that have been afforded special recognition by Federal, State, or local resource conservation agencies and organizations. These species have declining or limited population sizes, usually resulting from habitat loss. Also discussed are habitats that are unique, of relatively limited distribution, or of particular value to wildlife. Protected special-status species are classified by either Federal or State resource management agencies, or both, as threatened or endangered, under provisions of the Federal and State Endangered Species Acts (FESA and CESA, respectively).

4.7.1 Federal Special-status Resource Protection and Classifications

4.7.1.1 FESA

The FESA of 1973 defines an endangered species as "any species which is in danger of extinction throughout all or a significant portion of its range." A threatened species is defined as "any species which is likely to become an Endangered species within the foreseeable future throughout all or a significant portion of its range." Under provisions of Section 9(a)(1)(B) of the FESA, unless properly permitted, it is unlawful to "take" any listed species. "Take" is defined in Section 3(18) of FESA: "...harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Further, the USFWS, through regulation, has interpreted the terms "harm" and "harass" to include certain types of habitat modification as forms of "take." These interpretations, however, are generally considered and applied on a case-by-case basis and often vary from species to species. In a case where a property owner seeks permission from a federal agency for an action which could affect a federally listed plant or animal species, the property owner and agency are required to consult with USFWS pursuant to Section 7 of the ESA if there is a federal nexus, or pursuant to Section 10 of the ESA. Section 9(a)(2)(b) of the FESA addresses the protections afforded to listed plants.

All references to Federally-protected species in this BRA include the most current published status or candidate category to which each species has been assigned by USFWS. For purposes of this assessment the following acronyms are used for Federal status species, as applicable:

- FE Federally-listed as Endangered
- FT Federally-listed as Threatened
- FPE Federally proposed for listing as Endangered
- FPT Federally proposed for listing as Threatened
- FPD Federally proposed for delisting
- FC Federal candidate species (former C1 species)

Some of the USFWS offices maintain a database of listed species within their jurisdiction, for example the Sacramento[4] and Carlsbad[5] offices. The Carlsbad USFWS Office jurisdiction encompasses the counties of Los Angeles, Orange, Riverside, San Bernardino, Imperial, and San Diego.

4.7.1.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) protects individuals as well as any part, nest, or eggs of any bird listed as migratory. In practice, Federal permits issued for activities that potentially

4 http://www.fws.gov/sacramento/ES_Species/Lists/es_species_lists-overview.htm
5 http://www.fws.gov/carlsbad/SpeciesStatusList/CFWO_Species_Status_List.htm

impact migratory birds typically have conditions that require pre-disturbance surveys for nesting birds. In the event nesting is observed, a buffer area with a specified radius must be established, within which no disturbance or intrusion is allowed until the young have fledged and left the nest, or it has been determined that the nest has failed. If not otherwise specified in the permit, the size of the buffer area varies with species and local circumstances (e.g., presence of busy roads, intervening topography, etc.), and is based on the professional judgment of a monitoring biologist. A list of migratory bird species protected under the MBTA is published by USFWS.

4.7.1.3 Federal Clean Water Act, Section 404

Section 404 of the Clean Water Act (CWA) regulates the discharge of dredged or fill material into waters of the U.S. and authorizes the Secretary of the Army, through the Chief of Engineers, to issue permits for such actions. Implementing regulations for the CWA define waters of the U.S. as "rivers, creeks, streams, and lakes extending to their headwaters and any associated wetlands." Wetlands are defined as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions." The permit review process entails an assessment of potentially adverse impacts to USACE jurisdictional waters of the U.S.

Over the years, the USACE has modified its regulations, typically due to evolving policy or judicial decisions, through the issuance of Regulatory Guidance Letters, memorandums, or more expansive instruction guidebooks. These guidance documents help to update and define how jurisdiction is claimed, and how these waters of the U.S. will be regulated. The most recent, significant modification occurred on June 5, 2007, subsequently updated in December 2008, when the USACE and the U.S. Environmental Protection Agency (USEPA) issued a series of guidance documents outlining the requirements and procedures, effective immediately, to establish jurisdiction under Section 404 of the CWA and the Section 10 of the Rivers and Harbors Act of 1899. These documents are intended to be used for all jurisdictional delineations and provide specific guidance for the jurisdictional determination of potentially jurisdictional features affected by the U.S. Supreme Court rulings in *Rapanos v. the United States* and *Carabell v. the United States* 547 U.S. 715 (2006) (jointly referred to as *Rapanos*).

The *Rapanos* case outlines the conditions and criteria used by the USACE to assess and claim jurisdiction over non-isolated, non-navigable, ephemeral tributaries. Under a plurality ruling, the Court noted that certain "not relatively permanent" (i.e., ephemeral), non-navigable tributaries must have a "significant nexus" to downstream traditional navigable waters to be jurisdictional. An ephemeral tributary has a significant nexus to downstream navigable "waters" when it has "more than a speculative or an insubstantial effect on the chemical, physical, and/or biological integrity of a Traditional Navigable Water (TNW)." A significant nexus is established through the consideration of a variety of hydrologic, geologic and ecological factors specific to the particular drainage feature in question. For drainage features that do not meet the significant nexus criteria, a significant nexus determination is provided by the USACE to the USEPA for the final determination of federal jurisdiction. Drainage features that do not meet the significant nexus criteria based on completion of an AJD, and/or are determined to be isolated pursuant to the SWANCC ruling (see below), may still be regulated by California Department of Fish and

Wildlife (CDFW) under Fish and Game Code Section 1600 or the Regional Water Quality Control Board (RWQCB) under the Porter-Cologne Water Quality Act.

On January 15, 2003, the USACE and USEPA issued a Joint Memorandum to provide clarifying guidance regarding the United States Supreme Court ruling in the *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers*, No. 99-1178 (January 9, 2001) ("the SWANCC ruling"), (Federal Register: Vol. 68, No. 10.). This ruling held that the CWA does not give the federal government regulatory authority over non-navigable, isolated, intrastate waters. As a result of this decision, some previously regulated depressional areas such as mudflats, sandflats, wetlands, prairie potholes, wet meadows, playa lakes, natural ponds, and vernal pools, which are not hydrologically connected to other intra- or inter-state "waters of the U.S.," are no longer regulated by the USACE.

4.7.1.4 Federal Clean Water Act, Section 401

The mission of the RWQCB is to develop and enforce water quality objectives and implement plans that will best protect the beneficial uses of the state's waters, recognizing local differences in climate, topography, geology, and hydrology. The California RWQCB is responsible for implementing compliance not only with state codes such as the California Water Code, but also some federal acts such as Section 401 of the CWA. Section 401 of the CWA requires that any applicant for a federal permit for activities that involve a discharge to waters of the state shall provide the federal permitting agency with a certification from the state in which the discharge is proposed that states that the discharge will comply with the applicable provisions under the federal CWA.[6] As such, before the USACE will issue a CWA Section 404 permit, applicants must apply for and receive a Section 401 water quality certification (WQC) from the RWQCB. The RWQCB regulates "discharging waste, or proposing to discharge waste, within any region that could affect "waters of the state" (Water Code § 13260 (a)), pursuant to provisions of the Porter-Cologne Water Quality Control Act which defines RWQCB jurisdictional "waters of the state" as "any surface water or groundwater, including saline waters, within the boundaries of the state" (Water Code § 13050 (e)).

With the exception of isolated waters and wetlands, most discharges of fill to waters of the state are also subject to a CWA Section 404 permit. If a CWA Section 404 permit is not required for the project, the RWQCB may still require issuance of Waste Discharge Requirements (WDR) under the Porter-Cologne Water Quality Control Act. The RWQCB may regulate isolated waters that are not under jurisdiction of the USACE through issuance of WDR's. However, projects that obtain a Section 401 WQC are simultaneously enrolled in a statewide general WDR. Processing of Section 401 WQC's generally requires submittal of 1) a construction storm water pollution prevention plan (SWPPP), 2) a final water quality technical report that demonstrates that post-construction storm water Best Management Practices (BMPs) comply with the local design standards for municipal storm drain permits (MS4 permits) implemented by the State Water Resources Control Board effective January 1, 2011, and 3) a conceptual Habitat Mitigation and Monitoring Plan (HMMP) to compensate for permanent impacts to RWQCB waters, if any. In

6 33 USC 1341 *(a) (1)*.

addition to submittal of a draft CEQA document, a WQC application typically requires a discussion of avoidance and minimization of impacts to RWQCB jurisdictional resources, and efforts to protect beneficial uses as defined by the local RWQCB basin plan for the project. The RWQCB cannot issue a Section 401 WQC until the project CEQA document is certified by the lead agency.

4.7.2 State of California Special-status Resource Protection and Classifications

4.7.2.1 CESA

California's Endangered Species Act (CESA) defines an endangered species as:

> *…a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease.*

The State defines a threatened species as:

> *…a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by this chapter. Any animal determined by the commission as rare on or before January 1, 1985 is a threatened species.*

Candidate species are defined as:

> *…a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that the commission has formally noticed as being under review by the department for addition to either the list of endangered species or the list of threatened species, or a species for which the commission has published a notice of proposed regulation to add the species to either list.*

Candidate species may be afforded temporary protection as though they were already listed as threatened or endangered at the discretion of the Fish and Wildlife Commission. Unlike the FESA, CESA does not include listing provisions for invertebrate species.

Article 3, Sections 2080 through 2085, of the CESA addresses the taking of threatened or endangered species by stating:

> *…no person shall import into this State, export out of this State, or take, possess, purchase, or sell within this State, any species, or any part or product thereof, that the commission determines to be an endangered species or a threatened species, or attempt any of those acts, except as otherwise provided.*

Under the CESA, "take" is defined as, "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

Additionally, some special-status mammals and birds are protected by the State as Fully Protected Mammals or Fully Protected Birds, as described in the California Fish and Wildlife Code, Sections 4700 and 3511, respectively.

California Species of Special Concern are species designated as vulnerable to extinction due to declining population levels, limited ranges, and/or continuing threats. Informally listed species are not protected per se, but warrant consideration in the preparation of biological assessments. For some species, the CNDDB is only concerned with specific portions of the life history, such as roosts, rookeries, or nest areas.

For the purposes of this BRA, the following acronyms are used for State status species, as applicable:

- SE State-listed as Endangered
- ST State-listed as Threatened
- SR State-listed as Rare
- SCE State candidate for listing as Endangered
- SCT State candidate for listing as Threatened
- SFP State Fully Protected
- SSC California Species of Special Concern

Protection of Birds

Section 3503.5 of the California Fish and Game Code states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Activities that result in the abandonment of an active bird of prey nest may also be considered in violation of this code. In addition, California Fish and Game Code, Section 3511 prohibits the taking of any bird listed as fully protected, and California Fish and Game Code, Section 3515 states that is it unlawful to take any non-game migratory bird protected under the MBTA.

4.7.2.2 State of California Fish and Game Code, Section 1602

Section 1602 of the California Fish and Game Code requires any entity (e.g., person, state or local government agency, or public utility) who proposes a project that will substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake to notify the CDFW of the proposed project. In the course of this notification process, the CDFW will review the proposed project as it affects streambed habitats within the project area. The CDFW may then place conditions in the Section 1602 Streambed Alteration Agreement to avoid, minimize, and mitigate any potentially significant adverse impacts within CDFW jurisdictional limits.

4.7.2.3 California Native Plant Society

The CNPS is a private plant conservation organization dedicated to the monitoring and protection of special-status species in California. CNPS has compiled an inventory comprised of the information focusing on geographic distribution and qualitative characterization of Rare, Threatened, or Endangered vascular plant species of California (CNPS 2012). The list serves as the candidate list for listing as Threatened and Endangered by CDFW. CNPS has developed five categories of rarity, of which Ranks 1A, 1B, and 2 are particularly considered special-status:

- Rank 1A Presumed extinct in California.
- Rank 1B Plants Rare, Threatened, or Endangered in California and elsewhere.
- Rank 2 Plants Rare, Threatened, or Endangered in California, but more common elsewhere.
- Rank 3 Plants about which we need more information – a review list.
- Rank 4 Plants of limited distribution – a watch list.

The CNPS recently added “threat ranks” which parallel the ranks used by the CNDDB. These ranks are added as a decimal code after the CNPS List (e.g., Rank 1B.1). The threat codes are as follows:

- .1 – Seriously endangered in California (over 80% of occurrences threatened/high degree and immediacy of threat);
- .2 – Fairly endangered in California (20-80% occurrences threatened);
- .3 – Not very endangered in California (<20% of occurrences threatened or no current threats known).

Special-status species that occur or potentially could occur within the study area is based on one or more of the following: (1) the direct observation of the species within the study area during any field surveys; (2) a record reported in the CNDDB; and (3) the study area is within known distribution of a species and contains appropriate habitat.

4.7.2.4 Sensitive Plant Communities

Sensitive plant communities include those habitat types considered rare by resource agencies, namely the CDFW, due to their scarcity and/or their ability to support State and Federally-listed Endangered, Threatened, and Rare vascular plants, as well as several special-status bird and reptile species. CDFW maintains a natural plant community list, the *List of California Terrestrial Natural Communities*.[7] Special-status natural communities (also referred to by CDFW as ‘rare’ or ‘special concern’) are identified on the list by an asterisk and are considered high priority vegetation types (CDFW, 2010; CDFW, 2000a).

[7] Available online at: http://www.dfg.ca.gov/biogeodata/vegcamp/natural_comm_list.asp.

4.7.3 Local Special-status Resource Protection and Classifications

Western Riverside County MSHCP

The study area is within the Western Riverside County MSHCP which was adopted by the Riverside County Board of Supervisors (June 17, 2003). The MSHCP functions as an Habitat Conservation Plan (HCP) pursuant to Section 10(a)(1)(B) of the FESA and as a Natural Communities Conservation Plan (NCCP) under the NCCP Act of 2001. The USFWS and CDFW have authorized the take of a number special-status plant and wildlife species (Covered Species) within the MSHCP Plan Area in exchange for the assembly and management of a coordinated MSHCP Conservation Area.

Stephens' Kangaroo Rat Habitat Conservation Plan

The Stephens' kangaroo rat (SKR) HCP provides Take Authorization for SKR within its boundaries as implemented by legal agreements executed among the Riverside County Habitat Conservation Agency (RCHCA), its member agencies, USFWS, CDFW, BLM , U.S. Department of Interior, State of California Resources Agency, and other agencies as appropriate.[8] The MSHCP provides Take Authorization for SKR outside the boundaries of the SKR HCP, but within the MSHCP Plan Area boundaries. The seven core reserves established by the SKR HCP will be managed as part of the MSHCP Conservation Area consistent with the SKR HCP.

The study area is within the boundaries of the SKR HCP but is not within any of the core reserves. As such, the project would be required to pay a SKR mitigation fee for coverage under the SKR HCP.

4.7.4 Sensitive Plant Communities

The study area does not support any communities considered by CDFW as sensitive habitats.

4.7.5 Special-status Plant Species

Special-status plants include those listed, or candidates for listing, by the USFWS and CDFW; and species considered special-status by the CNPS (particularly Lists 1A, 1B, and 2). Several special-status plant species were reported in the vicinity based on CNDDB and CNPS, totaling 65 species within the 9-quadrangle search (as indicated in **Appendix B**, *Special-Status Plant Species*). A total of 12 species were identified as having a potential to occur within the study area based on the literature review and existing habitat on the study area, as listed in Appendix B. Focused plant surveys were conducted in 2015 on the project site and off-site road improvement and sewer line areas and in 2016 on the off-site water line areas; none of the species determined to have a potential to occur on the project site and off-site water and sewer line areas were observed. A summer focused survey was conducted within the off-site eastern manufactured slope area in 2016; however, a spring survey has not yet been conducted within this area. The western manufactured slope areas do not support suitable habitat for special-status plant species.

8 *http://www.skrplan.org/index.html*

4.7.6 Special-status Wildlife Species

Special-status wildlife include those species listed as Endangered or Threatened under the FESA or CESA, candidates for listing by the USFWS or CDFW, and species of special concern to the CDFW. Several special-status wildlife species were reported in the vicinity based on CNDDB, totaling 43 species within the 9-quadrangle search. A total of 19 species were identified as having a potential to occur within or use the study area based on the literature review and habitat present on the study area, as listed in **Appendix C**, *Special-status Wildlife Species*.

In addition, focused surveys were conducted for the burrowing owl in accordance with recommended protocols and the potential for foraging and nesting migratory bird and raptor species were also analyzed due to known presence within the study area or within the vicinity (see Appendix C). The species with a potential to occur on the study area are discussed below, including the results of the burrowing owl surveys and the migratory birds and raptors assessment.

Species With Potential to Occur On-site

Coast horned lizard (*Phrynosoma blainvillii*): This reptile species is a state species of special concern and is a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers sandy riparian and sage scrub habitats, but also occurs in valley-foothill, hardwood, conifer, pine-cypress, juniper and annual grassland habitats below 6,000 feet. Habitats include open country, especially sandy areas, washes, flood plains, and windblown deposits.

Coast horned lizard was determined to have a moderate potential to occur within the study area based on the presence of some potentially suitable habitat on the northwestern corner of the on-site area, which includes Riversidean sage scrub and brittlebush scrub. Harvester ants, this species main food source, were also observed (although the food source was not seen in the area supporting suitable habitat). Although habitat and a food source potentially exist on the study area, the majority of the potentially suitable habitat is disturbed and higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the study area. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Orange-throated whiptail (*Aspidoscelis hyperythra*): This reptile species is a state species of special concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers chaparral, non-native grassland, Riversidean sage scrub, and juniper and oak woodlands. It is often associated with riparian areas and alluvial fan sage scrub habitats.

Orange-throated whiptail was determined to have a moderate potential to occur within the study area based on the presence of some potentially suitable habitat on the northwestern corner of the on-site area, which includes Riversidean sage scrub and brittlebush scrub. These areas support perennial plants that may host this species preferred food source (termites). Although habitat and a food source potentially exist on the study area, the majority of the potentially suitable habitat is disturbed and higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the study area. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Red Diamond Rattlesnake (*Crotalus ruber*): This reptile species is a state species of special concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers chaparral, woodland, and arid desert habitats in rocky areas with dense vegetation.

Red diamond rattlesnake was determined to have a moderate potential to occur within the study area based on the presence of some potentially suitable habitat on the northwestern corner of the on-site area, which includes Riversidean sage scrub and brittlebush scrub. Although these areas support some vegetation and crevices within the rock outcrops, the vegetation is not dense and rock crevices available for cover are limited. Higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the study area. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Golden Eagle (*Aquila chrysaetos*): This raptor is a state fully protected species and is protected by the Bald and Golden Eagle Protection Act; it is also a Covered Species pursuant to the Western Riverside County MSHCP. This species nests on cliff faces and tall trees. Foraging habitat includes open country, including grasslands and early successional stages of forest and shrub habitats.

Golden eagle was determined to have a potential to occur only to forage within the study area based on the presence of a few fossorial mammal burrows within the disturbed areas on-site, suggesting the presence of small mammals that could provide a possible food source. However, the potential for foraging was considered very low since the majority of the site is surrounded by development and is highly disturbed, making it a less optimal habitat. This species is not expected to nest due to lack of cliffs on the study area, which is their preferred nesting habitat. Additionally, there is only one CNDDB occurrence record within the vicinity. This record was a breeding pair observed in fall 1979, spring 1980, and fall 1980 in San Timoteo Canyon, approximately 6.0 miles to the northeast. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Swainson's hawk (*Buteo swainsoni*): This bird species is listed as threatened by the state and is a Covered Species pursuant to the Western Riverside County MSHCP. It prefers Great Basin grasslands, riparian forests, riparian woodlands, and valley and foothill grasslands.

Swainson's hawk was determined to have a potential for foraging only within the study area based on the presence of a few fossorial mammal burrows within the disturbed areas on-site, suggesting the presence of small mammals that could provide a possible food source. However, the potential for foraging was considered low since the majority of the site is surrounded by development and is highly disturbed, making it a less optimal habitat. This species is not expected to nest due to the limited number of trees on the study area and the proximity of the trees to roads and residential homes, which could create some noise disturbance. Additionally, there are only two CNDDB occurrence records of nesting individuals within the vicinity; both records are from over 100 years ago. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Burrowing owl: This bird species is a state species of special concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers coastal prairie, coastal scrub, Great Basin scrub, Mojavean desert scrub, Sonoran desert scrub, valley and foothill grassland and disturbed habitats. It is known to occur in the project vicinity based on CNDDB and the MSHCP, and the study area is within the MSHCP Burrowing Owl Survey Area, an overlay in the MSHCP that requires additional surveys.

Burrowing owl was determined to have potential to occur within the study area based on the presence of suitable habitat that was identified during the Step I survey, including disturbed, low-growing vegetation, bare ground, and a few small fossorial mammal burrows. Step II surveys were conducted from May to July 2015 within the project site and off-site manufactured slopes, road improvement, proposed water line, and sewer line areas. Step II surveys were conducted from April to July 2016 within the off-site alternative water line areas. The subsequent Step II surveys did not identify individual burrowing owls, active burrowing owl burrows, or signs of burrowing owls within the survey area. Therefore, the study area and adjacent buffer area do not currently support burrowing owls. The results are also outlined in a separate survey reports attached as **Appendix D**, 2015 *Burrowing Owl Focused Survey Report* and **Appendix E**, 2016 *Burrowing Owl Focused Survey Report*.

Loggerhead shrike (*Lanius ludovicianus*): This bird species is listed as a state species of special concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers broadleaved upland forest, desert wash, Joshua tree woodland, Mojavean desert scrub, pinyon and juniper woodlands, riparian woodland, and Sonoran desert scrub habitats.

Loggerhead shrike was observed foraging within the northwestern corner of study area during the third burrowing owl survey conducted on July 2, 2015. This area supports suitable foraging habitat for this species, which includes Riversidean sage scrub and brittlebush scrub. The potential for nesting for this species is considered moderate based on the presence of shrubs on the northwestern corner. Although this area supports shrubs that may be suitable for nesting, the northwestern corner is adjacent to developed, residential areas; higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the study area.

Coastal California gnatcatcher (*Polioptila californica californica*): This bird species is listed as Federally Threatened, state species of special concern, and a Covered Species pursuant to the Western Riverside County MSHCP. This species is an obligate inhabitant of coastal sage scrub habitat.

This species was observed on the study area during the focused burrowing owl survey conducted on May 13, 2015. Only one individual was heard during the survey.

Northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*): This mammal species is listed as a state species of special concern and a Covered Species pursuant to the Western

Riverside County MSHCP. It prefers chaparral and coastal sage scrub habitats, in addition to grassland and Riversidean alluvial fan sage scrub habitats.

Northwestern San Diego pocket mouse was determined to have a moderate potential to occur within the study area based on the presence of suitable coastal scrub and chaparral habitat (e.g. brittle bush scrub, Riversidean sage scrub) in the northwestern portion and small fossorial mammal burrows. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Stephens' kangaroo rat (*Dipodomys stephensi*): This mammal species is listed as federally endangered and state threatened. Take Authorization for Stephens' kangaroo rat is provided by the SKR HCP within its plan boundaries, and by the Western Riverside County MSHCP for areas outside of the SKR HCP but within the MSHCP area plan boundaries (this species is a MSHCP Covered Species). This species prefers open grasslands or sparse shrub lands within sandy to sandy loam soils and low clay and gravel content.

Stephens' kangaroo rat was determined to have a moderate potential to occur within the study area based on the presence of suitable shrub habitat (e.g. brittle bush scrub, Riversidean sage scrub) in the northwestern portion and small fossorial mammal burrows. The study area is not within any core reserves identified by the SKR HCP. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Los Angeles pocket mouse (*Perognathus longimembris brevinasus*): This mammal species is listed as a state species of special concern and a conditionally Covered Species pursuant to the Western Riverside County MSHCP (surveys are required for areas within the survey overlay, with potential conservation). It prefers sparsely vegetated habitat areas within coastal sage scrub communities and in patches of fine sandy soils associated with washes.

Los Angeles pocket mouse was determined to have a moderate potential to occur within the study area based on the presence of suitable Riversidean sage scrub habitat in the northwestern portion. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

San Diego black-tailed jackrabbit (*Lepus californicus bennettii*): This mammal species is a California Species of Special Concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers open brushlands and scrub habitats.

San Diego black-tailed jackrabbit was determined to have a moderate potential to occur within the study area. The majority of the study area supports suitable habitat for this species, including the Riversidean sage scrub on the northwestern corner and the ruderal areas (which support some short grasses). However, this species is highly conspicuous and no incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

San Diego desert woodrat: This mammal species is a California Species of Special Concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers coastal scrub and chaparral habitats with areas containing rock outcrops and cliffs.

San Diego desert woodrat was determined to have a moderate potential to occur within the study area based on the presence of suitable habitat (e.g. Riversidean sage scrub, rock outcrop/Riversidean sage scrub) in the northwestern portion and small fossorial mammal burrows. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Southern Grasshopper Mouse (*Onychomys torridus ramona*): This mammal species is a state species of special concern. This species prefers grasslands, desert areas, and especially scrub with friable soils.

Southern grasshopper mouse was determined to have a potential to occur within the study area based on the presence of suitable shrub habitat (e.g. brittle bush scrub and Riversidean sage scrub) in the northwestern portion and small fossorial mammal burrows. However, the potential was considered low since this species has not been recorded on CNDDB within the vicinity of study area since 1938. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

American badger (*Taxidea taxus*): This mammal species is a state species of special concern. This species prefers grasslands, desert areas, and especially scrub with friable soils.

American badger was determined to have a potential to occur within the study area based on the presence of shrubs within the Riversidean sage scrub habitat on the northwestern corner of the study area. A few fossorial mammal burrows were observed, suggesting the presence of small mammals that could provide a possible food source. However, the potential was considered low since the majority of the site is surrounded by development and a large portion of suitable habitat is disturbed. Additionally, this species has not been recorded within the vicinity since 1908. No signs of this species were observed during any site surveys conducted in 2015.

Western Mastiff Bat (*Eumops perotis californicus*): This mammal species is a state species of special concern. This species prefers chaparral, cismontane woodlands, coastal scrub, and valley and foothill grassland habitats.

Western mastiff bat was determined to have a potential to occur for foraging only within the study area. However, the potential was considered low since although bats in this family are known to be strong fliers and can fly long distances to forage, habitat on the study area is disturbed and the majority of the study area is surrounded by development. This species preferred roosting habitat is not present on the study area and the nearest CNDDB occurrence record is from1990 approximately 3.0 miles to the southwest of the study area, in an area that is now a residential development. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Pocketed free-tailed bat (*Nyctinomops femorasaccus*): This bat species is a state species of special concern and occurs in more arid habitats, roosting in rock crevices, caverns, or buildings.

Pocketed free-tailed bat was determined to have a potential to occur for roosting only within the study area based on the presence of rock outcrops. However, this potential was considered very low since this species typically prefers steeper cliffs for roosting habitat. Although little is known regarding home range for this species, the potential for roosting is also unlikely since the study area does not support adjacent foraging habitat (CDFW, 2000b). There are only 2 CNDDB occurrence records in the vicinity. The nearest record is from 1985 approximately 6.5 miles to the southwest of the study area near March Air Force Base. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Lesser long-nosed bat (*Leptonycteris verbabuenae*): This bat species is a federally endangered species and occurs in more arid habitats, such as desert grasslands and shrublands.

Pocketed free-tailed bat was determined to have a potential to occur for roosting and foraging. Potential night roosts included a limited number of trees and rock crevices on the northwestern corner of the project and scattered cactus may provide feeding opportunities. Although day roosting habitat (caves or mines) are not present on the study area, this species can travel long distances between day roosting and foraging sites. However, the potential was considered very low for both roosting and foraging since this species not typically found in California and recorded sightings are typically vagrant migrants. There is only 1 CNDDB occurrence record within the vicinity from 1993, approximately 9.5 miles to the northeast in a residential neighborhood of Yucaipa. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Pallid bat (*Leptonycteris verbabuenae*): This bat species is a federally endangered species and occurs in more arid habitats, such as desert grasslands and shrublands.

Pocketed free-tailed bat was determined to have a potential to occur for roosting and foraging. Potential night roosts included a limited number of trees and rock crevices on the northwestern corner of the project and scattered cactus may provide feeding opportunities. Although day roosting habitat (caves or mines) is not present on the study area, this species can travel long distances between day roosting and foraging sites. However, the potential was considered very low for both roosting and foraging since this species not typically found in California and recorded sightings are typically vagrant migrants. There is only one CNDDB occurrence record within the vicinity from 1993, approximately 9.5 miles to the northeast in a residential neighborhood of Yucaipa. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Migratory Birds and Raptors

The study area supports some potential nesting and foraging habitat for nesting birds and raptors, primarily in the northwestern corner of the study area where there are shrubs and some trees. Several species of birds were observed on-site (see Appendix A) and were identified by CNDDB as potentially occurring within the 9-quadrangle search area (see Appendix C). Raptors observed on-site include Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), and American kestrel (*Falco sparverius*). There is also a foraging potential for listed raptors within the 9-quadrangle search area according to CNDDB, such as golden eagle (State Fully Protected) and Swainson's hawk (Federally Threatened), though the potential of foraging is considered low and neither are expected to nest on-site (see Appendix C).

4.7.7 Study Area's Relationship to the Western Riverside County MSHCP

This section provides a discussion of the study area's relationship to the MSHCP policies, including the location within the MSHCP Area Plan, Criteria Cells, and cores and linkages, and the presence of MSHCP protected biological resources.

4.7.7.1 Location of the Study Area within the MSHCP Area Plan and Criteria Cells

The entire study area is within the Reche Canyon/Badlands Area Plan (see Figure 6) of the MSHCP but is not within a Criteria Cell, a designated Cell Group, or a subunit within the Southwest Area Plan that requires conservation of land for inclusion in the MSHCP Conservation Area (Riverside County TLMA, 2015).

4.7.7.2 Location of the Study Area within MSHCP Cores and Linkages

As mentioned previously in section 4.5.2, *Wildlife Movement within the Study Area*, the study area is not within any cores or linkages (i.e., Special Linkage Areas) as identified in the Reche Canyon/Badlands Area Plan.

4.7.7.3 Riparian/Riverine Areas and Vernal Pools

Section 6.1.2, *Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools,* of the MSHCP provides for the protection of Riparian/Riverine Areas and Vernal Pools within the MSHCP Plan Area. Riparian/Riverine areas are defined in the MSHCP as "lands which contain habitat dominated by trees, shrubs, persistent emergents, or emergent mosses and lichens, which occur close to or which depend upon soil moisture from a nearby fresh water source; or areas with fresh water flow during all or a portion of the year." Vernal pools are defined in the MSHCP as "seasonal wetlands that occur in depression areas that have wetlands indicators of all three parameters (soils, vegetation, and hydrology) during the wetter portion of the growing season but normally lack wetlands indicators of hydrology and/or vegetation during the drier portion of the growing season."

As shown in **Figure 12**, *MSHCP Riverine Areas*, and summarized in **Table 3**, *MSHCP Riverine* Areas, The project study areas support a total 0.165 acre of MSHCP Riverine Areas including 0.059 acre in Drainage A (0.046 acre on-site and 0.013 acre off-site), 0.070 acre in Drainage B, 0.001 acre in Drainage B1, 0.001 acre in Drainage B2, 0.001 acre in Drainage B3, 0.002 acre in Drainage B4, and 0.033 acre in Drainage B5. All drainages are considered MSHCP Riverine Areas (rather than MSHCP Riparian Areas) since they are supported by ephemeral[9] flows and do not support riparian vegetation communities. No vernal pools occur within the on- and off-site study areas. Due to the presence of MSHCP Riverine features, the project will require a Determination of Biologically Equivalent or Superior Preservation (DBESP) analysis for any impacts proposed to these areas. The DBESP is required to provide details on any proposed impacts and compensatory mitigation for compliance with MSHCP requirements for submittal to the County of Riverside Environmental Programs Department (EPD), subject to approval by the

[9] Riparian drainages are streambeds that generally convey runoff during, and immediately after, a storm event.

County of Riverside Regional Conservation Authority (RCA) and the State and Federal Wildlife Agencies (CDFW and USFWS).

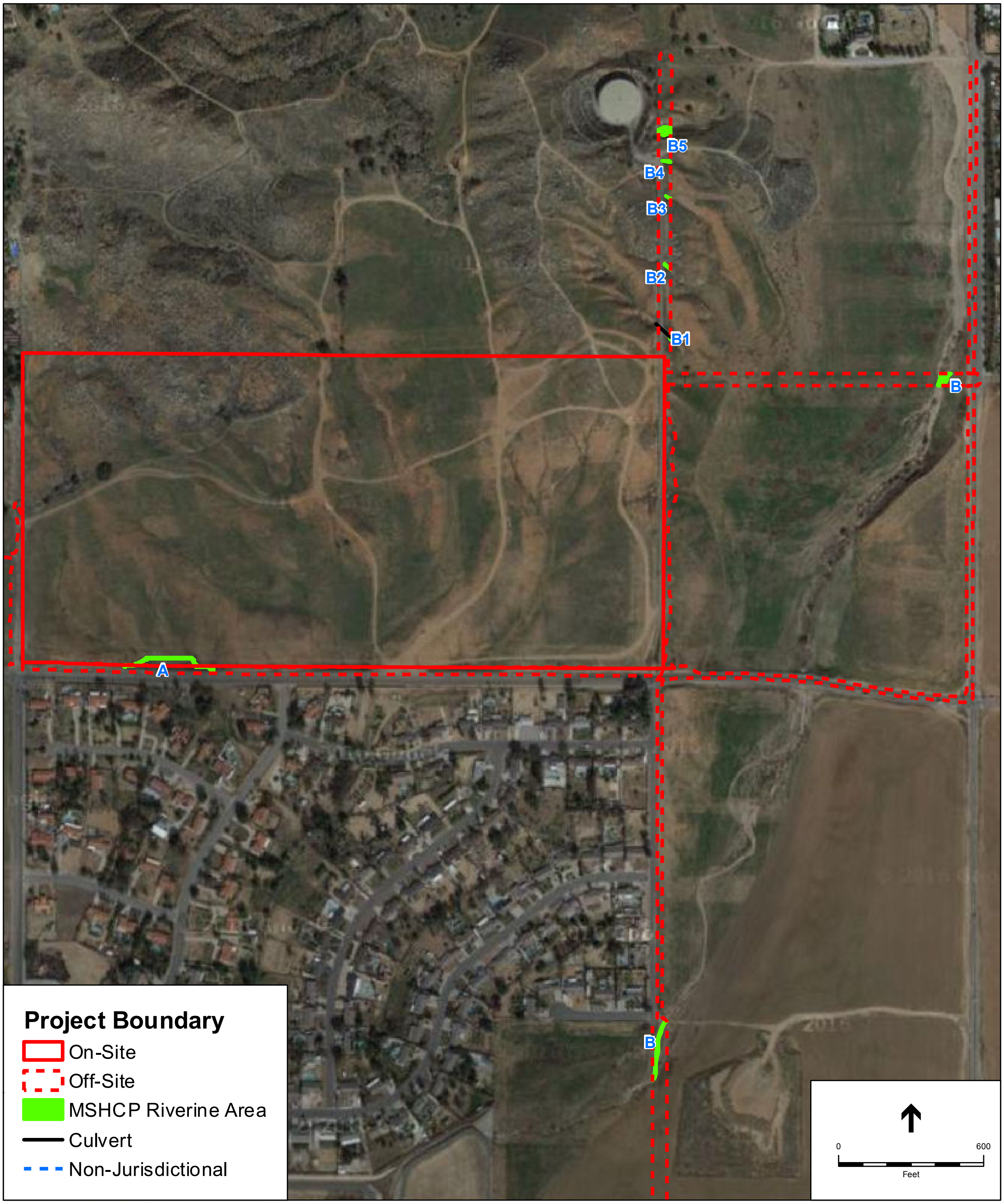
TABLE 3
MSHCP RIVERINE AREAS

Drainage (Study Area)	Length (ft)	Area (acres)	Riparian/Riverine Flow Classification
A (On-Site)	285	0.046	Riverine
A (Off-Site)	111	0.013	Riverine
B (Off-Site)	306	0.069	Riverine
B1 (Off-Site)	0*	0.001	Riverine
B2 (Off-Site)	32	0.001	Riverine
B3 (Off-Site)	25	0.001	Riverine
B4 (Off-Site)	34	0.001	Riverine
B5 (Off-Site)	35	0.033	Riverine
Total	**828**	**0.165**	

** Less than one linear foot of jurisdiction occurs within Drainage B1 as the majority of the drainage within the off-site study area is associated with an existing corrugated metal pipe that was not quantified.*

Source: ESA PCR, 2014

The biological function and value of the on- and off-site Riverine Areas within Drainage A and Drainage Complex B include the transport of water, which is limited based on the ephemeral flows of the drainage and limited watershed. The function and value of the drainages are also limited since they are primarily unvegetated and support only some small patches of upland and/or ruderal vegetation. Other types of aquatic features that could provide suitable habitat for Riparian/Riverine species, such as fairy shrimp, are not present within the study area (i.e. vernal pools, swales, vernal pool-like ephemeral ponds, seasonal ponds, stock ponds, or other human-modified depressions such as tire ruts, etc.).



SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project
Figure 12
MSHCP Riverine Areas

FSA PCR

Riparian/Riverine Plant Species

A habitat assessment was conducted for species listed in Section 6.1.2, *Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools*, of the MSHCP. The results are presented in **Table 4**, *MSHCP Riparian/Riverine Plant Species*. Only one Riparian/Riverine plant species was determined to have a potential to occur on the study area, namely smooth tarplant (*Centromadia pungens* ssp. *laevis*). This species was considered to have a potential to occur only within the riverine habitat associated with the on- and off-site drainages; however, smooth tarplant was not observed during any of the focused plant surveys and therefore was concluded to be absent from the project site. The remaining MSHCP Riparian/Riverine plant species are not expected to occur within the study area due to the lack of suitable habitat or the location of the study area.

TABLE 4
MSHCP RIPARIAN/RIVERINE PLANT SPECIES

Species	Potential to Occur within the Study Area
Brand's phacelia *Phacelia stellaris*	Not expected to occur. This species has not been recorded in the Moreno Valley area. There is only one occurrence record in CNDDB within Riverside County, which was observed in 2000 in the City of Riverside near the Santa Ana River.
California Orcutt grass *Orcuttia californica*	Not expected to occur due to the lack of vernal pools.
Coulter's matilija poppy *Romneya coulteri*	Not expected to occur. This perennial plant has conspicuous flowers that would have been detected during the focused plant surveys if present.
Engelmann oak *Quercus engelmannii*	Not expected to occur. This is a conspicuous tree species that would have been detected during the focused plant surveys if present.
Fish's milkwort *Polygala cornuta* var. *fishiae*	Not expected to occur. The majority of occurrence records of this species on CNDDB are confined to the Santa Ana Mountains.
graceful tarplant *Holocarpha virgata* ssp. *Elongate*	Not expected to occur due to disturbance on-site. The study area is outside of the species' range; there are no known records of this species within the flatter agricultural areas east of the Santa Ana Mountains.
lemon lily *Lilium parryi*	Not expected to occur due to the lack of suitable habitat. Also, the study area is outside the species' range; this species is restricted to the San Jacinto Mountains. The study area is outside of species' elevation range.
Mojave tarplant *Deinandra mohavensis*	Not expected to occur. The study area is outside the species range; this species is restricted to the San Jacinto Mountains. The study area is outside of species' elevation range.
mud nama *Nama stenocarpum*	Not expected to occur due to the lack of wetlands. None were incidentally observed during any surveys (this species can occasionally occur in non-wetlands).
ocellated Humboldt lily *Lilium humboldtii* ssp. *ocellatum*	Not expected to occur due to high disturbance within the drainages and lack of shade. This species is typically found at higher elevations.
Orcutt's brodiaea *Brodiaea orcuttii*	Not expected to occur due to the lack of vernal pools.
Parish's meadowfoam *Limnanthes alba* ssp. *parishii*	Not expected to occur due to the lack of suitable habitat. Also, the study area is outside the species' range; this species is restricted to the Santa Rosa Plateau within the MSHCP Plan Area. The study area is outside of this species' elevation range.

Species	Potential to Occur within the Study Area
prostrate navarretia *Navarretia prostrata*	Not expected to occur due to the lack of suitable habitat. Also, the study area is outside the species' range; this species is restricted to the Santa Rosa Plateau within the MSHCP Plan Area. The study area does not support suitable vernal pool habitat.
San Diego button-celery *Eryngium aristulatum* var. *parishii*	Not expected to occur. The study area is outside the species' range; this species is restricted to the Santa Rosa Plateau within the MSHCP Plan Area. The study area does not support suitable vernal pool habitat.
San Jacinto Valley crownscale *Atriplex coronata* var. *notatior*	Not expected to occur due to the lack of suitable alkaline habitat.
San Miguel savory *Satureja chandleri*	Not expected to occur due to the lack of suitable metavolcanic substrate habitat.
Santa Ana River woollystar *Eriastrum densifolium* ssp. *sanctorum*	Not expected to occur due to lack of suitable habitat. The study area is outside the species range; this species is restricted to the Santa Ana River and alluvial fan sage scrub habitat.
slender-horned spineflower *Dodecahema leptoceras*	Not expected to occur due to the lack of alluvial fan habitat.
smooth tarplant *Centromadia pungens* ssp. *laevis*	Potential, but not observed. This species was not observed during the focused plant surveys.
southern California black walnut *Juglans californica*	Not expected to occur. This is a conspicuous tree species that would have been detected if present.
spreading navarretia *Navarretia fossalis*	Not expected to occur due to the lack of vernal pools.
thread-leaved brodiaea *Brodiaea filifolia*	Not expected to occur due to the lack of vernal pools.
vernal barley *Hordeum intercedens*	Not expected to occur due to the lack of vernal pools.

SOURCE: ESA PCR, 2016

Riparian/Riverine Wildlife Species

Habitat assessments were conducted for wildlife species listed in Section 6.1.2, *Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools*, of the MSHCP. The results are presented in **Table 5**, *MSHCP Riparian/Riverine Wildlife Species*. No riparian/riverine wildlife species are expected to occur on the study area due to the lack of suitable habitat.

TABLE 5
MSHCP RIPARIAN/RIVERINE WILDLIFE SPECIES

Species	Potential to Occur within the Study Area
arroyo toad *Anaxyrus californicus*	Not expected to occur due to the lack of suitable habitat (perennial streams).
mountain yellow-legged frog *Rana muscosa*	Not expected to occur due to the lack of suitable habitat (perennial streams).
California red-legged frog *Rana aurora draytonii*	Not expected to occur due to the lack of suitable habitat (perennial streams).

Species	Potential to Occur within the Study Area
bald eagle *Haliaeetus leucocephalus*	Not expected to occur due to the lack of suitable habitat for foraging and nesting.
least Bell's vireo *Vireo bellii pusillus*	Not expected to occur due to the lack of suitable habitat for foraging and nesting.
American peregrine falcon *Falco peregrinus anatum*	Not expected to occur due to the lack of suitable habitat for foraging and nesting (cliffs overlooking open areas or large bodies of water).
southwestern willow flycatcher *Empidonax traillii extimus*	Not expected to occur due to the lack of suitable habitat for foraging and nesting.
western yellow-billed cuckoo *Coccyzus americanus occidentalis*	Not expected to occur due to the lack of suitable habitat for foraging and nesting; outside of the species range.
Santa Ana sucker *Catostomus santaanae*	Not expected to occur due to the lack of suitable habitat (perennial streams).
Riverside fairy shrimp *Streptocephalus woottoni*	Not expected to occur due to the lack of suitable habitat (vernal pools).
vernal pool fairy shrimp *Branchinecta lynchi*	Not expected to occur due to the lack of suitable habitat (vernal pools).
Santa Rosa Plateau fairy shrimp *Linderiella santarosae*	Not expected to occur due to the lack of suitable habitat (vernal pools).

SOURCE: ESA PCR, 2016

4.7.7.4 Narrow Endemic Plant Species Survey Area

The study area is not within the Narrow Endemic Plant Species Survey Area; therefore, no surveys were required for Narrow Endemic plant species.

4.7.7.5 Additional Survey Needs and Procedures

Section 6.3.2, *Additional Survey Needs and Procedures*, of the MSHCP provides for additional survey needs for the burrowing owl, as well as a number of special-status plant, amphibian, and mammal species.

Burrowing Owl Survey Area

The study area is within the Burrowing Owl Survey Area; therefore, in compliance with the Western Riverside County MSHCP, surveys are required for this species. As discussed above in section 4.7.6 Special-status Wildlife Species, Step I and Step II surveys conducted for the project following Western Riverside County MSHCP protocol were negative. Although the site does not currently support burrowing owls, pre-construction surveys are required within 30 days of ground disturbance based on the presence of suitable habitat.

Criteria Area Species Survey Area

The study area is not within the Criteria Area Species Survey Area; therefore, no surveys were required for Criteria Area plant species.

Amphibian Species Survey Area

The study area is not within the Amphibian Species Survey Area; therefore, no surveys are required.

Mammal Species Survey Area

The study area is not within the Mammal Species Survey Area; therefore, no surveys are required.

4.7.7.6Urban/Wildlands Interface

Section 6.1.4, *Guidelines Pertaining to the Urban/Wildlands Interface*, of the MSHCP presents a number of guidelines that are intended to address indirect effects associated with locating developments in proximity to a Western Riverside County MSHCP Conservation Area. These guidelines address the quantity and quality of any runoff generated by the development (i.e., drainage and toxics), night lighting, noise, non-native invasive plant species, barriers to humans and animal predators, and grading/land development encroachment.

The study area is not within or in the vicinity of any Criteria Cells (see Figure 6) and, as such, development of the site is not expected to result in indirect effects to MSHCP Conservation Areas related to night lighting, noise, and grading/land development, and barriers would not be necessary. Drainage A and Drainage Complex B ultimately drain to the San Jacinto River, which is a Constrained Linkage (19) and where Criteria Cells are located. Runoff from the site therefore has the potential to affect the quantity and quality of water downstream, in addition to the transport of plant seeds. Since the project will be required to comply with flood and water quality standards[10], no indirect effects from the quantity and quality of run-off will occur to downstream areas. At minimum, no invasive, non-native plant species listed in Tables 6-2 of the MSHCP, *Plants That Should Be Avoided Adjacent To The MSHCP Conservation Area*, will be utilized in the landscape plans. This will avoid dispersal of invasive plant seeds in the watershed. Despite the study area not being within any Criteria Cells or adjacent to any MSHCP Conservation Areas, it does support one on-site drainage and one off-site drainage complex that are considered Riverine Areas. The above measures will avoid indirect impacts to these drainages from runoff and invasive species.

[10] The project will be required to prepare a Water Quality Management Plan and Storm Water Pollution Prevention Plan consistent with Regional Water Quality Control Board and County requirements that will outline measures such as Best Management Practices (BMPS) to address water quantity and quality, and to address any potential flooding.

5.0 THRESHOLDS OF SIGNIFICANCE

The environmental impacts relative to biological resources are assessed using impact significance threshold criteria which mirror the policy statement contained in the CEQA, Section 21001(c) of the California Public Resources Code. Accordingly, the State Legislature has established it to be the policy of the State to:

> *"Prevent the elimination of fish or wildlife species due to man's activities, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities..."*

Determining whether or not a project may have a significant effect, or impact, plays a critical role in the CEQA process. According to CEQA, Section 15064.7, Thresholds of Significance, each public agency is encouraged to develop and adopt (by ordinance, resolution, rule, or regulation) thresholds of significance that the agency uses in the determination of the significance of environmental effects. A threshold of significance is an identifiable quantitative, qualitative or performance level of a particular environmental effect, non-compliance with which means the effect will normally be determined to be significant by the agency and compliance with which means the effect normally will be determined to be less than significant. In the development of thresholds of significance for impacts to biological resources CEQA provides guidance primarily in Section 15065, Mandatory Findings of Significance, and the State CEQA Guidelines, Appendix G, *Environmental Checklist Form*. Section 15065(a) states that a project may have a significant effect where:

> *"The project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or wildlife community, reduce the number or restrict the range of an endangered, rare, or threatened species..."*

Appendix G of the State CEQA Guidelines is more specific in addressing biological resources and encompasses a broader range of resources to be considered, including: candidate or other special-status species; riparian habitat or other special-status natural communities; Federally protected wetlands; fish and wildlife movement corridors; local policies or ordinances protecting biological resources; and, adopted HCPs. This is done in the form of a checklist of questions to be answered during the Initial Study leading to the preparation of the appropriate environmental documentation for a project [i.e., Negative Declaration, Mitigated Negative Declaration, or Environmental Impacts Report (EIR)]. Because these questions are derived from standards in other laws, regulations, and other commonly used thresholds, it is reasonable to use these standards as a basis for defining significance thresholds in an EIR. Therefore, for the purpose of this analysis, impacts to biological resources are considered potentially significant (before considering offsetting mitigation measures) if one or more of the following conditions would result from implementation of the proposed Project.

Threshold BIO-A Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Wildlife Service.

Note: Threshold BIO-A also encompasses the threshold on the Riverside County Environmental Assessment/Initial Study form as follows: "Have a substantial adverse effect, either directly or through habitat modifications, on any endangered, or threatened species, as listed in Title 14 of the California Code of Regulations (Sections 670.2 or 670.5) or in Title 50, Code of Federal Regulations (Sections 17.11 or 17.12)."

Threshold BIO-B Have a substantial adverse effect on any riparian habitat or other sensitive plant community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U. S. Fish and Wildlife Service.

Threshold BIO-C Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

Threshold BIO-D Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery areas.

Threshold BIO-E Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

Threshold BIO-F Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

For the purposes of this impact analysis the following definitions apply:

- "Substantial adverse effect" means loss or harm of a magnitude which, based on current scientific data and knowledge would: (1) substantially reduce population numbers of a listed, candidate, sensitive, rare, or otherwise special status species; (2) substantially reduce the distribution of a sensitive plant community/habitat type; or (3) eliminate or substantially impair the functions and values of a biological resource (e.g., streams, wetlands, or woodlands) in a geographical area defined by interrelated biological components and systems. In the case of this analysis, the prescribed geographical area is considered to be the region that includes the USGS topographic quadrangle for the study area, namely Sunnymead. For some species, the geographic area may extend to the vicinity of the study area based on known distributions of the species. The vicinity of the study area is considered to comprise the following USGS topographic quadrangles: San Bernardino South, Redlands, Yucaipa, Riverside East, El Casco, Steele Peak, Perris, and Lakeview.

- "Conflict" means contradiction of a magnitude, which based on foreseeable circumstances, would preclude or prevent substantial compliance.

- "Rare" means: (1) that the species exists in such small numbers throughout all, or a significant portion of, its range that it may become endangered if its environment worsens; or (2) the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and may be considered "threatened" as that term is used in the FESA.

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6.0 PROJECT RELATED IMPACTS

6.1 Regulatory Setting

Special-status species are provided protection by either Federal or State resource management agencies, or both, under provisions of the FESA and CESA.

There are a number of performance criteria and standard conditions that must be met as part of any review and approval of the proposed project. These include compliance with all of the terms, provisions, and requirements with applicable laws that relate to Federal, State, and local regulating agencies related to potential impacts to special-status plant and wildlife species, wetlands, riparian habitats, and blue lined stream courses. The following summarizes federal and state regulations, and CNPS, as previously discussed in section 4.7, *Special-Status Biological Resources*.

6.1.1 Federal Regulations

As previously discussed in section 4.7.1, Federal Sensitive Resource Protection and Classifications of this BRA, under provisions of Section 9(a)(1)(B) of the FESA, unless properly permitted, it is unlawful to "take" any listed species. In a case where a property owner seeks permission from a Federal agency for an action which could affect a Federally-listed plant and animal species, the property owner and agency are required to consult with USFWS to obtain appropriate permits. Section 9(a)(2)(b) of the FESA addresses the protections afforded to listed plants. In addition to FESA, take of migratory birds, or bald or golden eagles, require permits pursuant to the MBTA and the Bald and Golden Eagle Protection Act, respectively. Furthermore, any impacts to USACE and RWQCB jurisdictional waters would require permitting pursuant to Sections 404 and 401 of the CWA, respectively.

6.1.2 State of California Regulations

As previously discussed in section 4.7.2, *State of California Sensitive Resource Protection and Classifications* of this BRA, Article 3, Sections 2080 through 2085, of the CESA addresses the taking of threatened or endangered species. Exceptions authorized by the State to allow "take" require permits or memoranda of understanding and can be authorized for "endangered species, threatened species, or candidate species for scientific, educational, or management purposes." Sections 1901 and 1913 of the California Fish and Wildlife Code provide that notification is required by an initiator prior to disturbance. State regulations also exist for protection of birds pursuant to the MBTA, and for acquiring permits for impacts to CDFW jurisdictional streambeds pursuant to Section 1602 of the Fish and Game Code.

6.1.3 California Native Plant Society

As previously discussed in section 4.7.2, *State of California Sensitive Resource Protection and Classifications* of this BRA, the CNPS has compiled an inventory comprised of the information focusing on geographic distribution and qualitative characterization of rare, threatened, or endangered vascular plant species of California which classifies plant species into categories of rarity. Informally ranked species are not protected per se, but warrant consideration in the preparation of biological assessments.

6.1.4 Local Regulations

The study area is within the adopted Western Riverside County MSHCP Plan area. The Western Riverside County MSHCP provides permits for the take of all species identified in the MSHCP as covered and conditionally covered, so long as the conditions imposed are satisfied (see also sections 4.7.3 and 4.7.7 above).

6.2 Project Related Impacts

The analysis in section *6.3 Impact Analysis* of this BRA examines the potential impacts to plant and wildlife resources that may occur as a result of implementation of the project. For the purpose of this assessment, project-related impacts take two forms, direct and indirect. Direct impacts are considered to be those that involve the loss, modification or disturbance of natural habitats (i.e., vegetation or plant communities), which in turn, directly affect plant and wildlife species dependent on that habitat. Direct impacts also include the destruction of individual plants or wildlife, which is typically the case in species of low mobility (i.e., plants, amphibians, reptiles, and small mammals). The collective loss of individuals in these manners may also directly affect regional population numbers of a species or result in the physical isolation of populations thereby reducing genetic diversity and, hence, population stability.

Indirect impacts are considered to be those that involve the effects of increases in ambient levels of sensory stimuli (e.g., noise, light), unnatural predators (e.g., domestic cats and other non-native animals), and competitors (e.g., exotic plants, non-native animals). Indirect impacts may be associated with the construction and/or eventual habitation/operation of a project; therefore, these impacts may be both short-term and long-term in their duration. These impacts are commonly referred to as “edge effects” and may result in changes in the behavioral patterns of wildlife and reduced wildlife diversity and abundance in habitats adjacent to study area.

The determination of impacts in this analysis is based on both the proposed project development plan and the biological values of the habitat and/or sensitivity of plant and wildlife species to be affected. Any recommended mitigation measures to address impacts are discussed in section 7.0 below, and compliance with existing regulations are also outlined in section 7.0 as Conditions of Approval.

The biological values of resources within, adjacent to, and outside the area to be affected by the proposed project were determined by consideration of several factors, as applicable. These included the overall size of habitats to be affected, the study area’s previous land uses and disturbance history, the study area's surrounding environment and regional context, the on-site biological diversity and abundance, the presence of special-status plant and wildlife species, the study area's importance to regional populations of these species, and the degree to which on-site habitats are limited or restricted in distribution on a regional basis and, therefore, are considered sensitive in themselves. Therefore, the focus of this impacts analysis is on sensitive plant communities/habitats, resources that play an important role in the regional biological systems, and special-status species.

Impacts to biological resources as a result of project development were analyzed in GIS using Computer-Aided Design (CAD) data of the project footprint and guidelines on temporary impact areas for the drainage crossings, both provided by the project engineer. Acreages of impacts were calculated by overlaying the CAD data and adding the fuel modification zones over GPS data of biological resources collected by ESA PCR during the surveys.

6.3 Impact Analysis

6.3.1 Impacts to Special-Status Species

Threshold BIO-A: Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Wildlife Service?

Less than Significant with Mitigation Incorporated

6.3.1.1 Special-Status Plant Species

Development of the study area would result in the direct removal of numerous common plant species; a list of plant species observed within the study area is included in Appendix A. Common plant species present within the study area occur in large numbers throughout the region and their removal does not meet the significance thresholds defined in Section 5.0, *Thresholds of Significance* above. Therefore, impacts to common plant species would not be considered a significant impact and no mitigation measures are required.

A total of 53 special-status plant species of the 65 species identified as occurring in the project vicinity in available databases (see section 4.7.5 above) are not expected to occur within the study area due to the lack of suitable habitat or because the site is outside the known distribution or elevation range for the species. These species are listed in Appendix B. As discussed in section 4.7.5, above, the remaining 12 special-status plant species were determined to have a potential to occur on the study area; however, these 12 species are not expected to occur within the project site or off-site water and sewer line areas since focused surveys conducted within these areas were negative. As such, no impacts to special-status plant species would occur as a result development on the project site and within the proposed off-site water and sewer lines and no mitigation is required.

Although a summer focused survey was performed within the off-site manufactured slope area to the east of the project site, a spring focused survey has not been conducted within this off-site area. Of the 12 species with a potential to occur, seven (7) species are not expected to occur within the off-site manufactured slope area since these species were not detected during the summer focused survey or the area does not support suitable habitat, including California screw most (*Tortula californica*), smooth tarplant, San Bernardino aster (*Symphyotrichum defoliatum*), chaparral sand-verbena (*Abronia villosa* var. *aurita*), long-spined spineflower (*Chorizanthe polygonoides* var. *longispina*), salt spring checkerbloom (*Sidalcea neomexicana*), and mesa horkelia (*Horkelia cuneate* var. *puberula*). The blooming period of the remaining five (5) species with the potential to occur within the off-site manufactured slope area east of the project boundary fall outside of the summer survey window, which include Nevin's barberry (*Berberis nevinii*), Jaeger's bush milk-vetch (*Astragalus pachypus* var. *jaegeri*), round-leaved filaree (*California macrophylla*), Parry's spineflower (*Chorizanthe parryi* var. *parryi*), and white-bracted spineflower (*Chorizanthe xanti* var. *leucotheca*). Of these five species, Nevin's barberry, Jaeger's bush milk-vetch, and round-leaved filaree are covered by the MSHCP. Parry's spineflower and white-bracted spineflower are not currently covered by the MSHCP and impacts to these individuals, if present, would be significant. As such, a mitigation measure is prescribed as MM BIO-1 in section 7.2.1, which requires a spring focused plant survey to be conducted within the off-site manufactured slope area located directly east of the site prior to ground disturbance in the appropriate blooming period (between April and June) to determine the presence/absence of Parry's spineflower and white-bracted spineflower. If either or both of these species are found within the off-site eastern manufactured slope area, MM BIO-1 outlines the necessary actions that are required to reduce impacts to the special-status plant species to less than significant.

6.3.1.2 Special-status Wildlife Species

Development of the study area would result in the disruption and removal of habitat and the loss and displacement of common wildlife species. A list of wildlife species observed within the study area is included in Appendix A. Due to the limited amount of native habitat to be removed and the level of existing disturbance from human activity within the vicinity (e.g., nearby development), these impacts would not be expected to reduce the general wildlife populations below self-sustaining levels within the region and impacts to common wildlife species do not meet the significance thresholds defined in Section 5.0, *Thresholds of Significance* above. Therefore, impacts to common wildlife species would not be considered a significant impact and no mitigation measures are required.

A total of 25 special-status wildlife species of the 43 species identified as occurring in the project vicinity in available databases (see section 4.7.6 above) are not considered to have a potential to occur within the study area due to the lack of suitable habitat or because the site is outside the known distribution range for the species. These species are listed in Appendix C. Since these species are not expected to be present on the study area, no impacts would occur as a result of project development and no mitigation measures are required.

As discussed in section 4.7.6, above, the remaining 19 special-status wildlife species were determined to have a potential to occur on the study area. Of these species, focused surveys were conducted for burrowing owl, which is conditionally covered by the MSHCP with additional surveys and mitigation required as discussed in further detail below. Of the remaining 17 potential special-status wildlife species, 12 species are covered by the MSHCP with no survey or conservation requirements for the study area, including coast horned lizard, orange-throated whiptail, red diamondback rattlesnake, golden eagle, Swainson's hawk, loggerhead shrike, coastal California gnatcatcher, northwestern San Diego pocket mouse, Stephens' kangaroo rat (covered by the SKR HCP), Los Angeles pocket mouse, San Diego black-tailed jackrabbit, and San Diego desert woodrat. Therefore, assuming payment of the applicable fees (the MSHCP Local Development Mitigation Fee and the SKR HCP fee for the Stephens' kangaroo rat) and compliance with required guidelines in the MSHCP (see section 7.2.5 below), no additional mitigation is required for these species.

The remaining six (6) species, the southern grasshopper mouse, American badger, western mastiff bat, pocketed free-tailed bat, lesser long-nosed bat, and pallid bat are not covered by the MSHCP. These species are listed as species of special concern by the CDFW and do not carry a federal or state listing as threatened or endangered. These species are considered to have a low to very low potential to occur on the study area based on the limited habitat and/or quality of the habitat, and no significant impacts are anticipated to these species as described below. The study area also has the potential to support migratory birds and raptors that are discussed further in 6.2.4.2 of this report.

- No significant impact to southern grasshopper mouse since this species is only considered to have a low potential to occur as it has not been recorded on CNDDB within the vicinity of the study area since 1938.

- No significant impact to American badger since this species was considered to have low potential to occur. The majority of the site is surrounded by development and a large portion of suitable habitat is disturbed. Additionally, this species has not been recorded on CNDDB within the vicinity of the study area since 1908.

- No significant impact to western mastiff bat since this species was only considered to have a low potential to occur for foraging with no suitable roosting habitat on the study area. Although bats in this family are known to be strong fliers and can fly long distances to forage, there is only a low probability that these species will travel to the study area based on the disturbance present on the study area and presence of surrounding development. The nearest CNDDB occurrence record of this species was recorded in 1990 approximately 3.0 miles to the southwest of the study area.

- No significant impact to pocketed free-tailed bat since this species was only considered to have a very low potential to occur for roost with no suitable roosting habitat on the study area. The potential for roosting was considered very low since this species typically prefers steeper cliffs for roosting habitat. Although little is known regarding home range for this species, the potential for roosting is also unlikely since the study area does not support adjacent foraging habitat.[11] There are only two CNDDB occurrence records in the vicinity.

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11 CDFW. 2000. California Wildlife Habitat Relationships System: Pocketed Free-tailed Bat. State of California, The Resources Agency. May 2000.

The nearest record is from 1985 approximately 6.5 miles to the southwest of the study area near March Air Force Base.

- No significant impact to lesser long-nosed bat since this species was only considered to have a very low potential to roost and forage on the study area. The potential was considered low since this species is not typically found in California. Records in California are typically vagrant migrants. This species has only been recorded once on CNDDB within the vicinity of the study area, which was in 1993 approximately 9.5 miles to the northeast in a residential neighborhood of Yucaipa.

- No significant impact to pallid bat since this species was only considered to have a very low potential to roost and forage on the study area. The potential was considered very low because of evidence of disturbance on the study area and the presence of surrounding development to the south, northeast, and west; this species is highly sensitive to disturbance. Additionally, this species has not been recorded on CNDDB within the vicinity since 1929.

The above six species were not considered for coverage under the MSHCP, indicating that regionally significant populations of these species do not exist within the MSHCP boundaries. Based on the above discussion, the study area is not capable of supporting large populations of these species and a loss of a few individuals, if present, would not expect to reduce regional population numbers. Therefore, any impacts to these species would be less than significant and no mitigation measures are considered required.

Burrowing Owl

The study area supports potentially suitable burrowing owl (Species of Special Concern) habitat, but no active burrowing owl burrows, signs, or individuals were found on-site during the Step I and Step II surveys.

Although the study area does not currently support burrowing owls, a pre-construction survey is required in compliance with the MSHCP. Specifically, in accordance with the County of Riverside's *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area* (County of Riverside, 2006), a pre-construction survey for burrowing owl within the study area is required within 30 days prior to ground disturbance to avoid potential direct take of burrowing owls in the future. A Condition of Approval (COA BIO-1) requiring this survey is provided in section 7.2.2 below, in addition to a recommended mitigation measure (MM BIO-2) should burrowing owls be present in the future. Mitigation is proposed consistent with the burrowing owl mitigation guidelines published by CDFW (CDFW, 2012).

6.3.2 Impacts to Sensitive Plant Communities

Threshold BIO-B: Would the project have a substantial adverse effect on any riparian habitat or other sensitive plant community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U. S. Fish and Wildlife Service?

No Impacts (Sensitive Plant Communities)

Less than Significant with Regulatory Compliance (CDFW Jurisdiction)

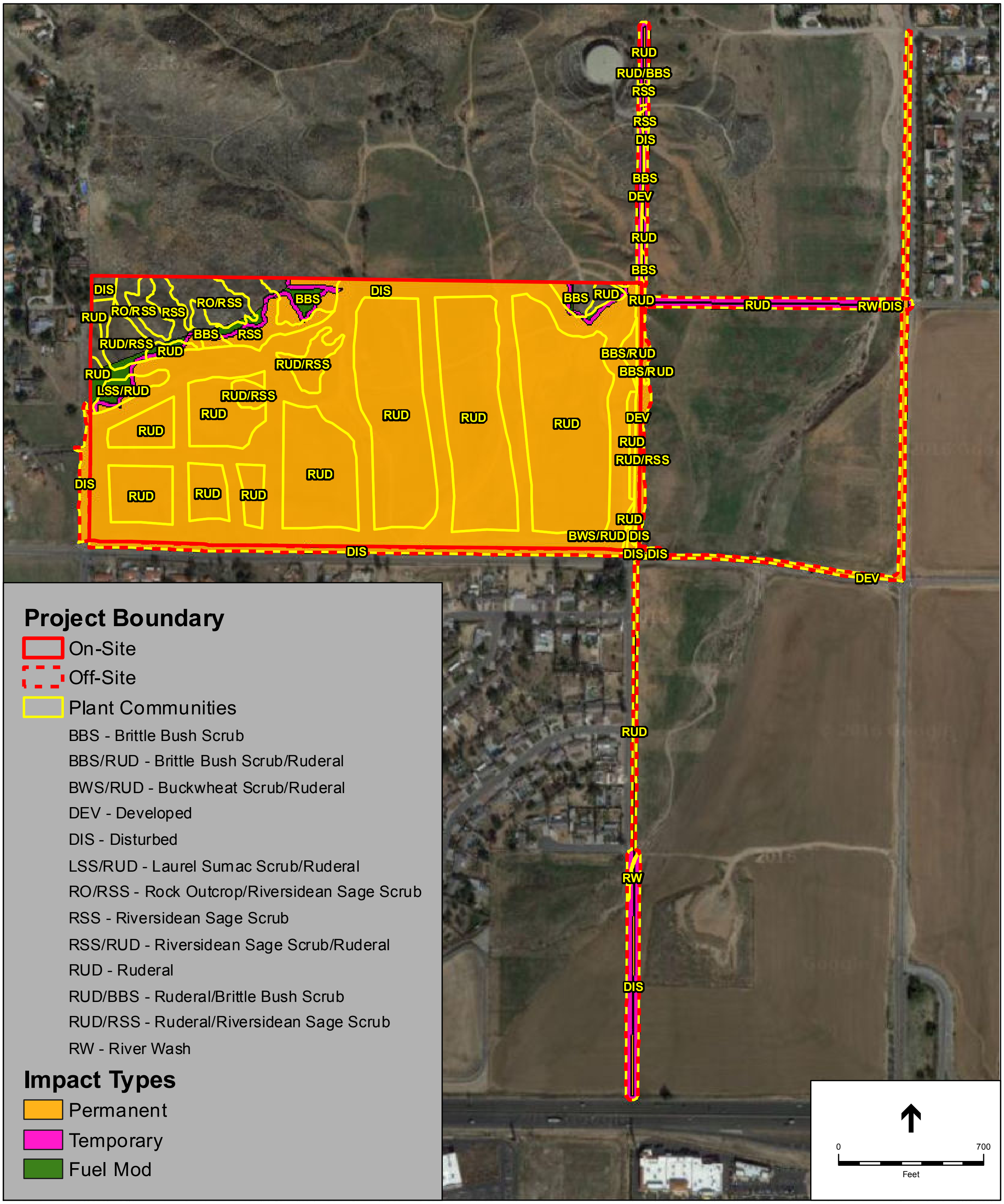
6.3.2.1 Sensitive Plant Communities

Sensitive plant communities were not observed within the study area; therefore, no impacts would occur. There are seven native communities on the study area that total 9.48 acres, including brittlebush scrub, brittlebush scrub/ruderal, buckwheat scrub/ruderal, laurel sumac scrub/ruderal, Riversidean sage scrub, Riversidean sage scrub/ruderal, and rock outcrop/Riversidean sage scrub. Permanent impacts to native communities on the study area are proposed to 2.91 acres, which is only 3.8 percent of the total proposed permanent impacts (75.81 acres) to plant communities. The majority of permanent impacts are proposed to ruderal (37.66 acres) and disturbed (30.54 acres) areas, which are dominated by non-native species. Impacts to these areas comprise 90.0 percent of the total impacts to plant communities on the study area. In addition to permanent impacts, 0.83 acres of fuel modification and 1.25 acres of temporary impacts are proposed to native communities on the study area. Impacts to plant communities are shown in **Figure 13**, *Impacts to Plant Communities* and **Table 6**, *Existing and Proposed Impacts to Plant Communities*.

TABLE 6
EXISTING AND PROPOSED IMPACTS TO PLANT COMMUNITIES

Plant Communities	Existing (acres)	Permanent Impacts (acres)	Fuel Modification Impacts (acres)	Temporary Impacts (acres)
Brittlebush Scrub	2.61	0.92	0.32	0.69
Brittlebush Scrub/Ruderal	0.52	0.51	0.00	0.01
Buckwheat Scrub/Ruderal	0.13	0.13	0.00	0.00
Laurel Sumac Scrub/Ruderal	0.78	0.36	0.26	0.16
Riversidean Sage Scrub	3.22	0.98	0.19	0.33
Riversidean Sage Scrub/Ruderal	0.07	0.01	0.00	0.06
Rock Outcrop/Riversidean Sage Scrub	2.15	0.00	0.06	0.00
River Wash	0.05	0.01	0.00	0.04
Ruderal	40.54	37.66	0.35	1.92
Ruderal/Brittlebush Scrub	0.04	0.01	0.00	0.03
Ruderal/Riversidean Sage Scrub	2.72	1.75	0.13	0.03
Disturbed	32.86	30.54	0.19	1.52
Developed	3.36	2.93	0.00	0.43
Total	**89.05**	**75.81**	**1.50**	**5.22**

SOURCE: ESA PCR, 2016



SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project

Figure 13

Impacts to Plant Communities

FSA PCR

6.3.2.2 CDFW Jurisdiction

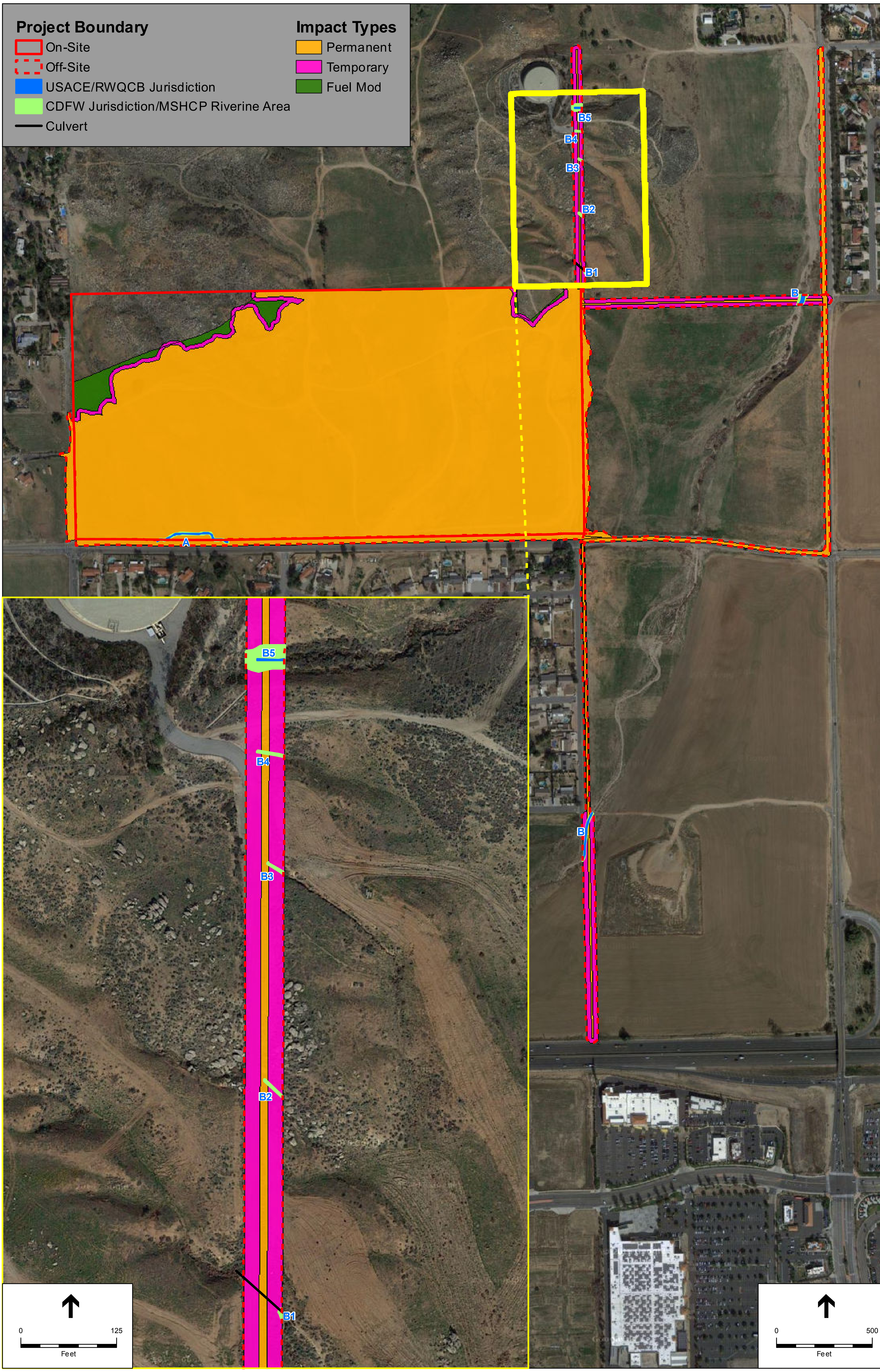
The project study areas support drainages that are considered CDFW jurisdictional streambeds pursuant to Section 1602 of the California Fish and Game Code and are proposed for impacts. Drainage A and Drainage Complex B are all jurisdictional, of which permanent impacts are proposed to Drainages A, B, B2, B3, B4, and B5 totaling 0.077 acre of permanent impacts (including 0.046 acre on-site and 0.031 acre off-site), as shown on **Figure 14**, *Impacts to Jurisdictional Features and MSHCP Riverine Areas*. Existing and impact acreages are summarized in **Table 7**, *Permanent Impacts to CDFW Jurisdictional Features and MSHCP Riverine Areas*. The permanent impacts total approximately 47 percent of the total 0.165 acre of CDFW jurisdiction identified within the on-site and off-site study areas. It should be noted that this report presumes combined impacts associated with the proposed water line alignment and two alternative alignments will occur. However, only one water line alignment will ultimately by implemented. Therefore, permanent and temporary impacts to CDFW jurisdictional waters will be slightly reduced once the final water line alignment is determined. Compensatory mitigation for permanent impacts to CDFW jurisdictional waters will be required for the project based only on impacts associated with the final water line alignment as part of subsequent CDFW Section 1602 permitting requirements. Temporarily impacted CDFW jurisdictional areas will be restored to pre-project conditions following completion of construction.

TABLE 7
IMPACTS TO CDFW JURISDICTIONAL FEATURES AND MSHCP RIVERINE AREAS[a]

Drainage (Study Area)	Existing (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)
Drainage A (On-Site)	0.046	0.046	-
Drainage A (Off-Site)	0.013	0.013	-
Drainage B (Off-Site)	0.069	0.011	0.058
Drainage B1 (Off-Site)	0.001	0.000	0.001
Drainage B2 (Off-Site)	0.001	0.000[b]	0.001
Drainage B3 (Off-Site)	0.001	0.000[c]	0.001
Drainage B4 (Off-Site)	0.001	0.000[d]	0.001
Drainage B5 (Off-Site)	0.033	0.007	0.026
Total	**0.165**	**0.077**	**0.088**

NOTES:
[a] MSHCP Riverine Areas are presumed equivalent to CDFW jurisdiction.
[b] Impacts are considered negligible; actual acreage of impacts to four decimal places is 0.0003 acre.
[c] Impacts are considered negligible; actual acreage of impacts to four decimal places is 0.0001 acre.
[d] Impacts are considered negligible; actual acreage of impacts to four decimal places is 0.0004 acre.

SOURCE: ESA PCR, 2016.



SOURCE: Google Maps, 2015.

Ironwood Village Project
Figure 14
Impacts to Jurisdictional Features and MSHCP Riverine Areas

ESA PCR

Impacts to CDFW jurisdictional features would be required to comply with Section 1602 of the California Fish and Game Code, including applying for a permit and providing compensatory streambed mitigation as stated above. A Condition of Approval (COA BIO-2) is proposed in section *7.2.3 Measures to Mitigate Potentially Significant Impacts to Jurisdictional Features* of this BRA to comply with the compensatory mitigation requirement of this regulation, subject to approval by CDFW. Compliance with Section 1602 of the California Fish and Game Code would reduce impacts to a less than significant level.

6.3.3 Impacts to Wetlands

Threshold BIO-C: Would the project have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Less than Significant with Regulatory Compliance

The project study areas do not support wetlands as defined by Section 404 of the Clean Water Act. However, the project study areas do support USACE/RWQCB ephemeral non-wetland jurisdictional streambeds regulated under Sections 404/401 of the Clean Water Act (CWA) that are proposed for impacts. Drainage A and Drainage B5 are considered jurisdictional "waters of the U.S.", of which permanent impacts are proposed totaling 0.034 acre(0.023 acre on-site and 0.011 acre off-site), as shown on Figure 14. Existing and permanent impact acreages are summarized in **Table 8**, *Permanent Impacts to USACE/RWQCB Jurisdictional Features*. The permanent impacts total less than 60 percent of the total 0.058 acre of USACE/RWQCB jurisdiction on-site and off-site. Temporarily impacted areas will be restored to pre-project conditions.

TABLE 8
IMPACTS TO USACE/RWQCB JURISDICTIONAL FEATURES

Drainage	Existing (acres)		Permanent Impacts (acres)		Temporary Impacts (acres)	
	Length (ft)	Area (acres)	Length (ft)	Area (acres)	Length (ft)	Area (acres)
Drainage A	285	0.023	285	0.023	0	0.000
Drainage A (off-site)	111	0.007	111	0.007	0	0.000
Drainage B (off-site)	306	0.026	40	0.004	266	0.022
Drainage B5 (off-site)	35	0.002	10	0.001	25	0.001
Total	**737**	**0.058**	**436**	**0.034**	**366**	**0.023**

SOURCE: ESA PCR, 2016

Impacts to USACE and RWQCB jurisdictional "waters of the U.S." would be required to comply with Sections 404 and 401 of the CWA, respectively, including applying for a permit and mitigation subject to approval by USACE and/or RWQCB. A Condition of Approval (COA

BIO-2) is proposed in section *7.2.3 Measures to Mitigate Potentially Significant Impacts to Jurisdictional Features* of this BRA to comply with the compensatory mitigation requirement of these regulations, subject to approval by USACE and RWQCB. Compliance with Sections 404 and 401 of the CWA is intended to reduce impacts to a less than significant level.

6.3.4 Impacts to Wildlife Movement and Migratory Species

Threshold BIO-D: Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery areas?

Less Than Significant (Wildlife Movement)

Less than Significant with Mitigation Incorporated (Migratory Species)

6.3.4.1 Wildlife Movement

As described in section 4.5.2 above, the study area supports potential live-in and movement habitat for species on a local scale (i.e., some limited live-in and at least marginal movement habitat for reptile, bird, and mammal species), but it likely provides little to no function to facilitate wildlife movement for wildlife species on a regional scale, and is not identified as a regionally important dispersal or seasonal migration corridor. Movement on a local scale likely occurs with species adapted to urban environments due to the development and disturbances in the vicinity of the study area. Although implementation of the project would result in disturbances to local wildlife movement within the study area, those species adapted to urban areas would be expected to persist on-site following construction, particularly within the open space areas. As such, impacts would be less than significant and no mitigation measures would be required. Since the study area does not function as a regional wildlife corridor and are not known to support wildlife nursery area(s), no impacts would occur and no mitigation measures would be required.

6.3.4.2 Migratory Species

Migratory Birds and Raptors

As previously discussed in section 4.7.6, *Special-status Wildlife Species*, the site supports potential nesting and foraging habitat for migratory birds, in addition to potential foraging habitat for raptors. Based on the disturbed nature of the site from agriculture and ongoing maintenance activities, the quality of foraging habitat is considered to be low. Higher quality foraging habitat is considered to occur in less developed areas with larger expanses of open space. The loss of a relatively small acreage of low quality foraging habitat as a result of the project would not be expected to impact the foraging of these species. Therefore, impacts to foraging habitat would be considered less than significant and no mitigation measures are considered required.

The study area has the potential to support songbird and raptor nests due to the presence of shrubs, ground cover, and limited trees on-site. Nesting activity typically occurs from February 15 to August 31. Disturbing or destroying active nests is a violation of the MBTA (16 U.S.C.

703 et seq.). In addition, nests and eggs are protected under Fish and Wildlife Code Section 3503. As such direct impacts to breeding birds (e.g. through nest removal) or indirect impacts (e.g. by noise causing abandonment of the nest) is considered a potentially significant impact as defined by the thresholds of significance (Threshold BIO-D) in Section 6.0 above. Compliance with the MBTA would reduce impacts to a less than significant level, as detailed in MM BIO-3 (see section 7.2.4).

6.2.5 Consistency with Local Policies and Ordinances

Threshold BIO-E: Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

No Impacts

The project does not conflict with any local policies or ordinances protecting biological resources, such as tree preservations or ordinances.

6.2.6 Consistency with Adopted Natural Community Conservation Plan

Threshold BIO-F: Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

Less than Significant with Mitigation Incorporated

The study area is within the Western Riverside County MSHCP and requires payment of the Local Development Mitigation Fee, compliance with requirements of the MSHCP including the Burrowing Owl Survey Area guidelines (Section 6.3.2 of the MSHCP), and the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools (Section 6.1.2 of the MSHCP). The study area is not within a cell, a designated cell group, or a subunit within the Reche Canyon/Badlands Area Plan; therefore, conservation of land on the study area is not required pursuant to the MSHCP. The study area is also not within the survey overlays for Criteria Area Species, Narrow Endemic Plant Species, Amphibian Species, or Mammal Species (Section 6.3.2 of the MSHCP). Since the study area is not within or in the vicinity of any Criteria Cells, the project will not result in edge effects that will adversely and directly affect biological resources within the MSHCP Conservation Area. As such, the project will not be subject to certain requirements outlined in the Guidelines Pertaining to the Urban/Wildlands Interface (Section 6.1.3 of the MSHCP) including those for the treatment and management of edge factors including night lighting, noise, barriers for public access and predators, and grading/land development limits. However, runoff from the site has the potential to indirectly affect MSHCP Conservation Areas downstream through the quantity and quality of water discharged from the site, in addition to the transport of plant seeds. Therefore compliance with the drainage, toxics, and invasive requirements outlined in Section 6.1.3 of the MSHCP would be required. A Condition of Approval (COA BIO-3) is proposed in section *7.2.5 Measures to Mitigate Potentially Significant Impacts to the MSHCP* of this BRA, which requires the project to comply with all provisions of the MSHCP prior to issuance of a grading permit. Compliance with COA BIO-3 would reduce impacts to a less than significant level.

Project compliance with the MSHCP pertaining to Burrowing Owl, Riparian/Riverine, and Urban/Wildlands Interface requirements for drainage, toxics and invasives are summarized below:

- The study area is within the Burrowing Owl Survey Area of the MSHCP. Focused burrowing owl surveys were conducted within all portions of the study area that support potentially suitable habitat for this species. No burrowing owls were observed on the study area. However, due to the presence of potentially suitable habitat, a 30-day pre-construction survey for burrowing owl is required pursuant to the MSHCP. If burrowing owls are found within the study area during the 30-day pre-construction survey, impacts to this species would be potentially significant. The Condition of Approval (COA BIO-1) and mitigation measure (MM BIO-2) prescribed in section 7.2.1 below would reduce this impact to a less than significant level and ensure consistency with the MSHCP.

- Drainage A and Drainage Complex B on the study area meet the definition of Riverine Areas pursuant to the MSHCP. The project will result in permanent impacts to 0.078 acre of Riverine Areas, including 0.046 acre within the on-site portion of Drainage A, 0.013 acre in the off-site portion of Drainage A, and 0.018 acre within Drainage Complex B. The permanent impacts are equivalent to approximately 47 percent of the total 0.165 acre of Riverine Areas within the project study areas. The proposed Riverine Areas impacts are summarized in Table 7.

- The biological function and value of the on- and off-site Riverine Areas within Drainage A and Drainage Complex B include the transport of water, which is restricted based on the ephemeral flows of the drainage and limited watershed. The function and value of the drainages are also limited since they support only small patches of upland and/or ruderal vegetation and are primarily unvegetated. Other types of aquatic features that could provide suitable habitat for Riparian/Riverine species, such as fairy shrimp, are not present within the study area (i.e. vernal pools, swales, vernal pool-like ephemeral ponds, seasonal ponds, stock ponds, or other human-modified depressions such as tire ruts, etc.).

- Impacts to Riverine Areas would be potentially significant based on requirements of the MSHCP. According to section 6.1.2 of the MSHCP, if an avoidance alternative is not feasible a Determination of Biologically Equivalent or Superior Preservation (DBESP) shall be made by the Project applicant to ensure the replacement of any lost functions and values of habitat as it relates to MSHCP Covered Species. The condition of approval prescribed in section 7.2.3 below pertaining to jurisdictional drainages ensures consistency with the MSHCP. The DBESP would be submitted to the City and reviewed and approved by the City and the Wildlife Agencies.

- The project has the potential to affect the quantity and quality of water in downstream MSHCP Conservation Areas or Riverine areas via Drainage A and Drainage Complex B through runoff generated by the development and transport of invasive, non-native plants species from project landscaping. Since the project will be required to comply with flood and water quality standards,[12] no indirect effects from the quantity and quality of run-off will occur to downstream areas. In addition, no invasive, non-native plant species listed in Tables 6-2 of the MSHCP, *Plants That Should Be Avoided Adjacent To The MSHCP Conservation Area*, will be utilized in the landscape plans. These measures will avoid impacts to water quality and the dispersal of invasive plant seeds in the watershed and are outlined in the Condition of Approval recommended in section 7.2.5 below.

12 The project will be required to prepare a Water Quality Management Plan and Storm Water Pollution Prevention Plan consistent with Regional Water Quality Control Board and County requirements that will outline measures such as Best Management Practices (BMPS) to address water quantity and quality, and to address any potential flooding.

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7.0 MITIGATION MEASURES AND CONDITIONS OF APPROVAL

7.1 Approach

Mitigation measures are recommended for those impacts determined to be significant to special-status biological resources (identified in italics in section 7.2 below). Mitigation measures for impacts considered to be "significant" were developed in an effort to reduce such impacts to a level of "insignificance," while at the same time allowing an opportunity to realize development goals under the proposed project. As stated in CEQA Guidelines Section 15370 mitigation includes:

1. Avoiding the impact altogether by not taking a certain action or parts of an action.
2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
3. Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment.
4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
5. Compensating for the impact by replacing or providing substitute resources or environments.

Where compliance with existing regulations and the issuance of permits by regulatory agencies would reduce impacts to a less than significant level, those measures are proposed as conditions of approval (identified in non-italics in section 7.2 below).

7.2 Mitigation Measures and Conditions of Approval for Significant Impacts

The following recommended mitigation measures (MM) and conditions of approval (COA) are intended to address potentially significant impacts from the proposed development Project.

7.2.1 Measures to Mitigate Potentially Significant Impacts to Special-Status Plant Species

MM BIO-1 Due to the presence of suitable habitat within the proposed off-site manufactured slope area located directly east of the project boundary, a spring focused plant survey to determine the presence/absence of Parry's spineflower and white-bracted spineflower is required to be conducted during the appropriate blooming periods of the two species (between April and June) prior to ground disturbance. If individuals are found, significant impacts would occur as a result of implementation of the project unless mitigation is implemented to reduce impacts to less than significant. Mitigation includes seed collection of individuals that would be significantly impacted by the project at the end of the growing season and prior to ground disturbance. Collected seeds will be planted within an appropriate on-site or off-site mitigation area, which will be conserved as open space in perpetuity. Mitigation for significant impacts to Parry's spineflower and white-bracted spineflower will be implemented in consultation with the City of Moreno Valley and CDFW.

7.2.2 Measures to Mitigate Potentially Significant Impacts to Special-Status Wildlife Species

COA BIO-1 Due to the presence of suitable habitat and in compliance with the MSHCP, a pre-construction survey for burrowing owl is required within 30 days prior to ground disturbance to determine the presence of burrowing owls and avoid potential direct take of burrowing owls if present.

MM BIO-2 If burrowing owls are determined present during the 30-day pre-construction survey, occupied burrows shall be avoided to the greatest extent feasible, following the guidelines in the Staff Report on Burrowing Owl Mitigation published by Department of Fish and Wildlife (CDFW, 2012) including, but not limited to, conducting pre-construction surveys, avoiding occupied burrows during the nesting and non-breeding seasons, implementing a worker awareness program, biological monitoring, establishing avoidance buffers, and flagging burrows for avoidance with visible markers. If occupied burrows cannot be avoided, acceptable methods may be used to exclude burrowing owl either temporarily or permanently, pursuant to a Burrowing Owl Exclusion Plan that shall be prepared and approved by the County of Riverside Environmental Programs Department (EPD), in coordination with the CDFW. The Burrowing Owl Exclusion Plan shall be prepared in accordance with the guidelines in the Staff Report on Burrowing Owl Mitigation and the MSHCP.

In accordance with the MSHCP, take of active nests will be avoided. Passive relocation (i.e., the scoping of the burrows by a burrowing owl biologist and collapsing burrows free of young) will occur when owls are present outside the nesting season. The EPD may require translocation sites for the burrowing owl to be created in the MSHCP reserve for the establishment of new colonies pursuant to MSHCP objectives for the species. Translocation sites, if required, will be identified in consultation with EPD and/or CDFW taking into consideration unoccupied habitat areas, presence of burrowing mammals, existing colonies, and effects to other MSHCP Covered Species.

7.2.3 Measures to Mitigate Potentially Significant Impacts to Jurisdictional Features

COA BIO-2 Prior to the issuance of any grading permit for permanent impacts in the areas designated as jurisdictional features, the project applicant shall obtain regulatory permits from the USACE, RWQCB, and CDFW. The following shall be incorporated into the permitting, subject to approval by the regulatory agencies:

1. On-site or off-site creation, restoration and/or enhancement of USACE/RWQCB jurisdictional "waters of the U.S." within the San Jacinto watershed at a ratio no less

than 1:1 or within an adjacent watershed at a ratio no less than 2:1 for permanent impacts, and for any temporary impacts to restore the impact area to pre-project conditions (i.e. pre-project contours). Off-site mitigation may occur on land acquired for the purpose of in-perpetuity preservation as approved by the resource agencies, or through the purchase of mitigation credits at a resource agency-approved off-site mitigation bank or in-lieu fee program.

2. On-site or off-site creation, restoration, and/or enhancement of CDFW jurisdictional streambed within the San Jacinto watershed at a ratio no less than 1:1 or within an adjacent watershed at a ratio no less than 2:1 for permanent impacts, and for any temporary impacts to restore the impact area to pre-project conditions (i.e. pre-project contours). Off-site mitigation may occur on land acquired for the purpose of in-perpetuity preservation as approved by the resource agencies, or through the purchase of mitigation credits at a resource agency-approved off-site mitigation bank or in-lieu fee program.

Purchase of any mitigation credits through an agency-approved mitigation bank or in-lieu fee program should occur prior to any impacts to jurisdictional drainages. Any mitigation proposed on land acquired for the purpose of in-perpetuity mitigation that is not part of an agency-approved mitigation bank or in-lieu fee program shall include the creation, restoration, and/or enhancement of similar streambed habitat pursuant to a resource agency-approved Habitat Mitigation and Monitoring Plan (HMMP). The HMMP shall be prepared prior to any impacts to jurisdictional features, and shall provide details as to the implementation of the mitigation, maintenance, and future monitoring of mitigation areas. The goal of the mitigation shall be to create, restore, and/or enhance similar habitat with equal or greater function and value than the impacted habitat.

7.2.4 Measures to Mitigate Potentially Significant Impacts to Migratory or Nesting Birds

MM BIO-3 Prior to the issuance of any grading permit that would remove potentially suitable nesting habitat for raptors or songbirds, the project applicant shall demonstrate to the satisfaction of the City of Moreno Valley that either of the following have been or will be accomplished:

1. Vegetation removal activities shall be scheduled outside the nesting season (September 1 to February 14 for songbirds; September 1 to January 14 for raptors) to avoid potential impacts to nesting birds.

2. Any construction activities that occur during the nesting season (February 15 to August 31 for songbirds; January 15 to August 31 for raptors) will require that all suitable habitat be thoroughly surveyed for the presence of nesting birds by a qualified biologist before commencement of clearing. If any active nests are detected a buffer of 300 feet (500 feet for raptors) around the nest adjacent to construction will be delineated, flagged, and avoided until the nesting cycle is complete. The buffer may be modified and/or other recommendations proposed as determined appropriate by the biological monitor to minimize impacts.

7.2.5 Measures to Mitigate Potentially Significant Impacts to the MSHCP

COA BIO-3 Prior to the issuance of any grading permit the project applicant shall comply with all of the provisions of the MSHCP, including payment of the MSHCP Local Development Mitigation Fee, compliance with Section 6.1.2 of the MSHCP pertaining to Riparian/Riverine Areas, implementation of drainage, toxics and non-native species guidelines pertaining to the Urban/Wildlands Interface in Section 6.1.4 of the MSHCP, and compliance with Section 6.3.2 of the MSHCP pertaining to Burrowing Owl Survey Area requirements. Compliance with Section 6.1.2 of the MSHCP will require preparation of a Determination of Biologically Equivalent or Superior Preservation (DBESP) analysis outlining the impacts and proposed compensatory mitigation for impacts to the Riparian/Riverine Areas for submittal and approval by the City of Moreno Valley and the wildlife agencies (CDFW and USFWS).

8.0 IMPACTS AFTER MITIGATION

8.1 Level of Significance after Mitigation

The proposed project, inclusive of mitigation measures and conditions of approval, would have less than significant impacts to special-status species, jurisdictional features, and migratory and/or nesting birds, in addition to providing MSHCP consistency.

8.2 Cumulative Impacts

Cumulative impacts are defined as the direct and indirect effects of a proposed project which, when considered alone, would not be deemed a substantial impact, but when considered in addition to the impacts of related projects in the area, would be considered significant. "Related projects" refers to past, present, and reasonably foreseeable probable future projects, which would have similar impacts to the proposed Project. CEQA deems a cumulative impact analysis to be adequate if a list of "related projects" is included in the EIR or the proposed project is consistent with an adopted general, specific, master, or comparable programmatic plan [Section 15130(b)(1)(B)]. CEQA also states that no further cumulative impact analysis is necessary for impacts of a proposed project consistent with an adopted general, specific, master, or comparable programmatic plan [Section 15130(d)].

The MSHCP identifies areas for long-term conservation and management. As such, cumulative impacts of proposed projects within authorized take lands are minimized through the conservation of land. Cumulative impacts to the biological resources listed below for the study area are considered to be less than significant based on compliance with the Western Riverside County MSHCP, and regulations for jurisdictional waters. This includes implementation of the mitigation measures and conditions of approval outlined above in section 6.*0*, *Project Related Impacts* and *7.0, Mitigation Measures and Conditions of Approval*. Since the study area was determined not to function as a regional wildlife movement corridor, this biological resource is not included below.

- Special-status plant species (Parry's spineflower and white-bracted spineflower);
- Burrowing owl;
- Migratory and/or nesting birds; and
- Drainage features (including USACE, RWQCB and CDFW jurisdictional features and MSHCP Riparian/Riverine areas).

The proposed mitigation would result in a minimum no-net-loss of the biological function and value of these resources, and the conditions of approval would ensure compliance with existing regulations (such as the Western Riverside County MSHCP) and regulations for jurisdictional drainages. Therefore, with the proposed mitigation and conditions of approval, impacts would not be considered cumulatively significant. A summary is provided below.

<u>Special-Status Plant Species:</u> Mitigation is proposed and includes a spring focused survey prior to ground disturbance to determine the presence/absence of Parry's spineflower and white-bracted spineflower within the off-site eastern manufactured slope area. If either or both of these species are observed, collection of seed and planting within an on-site or off-site mitigation site is required. The mitigation site is required to be preserved as open space in perpetuity. With this mitigation measure, any impacts to Parry's spineflower and white-bracted spineflower would not be considered cumulatively significant.

<u>Special-Status Wildlife Species:</u> Mitigation is proposed if burrowing owls are observed on the study area in the future, which would avoid direct impacts in compliance with the Western Riverside County MSHCP. Mitigation is also proposed to avoid direct impacts to raptors and migratory bird species through compliance with the MBTA. With these mitigation measures, any impacts would not be considered cumulatively significant.

<u>Jurisdictional Drainages:</u> Impacts to jurisdictional features would be subject to permitting with the regulatory agencies, including USACE, RWQCB and/or CDFW, including compensatory mitigation. With the proposed compliance of existing regulations through the permitting process, impacts would not be considered cumulatively significant.

<u>Riparian/Riverine Areas:</u> Impacts to MSHCP Riparian/Riverine areas would be subject to approval of a DBESP by the City of Moreno Valley and Wildlife Agencies, as required in Section 6.1.2 of the Western Riverside County MSHCP. With the approval and implementation of the DBESP impacts would not be considered cumulatively significant. Mitigation is proposed as compensation for impacts to jurisdictional drainages through the regulatory process as described above.

9.0 REFERENCES

American Ornithologists' Union. 1998. *The American Ornithologists' Union Checklist of North American Birds. 7th Edition*. American Ornithologists' Union, Washington, D.C. June.

Baldwin, B. G., Editor. 2012. The Jepson Manual: Vascular Plants of California, Second Edition. University of California Press, Berkeley, California

Barbour, Michael G., Keeler-Wolf, Todd, and Schoenherr, Allan A. 2007. *Terrestrial Vegetation of California* Third Edition. University of California Press.

Bennett, A. F. 1990. *Habitat Corridors and the Conservation of Small Mammals in a Fragmented Forest Environment*. Landscape Ecol. 4:109-122.

California Herps. 2015**.** *A Guide to the Amphibians and Reptiles of California*. Available online (http://www.californiaherps.com).

CDFW (California Department of Fish and Wildlife). 2015. *California Natural Diversity Database* (available by subscription) and *Rarefind*. CDFW: Sacramento, California.

CDFW. 2012. *Staff Report on Burrowing Owl Mitigation*. State of California Natural Resources Agency. March 7, 2012.

CDFW. 2010. *Natural Communities List*. The Vegetation Classification and Mapping Program. California Department of Fish and Wildlife. Sacramento, CA. September 2010.

CDFW. 2009. *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities*. State of California, California Natural Resources Agency. November 24, 2009.

CDFW. 2000a. *Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities*. State of California, The Resources Agency. December 9, 1983; revised May 8, 2000.

CDFW. 2000b. *California Wildlife Habitat Relationships System: Pocketed Free-tailed Bat*. State of California, The Resources Agency. May 2000.

CNPS (California Native Plant Society). 2015. *Inventory of Rare and Endangered Plants of California*. California Native Plant Society. Available online (http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi).

Clarke, O.F. 2007. *Flora of the Santa Ana River and Environs with References to World Botany*. Heyday Books: Berkeley, California.

County of Riverside. 2006. *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area*. March 29, 2006.

Dudek & Associates. 2003. *Western Riverside County Multiple Species Habitat Conservation Plan* (*MSHCP*). *Final MSHCP, Volumes I and II*. Prepared for County of Riverside Transportation and Lands Management Agency by Dudek & Associates, Inc. Approved June 17, 2003.

Earth Survey. 2015. PLSS in Google Earth (PLSGE). Available online at: http://www.metzgerwillard.us/ plss/plss.html

Environmental Laboratory. 1987. *U.S. Army Corps of Engineers Wetlands Delineation Manual*, Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Fahrig, L. and G. Merriam. 1985. *Habitat Patch Connectivity and Population Survival*. Ecology. 66:1762-1768.

Harris, L. D. and P. B. Gallagher. 1989. New Initiatives for Wildlife Conservation: The Need for Movement Corridors. Pages 11-34 in G. Mackintosh, ed. *Preserving Communities and Corridors*. Defenders of Wildlife. Washington D.C. 96 pp.

Holland, R. F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. State of California, the Resource Agency. October 1986.

Jameson, Jr., E. W., and H. J. Peeters. 1988. *California Mammals*. Berkeley: University of California Press.

MacArthur, R. M. and E. O. Wilson. 1967. *The Theory of Island Biogeography*. Princeton University Press: Princeton, New Jersey.

Munz, P. A. 1974. *A Flora of Southern California*. Berkeley: University of California Press.

Noss, R. F. 1983. *A Regional Landscape Approach to Maintain Diversity*. BioScience. 33:700-706.

NRCS (Natural Resources Conservation Service). 2015. Web Soil Survey. Available online (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx).

Riverside County TLMA (Transportation & Land Management Agency). 2015. RCIP Conservation Summary Report Generator. Available online at: http://www.rctlma.org/online /content/rcip_report_ generator.aspx.

Sawyer, John O., T. Keeler-Wolf, and J. Evens. 2009. *A Manual of California Vegetation, Second Edition*. Sacramento: California Native Plant Society.

Simberloff, D. and J. Cox. 1987. *Consequences and Costs of Conservation Corridors*. Conserv.Biol. 1:63-71.

Soulé, M. E. 1987. *Viable Populations for Conservation*. Sinaur Associates Inc., Publishers, Sunderland, Massachusetts.

South Coast Wildlands. 2008. *South Coast Missing Linkages: A Wildland Network for the South Coast Ecoregion*. South Coast Wildlands, Idyllwild, CA. www.scwildlands.org. March 2008.

Stebbins, R. C. 2003. *A Field Guide to Western Reptiles and Amphibians Third Edition.* Boston: Houghton-Mifflin.

USACE (U.S. Army Corps of Engineers). 2008a. *A Field Guide to the Identification of the Ordinary High Water Mark* (*OHWM*) *in the Arid West Region of the Unites States*. Technical Report TR-08-12, Ed. R.W. Lichvar, S.M. McColley. Hanover, New Hampshire: Cold Regions Research and Engineering Laboratory. August.

USACE. 2008b. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (*Version 2.0*). Ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERCD/EL TR-06-16. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

USFWS (U.S. Fish and Wildlife Service). 2015a. Species Occurrence Data. Provided by USFWS.

USFWS. 2015b. Critical Habitat Mapping. GIS files provided by USFWS.

USFWS. 2000. *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants.* United States Fish and Wildlife Service. January 2000.

USGS (U.S. Geological Survey). 1967. *Sunnymead, California* topographic quadrangle map. Photorevised 1980.

APPENDIX A - FLORAL AND FAUNAL COMPENDIUM

ANGIOSPERMS (DICOTYLEDONS)

SCIENTIFIC NAME	COMMON NAME
Adoxaceae	**Muskroot Family**
Sambucus nigra ssp. *caerulea*	blue elderberry
Anacardiaceae	**Sumac or Cashew Family**
Rhus ovata	sugar sumac
Asteraceae	**Sunflower Family**
Ambrosia acanthicarpa	flatspine bur ragweed
Artemisia californica	California sagebrush
Artemisia douglasiana	mugwort
Baccharis salicifolia	mule fat
Brickellia desertorum	desert brickellbush
* *Centaurea melitensis*	tocalote
Corethrogyne filaginifolia	common sandaster
Deinandra fasciculata	fascicled tarplant
Encelia farinosa	brittlebush
Ericameria pinifolia	pinebush
Erigeron canadensis	horseweed
* *Helianthus annuus*	common sunflower
Heterotheca grandiflora	telegraphweed
* *Lactuca serriola*	prickly lettuce
* *Oncosiphon piluliferum*	stinknet
Pseudognaphalium bicolor	bicolored cudweed
* *Salsola tragus*	prickly Russian thistle
Stephanomeria virgata	rod wirelettuce
Boraginaceae	**Borage Family**
Amsinckia intermedia	common fiddleneck
Phacelia cicutaria	caterpillar phacelia
Brassicaceae	**Mustard Family**
* *Hirschfeldia incana*	short pod mustard
* *Raphanus raphanistrum*	wild radish
* *Sisymbrium irio*	London rocket
Sisymbrium sp.	mustard

* *non-native*

ANGIOSPERMS (DICOTYLEDONS)

SCIENTIFIC NAME	COMMON NAME
Cactaceae	**Cactus Family**
Cylindropuntia californica var. *parkeri*	cane cholla
Opuntia littoralis	coast prickly pear
Chenopodiaceae	**Goosefoot Family**
* *Chenopodium murale*	nettle-leaved goosefoot
Convolvulaceae	**Morning-Glory Family**
* *Convolvulus arvensis*	field bindweed
Cucurbitaceae	**Gourd Family**
Cucurbita palmata	coyote gourd
Marah macrocarpa	wild cucumber
Cuscutaceae	**Dodder Family**
Cuscuta sp.	dodder
Euphorbiaceae	**Spurge Family**
Croton setigerus	dove weed
Euphorbia albomarginata	rattlesnake weed
Fabaceae	**Legume Family**
Acmispon americanus	Spanish lotus
Acmispon glaber var. *glaber*	deerweed
Geraniaceae	**Geranium Family**
* *Erodium botrys*	longbeak stork's bill
* *Erodium cicutarium*	red-stemmed filaree
Lamiaceae	**Mint Family**
* *Marrubium vulgare*	horehound
Salvia apiana	white sage
Salvia columbariae	chia
Salvia mellifera	black sage
Trichostema lanceolatum	vinegarweed
Malvaceae	**Mallow Family**
* *Malva parviflora*	cheeseweed
Myrtaceae	**Myrtle Family**
* *Eucalyptus camaldulensis*	red gum
* *Eucalyptus citriodora*	lemon scented gum
Nyctaginaceae	**Four O'Clock Family**
Mirabilis laevis	wishbone bush

Attachment: Biological Resources Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

* *non-native*

ANGIOSPERMS (DICOTYLEDONS)

SCIENTIFIC NAME	COMMON NAME
Polygonaceae	**Buckwheat Family**
Eriogonum fasciculatum	California buckwheat
Salix gooddingii	black willow
Scrophulariaceae	**Figwort Family**
Antirrhinum nuttallianum	Nuttall's snapdragon
Scrophularia californica	California figwort
Solanaceae	**Nightshade Family**
Datura wrightii	jimsonweed
* *Nicotiana glauca*	tree tobacco
Solanum douglasii	Douglas' nightshade
Solanum xanti	purple nightshade
Zygophyllaceae	**Caltrop Family**
* *Tribulus terrestris*	puncturevine

ANGIOSPERMS (MONOCOTYLEDONS)

SCIENTIFIC NAME	COMMON NAME
Arecaceae	**Palm Family**
* *Washingtonia robusta*	Mexican fan palm
Liliaceae	**Lily Family**
Chlorogalum pomeridianum	soap plant
Poaceae	**Grass Family**
* *Arundo donax*	giant reed
* *Avena fatua*	wild oat
* *Bromus diandrus*	ripgut grass
* *Bromus madritensis* ssp. *rubens*	foxtail chess
* *Festuca perennis*	Italian ryegrass
* *Hordeum vulgare*	barley
* *Lamarckia aurea*	goldentop
* *Polypogon monspeliensis*	annual beard grass
* *Schismus barbatus*	Mediterranean schismus

* *non-native*

REPTILES

SCIENTIFIC NAME	COMMON NAME
Colubridae	**Colubrid Snakes**
Coluber flagellum	coachwhip
Phrynosomatidae	**Zebratail, Earless, Horned, Spiny, Fringe-Toed Lizards**
Sceloporus occidentalis	western fence lizard

BIRDS

SCIENTIFIC NAME		COMMON NAME
Cathartidae		**New World Vultures**
	Cathartes aura	*turkey vulture*
Accipitridae		**Hawks**
	Accipiter cooperii	*Cooper's hawk*
	Buteo jamaicensis	*red-tailed hawk*
Falconidae		**Falcons**
	Falco sparverius	*American kestrel*
Charadriidae		**Plovers**
	Charadrius vociferus	*killdeer*
Columbidae		**Pigeons and Doves**
*	*Columba livia*	*rock pigeon*
	Zenaida macroura	*mourning dove*
Apodidae		**Swifts**
	Aeronautes saxatalis	*white-throated swift*
Trochilidae		**Hummingbirds**
	Archilochus alexandri	*black-chinned hummingbird*
	Calypte anna	*Anna's hummingbird*
Picidae		**Woodpeckers**
	Picoides nuttallii	*Nuttall's woodpecker*
Tyrannidae		**Tyrant Flycatchers**
	Sayornis nigricans	*black phoebe*
	Sayornis saya	*Say's phoebe*
	Tyrannus verticalis	*western kingbird*
	Tyrannus vociferans	*Cassin's kingbird*
Laniidae		**Shrikes**
	Lanius ludovicianus	*loggerhead shrike*

** non-native*

BIRDS

SCIENTIFIC NAME		COMMON NAME
Corvidae		**Jays and Crows**
	Corvus brachyrhynchos	*American crow*
Alaudidae		**Larks**
	Eremophila alpestris	*horned lark*
Hirundinidae		**Swallows**
	Petrochelidon pyrrhonota	*cliff swallow*
	Hirundo rustica	*barn swallow*
	Stelgidopteryx serripennis	*northern rough-winged swallow*
Aegithalidae		**Bushtits**
	Psaltriparus minimus	*bushtit*
Polioptilidae		**Gnatcatchers**
	Polioptila californica californica	*coastal California gnatcatcher*
Sturnidae		**Starlings**
*	*Sturnus vulgaris*	*European starling*
Emberizidae		**Emberizine Sparrows and Allies**
	Melozone crissalis	*California towhee*
Icteridae		**Blackbirds**
	Agelaius phoeniceus	*red-winged blackbird*
Fringillidae		**Finches**
	Haemorhous mexicanus	*house finch*
	Spinus psaltria	*lesser goldfinch*
	Spinus tristis	*American goldfinch*
Passeridae		**Old World Sparrows**
*	*Passer domesticus*	*house sparrow*

MAMMALS

SCIENTIFIC NAME	COMMON NAME
Sylvilagus audubonii sanctidiegi	Audubon's cottontail

* *non-native*

APPENDIX B: SPECIAL-STATUS PLANT SPECIES

Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
BRYOPHYTES								
Bryaceae	**Moss Family**							
Tortula californica	California screw moss	N/A	NONE	NONE	1B.2	NONE	Sandy soil. Chenopod scrub, Valley and foothill grassland. 10-1460 meters.	**ABSENT**
ANGIOSPERMS (DICOTS)								
Asteraceae	**Sunflower Family**							
Ambrosia pumila	San Diego ambrosia	Apr.-Oct.	FE	NONE	1B.1	MSHCP(b)	Chaparral, coastal scrub, valley and foothill grassland, vernal pools; often in disturbed areas; sometimes alkaline sandy loam or clay soils. 20-415 meters.	**NONE**
Artemisia palmeri	San Diego sagewort	May-Sep.	NONE	NONE	4.2	MSHCP	Coastal scrub, chaparral, riparian forest, riparian woodland, riparian scrub; found in sandy soils within drainages and riparian areas. 15-915 meters.	**NONE**
Centromadia pungens ssp. *laevis*	smooth tarplant	Apr.-Sep.	NONE	NONE	1B.1	MSHCP(d)	Chenopod scrub, meadows and seeps, playas, riparian woodland, valley and foothill grassland; alkaline. 0-640 meters.	**ABSENT**
Deinandra paniculata	paniculate tarplant	Apr.-Nov.	NONE	NONE	4.2	NONE	Generally vernally mesic; coastal scrub; valley and foothill grassland; vernal pools 25-940 meters.	**NONE**
Helianthus nuttallii ssp. *parishii*	Los Angeles sunflower	Aug.-Oct.	NONE	NONE	1A	NONE	Freshwater marsh, salt marsh. 10-1675 meters.	**NONE**
Lasthenia glabrata ssp. *coulteri*	Coulter's goldfields	Feb.-Jun.	NONE	NONE	1B.1	MSHCP(d)	Marshes and swamps (coastal salt), playas, vernal pools. 1-1220 meters.	**NONE**

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Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
Senecio astephanus	San Gabriel ragwort	May-Jul.	NONE	NONE	4.3	NONE	Chaparral, coastal bluff scrub; rocky slopes. 400-1500 meters.	**NONE**
Symphyotrichum defoliatum	San Bernardino aster	Jul.-Nov.	NONE	NONE	1B.2	NONE	Cismontane woodland; coastal scrub; lower montane coniferous forest; meadows and seeps; marshes and swamps; valley and foothill grassland (vernally mesic); near ditches, streams and springs. 2-2040 meters.	**ABSENT**
Trichocoronis wrightii var. *wrightii*	Wright's trichocoronis	May-Sep.	NONE	NONE	2B.1	MSHCP(b)	Meadows and seeps, marshes and swamps, riparian scrub, vernal. 5-435 meters.	**NONE**
Aspleniaceae	**Spleenwort Family**							
Asplenium vespertinum	western spleenwort	Mar.-Jun.	NONE	NONE	4.2	NONE	Sandy soils in low-gradient washes, alluvial terraces, and canyon bottoms, along gravelly wash margins, or on coarse soils on steep, generally north-facing slopes in alluvial scrub, cismontane (e.g., chamise) chaparral, coastal sage scrub, oak woodland, and/or riparian scrub or woodland. 274 - 825 meters.	**NONE**
Berberidaeeae	**Barberry Family**							
Berberis nevinii	Nevin's barberry	Mar.-Jun.	FE	SE	1B.1	MSHCP(d)	Sandy soils in low-gradient washes, alluvial terraces, and canyon bottoms, along gravelly wash margins, or on coarse soils on steep, generally north-facing slopes in alluvial scrub, cismontane (e.g., chamise) chaparral, coastal sage scrub, oak woodland, and/or riparian	**ABSENT**

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Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
							scrub or woodland. 274 - 825 meters.	
Nasturtium gambelii	Gambel's water cress	Apr.-Oct.	FE	ST	1B.1	NONE	Marshes or swamps. 5-330 meters.	**NONE**
Boraginaceae	**Borage Family**							
Harpagonella palmeri	Palmer's grapplinghook	Mar.-May	NONE	NONE	4.2	MSHCP	Chaparral, coastal scrub, valley and foothill grassland; open grassy areas within shrubland; clay soils. 20-955 meters.	**NONE**
Brassicaceae	**Mustard Family**							
Caulanthus simulans	Payson's jewel-flower	Feb.-Jun.	NONE	NONE	4.2	MSHCP	Chaparral, coastal scrub; sandy, granitic soils. 90-2200 meters.	
Lepidium virginicum var. robinsonii	Robinson's pepper-grass	Jan.-Jul.	NONE	NONE	4.3	NONE	Chaparral, coastal scrub; shrubland; dry soils. 1-885 meters.	**NONE**
Cactaceae	**Cactus Family**							
Opuntia basilaris var. brachyclada	short-joint beavertail	Apr.-Jun.	NONE	NONE	1B.2	NONE	Chaparral, Joshua tree woodland, Mojavean desert scrub, pinyon-juniper woodland, riparian woodland; sandy or granitic soils. 425-1800 meters.	**NONE**
Caryophyllaceae	**Pink Family**							
Arenaria paludicola	marsh sandwort	May-Aug.	FE	SE	1B.1	NONE	Marshes and swamps (freshwater); grows through dense areas of *Typha*, *Juncus*, and *Scirpus*; found in sandy soils. 3-170 meters.	**NONE**
Chenopodiaceae	**Saltbush Family**							
Atriplex coronata var. *notatior*	San Jacinto Valley crownscale	Apr.-Aug.	FE	NONE	1B.1	MSHCP(d)	Alkaline flats, playas, valley and foothill grassland, vernal pools. 139-500 meters.	**NONE**
Atriplex pacifica	South Coast saltscale	Mar.-Oct.	NONE	NONE	1B.2	NONE	Coastal bluff scrub, Coastal dunes, Coastal scrub, Playas. 0-140 meters.	**NONE**

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Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
Atriplex parishii	Parish's brittlescale	Jun.-Oct.	NONE	NONE	1B.1	MSHCP(d)	Shadscale scrub, alkali sinks, freshwater wetlands, wetland-riparian; playas, vernal pools. 25-1900 meters.	**NONE**
Atriplex serenana var. *davidsonii*	Davidson's saltscale	Apr.-Oct.	NONE	NONE	1B.2	MSHCP(d)	Coastal sage scrub, wetland-riparian; coastal. 10-200 meters	**NONE**
Convolvulaceae	**Morning-glory Family**							
Convolvulus simulans	small-flowered morning-glory	Mar.-Jul.	NONE	NONE	4.2	MSHCP(e)	Clay soils, serpentinite seeps; openings in chaparral; coastal sage scrub; valley and foothill grassland. 30-700 meters.	**NONE**
Cuscuta obtusiflora var. *glandulosa*	Peruvian dodder	Jul.-Oct.	NONE	NONE	2B.2	NONE	Marshes and swamps (freshwater). 15-280 meters.	**NONE**
Fabaceae	**Pea Family**							
Astragalus hornii var. hornii	Horn's milk-vetch	May-Oct.	NONE	NONE	1B.1	MSHCP	Meadows and seeps, playas, lake margins; alkali soils. 60-850 meters.	**NONE**
Astragalus pachypus var. jaegeri	Jaeger's bush milk-vetch	Dec.-Jun.	NONE	NONE	1B.1	MSHCP	Coastal scrub, chaparral, valley and foothill grassland, cismontane woodland; dry habitats, such as ridges, valleys, and sandy slopes, typically within grasslands and oak chaparral. 365-915 meters.	**ABSENT**
Rupertia rigida	Parish's rupertia	Jun.-Aug.	NONE	NONE	4.3	NONE	Chaparral, lower montane coniferous forest, cismontane woodland, meadows and seeps, pebble plain, valley and foothill grassland. 700-2500 meters	**NONE**

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Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
Geraniaceae	**Geranium Family**							
California macrophylla	round-leaved filaree	Mar.-May	NONE	NONE	1B.1	MSHCP(d)	Cismontane woodland, valley and foothill grassland; clay. 15-1200 meters.	**ABSENT**
Grossulariaceae	**Gooseberry Family**							
Ribes divaricatum var. parishii	Parish's gooseberry	Feb.-Apr.	NONE	NONE	1A	NONE	Riparian woodland. 65-300 meters.	**NONE**
Hydrophyllaceae	**Waterleaf Family**							
Nama stenocarpa	mud nama	Jan.-Jul.	NONE	NONE	2.B2	MSHCP(d)	Marches and swamps (lake margins, riverbanks). 5-500 meters.	**NONE**
Juglandaceae	**Walnut Family**							
Juglans californica	California black walnut	Mar.-Jun.	NONE	NONE	4.2	MSHCP	Chaparral, coastal scrub, cismontane woodland, slopes, canyons, alluvial habitats. 50-900 meters.	**NONE**
Juglandaceae	**Walnut Family**							
Lepechinia cardiophylla	heart-leaved pitcher sage	Apr.-Jul.	NONE	NONE	1B.2	MSHCP(d)	Closed-cone coniferous forest, chaparral, cismontane woodland. 520-1370 meters.	**NONE**
Monardella macrantha ssp. *hallii*	Hall's monardella	Jun.-Oct.	NONE	NONE	1B.3	MSHCP	Broadleafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest, valley and foothill grassland. 730-2195 meters.	**NONE**
Monardella pringlei	Pringle's monardella	May-Jun.	NONE	NONE	1A	NONE	Coastal scrub; sandy soils. 300-400 meters.	**NONE**
Juncaceae	**Rush Family**							
Juncus duranii	Duran's rush	Jul.-Aug.	NONE	NONE	4.3	NONE	Meadows, lower and upper montane coniferous forest; wet areas. 1770-2805 meters.	**NONE**

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Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
Malvaceae	**Stick-leaf Family**							
Malacothamnus parishii	Parish's bush-mallow	Jun.-Jul.	NONE	NONE	1A	NONE	Chaparral, coastal sage scrub; in washes. 305-455 meters.	**NONE**
Sidalcea hickmanii ssp. parishii	Parish's checkerbloom	Jun.-Aug.	NONE	SR	1B.2	NONE	Chaparral, cismontane woodland, lower montane coniferous forest; typically found in burned or cleared areas on dry, rocky hillsides and along edges of fire roads. 1000-2500 meters.	**NONE**
Sidalcea neomexicana	salt spring checkerbloom	Mar.-Jun.	NONE	NONE	2B.2	NONE	Chaparral, coastal scrub, lower montane coniferous forest, Mojavean desert scrub, playas/alkaline, mesic. 15-1530 meters.	**ABSENT**
Nyctaginaceae	**Four O'Clock Family**							
Abronia villosa var. *aurita*	chaparral sand-verbena	Jan.-Sep.	NONE	NONE	1B.1	NONE	Chaparral, coastal scrub, desert dunes; sandy. 75-1600 meters.	**ABSENT**
Orobanchaceae	**Broom-rape Family**							
Chloropyron maritimum ssp. maritimum	salt marsh bird's-beak	May-Oct.	FE	SE	1B.2	NONE	Coastal salt marsh, coastal dunes; limited to the higher zones of the salt marsh habitat 0-30 meters.	**NONE**
Papaveraceae	**Poppy Family**							
Romneya coulteri	Coulter's matilija poppy	Mar.-Jul.	NONE	NONE	4.2	MSHCP(e)	Dry washes and canyons in sage scrub and chaparral. 20-1200 meters.	**NONE**
Polemoniaceae	**Phlox Family**							
Eriastrum densifolium ssp. sanctorum	Santa Ana River woollystar	Apr.-Sep.	FE	SE	1B.1	MSHCP	Chaparral, coastal scrub (alluvial fan); sandy or gravelly soils. 91-610 meters.	**NONE**

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Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
Navarretia fossalis	spreading navarretia	Apr.-Jun.	FT	NONE	1B.1	MSHCP(b)	Coastal sage scrub, wetland-riparian; occurs almost always under natural conditions in wetlands. 30-655 meters.	**NONE**
Polygonaceae	**Buckwheat Family**							
Chorizanthe leptotheca	Peninsular spineflower	May-Aug.	NONE	NONE	4.2	MSHCP(e)	Chaparral, coastal scrub, lower montane coniferous forest; granitic soils and alluvial fans. 300-1900 meters.	**NONE**
Chorizanthe parryi var. *parryi*	Parry's spineflower	Apr.-Jun.	NONE	NONE	1B.1	MSHCP(e)	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland; sandy or rocky, openings. 275-1220 meters.	**ABSENT** However, there is a potential for this species to occur within the off-site manufactured slope area east of the project boundary.
Chorizanthe polygonoides var. *longispina*	long-spined spineflower	Apr.-Jul.	NONE	NONE	1B.2	MSHCP	Chaparral, coastal scrub, meadow and seep, valley and foothill grassland, vernal pools; ultramafic, often clay. 30-1530 meters.	**ABSENT**
Chorizanthe xanti var. leucotheca	white-bracted spineflower	Apr.-June	NONE	NONE	1B.2	NONE	Coastal scrub(alluvial fans), Mojavean desert scrub, pinyon and juniper woodland; sandy or gravelly soils. 300-1200 meters.	**ABSENT** However, there is a potential for this species to occur within the off-site manufactured slope area east of the project boundary.
Dodecahema leptoceras	slender-horned spineflower	Apr.-Jun.	FE	SE	1B.1	MSHCP(b)	Chaparral, cismontane woodland, coastal scrub (alluvial fan); sandy. 200-760 meters.	**NONE**
Ranunculaceae	**Buttercup Family**							
Myosurus minimus ssp. *apus*	little mousetail	Mar.-Jun.	NONE	NONE	3.1	MSHCP(d)	Associated with vernal pools and inundated grassland habitats.	**NONE**

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Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
Rosaceae	**Rose Family**							
Horkelia cuneata var. *puberula*	mesa horkelia	Feb.-Sep.	NONE	NONE	1B.1	NONE	Chaparral (maritime), cismontane woodland, coastal scrub; sandy or gravelly soils. 70-810 meters.	**ABSENT**
Rubiaceae	**Coffee Family**							
Galium californicum ssp. *primum*	Alvin Meadow bedstraw	May-Jul.	NONE	NONE	1B.2	MSHCP(f)	Chaparral, Lower montane coniferous forest/granitic, sandy 1350-1700 meters.	**NONE**
Solanaceae	**Nightshade Family**							
Lycium parishii	Parish's desert-thorn	Mar.-Apr.	NONE	NONE	2B.3	NONE	Coastal scrub, Sonoran desert scrub. 135-1000 meters.	**NONE**
Themidaceae	**Butcher's-Broom Family**							
Brodiaea filifolia	thread-leaved brodiaea	Mar.-Jun.	FT	SE	1B.1	MSHCP(d)	Clay soils in coastal scrub, valley and foothill grassland, cismontane woodland, and vernal pools. 25-1120 meters.	**NONE**
Muilla coronate	crowned muilla	Mar.-Apr.	NONE	NONE	4.2	NONE	Joshua tree woodland, pinyon-juniper woodland, Mojavean desert scrub, chenopod scrub; found in sandy, granitic soils on barren flats and ridges. 670-1960 meters.	**NONE**
ANGIOSPERMS (MONOCOTS)								
Cyperaceae	**Sedge Family**							
Carex comosa	bristly sedge	May-Sep.	NONE	NONE	2B.1	NONE	Coastal prairie, Marshes and swamps (lake margins), Valley and foothill grassland. 0-625 meters.	**NONE**

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Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
Orchidaceae	**Orchid Family**							
Piperia leptopetala	narrow-petaled rein orchid	Mar.-Jul.	NONE	NONE	4.3	NONE	Cismontane woodland, lower and upper montane coniferous forest. 380-2225 meters.	**NONE**
Liliaceae	**Lily Family**							
Allium munzii	Munz's onion	Mar.-May	FE	ST	1B.1	MSHCP(b)	Prefers chaparral, cismontane woodland, coastal scrub, pinyon and juniper woodland, valley and foothill grassland; mesic, clay. 297-1070 meters.	**NONE**
Calochortus plummerae	Plummer's mariposa lily	May-Jul.	NONE	NONE	4.2	MSHCP(e)	Coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous forest; rocky and sandy areas, typically of granitic or alluvial material; typically common after fire. 100-1700 meters.	**NONE**
Lilium humboldtii ssp. ocellatum	ocellated Humboldt lily	Mar.-Jul.	NONE	NONE	4.2	MSHCP(e)	Chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, riparian woodland, openings. 30-1800 meters.	**NONE**
Poaceae	**Grass Family**							
Hordeum intercedens	vernal barley	Mar.-Jun.	NONE	NONE	3.2	MSHCP	Valley and foothill grassland, vernal pools, coastal dunes, coastal scrub, dry saline streambeds, alkaline flats. 5-1000 meters.	**NONE**
Imperata brevifolia	California satintail	Sep.-May	NONE	NONE	2.1	NONE	Chaparral, coastal sage scrub, Mojavean desert scrub, meadows and seeps (often alkali), riparian scrub/mesic. 0-1215 meters.	**NONE**
Sphenopholis obtusata	prairie wedge grass	Apr.-Jul.	NONE	NONE	2B.2	NONE	Cismontane woodland, meadows and seeps; mesic sites. 300-2000 meters.	**NONE**

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Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
FUNGI (ASCOMYCOTA)								
Caliciaceae	**Lichen-forming Fungi**							
Texosporium sancti-jacobi	woven-spored lichen	N/A	NONE	NONE	3	NONE	Chaparral; found in open areas with chamise, buckwheat, club moss, and sometimes on small mammal droppings. 290-660 meters.	**NONE**

Key to Species Listing Status Codes

FE	*Federally Endangered*	SE	*State Listed as Endangered*
FT	*Federally Threatened*	ST	*State Listed as Threatened*
FC	*Federal Candidate*	SCE	*State Candidate for Endangered*
FPE	*Federally Proposed as Endangered*	SCT	*State Candidate for Threatened*
FPT	*Federally Proposed as Threatened*	SFP	*State Fully Protected*
FPD	*Federally Proposed for Delisting*	SSC	*California Species of Special Concern*

MSHCP	*Western Riverside County Multiple Species Habitat Conservation Plan covered species*
MSHCP(a)	*Surveys may be required as part of wetlands mapping per MSHCP Section 6.1.2.*
MSHCP(b)	*Surveys may be required within Narrow Endemic Plant Species survey area per MSHCP Section 6.1.3.*
MSHCP(c)	*Surveys may be required per MSHCP Section 6.3.2.*
MSHCP(d)	*Surveys may be required within Criteria Area per MSHCP Section 6.3.2.*
MSHCP(e)	*These Covered Species will be considered to be Covered Species Adequately Conserved when conservation requirements identified in species-specific conservation objectives have been met per MSHCP Section 9.0 (Table 9-3).*
MSHCP(f)	*These Covered Species will be considered to be Covered Species Adequately Conserved when a Memorandum of Understanding is executed with the Forest Service that addresses management for these species on Forest Service Land per MSHCP Table 9-3.*

Source: PCR Services Corporation, 2015

NONE = species not expected to occur on the study area due to the lack of suitable habitat, or the site's location outside of the species' range; **ABSENT** = preferred habitat was considered present based on the literature review and observed habitat on the study area, however no individuals were observed during the focused sensitive plant survey.

Appendix C: Special-Status Wildlife Species

Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
INVERTEBRATES						
ANOSTRACA	**Fairy Shrimp**					
Streptocephalus woottoni	Riverside fairy shrimp	FE	NONE	MSHCP(a)	Endemic to western Riverside, Orange and San Diego Counties In areas of tectonic swales and slump basins in grassland and coastal scrub. Inhabit seasonal pools filled by winter/spring rains. Hatch in warm water later in the season.	**NONE** No suitable habitat.
Diptera	**Flies**					
Rhaphiomidas terminatus abdominalis	Delhi Sands flower-loving fly	FE	NONE	MSHCP	Found in areas of the Delhi Sands formation in southwestern San Bernardino and northwestern Riverside Counties. Requires fine, sandy soils, often with wholly or partly consolidated dunes and sparse vegetation.	**NONE** No suitable habitat. Although the study area is in the species range, Delhi Sands soils were not mapped by NRCS. Additionally, the majority of the site is highly disturbed.
Lepidoptera	**Butterflies and Moths**					
Euphydryas editha quino	quino checkerspot butterfly	FE	NONE	MSHCP	Chaparral and coastal scrub with sunny clearings. Require high densities of host plants, cuhs as *Plantago erecta*, *P. insularis*, and *Orthocarpus purpurescens*.	**NONE** No host species.
FISHES						
Catostomidae	**Suckers**					
Catostomus santaanae	Santa Ana sucker	FT	NONE	MSHCP	Habitat generalists, but prefer sand-rubble-boulder bottoms,	**NONE**

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OBSERVED = Species was observed during surveys conducted on the site.

Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
					cool, clear water, & algae.	No suitable habitat.
Cyprinidae	**Carps and Minnows**					
Gila orcutti	arroyo chub	NONE	SSC	MSHCP	Aquatic and south coast flowing waters; slow water stream sections with mud or sand bottoms; feeds heavily on aquatic vegetation and associated invertebrates.	**NONE** No suitable habitat.
Rhinichthys osculus ssp. *3*	Santa Ana speckled dace	NONE	SSC	NONE	Aquatic and south coast flowing waters. Prefer stony habitat where there are hiding spaces between stones, washed by moderate current.	**NONE** No suitable habitat.
AMPHIBIANS						
Ranidae	**True Frogs**					
Rana muscosa	southern mountain yellow-legged frog	FE, FSS	SSC	MSHCP(d)	Prefers rocky stream courses in the mountains of southern California. Inhabits mid- to upper-elevation, perennial streams, often in locations with bedrock pools. Always encountered within a few feet of water.	**NONE** No suitable habitat.
Scaphiopodidae	**North American Spadefoots**					
Spea hammondii	western spadefoot	NONE	SSC	MSHCP	Prefers burrow sites within relatively open areas in lowland grasslands, chaparral, and pine-oak woodlands, areas of sandy or gravelly soil in alluvial fans, washes, and floodplains.	**NONE** No suitable habitat.

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
					Requires temporary pools for reproduction.	
REPTILES						
Anniellidae	**Legless Lizards**					
Anniella pulchra pulchra	silvery legless lizard	NONE	SSC	NONE	Sparse vegetation in beach, chaparral, and pine-oak woodland habitats as well as sycamores, cottonwoods, and oaks growing adjacent to streams. Needs loose soil for burrowing, moisture, warmth, and plant cover. Requires moisture.	**NONE** No suitable habitat.
Colubridae	**Colubrid Snakes**					
Lampropeltis zonata parvirubra	California mountain kingsnake (San Bernardino population)	NONE	SSC	MSHCP(f)	Well-lit canyons with rocky outcrops or rocky talus.	**NONE** No suitable habitat. Although the study area supports two small areas with rock outcrops, the outcrops are interspersed with vegetation and surrounded by unsuitable habitat. The study area also lacks rocky talus and is not within a canyon, which are both habitat features preferred by this species. The only CNDDB occurrence record in the vicinity is from 1997 on near Mill Creek off of SR-38, approximately 14.25 miles to the northeast of the study area.
Thamnophis hammondii	two-striped garter snake	NONE	SSC	NONE	Riparian and freshwater marshes with perennial water.	**NONE** No suitable habitat.

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
Emydidae	**Box and Water Turtles**					
Emys marmorata	western pond turtle	None	SSC	MSHCP	Aquatic environments; artificial flowing waters; marsh and swamp; south coast flowing and standing waters; wetlands. Requires upland habitat up to 0.5 km from water for egg laying and sandy banks or open fields for basking.	**None** No suitable habitat.
Phrynosomatidae	**Zebratail, Earless, Horned, Spiny, Fringe-Toed Lizards**					
Phrynosoma blainvillii	coast horned lizard	None	SSC	MSHCP	Chaparral; cismontane woodland; coastal bluff scrub; coastal scrub; desert wash; pinyon and juniper woodlands; riparian scrub; riparian woodland; valley and foothill grassland. Requires opens areas for basking, bushes for cover, loose soil for burrowing, and insects for food.	**Potential [Moderate]** The majority of potentially suitable habitat resides on the northwestern corner of study area where Riversidean sage scrub and brittlebush scrub occurs. Harvester ants, this species main food source, were also observed (although the food source was not observed in the area supporting suitable habitat). Although suitable habitat and a possible food source exists on the study area, the majority is disturbed and higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the study area. There are numerous CNDDB occurrence records for this species within the vicinity of the study area.

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
Teiidae	**Whiptail Lizards**					
Aspidoscelis hyperythra	orange-throated whiptail	None	SSC	MSHCP	Chaparral; cismontane woodland; coastal scrub. Typically found along washes and other sandy sites. Requires perennial plants that host termites.	**Potential [Moderate]** The majority of potentially suitable habitat resides on the northwestern corner of the study area where Riversidean sage scrub and brittlebush scrub occurs. These areas support perennial plants that may host this species preferred food source (termites). Although suitable habitat and a possible food source exists on the study area, the majority is disturbed and higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the study area. There are numerous CNDDB occurrence records for this species within the vicinity of the study area.
Viperidae	**Vipers**					
Crotalus ruber	red diamond rattlesnake	None	SSC	MSHCP	Chaparral, woodland, and arid desert habitats in rocky areas with dense vegetation.	**Potential [Moderate]** The majority of potentially suitable habitat resides on the northwestern corner of study area where Riversidean sage scrub and brittlebush scrub occurs. However, these areas support limited vegetation and crevices for cover required by this species and higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
						study area. There are numerous CNDDB occurrence records for this species within the vicinity of the study area.
BIRDS						
Accipitridae	**Hawks**					
Aquila chrysaetos	golden eagle	NONE	SFP	MSHCP	Mountains, deserts, and open country; prefer to forage over grasslands, deserts, savannahs and early successional stages of forest and shrub habitats.	**NONE (N); POTENTIAL(F, LOW)** There are few trees are present on the site, primarily near the western boundary in the laurel sumac scrub/ ruderal community. However, this species typically prefers to nest on cliffs, which are not present. This species is not expected to nest on the study area since it is highly disturbed, preferred nesting habitat is not present, and no records of nesting occur. There were some small mammal burrows observed in the disturbed areas of the study area, which could potentially provide a food source. However, there is only 1 CNDDB occurrence record within the vicinity. This record was a breeding pair observed in fall 1979, spring 1980, and fall 1980 in San Timoteo Canyon, approximately 6.0 miles to the northeast.
Buteo swainsoni	Swainson's hawk	NONE	ST	MSHCP	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, and agricultural or ranch lands	**NONE (N); POTENTIAL (F, LOW)** There are a few trees present on the study area, primarily near the

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
					with groves or lines of trees. Requires suitable foraging areas adjacent to breading areas such as grasslands that support rodent populations. This species will also hunt for reptiles and occasionally insects.	western boundary in the laurel sumac scrub/ ruderal community. However, these trees are limited and directly adjacent to roads and residential homes, which could create some noise disturbance. Disturbed areas supply open space with some potentially suitable habitat for burrowing animals and insects, and therefore may provide a food source for this species. There are only 2 CNDDB occurrence records of nesting individuals within the vicinity, both from over 100 years ago.
Elanus leucurus	white-tailed kite	None	SFP	MSHCP	Cismontane woodland; marsh and swamp; riparian woodland; valley and foothill grassland; wetland. Requires open grasslands, meadows, or marshes for foraging near isolated full-canopied trees for nesting.	**None (N); None (F)** No suitable habitat.
Haliaeetus leucocephalus	bald eagle	None	SE	MSHCP	Lower montane coniferous forest; old growth.	**None (N); None (F)** No suitable habitat.
Cuculidae	**Cuckoos, Roadrunners, and Anis**					
Coccyzus americanus occidentalis	western yellow-billed cuckoo	FC	SE	MSHCP(a)	Riparian thickets and forests dominated by willows abutting slow-moving watercourses, backwaters, or seeps.	**None (N); None (F)** No suitable habitat.

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
Strigidae	**True Owls**					
Athene cunicularia	burrowing owl	NONE	SSC	MSHCP(c)	Disturbed; low-growing vegetation within coastal prairie, coastal scrub, Great Basin scrub, Mojavean desert scrub, Sonoran desert scrub, valley and foothill grassland; bare ground, disturbed.	**NOT EXPECTED** Potentially suitable habitat present. Presence/absence surveys conducted with no BUOW observed.
Asio otus	long-eared owl	NONE	SSC	NONE	Riparian bottomlands with tall willows & cottonwoods; also found in live oak patches along streams. Require adjacent open land with mice and old nests of crows, hawks, or magpies for breeding.	**NONE (N); NONE (F)** No suitable habitat.
Tyrannidae	**Tyrant Flycatchers**					
Empidonax traillii extimus	southwestern willow flycatcher	FE	SE	MSHCP(a)	Wet meadows, riparian woodlands that contain water and low growing willow thickets.	**NONE (N); NONE (F)** No suitable habitat.
LANIIDAE	**Shrikes**					
Lanius ludovicianus	loggerhead shrike	NONE	SSC	MSHCP	Broken woodlands, savannah, pinyon-juniper, Joshua tree, & riparian woodlands, desert oases, scrub & washes; open country with perches for hunting and relatively dense shrubs for nesting.	**POTENTIAL (N, MODERATE); OBSERVED (F)** This species was observed during the third BUOW survey (7/2/2015).
Vireonidae	**Vireos**					
Vireo bellii pusillus	least Bell's vireo	FE	SE	MSHCP(a)	Riparian forest; riparian scrub; riparian woodland.	**NONE (N); NONE (F)** No suitable habitat.

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
Troglodytidae	**Wrens**					
Campylorhynchus brunneicapillus sandiegensis	coastal cactus wren	NONE	SSC	MSHCP	Coastal scrub. Requires tall, mature *Opuntia* or cholla cactus for nesting.	**NONE (N); NONE (F)** No suitable habitat. The cactus observed on-site (*Opuntia littoralis* and *Cylindropuntia californica* var. *parkeri*) are sparsely growing, immature individuals and are not suitable for nesting.
Parulidae	**Wood Warblers**					
Icteria virens	yellow-breasted chat	NONE	SSC	MSHCP	Nests in low, dense riparian willow thickets & other brushy tangles (e.g. blackberry, wild grape) near water. Forages and nests within 10 feet of ground.	**NONE (N); NONE (F)** No suitable habitat.
Setophaga petechia	yellow warbler	NONE	SSC	MSHCP	Riparian woodlands, montane chaparral, open ponderosa pine and mixed coniferous habitat with significant brush.	**NONE (N); NONE (F)** No suitable habitat.
Polioptilidae	**Gnatcatchers**					
Polioptila californica californica	coastal California gnatcatcher	FT	SSC	MSHCP	Coastal bluff scrub; coastal scrub.	**POTENTIAL (LOW, N); OBSERVED (F)** This species was observed on the study area after completing the burrowing owl survey conducted on 5/13/2015. There is potential for this species to nest on the study area based on the presence of suitable RSS habitat; however, the potential is low since the habitat is fragmented and interspersed with unsuitable habitat.

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
Icteridae	**Blackbirds**					
Agelaius tricolor	tricolored blackbird	None	SSC	MSHCP	Highly colonial species. Requires open water, protected nesting substrate, and foraging area with insect prey within a few kilometers of the colony.	**None (N); None (F)** No suitable habitat.
Mammals						
Heteromyidae	**Pocket Mice and Kangaroo Rats**					
Chaetodipus fallax fallax	northwestern San Diego pocket mouse	None	SSC	MSHCP	Coastal scrub, chaparral, grasslands, sagebrush; sandy, herbaceous areas, usually in association with rocks or coarse gravel.	**Potential [Moderate]** The study area supports suitable coastal scrub and chaparral habitat within the northwestern portion (e.g. brittle bush scrub, Riversidean sage scrub). Additionally, a number of small fossorial mammal burrows were observed on the study area.
Dipodomys merriami parvus	San Bernardino kangaroo rat	FE	None	MSHCP	Alluvial scrub vegetation on sandy loam substrates characteristic of alluvial fans and flood plains.	**None** The study area does not support suitable alluvial scrub vegetation.
Dipodomys stephensi	Stephens' kangaroo rat	FE	ST	MSHCP/SKR HCP	Open grasslands or sparse shrub lands. Sandy to sandy loam soils with low clay to gravel content.	**Potential [Moderate]** The study area supports potentially suitable shrub habitat within the northwestern portion (e.g. brittle bush scrub and Riversidean sage scrub communities). Additionally, a number of small fossorial

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
						mammal burrows were observed on the study area.
Perognathus longimembris brevinasus	Los Angeles pocket mouse	NONE	SSC	MSHCP(c)	Lower elevation grasslands and coastal sage communities. Sparsely vegetated habitat areas in patches of fine sandy soils associated with washes. May not dig burrows, rather using weeds and dead leaves.	**POTENTIAL [MODERATE]** The study area supports potentially suitable habitat within the Riversidean sage scrub in the northwestern corner.
Leporidae	**Hares and Rabbits**					
Lepus californicus bennettii	San Diego black-tailed jackrabbit	NONE	SSC	MSHCP	Arid regions with short grasses; coastal scrub.	**POTENTIAL [MODERATE]** The majority of the study area supports suitable habitat for this species, including the Riversidean sage scrub on the northwestern corner and the ruderal areas (which support some short grasses)
Muridae	**Mice, Rats, and Voles**					
Neotoma lepida intermedia	San Diego desert woodrat	NONE	SSC	MSHCP	Coastal scrub and chaparral. Prefer areas with moderate to dense canopy cover. Frequently found in areas with rock outcrops and cliffs.	**POTENTIAL [MODERATE]** The study area supports potentially suitable habitat within northwestern corner (e.g. Riversidean sage scrub, rock outcrop/Riversidean sage scrub).

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
Onychomys torridus ramona	southern grasshopper mouse	NONE	SSC	NONE	Low, open, and semi-open coastal sage scrub, mixed chaparral, low sagebrush, riparian scrub, chenopod scrub, and annual grasslands with scattered shrubs; food source is arthropods, especially scorpions and grasshoppers.	**POTENTIAL [LOW]** The study area supports potentially suitable shrub habitat within the northwestern portion (e.g. brittle bush scrub and Riversidean sage scrub). Additionally, a number of small fossorial mammal burrows were observed on the study area. The nearest CNDDB occurrence record of this species was recorded in 1938 approximately 4.3 miles to the southeast of the study area within the Badlands.
Mustelidae	**Weasels, Badgers, and Otters**					
Taxidea taxus	American badger	NONE	SSC	NONE	Open shrub, forest, and herbaceous habitats, with friable soils to dig burrows. Requires rodent populations for food source.	**POTENTIAL [LOW]** Shrub habitat is present on the study area within the Riversidean sage scrub community on the northwestern corner of the study area. A few mammal burrows were observed, suggesting the presence of small fossorial mammals that could provide a possible food source. However, the majority of the site is surrounded by development and a large portion of suitable habitat is disturbed. Nearest CNDDB occurrence record is from 1908 roughly 6.5 miles to the northwest of the study area.
Molossidae	**Free-Tailed Bats**					
Eumops perotis californicus	western mastiff bat	NONE	SSC	NONE	Chaparral; cismontane woodland; coastal scrub; valley	**NONE [N]; POTENTIAL [F, LOW]**

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NONE (F) = Species not expected to forage due to lack of food sources, or the site's location is outside of the species' range.

NOT EXPECTED = Preferred habitat was considered potentially present based on the literature review and anticipated habitat in the study area, however no individuals were observed and/or suitable habitat was absent based on the general field survey or focused surveys.

POTENTIAL = Preferred habitat was considered potentially present based on the literature review and observed habitat in the study area.

POTENTIAL (N) = Preferred nesting or roosting habitat was considered potentially present based on the literature review and observed habitat in the study area.

POTENTIAL (F) = Preferred foraging habitat was considered potentially present based on the literature review and observed habitat in the study area.

OBSERVED = Species was observed during surveys conducted on the site.

Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
					and foothill grassland. Roosts in crevices in cliff faces, high buildings, trees, and tunnels. Feed on insects.	No suitable roosting habitat exists on the study area. Bats in this family are known to be strong fliers and can fly long distances to forage. There is a probability that individuals may travel from roosts to forage on insects on the study area, but this is considered low based on the disturbance present on the study area and presence of surrounding development. The nearest CNDDB occurrence record is from1990 approximately 3.0 miles to the southwest of the study area.
Nyctinomops femorosaccus	pocketed free-tailed bat	NONE	SSC	NONE	Joshua tree woodland; pinyon and juniper woodland; desert scrub, palm oasis, desert wash, and desert riparian; Sonoran desert scrub. Typically roost in caves and rocky outcrops; prefers cliffs in order to obtain flight speed. Feeds on insects flying, over bodies of water or arid desert habitats to capture prey.	**POTENTIAL [N, VERY LOW]; NONE [F]** Rock outcrops are present on the study area, which may provide some potentially suitable habitat for roosting. However, this potential was considered very low since this species typically prefers steeper cliffs for roosting habitat. Although little is known regarding home range for this species, the potential for roosting is also unlikely since the study area does not support adjacent foraging habitat.[1] There are only 2 CNDDB occurrence records in the vicinity. The nearest record is from 1985 approximately 6.5 miles to the

1 *CDFW. 2000.* California Wildlife Habitat Relationships System: Pocketed Free-tailed Bat. *State of California, The Resources Agency. May 2000.*

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POTENTIAL (F) = Preferred foraging habitat was considered potentially present based on the literature review and observed habitat in the study area.

OBSERVED = Species was observed during surveys conducted on the site.

Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
						southwest of the study area near March Air Force Base.
Phyllostomidae	**Leaf-Nosed Bats**					
Leptonycteris yerbabuenae	lesser long-nosed bat	FE	NONE	NONE	Found in dry areas, such as desert grasslands and shrublands. Require caves or mines for day roosting and may additionally use rock crevices, trees & shrubs, and abandoned buildings for night roosting. Feed on cactus or agave fruit, nectar, and pollen (frugivorous). There are no records of breeding individuals in California, and occurrence records may only be vagrants.	**POTENTIAL [N, VERY LOW]; POTENTIAL [F, VERY LOW]** Some potentially suitable habitat is present on the study area. Potential night roosts include a limited number of trees and rock crevices on the northwestern corner of the project and scattered cactus may provide feeding opportunities. This species can travel long distances between day roosting and foraging sites. However, the potential was considered low since this species is not typically found in California. Records in California are typically vagrant migrants. There is only 1 CNDDB occurrence record within the vicinity from 1993, approximately 9.5 miles to the northeast in a residential neighborhood of Yucaipa.
Vespertilionidae	**Evening Bats**					
Antrozous pallidus	pallid bat	NONE	SSC	NONE	Chaparral, coastal scrub, desert wash, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, riparian woodland, Sonoran desert scrub, upper montane coniferous forest, and valley and foothill grassland. Prefers rocky outcrops, cliffs, and crevices with access to open	**POTENTIAL [N, VERY LOW]; POTENTIAL [F, VERY LOW]** Some potentially suitable habitat is present on the study area. Potential roosting habitat includes the rock outcrops and Riversidean sage scrub on the northwestern corner of the study area and the

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POTENTIAL = Preferred habitat was considered potentially present based on the literature review and observed habitat in the study area.

POTENTIAL (N) = Preferred nesting or roosting habitat was considered potentially present based on the literature review and observed habitat in the study area.

POTENTIAL (F) = Preferred foraging habitat was considered potentially present based on the literature review and observed habitat in the study area.

OBSERVED = Species was observed during surveys conducted on the site.

Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
					habitats for foraging. Very sensitive to disturbance of roosting sites.	open ruderal areas may provide feeding opportunities. However, the potential was considered very low because of evidence of disturbance on the study area and the presence of surrounding development to the south, northeast, and west; this species is highly sensitive to disturbance. Additionally, this species has not been recorded on CNDDB within the vicinity since 1929.
Lasiurus xanthinus	western yellow bat	NONE	SSC	NONE	Desert wash. Known to occur in palm oases.	**NONE [N]; NONE [F]** No suitable habitat.

Key to Species Listing Status Codes

FE	*Federally Endangered*	SE	*State Listed as Endangered*
FT	*Federally Threatened*	ST	*State Listed as Threatened*
FC	*Federal Candidate*	SCE	*State Candidate for Endangered*
FPE	*Federally Proposed as Endangered*	SCT	*State Candidate for Threatened*
FPT	*Federally Proposed as Threatened*	SFP	*State Fully Protected*
FPD	*Federally Proposed for Delisting*	SSC	*California Species of Special Concern*

MSHCP	*Western Riverside County Multiple Species Habitat Conservation Plan covered species*
MSHCP(a)	*Surveys may be required as part of wetlands mapping per MSHCP Section 6.1.2.*
MSHCP(b)	*Surveys may be required within Narrow Endemic Plant Species survey area per MSHCP Section 6.1.3.*
MSHCP(C)	*Surveys may be required per MSHCP Section 6.3.2.*
MSHCP(d)	*Surveys may be required within Criteria Area per MSHCP Section 6.3.2.*
MSHCP(e)	*These Covered Species will be considered to be Covered Species Adequately Conserved when conservation requirements identified in species-specific conservation objectives have been met per MSHCP Section 9.0 (Table 9-3).*
MSHCP(f)	*These Covered Species will be considered to be Covered Species Adequately Conserved when a Memorandum of Understanding is executed with the Forest Service that addresses management for these species on Forest Service Land per MSHCP Table 9-3.*

Source: PCR Services Corporation, 2015

NONE = Species not expected to occur due to the lack of suitable habitat, or the site's location is outside of the species' range.

NONE (N) = Species not expected to nest or roost due to the lack of suitable habitat, or the site's location is outside of the species' range.

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OBSERVED = Species was observed during surveys conducted on the site.

Appendix D

2015 Burrowing Owl Focused Survey Report

PCR

August 3, 2015

Mr. Joseph Rivani
GLOBAL INVESTMENT & DEVELOPMENT
3470 Wilshire Boulevard, Suite 1020
Los Angeles, CA 90010

Re: RESULTS OF FOCUSED BURROWING OWL SURVEYS FOR THE IRONWOOD PROJECT, CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA

Dear Mr. Rivani:

This report summarizes the methodology and findings of focused burrowing owl (*Athene cunicularia*) (BUOW) surveys conducted by **PCR Services Corporation (PCR)** for the approximately 83-acre property located directly northeast of Ironwood Avenue and Nason Street (APN 473-160-004) ("project site") located in the City of Moreno Valley, Riverside County, California. The surveys encompassed the project site and a 500-foot survey buffer surrounding the perimeter of the project site where suitable habitat was present. The surveys were conducted in accordance with the County of Riverside's 2006 *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area*.[1]

PROJECT SITE DESCRIPTION

The approximately 83-acre project site is generally situated east of Interstate 10 (I-10) and north of State Route 60 (SR 60), as shown in **Figure 1**, *Regional Map*. Specifically, the project site is located northwest of the intersection of Ironwood Avenue and Nason Street. The project site is depicted on the U.S. Geological Survey (USGS) 7.5' Sunnymead topographic quadrangle map, Section 34, T. 2 S., R. 3 W., as shown in **Figure 2**, *Vicinity Map*. The topography of the project site is generally flat with gently rolling hills throughout and steep rocky hillsides along the northwestern portion of the project site. Elevations on the project site range from approximately 1,975 feet above mean sea level (MSL) along the northwestern boundary of the project site, to approximately 1,830 feet above MSL along the southern boundary of the project site. Surrounding land uses include residential development to the south, northeast, and west and undeveloped land to the north and southeast.

[1] *County of Riverside. 2006. Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area.*

PLANT COMMUNITIES

The project site consists primarily of large ruderal areas. Plant communities found on the project site include brittlebush scrub, Riversidean sage scrub, rock outcrop/Riversidean sage scrub, brittlebush scrub/ruderal, laurel sumac scrub/ruderal, ruderal/Riversidean sage scrub, river wash, ruderal, disturbed, and developed. A brief summary of each plant community within the project site in which surveys were conducted is discussed below.

Brittlebush Scrub/Ruderal

Brittlebush scrub is a drought tolerant subtype of Riversidean Sage Scrub in which the dominate plant is brittlebush (*Encelia farinosa*). Additional native species within the brittlebush scrub community include California buckwheat (*Eriogonum fasciculatum*), California sagebrush (*Artemisia californica*), and chia (*Salvia columbariae*). Ruderal vegetation is also found within this community. Brittlebush scrub/ruderal areas occupy 0.29 acre throughout the project site.

River Wash

River wash consists of prevailingly course-textured but variable material, ranging from sand to gravel. Sparse vegetation within the river wash includes giant reed (*Arundo donax*), telegraph weed (*Heterotheca grandiflora*), doveweed, and Russian thistle (*Salsola tragus*). River wash occupies 0.03 acre throughout the project site.

Ruderal/Riversidean Sage Scrub

Ruderal/Riversidean sage scrub within the project site is heavily disturbed and is dominated by ruderal vegetation. Non-native species observed within this community include shortpod mustard (*Hirschfeldia incana*), foxtail chess (*Bromus madritensis*), and red-stemmed filaree (*Erodium cicutarium*). Native species found within this community include brittlebush (*Encelia farinosa*), California buckwheat, California sagebrush, common sunflower (*Helianthus annuus*), deerweed (*Acmispon glaber*), and pinebush (*Ericameria pinifolia*). Ruderal/Riversidean sage scrub occupies 1.31 acres throughout the project site.

Ruderal

Ruderal vegetation is found in areas heavily disturbed by human activities, such as roadsides, graded fields, and manufactured slopes. Within the project site, non-native species observed within this community include shortpod mustard, foxtail chess, red-stemmed filaree, ripgut brome (*Bromus diandrus*), and native species such as doveweed (*Croton setigerus*), common fiddleneck (*Amsinckia* *intermedia*), and cudweed aster (*Corethrogyne filaginifolia*). Ruderal areas occupy 39.08 acres throughout the project site.

Disturbed

Disturbed areas consist of areas heavily disturbed by human activities, including dirt roads with little to no vegetation. Disturbed areas occupy 31.23 acres throughout the project site.

Developed

Developed areas consist of man-made structures such as homes and buildings, and these areas comprise 1.64 acres throughout the project site.

METHODOLOGY

Step I - Habitat Assessment

The surveys were conducted in accordance with the County of Riverside's 2006 *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area*.[2] During the Step I Habitat Assessment, suitable habitat was identified on-site during the field survey, including disturbed, low-growing vegetation; bare ground; and small fossorial mammal burrows.

Step II – Locating Burrows and Burrowing Owls

Step II surveys were conducted within the project site plus an approximately 500-foot survey buffer around the project site perimeter. Surveys focused on the detection of small fossorial mammal burrows potentially suitable for BUOW, BUOW burrows, individual BUOW, and any diagnostic sign of their occurrence (e.g., molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance). Off-site areas within the 500-foot survey buffer were surveyed by foot where accessible, or with the use of binoculars in areas which were inaccessible.

Surveys were conducted on May 13, June 3, July 2, and July 27, 2015 by PCR biologists Ezekiel Cooley, Amy Lee, and Lauren Singleton. Surveys consisted of four site visits, on four separate days, and were conducted between one hour prior to and two hours after sunrise during suitable weather conditions. Transects were utilized in all accessible areas, spaced no more than 100

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[2] *County of Riverside. 2006. Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area.*

feet apart, to allow for 100 percent visibility (**Figure 3**, *Transect Map*, attached). In addition, observations were made with the use of binoculars. Weather conditions consisted of hazy to cloudy skies with winds between 0 and 5 miles per house (mph) and air temperatures ranging from 52° to 76° Fahrenheit. Survey data is presented in **Table 1**, *Survey Data*, below.

Table 1

Survey Data

Date	Time	Wind (mph) (start/end)	Temperature (F) (start-end)	Weather (start-end)	Results	Surveyor
05/13/15	0615 – 0820	1-2/2-5	52° – 61°	70% Cloud Cover – 60% Cloud Cover	No BUOW or BUOW sign	Cooley, Lee, Singleton
06/03/15	0600 – 0800	1-3/0-1	55° – 57°	100% Cloud Cover – 100% Cloud Cover	No BUOW or BUOW sign	Cooley, Lee, Singleton
07/02/15	0545 – 0730	0-1/0-1	72° – 76°	60% Cloud Cover – 80% Cloud Cover	No BUOW or BUOW sign	Cooley, Lee, Singleton
07/27/15	0600 – 0730	0-1/0-1	62°– 66°	100% Cloud Cover – 100% Cloud Cover	No BUOW or BUOW sign	Cooley, Lee, Singleton

Source: PCR Services Corporation, 2015.

RESULTS

The project site is within the Burrowing Owl Survey Area for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The following results present the findings of the Step I Habitat Assessment and Step II Locating Burrows and Burrowing Owls.

Step I - Habitat Assessment

Results of the Step I, Habitat Assessment concluded that the project site and 500-foot survey buffer exhibited suitable BUOW habitat consisting of disturbed, low-growing vegetation; bare ground; and fossorial mammal burrows.

PCR

Step II – Locating Burrows and Burrowing Owls

The Step II surveys did not identify BUOW burrows, BUOW sign or BUOW within the project site or within the 500-foot survey buffer. A complete list of all avian species observed within the project site is included in **Appendix A**, *Avian Compendium*, attached.

RECOMMENDATIONS

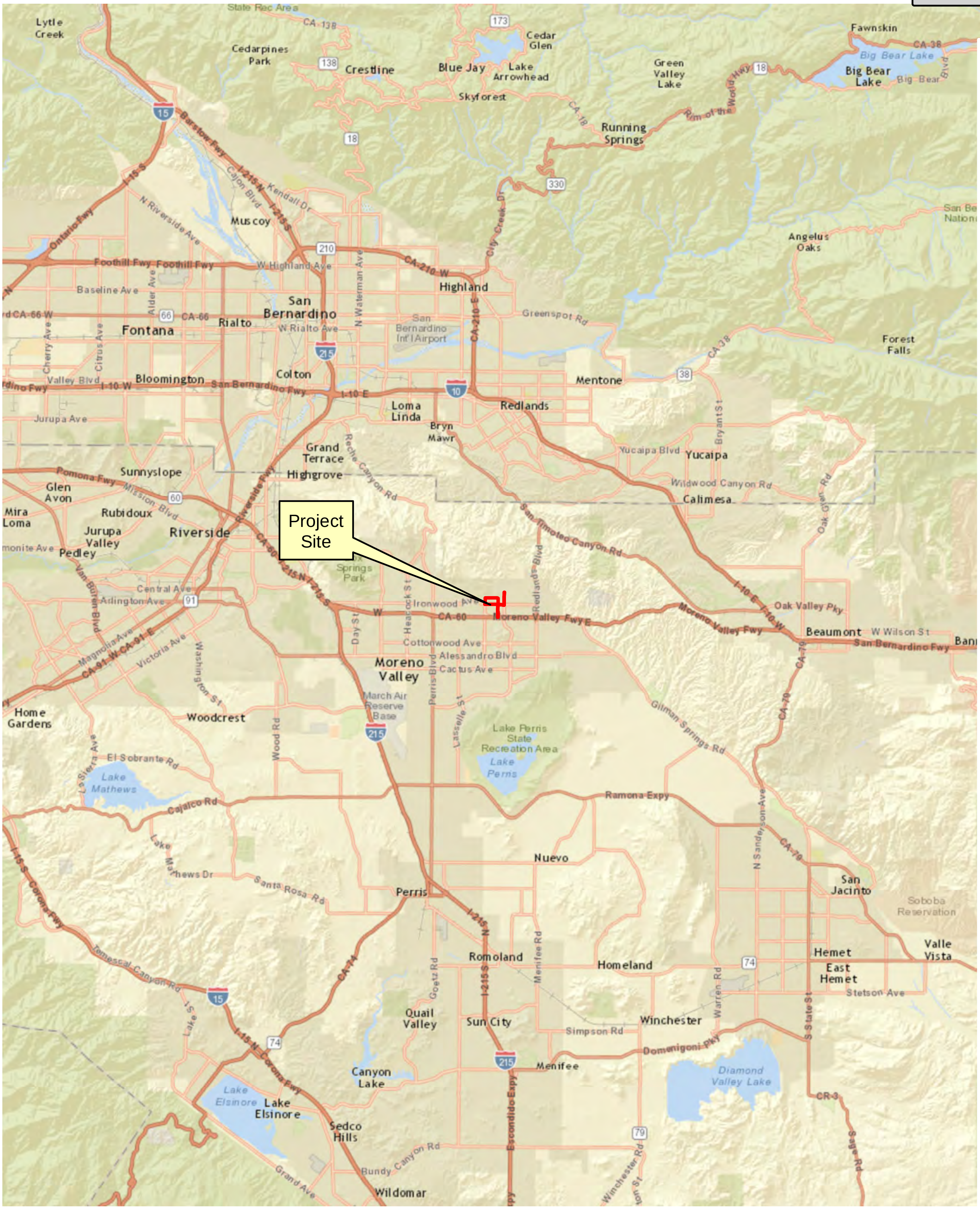
As required by the MSHCP, a pre-construction survey must be conducted 30 days prior to ground disturbance for project sites whether or not BUOW are found during the focused surveys to avoid the direct take of BUOW.

Should you have any questions concerning the methodology or findings in this report, please contact Ezekiel Cooley (E.Cooley@pcrnet.com) at (949) 753-7001.

Sincerely,
PCR SERVICES CORPORATION

Ezekiel Cooley	Amy Lee	Lauren Singleton
Senior Biologist	Biologist	Biologist

Attachments:
Figure 1: Regional Map
Figure 2: Vicinity Map
Figure 3: Transect Map
Appendix A: Avian Compendium



Regional Map

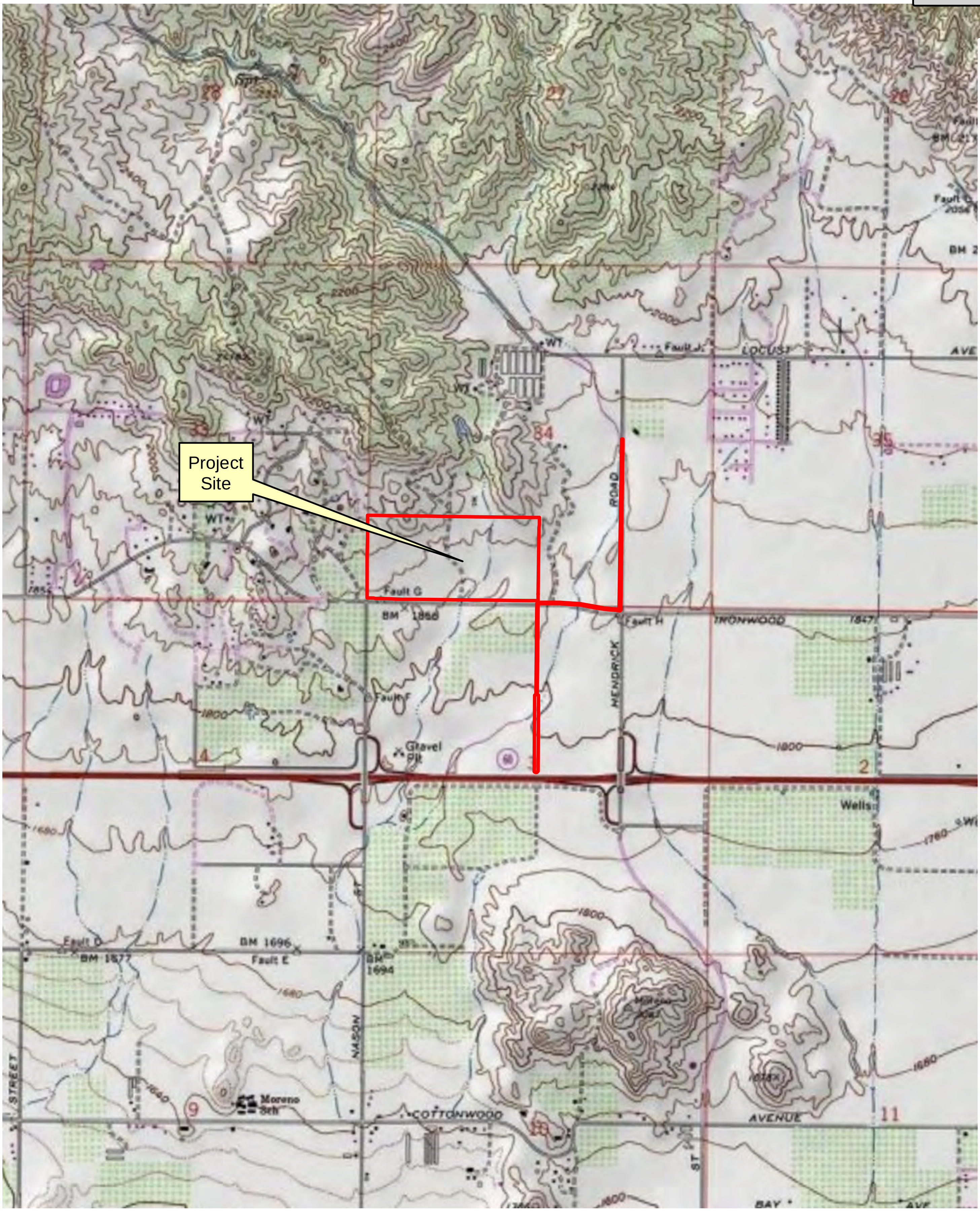
Ironwood Residential Project

Source: ESRI Street Map, 2009; PCR Services Corporation, 2015.

FIGURE

1

Attachment: Biological Resources Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))



0 2,000 4,000 Feet

PCR

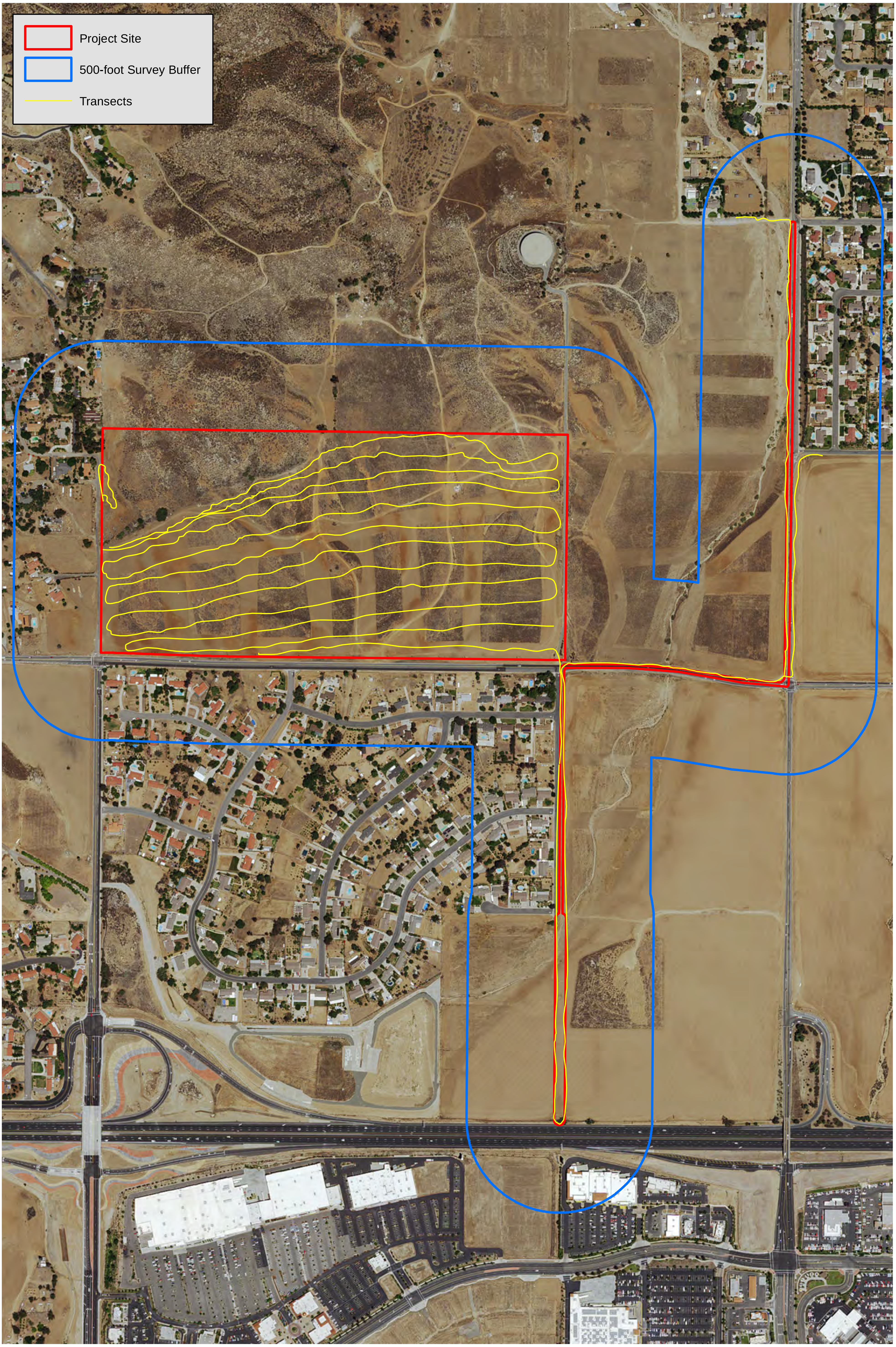
Vicinity Map

Ironwood Residential Project

Source: USGS Topographic Series (Sunnymead, CA); PCR Services Corporation, 2015.

FIGURE

2



0 500 1,000 Feet

PCR

Transect Map

Ironwood Residential Project

Source: Microsoft, 2010 (Aerial); PCR Services Corporation, 2015.

FIGURE 3

Attachment: Biological Resources Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Appendix A: Avian Compendium

Scientific Name	Common Name
Cathartidae	**New World Vultures**
Cathartes aura	turkey vulture
Accipitridae	**Hawks**
Accipiter cooperii	Cooper's hawk
Buteo jamaicensis	red-tailed hawk
Falconidae	**Falcons**
Falco sparverius	American kestrel
Charadriidae	**Plovers**
Charadrius vociferus	killdeer
Columbidae	**Pigeons and Doves**
* *Columba livia*	rock pigeon
Zenaida macroura	mourning dove
Apodidae	**Swifts**
Aeronautes saxatalis	white-throated swift
Trochilidae	**Hummingbirds**
Archilochus alexandri	black-chinned hummingbird
Calypte anna	Anna's hummingbird
Picidae	**Woodpeckers**
Picoides nuttallii	Nuttall's woodpecker
Tyrannidae	**Tyrant Flycatchers**
Sayornis nigricans	black phoebe
Sayornis saya	Say's phoebe
Tyrannus verticalis	western kingbird
Tyrannus vociferans	Cassin's kingbird
Laniidae	**Shrikes**
Lanius ludovicianus	loggerhead shrike
Corvidae	**Jays and Crows**
Corvus brachyrhynchos	American crow
Alaudidae	**Larks**
Eremophila alpestris	horned lark
Hirundinidae	**Swallows**
Petrochelidon pyrrhonota	cliff swallow
Hirundo rustica	barn swallow
Stelgidopteryx serripennis	northern rough-winged swallow
Aegithalidae	**Bushtits**
Psaltriparus minimus	bushtit

* *Non-native species*

Scientific Name		Common Name
Polioptilidae		**Gnatcatchers**
	Polioptila californica californica	coastal California gnatcatcher
Sturnidae		**Starlings**
*	*Sturnus vulgaris*	European starling
Emberizidae		**Emberizine Sparrows and Allies**
	Melozone crissalis	California towhee
Icteridae		**Blackbirds**
	Agelaius phoeniceus	red-winged blackbird
Fringillidae		**Finches**
	Haemorhous mexicanus	house finch
	Spinus psaltria	lesser goldfinch
	Spinus tristis	American goldfinch
Passeridae		**Old World Sparrows**
*	*Passer domesticus*	house sparrow

* *Non-native species*

Appendix E

2016 Burrowing Owl Focused Survey Report

ESA PCR

2121 Alton Parkway
Suite 100
Irvine, CA 92606
949.753.7001 phone
949.753.7002 fax

www.pcrnet.com

July 13, 2016

Mr. Joseph Rivani
Global Investment & Development
3470 Wilshire Boulevard, Suite 1020
Los Angeles, CA 90010

Subject: Results of Focused Burrowing Owl Surveys for the Alternative Off-site Waterline Area for the Ironwood Village Project, City of Moreno Valley, Riverside County, California

Dear Mr. Rivani:

This report summarizes the methodology and findings of focused burrowing owl (*Athene cunicularia*) (BUOW) surveys conducted by **ESA PCR** for the two proposed alternative off-site waterline areas associated with the approximately 78.48-acre Ironwood Village Project (APN 473-160-004) located directly northeast of Ironwood Avenue and Nason Street, City of Moreno Valley, Riverside County, California.[1] The surveys encompassed the two alternative off-site waterline areas (survey area) and a 500-foot survey buffer surrounding the survey area (survey buffer). The surveys were conducted in accordance with the County of Riverside's 2006 *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area*.[2]

Survey Area Description

The survey area is generally situated south of Interstate 10 (I-10) and north of State Route 60 (SR 60), as shown in **Figure 1**, *Regional Map*. Specifically, the survey area includes a waterline alignment that runs north-south, immediately north of the intersection of Ironwood Avenue and Oliver Street along the Eastern Municipal Water District access road, and another which runs east-west, west of the intersection of Moreno Beach Drive and Juniper Avenue. The survey area and survey buffer are depicted on the U.S. Geological Survey (USGS) 7.5' Sunnymead topographic quadrangle map, Section 34, T. 2 S., R. 3 W., as shown in **Figure 2**, *Vicinity Map*. The topography of the survey area and survey buffer is generally flat with the expectation of fairly steep east-facing slope on the western portion. Elevations in the survey area are approximately 1,858 feet above mean sea level (MSL) along the midpoint of the east-west waterline, to approximately 1,945 feet above MSL at the northern terminus of north-south waterline. Surrounding land uses include residential development to the northeast and east, and undeveloped land to the northwest, west, and south.

Plant Communities

The survey area and survey buffer consists primarily of ruderal and disturbed habitat. Ruderal habitat is dominated by non-native species including mediterranean grass (*Schismus barbatus*), Russian thistle (*Salsola tragus*), and ripgut brome (*Bromus diandrus*). Disturbed areas consist of areas heavily disturbed by human activities, including dirt roads with little to no vegetation.

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1 Step II BUOW surveys were conducted in all suitable habitat for the Ironwood Village project during the 2015 breeding season.
2 County of Riverside. 2006. Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area.

ESA PCR

Methodology

Step I - Habitat Assessment

The surveys were conducted in accordance with the County of Riverside's 2006 *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area*.[2] During the Step I Habitat Assessment, suitable habitat was identified on-site during the field survey, including disturbed, low-growing vegetation; bare ground; and small fossorial mammal burrows.

Step II – Locating Burrows and Burrowing Owls

Step II surveys were conducted within the survey area plus an approximately 500-foot survey buffer. Surveys focused on the detection of small fossorial mammal burrows potentially suitable for BUOW, BUOW burrows, individual BUOW, and any diagnostic sign of their occurrence (e.g., molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance). Off-site areas within the 500-foot survey buffer were surveyed by foot where accessible, or with the use of binoculars in areas which were inaccessible.

Surveys were conducted on April 28, May 23, June 9, and July 5, 2016 by ESA PCR biologists Amy Lee and Lauren Singleton. Surveys consisted of four site visits, on four separate days, and were conducted between one hour prior to and two hours after sunrise during suitable weather conditions. Transects were utilized in all accessible areas, spaced no more than 100 feet apart, to allow for 100 percent visibility (**Figure 3**, *Survey Area*, attached). In addition, observations were made with the use of binoculars. Weather conditions consisted of 45 to 100 percent cloud cover with winds between 0 and 4 miles per hour (mph) and air temperatures ranging from 48° to 68° Fahrenheit. Survey data is presented in **Table 1**, *Survey Data*, below.

TABLE 1
SURVEY DATA

Date	Time	Wind (mph) (start/end)	Temperature (F) (start-end)	Weather (start-end)	Results	Surveyor
04/28/16	0600 – 0800	2-4/0-1	50° – 49°	100% Cloud Cover – 100% Cloud Cover	No BUOW or BUOW sign	Singleton
05/23/16	0550 – 0750	0-1/0-1	48° – 54°	90% Cloud Cover – 75% Cloud Cover	No BUOW or BUOW sign	Lee
06/09/16	0525 – 0715	0-1/0-1	61° – 68°	45% Cloud Cover – 45% Cloud Cover	No BUOW or BUOW sign	Lee
07/05/16	0550 – 0735	0-2/0-2	63°– 63°	100% Cloud Cover – 100% Cloud Cover	No BUOW or BUOW sign	Lee

Source: ESA PCR, 2016.

ESA PCR

Results

The survey area is within the Burrowing Owl Survey Area for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The following results present the findings of the Step I Habitat Assessment and Step II Locating Burrows and Burrowing Owls.

Step I - Habitat Assessment

Results of the Step I, Habitat Assessment concluded that the survey area and 500-foot survey buffer exhibited suitable BUOW habitat consisting of disturbed, low-growing vegetation; bare ground; and fossorial mammal burrows.

Step II – Locating Burrows and Burrowing Owls

The Step II surveys did not identify BUOW burrows, BUOW sign or BUOW within the survey area or within the 500-foot survey buffer. A complete list of all avian species observed within the survey area and survey buffer is included in **Appendix A**, *Avian Compendium*, attached.

Recommendations

As required by the MSHCP, a pre-construction survey must be conducted 30 days prior to ground disturbance for project sites whether or not BUOW are found during the focused surveys to avoid the direct take of BUOW.

Should you have any questions concerning the methodology or findings in this report, please contact Amy Lee (A.Lee@pcrnet.com) at (949) 753-7001.

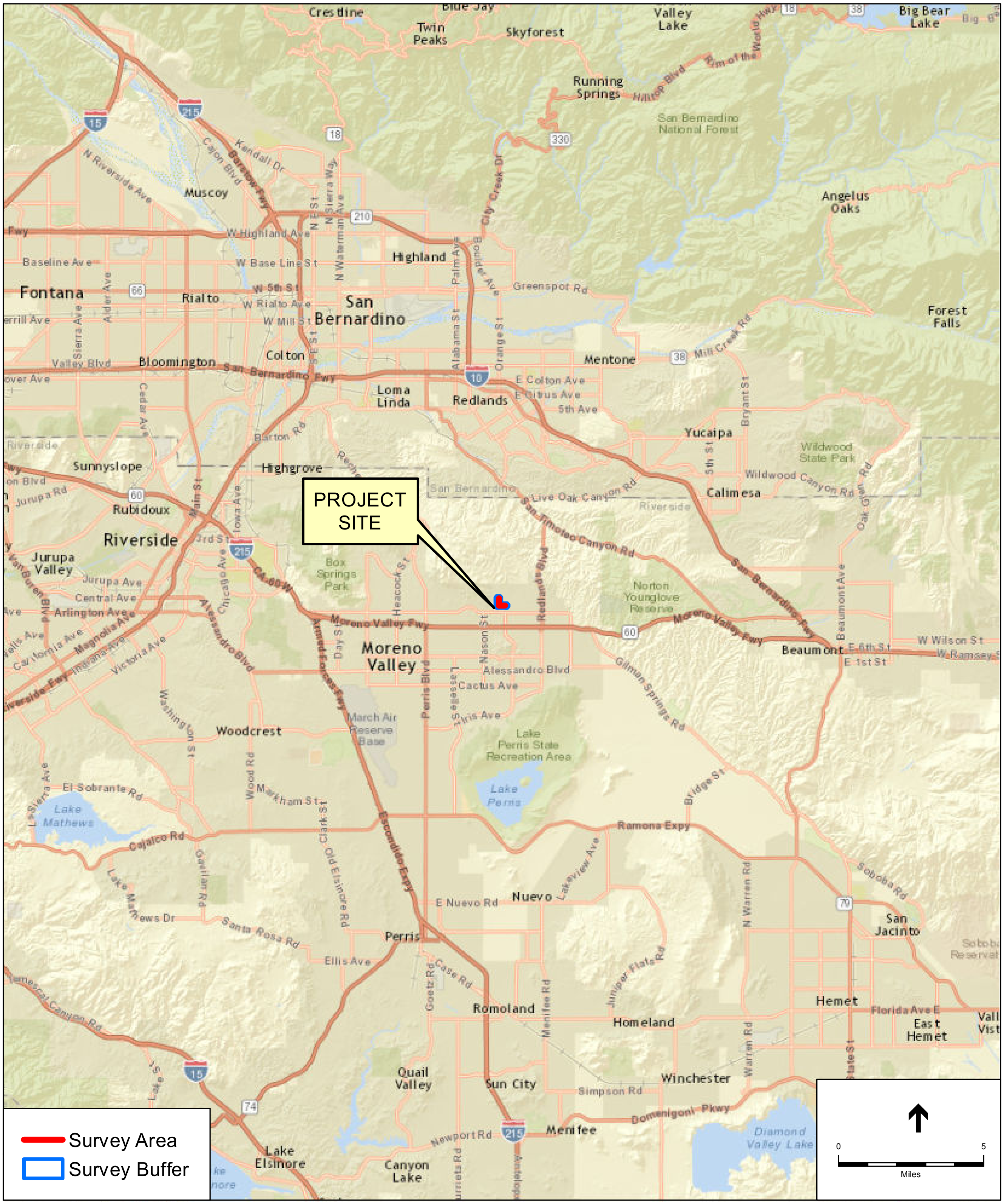
Sincerely,

Amy Lee

Amy Lee
Biologist

Attachments

Fig 1 - Regional Map
Fig 2 - Vicinity Map
Fig 3 - Survey Area
Appendix A – Avian Compendium

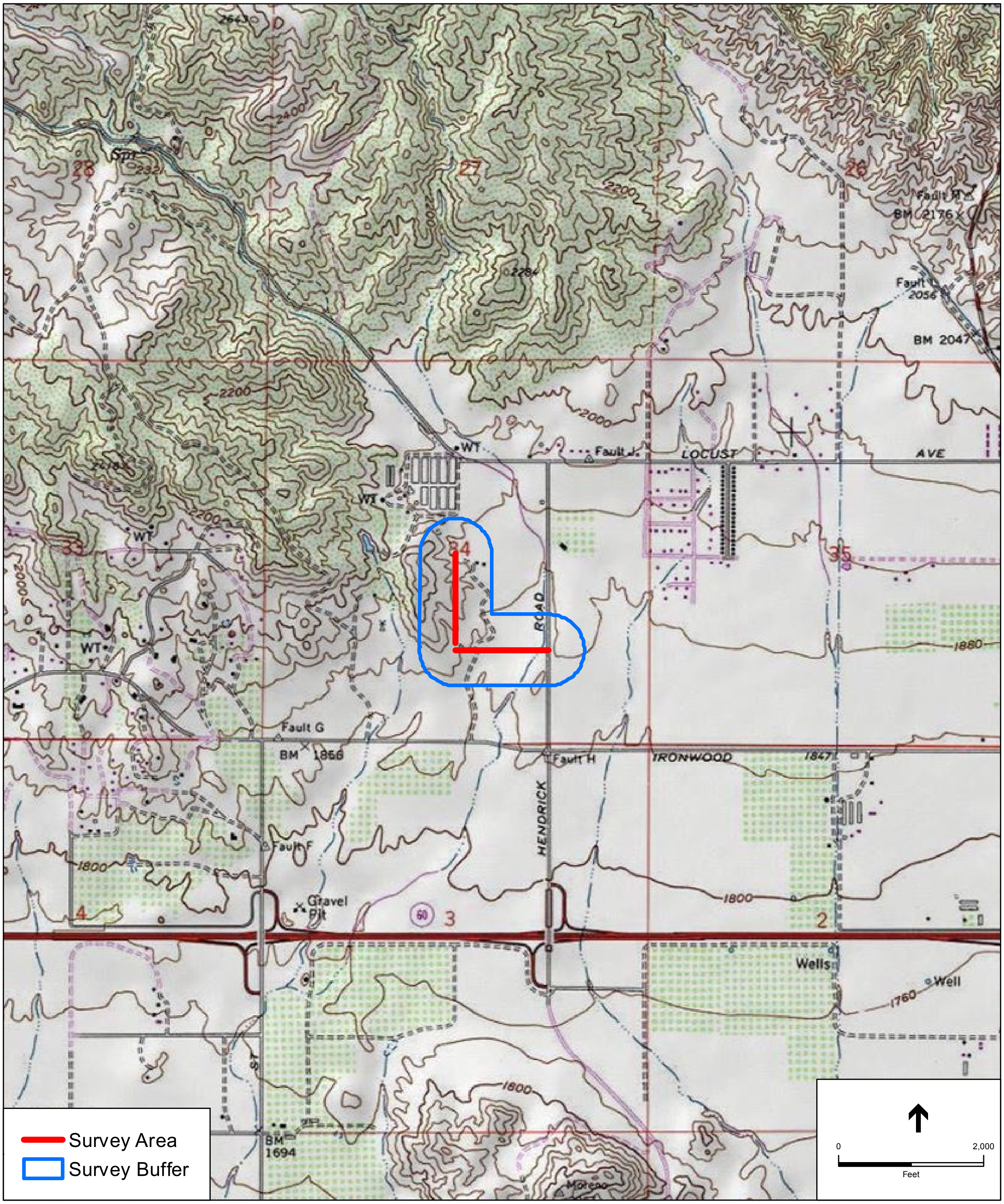


SOURCE: ESRI Street Map, 2009.

Ironwood Village Project - Alternative Off-site Waterline Area

Figure 1
Regional Map

ESA PCR



SOURCE: USGS Topographic Series (Sunnymead, CA).

Ironwood Village Project - Alternative Off-site Waterline Area

Figure 2

Vicinity Map

ESA PCR

Attachment: Biological Resources Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project - Alternative Off-site Waterline Area

Figure 3
Survey Area

ESA PCR

Appendix A - Avian Compendium

BIRDS

Scientific Name	Common Name
Cathartidae	**New World Vultures**
Cathartes aura	turkey vulture
Falconidae	**Falcons**
Falco sparverius	American kestrel
Charadriidae	**Plovers**
Charadrius vociferus	killdeer
Columbidae	**Pigeons and Doves**
Zenaida macroura	mourning dove
Cuculidae	**Cuckoos and Roadrunners**
Geococcyx californianus	greater roadrunner
Trochilidae	**Hummingbirds**
Calypte anna	Anna's hummingbird
Tyrannidae	**Tyrant Flycatchers**
Myiarchus cinerascens	ash-throated flycatcher
Sayornis nigricans	black phoebe
Sayornis saya	Say's phoebe
Tyrannus vociferans	Cassin's kingbird
Corvidae	**Jays and Crows**
Corvus brachyrhynchos	American crow
Corvus corax	common raven
Hirundinidae	**Swallows**
Stelgidopteryx serripennis	northern rough-winged swallow
Aegithalidae	**Bushtits**
Psaltriparus minimus	bushtit
Troglodytidae	**Wrens**
Salpinctes obsoletus	rock wren
Mimidae	**Thrashers**
Mimus polyglottos	northern mockingbird
Ptilogonatidae	**Silky-flycatchers**
Phainopepla nitens	phainopepla
Parulidae	**Wood Warblers**
Setophaga coronata	yellow-rumped warbler

* non-native

BIRDS

Scientific Name	Common Name
Emberizidae	**Emberizine Sparrows and Allies**
Melozone crissalis	California towhee
Pipilo maculatus	spotted towhee
Icteridae	**Blackbirds**
Icterus bullockii	Bullock's oriole
Icterus cucullatus	hooded oriole
Sturnella neglecta	western meadowlark
Fringillidae	**Finches**
Haemorhous mexicanus	house finch
Spinus psaltria	lesser goldfinch
Spinus tristis	American goldfinch
Passeridae	**Old World Sparrows**
* *Passer domesticus*	house sparrow

* non-native

PHASE I CULTURAL RESOURCES ASSESSMENT OF THE PROPOSED IRONWOOD RESIDENTIAL PROJECT; CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, CALIFORNIA

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Sunnymead, CA United States Geological Survey 7.5' Quadrangle Map, Sections 33 and 34 of Township 2 South, Range 3 West

Project Acreage: 79

Resources Identified: P-33-024882/CA-RIV-12,333 and P-33-024883

June 2016

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EXECUTIVE SUMMARY

Global Investment & Development, LLC. (the "Applicant") is proposing to develop the Ironwood Residential Project on an approximately 79-acre parcel in the City of Moreno, California. The proposed project would include the construction of single-family residences, streets, other infrastructure, underground utilities, parks, open spaces, and off-site water and sewer lines (the "proposed project"). For purpose of this report, all project components will collectively be referred to as the "Study Area", unless otherwise noted. The proposed project would include excavations across the majority of the Study Area.

ESA PCR conducted a phase I cultural resources assessment of the Study Area to determine the potential impacts to cultural resources (including archaeological, historical, and paleontological resources) for the purpose of complying with the California Environmental Quality Act (CEQA) and the local cultural resource regulations. The scope of work for this assessment included a cultural resources records search through the California Historical Resources Information System-Eastern Information Center (CHRIS-EIC), a Sacred Lands File (SLF) search through the California Native American Heritage Commission (NAHC) and follow-up Native American consultation, land use history research, a paleontological resources records search through the San Bernardino County Museum (SBCM), a pedestrian survey, eligibility evaluations for resources identified within the Study Area, impact analyses, and the recommendation of additional work and mitigation measures.

ARCHAEOLOGICAL RESOURCES

The results of ESA PCR's assessment revealed that two prehistoric cultural resources (P-33-024882/CA-RIV-12,333 and P-33-024883) are located within the Study Area. Resource 33-024882/CA-RIV-12333 is a prehistoric archaeological resource that was previously recorded in the northwestern portion of the Study Area and was revisited by ESA PCR during the pedestrian survey. It consists of one boulder with one milling slick and one boulder with three milling slicks and measures 25 meters (north/south) x 6 meters (east-west). The Applicant has designed the project to avoid this resource and it is located in an area that is planned for open space; therefore no additional work or mitigation would be warranted. Resource P-33-024883, an isolated quartzite hammerstone, is not eligible for the California Register of Historical Resources therefore impacts to it from the proposed project are not considered a significant impact on the environment. Therefore, no further work or mitigation is warranted at this resource as well.

It is possible to encounter buried archaeological resources given the proven prehistoric occupation of the region, the identification of multiple surface archaeological resources within the vicinity of the Study Area (including two archaeological resources within the Study Area and numerous resources recorded in the Reche Hills Complex – see Section 4.1.5 of this report), and the favorable natural conditions (e.g., ephemeral drainages, natural spring, and vegetation communities) that would have attracted prehistoric inhabitants to the area. Therefore, despite the heavy disturbances of the Study Area that may have displaced archaeological resources on the surface, it is possible that intact archaeological resources exist at depth. As a result, recommended mitigation measures are provided in Chapter 9 to reduce potentially significant impacts to previously undiscovered archaeological resources that may be accidentally encountered during project implementation to a less than significant level.

BUILT ENVIRONMENT RESOURCES

The cultural resources records search results from the CHRIS-EIC indicated that there were no built environment resources located within the Study Area and none were identified during the pedestrian survey. Therefore, the proposed project would result in no substantial adverse change in the significance of a historical resource as defined in §15064.5.

PALEONTOLOGICAL RESOURCES

Results of the paleontological resources records search through SBCM indicate that no vertebrate fossil localities from the SBCM records have been previously recorded within the Study Area or within a one-mile radius. Moreover, no paleontological resources were identified by ESA PCR during the pedestrian survey. These findings; however, do not preclude the existence of undiscovered paleontological resources located below the ground surface and lacking surface manifestation, which may be encountered during construction excavations associated with the proposed project. The Study Area has been previously mapped geologically as containing surface exposures of early Pleistocene-aged (i.e., 1.9 million to 12,000 years ago) fan deposits, overlain across much of the Study Area by a thin sedimentary veneer of recent Holocene-aged (i.e., 12,000 years ago to present day) alluvium. The northwestern portion of the Study Area is mapped as Cretaceous-aged (i.e., 145 million to 65 million years ago) tonalite. The tonalite and the surficial Holocene-aged alluvium have very limited to no potential to be conducive to retaining paleontological resources; however, the Pleistocene-aged fan (or alluvial) deposits may have high a paleontological sensitivity, depending upon their lithology, as these sediments have yielded significant fossils of extinct animals from the Ice Age throughout the Inland Empire (Scott 2014). As a result, recommended mitigation measures are provided in Chapter 9 to reduce potentially significant impacts to previously undiscovered paleontological resources and/or unique geological features that may be accidentally encountered during project implementation to a less than significant level

1.0 INTRODUCTION

1.1 PROPOSED PROJECT AND LOCATION

Global Investment & Development, LLC. (the "Applicant") is proposing to develop the Ironwood Residential Project on an approximately 79-acre parcel in the City of Moreno, California. The proposed project would include the construction of single-family residences, streets, other infrastructure, underground utilities, parks, open spaces, and off-site water and sewer lines (the "proposed project"). For purpose of this report, all project components will collectively be referred to as the "Study Area", unless otherwise noted. The proposed project would include excavations across the majority of the Study Area.

The Study Area is located in a semi-rural area of the City of Moreno Valley, in western Riverside County, California (**Figure 1**, *Regional Map)*. It is located approximately one-half mile north of State Route 60 (SR-60). The Study Area is depicted in Section 33 of Township 2 South, Range 3 West of the Sunnymead CA United States Geological Survey (USGS) 7.5' topographic quadrangle map (**Figure 2**, *Vicinity Map*). It is surrounded by open space to the north, Ironwood Avenue on the south, Oliver Street on the east, Nason Street on the west, and semi-rural development (**Figure 3**, *Aerial Photograph*).

1.2 SCOPE OF STUDY AND PERSONNEL

ESA PCR conducted a phase I cultural resources assessment of the Study Area from November 2014 through January 2015 (with an update in June 2016) to identify potential impacts to cultural resources (including archaeological, historical, and paleontological resources) and to develop mitigation measures to avoid, reduce, or mitigate potential impacts to resources for the purpose of complying with CEQA and local cultural resource guidelines. The scope of work for this assessment included a cultural resources records search through the CHRIS-EIC, a SLF search through the NAHC and follow-up Native American consultation, land use history research, a paleontological resources records search through the SBCM, a pedestrian survey, eligibility evaluations for the resources identified within the Study Area, impact analyses, and the recommendation of additional work and mitigation measures. In June 2016, ESA PCR conducted an additional pedestrian survey of proposed water pipeline alignment that was not previously included in the original assessment.

The assessment was co-managed and this report compiled by Mr. Kyle Garcia and Mr. Chris Purtell, M.A., RPA. The pedestrian field survey was performed by Mr. Purtell, Mr. Garcia, and Ms. Lauren Willey. The record searches were conducted by Mr. Purtell. The June 2016 pedestrian survey was conducted by Mrs. Fatima Clark. Qualifications of key personnel are provided in Appendix A.

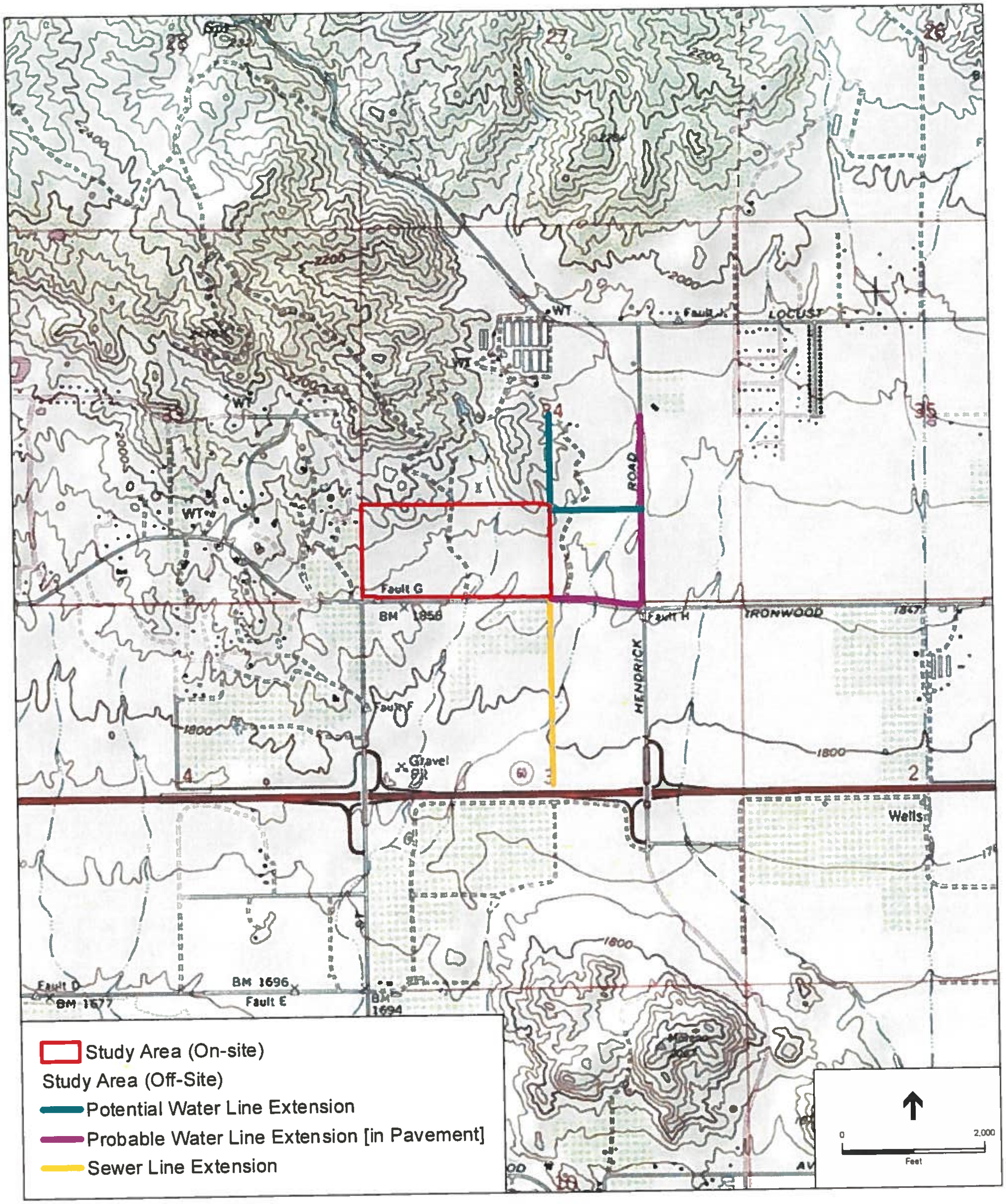
SOURCE: ESRI Street Map, 2009.

Ironwood Village Project

Figure 1

Regional Map

ESA PCR



SOURCE: USGS Topographic Series (Sunnymead, CA).

Ironwood Village Project

Figure 2

Vicinity Map

ESA PCR

SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project

Figure 3

Aerial Photograph

ESA PCR

2.0 REGULATORY SETTING

Numerous laws and regulations require federal, state, and local agencies to consider the effects of a proposed project on cultural resources. These laws and regulations establish a process for compliance, define the responsibilities of the various agencies proposing the action, and prescribe the relationship among other involved agencies (e.g., State Historic Preservation Office and the Advisory Council on Historic Preservation). The National Historic Preservation Act (NHPA) of 1966, as amended, CEQA, and Public Resources Code (PRC) 5024, are the primary federal and state laws governing and affecting preservation of cultural resources of national, state, regional, and local significance. Other relevant regulations and guidelines at the local level include the City's General Plan and Municipal Code. A description of the applicable laws, regulations, and guidelines are provided in the following paragraphs.

2.1 STATE LEVEL

2.1.1 California Register of Historical Resources

The California Office of Historic Preservation (OHP), as an office of the California Department of Parks and Recreation, implements the policies of the NHPA on a statewide level. The OHP also maintains the California Historic Resources Inventory. The SHPO is an appointed official who implements historic preservation programs within the State's jurisdictions.

Created by Assembly Bill 2881, which was signed into law on September 27, 1992, the California Register is "an authoritative listing and guide to be used by state and local agencies, private groups, and citizens in identifying the existing historical resources of the state and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change."[1] The criteria for eligibility for the California Register are based upon National Register criteria.[2] Certain resources are determined by the statute to be automatically included in the California Register, including California properties formally determined eligible for, or listed in, the National Register of Historic Places.[3]

To be eligible for the California Register, a prehistoric or historic property must be significant at the local, state, and/or federal level under one or more of the following criteria:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with the lives of persons important in our past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4. Has yielded, or may be likely to yield, information important in prehistory or history.

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1 *California Public Resources Code § 5024.1(a).*

2 *California Public Resources Code § 5024.1(b).*

3 *California Public Resources Code § 5024.1(d).*

A resource eligible for the California Register must meet one of the criteria of significance described above and retain enough of its historic character or appearance (integrity) to be recognizable as a historical resource and to convey the reason for its significance. It is possible that a historic resource may not retain sufficient integrity to meet the criteria for listing in the National Register, but it may still be eligible for listing in the California Register.

Integrity is evaluated with regard to the retention of location, design, setting, materials, workmanship, feeling, and association. The resource must also be judged with reference to the particular criteria under which it is proposed for eligibility.[4]

Additionally, the California Register consists of resources that are listed automatically and those that must be nominated through an application and public hearing process. The California Register automatically includes the following:

- California properties listed on the National Register and those formally Determined Eligible for the National Register.
- California Registered Historical Landmarks from No. 770 onward.
- Those California Points of Historical Interest that have been evaluated by the OHP and have been recommended to the State Historical Commission for inclusion on the California Register.

Other resources that may be nominated to the California Register include:

- Historical resources with a significance rating of Category 3 through 5.[5]
- Individual historical resources.
- Historical resources contributing to historic districts.
- Historical resources designated or listed as local landmarks, or designated under any local ordinance, such as an historic preservation overlay zone.

2.1.2 California Environmental Quality Act

CEQA is the principal statute governing environmental review of projects occurring in the State. CEQA requires lead agencies to determine if a proposed project would have a significant effect on archaeological resources (PRC Sections 21000 *et seq.*). As defined in Section 21083.2 of the PRC, a "unique" archaeological resource is an archaeological artifact, object, or site, about which it can be clearly demonstrated that without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information.

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[4] *Ibid.*

[5] *Those properties identified as eligible for listing in the National Register, the California Register, and/or a local jurisdiction register.*

- Has a special and particular quality such as being the oldest of its type or the best available example of its type.
- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

In addition, CEQA Guidelines Section 15064.5 broadens the approach to CEQA by using the term "historical resource" instead of "unique archaeological resource." The CEQA Guidelines recognize that certain historical resources may also have significance. The CEQA Guidelines recognize that a historical resource includes: (1) a resource in the California Register of Historical Resources; (2) a resource included in a local register of historical resources, as defined in PRC section 5020.1 (k) or identified as significant in a historical resource survey meeting the requirements of PRC section 5024.1 (g); and (3) any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California by the lead agency, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

If a lead agency determines that an archaeological site is a historical resource, the provisions of section 21084.1 of the PRC and section 15064.5 of the CEQA Guidelines apply. If an archaeological site does not meet the criteria for a historical resource contained in the CEQA Guidelines, but does meet the definition of a unique archaeological resource in Section 20183.2 of the PRC, then the site is to be treated in accordance with the provisions of PRC section 21083. The CEQA Guidelines note that if an archaeological resource is neither a unique archaeological nor a historical resource, the effects of the project on those resources shall not be considered a significant effect on the environment. (CEQA Guidelines §15064.5(c)(4)).

2.2 LOCAL LEVEL

2.2.1 City of Moreno Valley General Plan

The City of Moreno Valley has put forth numerous policies within the Goals and Objectives section of the General Plan. These policies were created to identify and preserve Moreno Valley's unique historical and archaeological resources for future generations (City of Moreno Valley 2006). These policies are listed below:

- **Policy 7.6.1:** Historical, cultural and archaeological resources shall be located and preserved, or mitigated consistent with their intrinsic value.
- **Policy 7.6.2:** Implement appropriate mitigation measures to conserve cultural resources that are uncovered during excavation and construction activities
- **Policy 7.6.3:** Minimize damage to the integrity of historic structures when they are altered.
- **Policy 7.6.4:** Encourage restoration and adaptive reuse of historical buildings worthy of preservation.
- **Policy 7.6.5:** Encourage documentation of historic buildings when such buildings must be demolished (City of Moreno Valley 2006).

2.2.2 City of Moreno Valley Landmark Criteria

The City of Moreno Valley's Municipal Code Title Chapter 7: Cultural Preservation, Subsection 7.05 Landmarks and Structures of Merit. Subchapter 7.05.010 states: a Landmark is any site, including significant trees or other significant permanent landscaping located thereof, place, building, structure, street, improvement, natural feature or other object having a special historical, archaeological, paleontological, cultural, architectural or community value in the city and which has been designated a landmark pursuant to this title. (Ord. 126 § 1, 1987). The City has established 11 Subsection Chapters in determining landmark eligibility and procedural processes.

The Subsection Chapters are as follows:

7.05.020 Initiation. The designation, repeal or modification of a landmark may be initiated by the city council, the environmental and historical preservation board, the planning commission or the record property owner. Application for such designation, repeal or modification shall be made to the community development director upon such forms and accompanied by such data and information as may be required for that purpose by the environmental and historical preservation board so as to assure the fullest practical presentation of the facts for proper consideration of the request. (Ord. 723 §2.3, 2006: Ord. 126 § 1, 1987)

7.05.030 Hearing date. Upon the acceptance by the director of developmental services of an application, the matter shall be set for public hearing thereon before the committee. The date of such hearing shall be not more than fifty (50) days from the date of acceptance of the application. (Ord. 126 § 1, 1987)

7.05.040 Hearing notice. Notice of the date, time, place and purpose of the hearing before the committee shall be given by at least one publication of a notice, in a newspaper having general circulation in the city, not less than ten days prior to the date of such hearing and by depositing in the United States mail, postage prepaid, at least ten days prior to the date of the hearing, a notice addressed to the owner of the property being considered. When the property being considered is not real property, notice shall be given to both the owner and the person in possession of the real property where the object is situated. The last known name and address of each owner as shown on the records of the county assessor may be used for this notice. Failure to send any notice by mail to any property owner where the address of such owner is not a matter of public record or the failure to receive any mailed notice shall not invalidate any proceedings in connection with the proposed designation. (Ord. 126 § 1, 1987)

7.05.050 Hearing. At the time and place so fixed and noticed, a public hearing shall be conducted before the committee. The committee may continue such hearing to a time and place certain when such action is deemed necessary or desirable. The committee may establish rules for the conducting of such public hearings. (Ord. 126 § 1, 1987)

7.05.060 Investigation. The director of developmental services shall cause to be made such investigation of facts bearing upon the application set for hearing as in the opinion of the director will provide sufficient information to permit the committee to take action consistent with the intent and purpose of this title. (Ord. 126 § 1, 1987)

7.05.070 Designation. The committee may designate a landmark in whole or in part if from the facts presented in the application, at the public hearing or by investigation, the committee finds that the site, landscaping, place, buildings, structure, street, improvement, natural feature or other object has special historical, archaeological, paleontological, cultural, architectural or community value in the city and that purposes of this title are furthered by such designation. (Ord. 126 § 1, 1987)

7.05.080 Resolution. A landmark shall be designated by resolution of the committee. Rescission or modification of such designation shall be accomplished in the same manner. (Ord. 126 § 1, 1987)

7.05.090 Notice of designation. Promptly after the adoption thereof, notice of the designation, rescission or modification of landmark status shall be transmitted by the planning director to the city clerk, the city manager, the community redevelopment agency of the city, the assessor and the recorder of Riverside County, and to any other interested departments and governmental and civic agencies. Upon receipt of such notice, the city clerk shall place it upon the agenda of the first regular meeting of the city council occurring at least five days after receipt of the notice. Each city department and division shall incorporate the notice of designation, rescission or modification into its records, so that future decisions or permissions regarding or affecting any landmark made by the city will have been made with the knowledge thereof, and in accordance with the procedures set forth in this title. Whenever any project to be carried out on behalf of the city may have an impact on a designated landmark, written notice shall be given to the committee and to the city council prior to taking any irreversible action to carry out such project. (Ord. 260 § 1.2, 1990: Ord. 126 § 1, 1987)

7.05.100 Appeal and city council review. Any person aggrieved or affected by a decision of the committee in designating, repealing or modifying landmark status may appeal to the city council from such decision at any time within ten days after the date upon which the committee announced its decision. An appeal to the city council shall be taken by filing a letter of appeal, in duplicate, with the city clerk. Such letter of appeal shall set forth the grounds upon which the appeal is based. Within five days after the letter of appeal has been filed, the city clerk shall notify the committee and the planning director of such filing. Within five working days after such notice is given, the planning director shall lodge with the city clerk copies of the application and all other papers constituting the record upon which the action of the committee was taken. The city clerk shall give notice of hearing upon the appeal in the same manner and for the same time as is required by Section 7.05.040 for hearing in connection with an application before the committee. The date of such hearing upon the appeal shall be not more than thirty (30) days from the date of filing of the appeal. Upon the hearing of such appeal, the city council may by resolution affirm, reverse or modify the determination of the committee. Except for provisions which properly can relate only to appeals, review of committee decisions by the city council without any appeal having been filed, shall follow the procedures set forth above for appeals. (Ord. 260 1.3, 1990: Ord. 126 § 1, 1987)

7.05.120 Duty to maintain. Every owner of a landmark and any appurtenant premises shall maintain and keep in good repair the exterior of such landmark and premises. "Good repair" is defined as that level of maintenance and repair which clearly insures the continued availability of such structure and premises for lawful reasonable uses and prevents deterioration, dilapidation and decay of such structures and premises. (Ord. 126 § 1, 1987)

7.05.130 Structures of merit. The committee may encourage the protection, enhancement, appreciation and use of structures of historical, archaeological, paleontological, cultural, architectural, community or aesthetic value which have not been designated as landmarks but are deserving of recognition, by designating them as structures of merit so as to emphasize their importance in the past, present and future of the city (Ord. 126 § 1, 1987).

3.0 ENVIRONMENTAL SETTING

The Study Area is located in western Riverside County, California within the City of Moreno Valley in a semi-rural area that is situated between open spaces on the north and east and adjacent to residential housing on the west and south. The elevation within the Study Area ranges from approximately 1,858 feet above mean sea level (MSL) in the south to 2,000 feet above MSL in the north. The Study Area is characterized as undeveloped; however, evidence of past disking/plowing activities is depicted in historic aerial photographs. The Study Area may have been used for cultivation in the past although it is currently fallow. The topography of a majority of the Study Area is relatively flat, except in the northern area which exhibits an elevated topography and numerous granitic bedrock outcroppings. Review of aerial photographs indicates that the Study Area has been highly disturbed by dirt access roads and regular disking/plowing for fire breaks.

Two ephemeral steams are located within and adjacent to the Study Area. The first stream was formerly located in the central portion of the Study Area and ran in a northwest-southeast direction as shown USGS maps (see **Figure 2**). This stream has since been diverted and filled in and is no longer visible within the Study Area. The second ephemeral stream is located approximately 600-feet east of the Study Area's eastern boundary and runs in a north-south direction and shows minimal change or modification over time based on historic topographic map review. Vegetation within the Study Area can be characterized as sparse plant communities consisting of coyote bush, white bur sage, native and non-native wild grasses.

Geologically, the Study Area is located in the northwestern portion of the Peninsular Ranges geomorphic province. The Peninsular Ranges province is distinguished by northwest trending mountain ranges and valleys following faults branching from the San Andreas Fault. The Peninsular Ranges are bound to the east by the Colorado Desert and extend north to the San Bernardino – Riverside county line (Norris and Webb 1976), west into the submarine continental shelf, and south to the California state line.

Previous mapping of the Study Area (Rogers 1965) suggests that the majority of the area is situated upon surface exposures of early Pleistocene fan deposits (Qvofa), overlain by a thin sedimentary veneer of recent alluvium (Qyaa). The northwestern portion of the Study Area is mapped as Cretaceous-aged tonalite (Kt) (Scott 2014).

4.0 CULTURAL SETTING

4.1 PREHISTORIC CONTEXT

Prehistory is most easily discussed chronologically, in terms of environmental change and recognized cultural developments. Several chronologies have been proposed for inland Southern California, the most widely accepted of which is Wallace's four-part Horizon format (1955), which was later updated and revised by Claude Warren (1968). The advantages and weaknesses of Southern California chronological sequences are reviewed by Warren (in Moratto 1984), Chartkoff and Chartkoff (1984), and Heizer (1978). The following discussion is based on Warren's (1968) sequence, but the time frames have been adjusted to reflect more recent archaeological findings, interpretations, and advances in radiocarbon dating.

4.1.1 Paleo-Indian Period (ca. 13,000-11,000 years before present [YBP])

Little is known of Paleo-Indian peoples in inland southern California, and the cultural history of this period follows that of North America in general. Recent discoveries in the Americas have challenged the theory that the first Americans migrated from Siberia, following a route from the Bering Strait into Canada and the Northwest Coast sometime after the Wisconsin Ice Sheet receded (ca. 14,000 YBP), and before the Bering Land Bridge was submerged (ca. 12,000 YBP). Based on new research from the Pacific Rim, it has been proposed that modern humans settled islands of the eastern Pacific between 40,000 and 15,000 years ago. Evidence of coastal migration has also come from sites on islands off Alta and Baja California. As a result, these sites are contemporary with Clovis and Folsom points found in North America's interior regions. All of these new findings have made the coastal migration theory gain credibility in recent times (Erlandson et al. 2007).

The timing, manner, and location of the Bering Strait crossing are a matter of debate among archaeologists, but the initial migration probably occurred as the Laurentide Ice Sheet melted along the Alaskan Coast and interior Yukon. The earliest radiocarbon dates from the Paleo-Indian Period in North America come from the Arlington Springs Woman site on Santa Rosa Island located approximately 150 miles west-northwest of the Study Area. These human remains date to approximately 13,000 YBP (Johnson, et al. 2002). Other early Paleo-Indian sites include the Monte Verde Creek site in Chile (Meltzer, et al. 1997) and the controversial Meadowcroft Rockshelter in Pennsylvania. Both sites have early levels dated roughly at 12,000 YBP. Lifeways during the Paleo-Indian Period were characterized by highly mobile hunting and gathering. Prey included megafauna such as mammoth and technology included a distinctive flaked stone toolkit that has been identified across much of North America and into Central America. They likely used some plant foods, but the Paleo-Indian toolkit recovered archaeologically does not include many tools that can be identified as designed specifically for plant processing.

The megafauna that appear to have been the focus of Paleo-Indian life went extinct during a warming trend that began approximately 10,000 years ago, and both the extinction and climatic change (which included warmer temperatures in desert valleys and reduced precipitation in mountain areas) were factors in widespread cultural change. Subsistence and social practices continued to be organized around hunting and gathering, but the resource base was expanded to include a wider range of plant and game resources. Technological traditions also became more localized and included tools specifically for the processing of plants and other materials. This constellation of characteristics has been given the name "Archaic" and it was the most enduring of cultural adaptations to the North American environment.

4.1.2 Archaic Period (ca. 11,000-3,500 YBP)

The earliest Archaic Period life in inland southern California has been given the name San Dieguito tradition, after the San Diego area where it was first identified and studied (Warren 1968). Characteristic artifacts include stemmed projectile points, crescents and leaf-shaped knives, which suggest a continued subsistence, focus on large game, although not megafauna of the earlier Paleo-Indian period. Milling equipment appears in the archaeological record at approximately 7,500 years ago (Moratto 1984:158). Artifact assemblages with this equipment include basin milling stones and unshaped manos, projectile points, flexed burials under cairns, and cogged stones, and have been given the name La Jolla Complex (7,500–3,000 YBP). The transition from San Dieguito life to La Jolla life appears to have been an adaptation to drying of the climate after 8,000 YBP, which may have stimulated movements of desert peoples to the coastal regions, bringing milling stone technology with them. Groups in the coastal regions focused on mollusks, while inland groups relied on wild-seed gathering and acorn collecting.

4.1.3 Late Prehistoric Period (ca. 3,500 YBP-A.D. 1769)

Cultural responses to environmental changes around 4,000–3,000 YBP included a shift to more land-based gathering practices. This period was characterized by the increasing importance of acorn processing, which supplemented the resources from hunting and gathering. Meighan (1954) identified the period after A.D. 1400 as the San Luis Rey complex. San Luis Rey I (A.D. 1400–1750) is associated with bedrock mortars and milling stones, cremations, small triangular projectile points with concave bases and Olivella beads. The San Luis Rey II (A.D. 1750–1850) period is marked by the addition of pottery, red and black pictographs, cremation urns, steatite arrow straighteners and non-aboriginal materials (Meighan 1954:223, Keller and McCarthy 1989:6). Work at Cole Canyon and other sites in southern California suggests that this complex, and the ethnographically described life of the native people of the region, were well established by at least 1,000 YBP (Keller and McCarthy 1989:80).

4.1.4 Ethnographic Context

Information presented in the California volume of the Handbook of North American Indians (Heizer 1978:575) shows the Study Area is located near the traditional territory of the Luiseño and Cahuilla. Both of these ethnographic groups are described below.

Luiseño

The Luiseño are a Takic speaking people that are usually associated with coastal and inland areas of present-day Orange and southern Riverside counties, with cultural and social behavioral characteristics similar to those of the Cahuilla, a tribal group generally linked with areas northeast of the San Jacinto Mountains. In fact, exchanges between the Luiseno and Cahuilla have been well documented. In context, the Study Area is considered a Luiseño area, though evidence of a Cahuilla presence may be identified (Robinson and Risher 1996:102-103).

The term Luiseño derives from the mission named San Luis Rey and has been used in the region to refer to those Takic-speaking people associated with Mission San Luis Rey (Bean and Shipek 1978:550). The Luiseño shared boundaries with the Cahuilla, Cupeño, Gabrielino, and Kummeyaay groups on the east, north, and south, respectively. These different bands shared cultural and language traditions with the Luiseño. The Luiseño territory comprised from the coast to Agua Hedionda Creek on the south to near Aliso Creek on the northwest. The boundary extended inland to Santiago Peak, then across to the eastern side of Elsinore Fault Valley, then southward to the east of Palomar Mountain, then around the southern slope above the valley of San Jose (*ibid.*:550). Their habitat covered every ecological zone from the ocean, sandy beaches, shallow inlets, coastal chaparral, grassy valleys oak groves, among various other niches. The primary food source consisted of game animals such as deer, rabbit, jackrabbit, woodrat, mice, ground squirrels, antelope, and various species of birds. Next to game animals, acorns were the most single important staple, and six different species were utilized (*ibid.*:552). The Luiseño social structure is unclear; however, each village was a clan-triblet-a group of people patrilineally related who owned an area in common and who were politically and economically autonomous from neighboring groups. The Luiseño were not organized into exogamous moieties such as were their neighbors, Cahuilla, Cupeño, and Serrano (Strong 1929:291). The hereditary village chief held an administrative position that combined and controlled religious, economic, and warfare powers (Boscana 1933:43). Marriage was arranged by the parents of children and important lineages were allied through marriage. Reciprocally useful alliances were arranged between groups in different ecological niches, and became springboards of territorial expansion, especially following warfare and truces (White 1963:130).

The Luiseño material culture included an array of tools that were made from stone, wood, bone, and shell, and which served to procure and process the region's resources. Needs for shelter and clothing were minimal in the region's forgiving climate, but considerable attention was devoted to personal decoration in ornaments, painting, and tattooing. The local pottery was well made, although it was not elaborately decorated (Laylander and Pham 2012).

Cahuilla

The Cahuilla occupied a large area in the geographic center of southern California that was bisected by the Cocopa-Maricopa Trail in addition to Santa Fe and Yuman Trails. They occupied an area from the summit of the San Bernardino Mountains in the north to Borrego Springs and the Chocolate Mountains in the south, portions of the Colorado Desert west of Orocopia Mountain to the east, and the San Jacinto Plain near Riverside and the eastern slopes of Palomar Mountain to the west (Bean 1978). The Cahuilla hunted with throwing sticks, clubs, nets, traps, dead falls with seed triggers, spring-poled snares, arrows (often poison-tipped) and self-backed and sinew-backed bows. They sometimes fired bush clumps to drive game out in the open, and flares to attract birds at night. Baskets of various kinds were used for winnowing, leaching, grinding, transporting, parching, storing, and cooking. Pottery vessels were used for carrying water, for storage, cooking, serving food and drink. Cahuilla tools included mortars and pestles, manos and metates, fire drills, awls, arrow-straighteners, flint knives, wood, horn, and bone spoons and stirrers, scrapers, and hammerstones. Woven rabbitskin blankets served to keep people warm in cold weather. Feathered costumes were worn for ceremonial events, and at these events the Cahuilla made music using rattles derived from insect cocoon, turtle and tortoise shell, and deer-hoofs, along with wood rasps, bone whistles, bull-roarers, and flutes, to make music. They wove bags, storage pouches, cords, and nets from the fibers of yucca, agave, and other plants (Bean and Vane 2002).

4.1.5 Reche Hills Complex

The Study Area is located within an area that has been designated as the Reche Hills Complex (City of Moreno Valley 2006). The Reche Hills Complex is comprised of a series of hills that stretch south into Moreno Valley from the mountains on the west side of Reche Canyon. Their appears to be two major habitation areas within the complex and include an area at the mouth of Reche Canyon (approximately one-half mile northwest of the Study Area) and another area to the southeast of the canyon. These areas are characterized as prehistoric habitation areas that consist of more than 23 bedrock millings stations, cupule rocks, petroglyphs, and pictographs (*Ibid.*). The identification of this complex, whose boundaries encompass the Study Area, confirms the prehistoric occupation of the Study Area and surrounding vicinity.

4.1.6 European Contact

European contact with the Native American groups that likely inhabited the Study Area and surrounding region began in 1542 when Spanish explorer, Juan Rodriguez Cabrillo, arrived by sea during his navigation of the California coast. Sebastian Vizcaino arrived in 1602 during his expedition to explore and map the western coast that Cabrillo visited 60 years earlier. In 1769, another Spanish explorer, Gaspar de Portola, passed through Luiseño/Kumeyaay territory and interacted with the local indigenous groups. In 1798, Mission San Luis Rey was established by the Spanish and it likely integrated the Native Americans from the surrounding region. Multiple epidemics took a great toll on Native American populations between approximately 1800 and the early 1860s (Porretta 1983), along with the cultural and political upheavals that came with European, Mexican, and American settlement (Goldberg 2001:50-52). In the beginning of the nineteenth century, some Spaniards who had worked at the missions began to set up what would later be known as the "Ranchos." The Rancho era in California history was a period when the entire state was divided into large parcels of land equaling thousands of acres apiece. These large estates were ruled over in a semi-feudal manner by men who had been deeded the land by first the Spanish crown, and later the Mexican government. In 1821 Mexico won independence from Spain and began to dismantle the mission system in California. As the missions began to secularize, they were transformed into small towns and most Native Americans would later be marginalized into reservations or into American society. It was during this time that "Americans" began to enter California. Many of the American Californians married into the Rancho families, a development that would transform land ownership in Mexican California. By the time the United States annexed California after the Mexican-American War in 1850, much of the Rancho lands were already in the hands of Americans.

4.2 HISTORIC CONTEXT

4.2.1 City of Moreno Valley

By the mid-19th century, the area that comprises present-day Moreno Valley remained essentially uninhabited, despite its location on a grassy upland surrounded by several large Mexican Ranchos. When the U.S. government initiated its first official land survey in southern California in 1853-1855, the only man-made features in the Moreno Valley were a few roads including a wagon road from San Bernardino to Temecula, a second one leading to San Jacinto, and several unidentified roads and/or trails.

The area surrounding Moreno Valley remained unclaimed public land until 1870, when a large tract of 13,471 acres were purchased from the U.S. Government and with the expansion of the railroad in 1880's a land boom soon brought settlers into the area, only to see the boom turn to bust for lack of a reliable water supply. In 1891, private developers brought water into new Haven, which was subsequently changed to Moreno and Midland also, known as Armada from the newly constructed Bear Valley reservoir, which got the economy moving again until a drought the following year stopped the water flow from the Bear Valley reservoir. As a result, the town of Moreno died again and many of its budding were either abandoned or were sold and moved to Riverside (Gunther 1984).

Moreno Valley's economic fortunes were severely hampered by the lack of water. Finally, in 1973, after the completion of the California Aqueduct and the construction of Lake Perris, Moreno Valley's economic fortunes began to change. A reliable water supply, coupled with the Interstate Freeway System and the construction of affordable housing brought an influx of commuters to the Moreno Valley area, setting off a period of rapid expansion and urbanization. By 1984, when residents in the communities of Moreno, Sunnymead, and Edgemont voted to incorporate as the City of Moreno Valley, the new city had already become the second most populous in Riverside County (*Ibid.*).

5.0 METHODS

5.1 CULTURAL RESOURCES RECORDS SEARCH

On November 17, 2014, Mr. Purtell conducted a records search of the Study Area at the CHRIS-EIC. The records searches included a review of all recorded archaeological and historical resources within a one half-mile radius of the Study Area and within a one-mile radius of the Off-Site Areas as well as a review of cultural resource reports and historic topographic maps on file. In addition, ESA PCR reviewed the California Points of Historical Interest (CPHI), the California Historical Landmarks (CHL), the California Register, the National Register, and the California State Historic Resources Inventory (HRI) listings. The purpose of the record search is to determine whether or not there are previously recorded archaeological or historical resources within the Study Area that require evaluation and treatment. The results also provide a basis for assessing the sensitivity of the Study Area for additional and buried cultural resources.

5.2 SACRED LANDS FILE SEARCH AND NATIVE AMERICAN CONSULTATION

On November 12, 2014, Mr. Purtell commissioned a SLF records search of the Study Area through the NAHC and conducted follow-up consultation with the ten (10) Native American groups and/or individuals (inclusive of Luiseño and Cahuilla groups) identified by the NAHC as having affiliation with the Study Area vicinity. Each Native American group and/or individual listed was sent a project notification letter and map and was asked to convey any knowledge regarding prehistoric or Native American resources (archaeological sites, sacred lands, or artifacts) located within the Study Area or surrounding vicinity. The letter included information such as Study Area location and a brief description of the proposed project. Results of the search and follow-up consultation provided information as to the nature and location of additional prehistoric or Native American resources to be incorporated in the assessment whose records may not be available at the CHRIS-EIC.

5.3 PALEONTOLOGICAL RESOURCES RECORDS SEARCH

On November 12, 2014, Mr. Purtell commissioned a paleontological resources records search through the Division of Geological Sciences at the SBCM in Redlands, California. This institution maintains files of regional paleontological site records as well as supporting maps and documents. This record search entailed an examination of current geologic maps and known fossil localities inside and within the general vicinity of the Study Area. The objective of the record search was to determine the geological formations underlying the Study Area, whether any paleontological localities have previously been identified within the Study Area or in the same or similar formations near the Study Area, and the potential for excavations associated with the Study Area to encounter paleontological resources. The results also provide a basis for assessing the sensitivity of the Study Area for additional and buried paleontological resources.

5.4 PEDESTRIAN SURVEY

On December 23, 2014, ESA PCR (Mr. Garcia, Mr. Purtell, and Ms. Willey) conducted a pedestrian survey of the Study Area to identify the presence of archaeological, historical, or paleontological resources. The field crew surveyed the Study Area using parallel pedestrian transects spaced not more than 10 to 15 meters (m) between each surveyor. A Trimble® GeoXT™ sub-meter Global Positioning System (GPS) unit was used for navigation and documenting distribution of Study Area conditions. ESA PCR surveyed 100% of the Study Area. Detailed notes and digital photographs were also taken of the Study Area and surrounding vicinity.

Resources were documented on State of California Department of Parks and Recreation (DPR) 523 series Site Forms with preliminary sketch maps and photographs providing supplemental documentation.

On June 14, 2016, Mrs. Clark conducted an additional pedestrian survey of a proposed water pipeline alignment west of the intersection of Moreno Beach Drive and Juniper Avenue which was not previously included as part of the original 2014 ESA PCR assessment. Mrs. Clark surveyed the additional pipeline alignment using parallel transects spaced at no more than five meters apart.

6.0 RESULTS

6.1 CULTURAL RESOURCES RECORDS SEARCH

Results of the records research conducted at the CHRIS-EIC revealed that there have been two cultural resource studies conducted within the Study Area (RI-08242 and RI-08368). These studies are described in detail, below. Twelve cultural resource studies have been conducted within a one-half mile radius and 17 studies have been conducted within a one-mile radius of the Study Area. All of these studies were conducted from 1978 to 2012 and encompass approximately 75 percent of the record search area.

Report RI-08242 is described as phase I assessment of the current Study Area (not inclusive of the off-site areas) for a proposed high school that was conducted in 2008. Results of this assessment identified one prehistoric cultural resource within the Study Area (P-33-001064/CA-RIV-1064). This resource is described as one bedrock milling slick on a granitic boulder in the northwestern portion of the Study Area with no associated surface artifacts.

Report RI-8368 is described as a phase I assessment (in 2009) of the two alternative sewer pipelines that appear to overlap in certain area of the current Study Area. No cultural resources were identified as part of this assessment.

As discussed above, the records search also revealed that one prehistoric archaeological resource, CA-RIV-1064 (P-33-001064) was recorded within the Study Area. This resource is described in more detail in Section 6.4 of this report. Seven prehistoric archaeological sites and one prehistoric isolate have been recorded within a one-eighth mile of the Study Area. These resources are summarized in **Table 1,** *Previously Recorded Cultural Resources Within a One-eighth Mile of the Study Area.* Twenty-four prehistoric archaeological sites and one historical archaeological site have been recorded within one-half mile of the Study Area. The majority of the prehistoric archaeological resources recorded in the vicinity of the Study Area include bedrock milling stations.

Table 1

Previously Recorded Cultural Resources Within a One-Eighth Mile Radius of the Study Area

Resource Designation	Description	Status Code
CA-RIV-2277	Six milling slicks on two boulders, chert flake, metavolcanic scraper	7
CA-RIV-2587	Three milling slicks on one granite boulder	7
CA-RIV-3305	One milling slick on one granite boulder	7
CA-RIV-3306	10 cupules on a granite boulder	7
CA-RIV-1604	Rockshelter with more than 100 cupules and several pit-and-groove petroglyphs	7
CA-RIV-4924	One milling slick on one granite boulder	7
CA-RIV-4925	One milling slick on one granite boulder	7
P-33-017851	Isolated granite mano	7

7 – Not Evaluated

Source: CHRIS-EIC, November 2014

6.2 SACRED LANDS FILE SEARCH AND NATIVE AMERICAN CONSULTATION

The NAHC SLF records search results (received November 24, 2014) revealed that there are no known "Native American cultural resources" in the SLF database within the Study Area. As per NAHC suggested procedure, follow-up letters were sent via certified mail on December 15, 2014 to the ten (10) Native American individuals and organizations identified by the NAHC as being affiliated with the vicinity of the Study Area to request any additional information they may have about Native American cultural resources that may be affected by the proposed project.

As of June 23, 2016, ESA PCR has received one response from the Morongo Band of Mission Indians (Morongo) who requested the following: 1) If human remains are discovered, that they be treated in accordance with State Health and Safety Code Section 7050.5, 2) If significant prehistoric Native American resources are discovered, that a qualified archaeologist be consulted to assess the find, 3) If a treatment plan is prepared for the resource that the Morongo be contacted, and 4) If requested by the Morongo, the Applicant shall consult with the Morongo "on the discovery and its disposition (e.g., avoidance, preservation, return of artifacts, etc.)." ESA PCR has received no other responses from the Native American community concerning the proposed project. ESA PCR will keep the Applicant apprised with the progress of this on-going Native American consultation. The NAHC SLF records search results, the Native American contact list, request letters, and response letters are provided in Appendix B of this report.

6.3 PALEONTOLOGICAL RESOURCES RECORDS SEARCH

Results of the paleontological resources records search through the SBCM indicate that no known vertebrate fossil localities from the SBCM database have been previously identified within the Study Area or within a one-mile radius. The Study Area has been previously mapped geologically and is situated upon surface exposures of early Pleistocene-aged fan deposits (Qvofa), overlain across much of the property by a thin sedimentary veneer of recent Holocene-aged alluvium (Qyaa). Similar older Pleistocene-aged alluvial sediments throughout the Inland Empire have yielded extinct taxa including mammoths, mastodons, ground sloths, dire wolves, sabre-toothed cats, large and small horses, large and small camels, and bison, as well as plant macro- and microfossils. The northwestern portion of the Study Area is mapped as Cretaceous-aged tonalite (Kt) (Scott 2014).

The paleontological resources records search results letter from the SBCM is provided in Appendix C of this report.

6.4 PEDESTRIAN SURVEY

ESA PCR identified two prehistoric archaeological resources (P-33-024882/CA-RIV-12,333 and P-33-024883) within the Study Area during the pedestrian survey. Moreover, one previously recorded archaeological resource (P-33-017851) that was recorded immediately outside of the off-site sewer area was revisited by ESA PCR. These resources are described in more detail below. No built environment or paleontological resources were identified during the pedestrian survey.

6.4.1 33-024882/CA-RIV-12333

This resource consists of a previously recorded bedrock milling station that was recorded in 2008 by McKenna in the northwestern portion of Study Area (**Figure D1**, *Resources Map*, in Appendix D of this report). It is described by McKenna as one milling slick on a single granite boulder and given its proximity to other nearby prehistoric resources, McKenna designated it as a component of the previously recorded resource CA-RIV-1604 (McKenna 2008a, 2008b). CA-RIV-1604 is located approximately 300 m to the west of 33-024882 and was originally recorded in 1976 as a rockshelter with more than 100 cupules and several pit-and-groove petroglyphs (Parr and Arkush 1987). Although ESA PCR agrees with McKenna in that 33-024882 is likely associated with CA-RIV-1064, ESA PCR has decided to give the resource a separate designation since other nearby bedrock milling stations were also designated separately and since this resource will be evaluated separately from CA-RIV-1064.

ESA PCR identified P-33-024882 in the exact location within the Study Area that McKenna did in 2008; however, ESA PCR identified three milling slicks on the boulder as opposed to a single milling slick. Furthermore, ESA PCR identified an additional milling slick on another low-lying granite boulder approximately 17 m to the north. As a result, P-33-024882 consists of one boulder with one milling slick and one boulder with three milling slicks and measures 25 m (north/south) x 6 m (east-west) (see **Figure D1**). No surface artifacts were identified by ESA PCR (or McKenna in 2008) near the boulders. The area within and around P-33-024882 has been disturbed by recent and recurring disking/plowing activities and many nearby boulders appear to have been displaced from their former location as result of the construction of the adjacent road (Nason St.).

6.4.2 P-33-024883

This resource consists of a newly identified isolated artifact-a quartzite hammerstone-that is polished on one end and therefore appears to have been utilized as a ground stone as well. The resource was found within the southwestern portion of the Study Area in a disturbed context (recently disked field) and has likely been displaced from its original location (see **Figure D1**).

6.4.3 P-33-017851

This resource was originally recorded in 2009 as an isolated granite mano artifact (Ballester 2009). ESA PCR revisited the resource during the pedestrian survey and confirmed its location outside the Study Area. Specifically it is located 20 m west of the edge of the pavement of a road (Oliver St.) where an off-site sewer line is proposed.

The new and/or updated DPR Site Forms form the aforementioned resources are provided in Appendix D of this report.

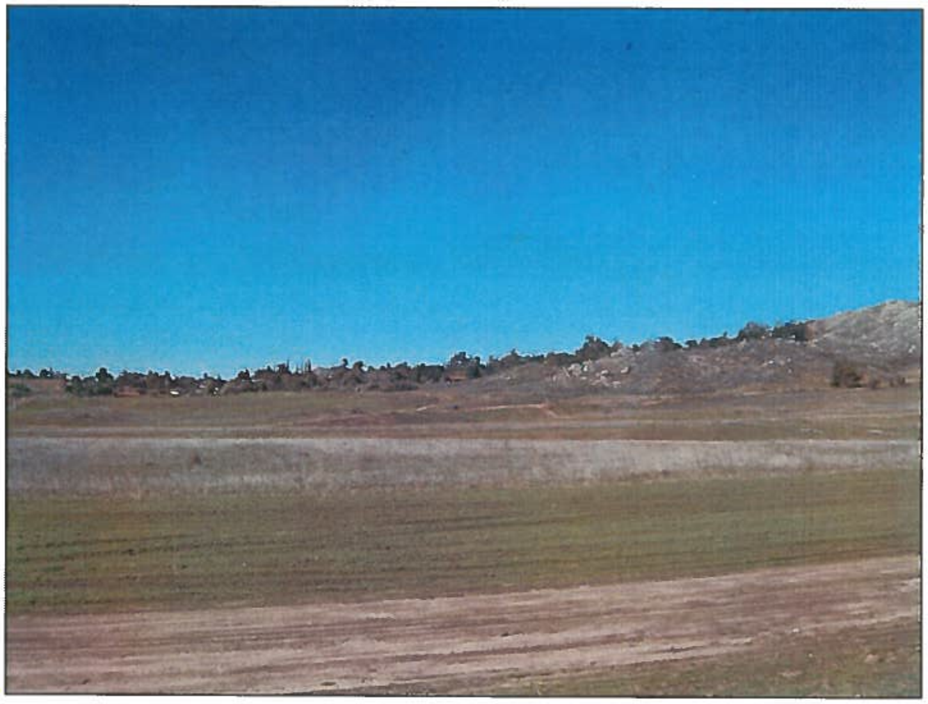
No other resources were identified within the Study Area during the pedestrian survey. This may have been a direct results of heavy ground-surface disturbances from recent and recurring disking/plowing and numerous off-road vehicle tracks and walking trails, which may have displaced (e.g., buried) resources from their original location.

6.4.4 Other Study Area Conditions

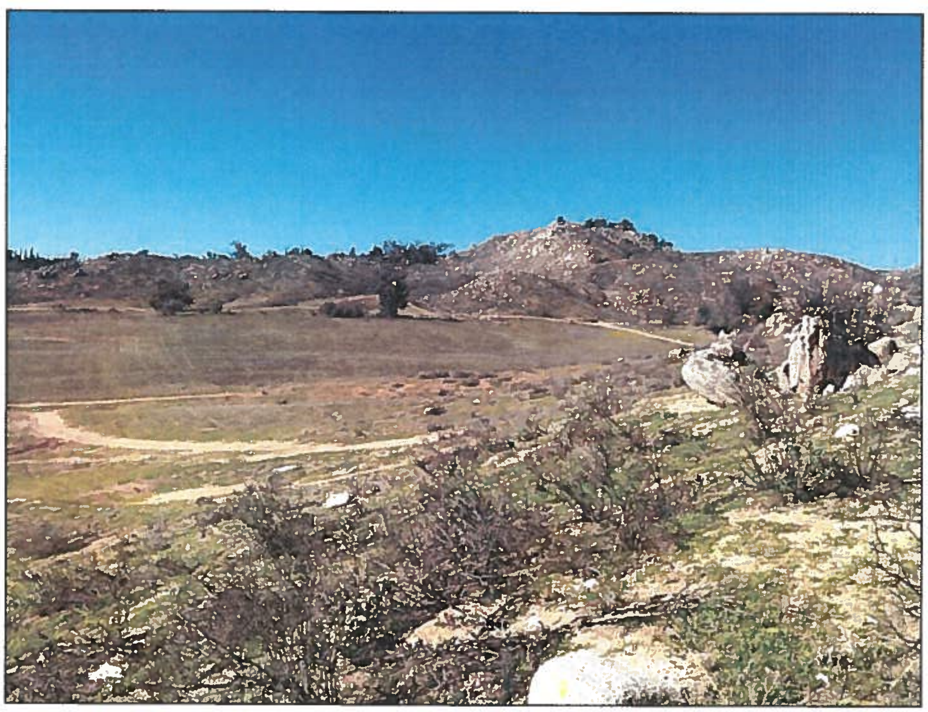
Ground surface visibility was relatively consistent throughout the Study Area and ranged from 75 to 100 percent within in the 79-acre on-site parcel and zero percent in the off-site areas due to existing pavement (roadways) that obstructed the natural ground surface (**Figure 4** through **Figure 6**, *Study Area Photographs)*. Limitations to ground visibility including low-lying vegetation (primarily California buckwheat, salt-brush, white sage, and wild grasses) that occurred throughout the Study Area except in northern portion where large granite boulders, spares trees, and tall brush partially obstructed ground visibility.

6.4.5 June 2016 Pedestrian Survey

The pedestrian survey revealed that this portion of the Study Area (located immediately west of the intersection of Juniper Avenue and Moreno Beach Drive) is covered with dense vegetation. In particular, the ground surface visibility in this area is approximately 25 to 50 percent. A drainage was identified in the eastern portion of the alignment near Moreno Beach Drive. No archaeological, built environment, or paleontological resources were encountered during the June 2016 pedestrian survey.



Overview of Study Area, view west.



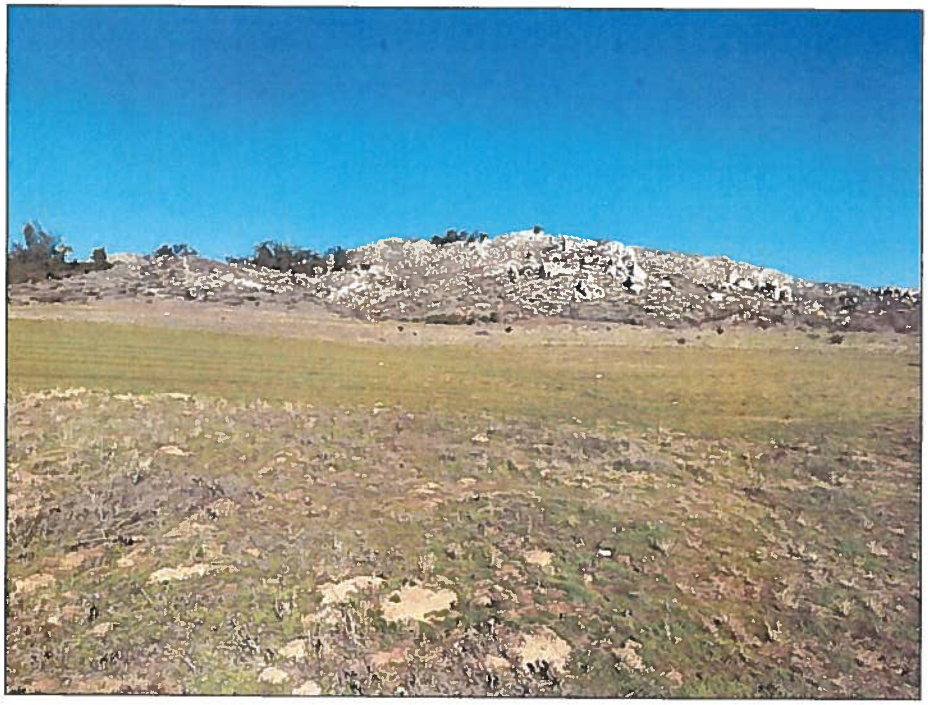
Overview of Study Area showing topography, view west.

SOURCE: ESA PCR, 2016

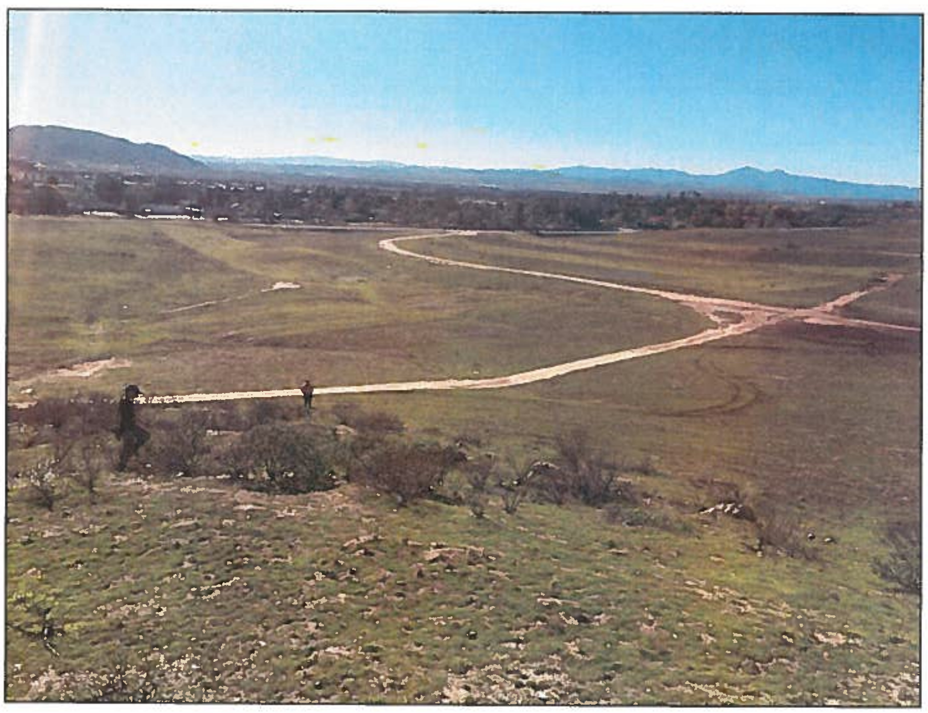
Ironwood Residential Project

Figure 4
Study Area Photographs

ESA PCR



Overview of elevated areas in northern portion of Study Area, view north.



Overview of southern areas of Study Area, view southwest.

SOURCE: ESA PCR, 2016

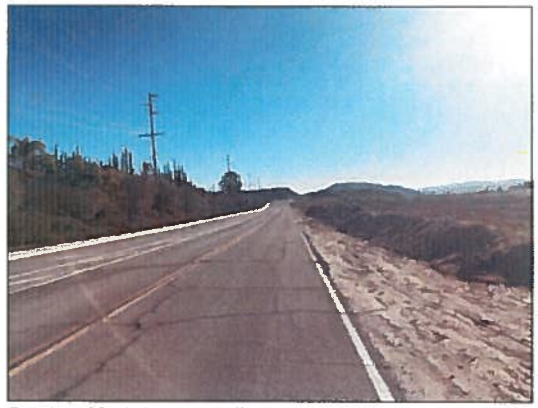
Ironwood Residential Project

Figure 5

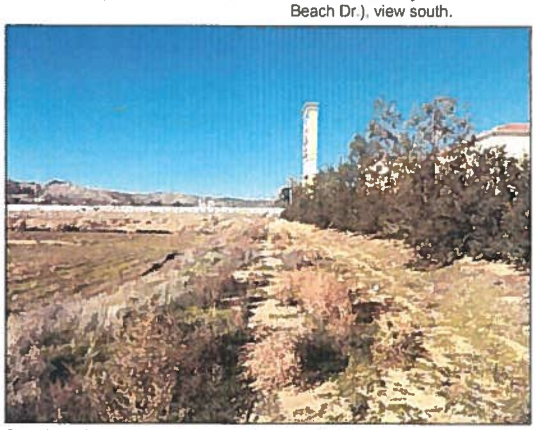
Study Area Photographs

ESA PCR

Overview of Study Area where off-site water line is proposed, view south.



Overview of Study Area where off-site water line is proposed (Moreno Beach Dr.), view south.



Overview of Study Area where off-site sewer line is proposed (immediately south of U.S. Route 60), view north.

SOURCE: ESA PCR, 2016

Ironwood Residential Project

Figure 6

Study Area Photographs

ESA PCR

7.0 EVALUATION

Evaluation of cultural resources is determined by conducting an "evaluation" of a resource's eligibility for listing in the California Register; determining whether it qualifies as a "unique archaeological resource"; and determining whether the resource retains integrity. This is achieved by applying the California Register criteria (including criteria for a "unique archaeological resource") as defined in Chapter 2 of this report. If a resource is determined eligible for listing in the California Register or qualifies as a "unique archaeological resource" and retains integrity, then the resource is considered an archaeological resource and/or a historical resource pursuant to CEQA §15064.5 and any substantial adverse change to the resource is considered a significant impact on the environment. The CEQA guidelines do not provide criteria to evaluate paleontological resources.

7.1 ARCHAEOLOGICAL RESOURCES

7.1.1 P-33-024882/CA-RIV-12,333

Resource P-33-024882/CA-RIV-12,333 is a prehistoric archaeological resource that was previously recorded in the northwestern portion of the Study Area and was revisited by ESA PCR during the pedestrian survey. It consists of one boulder with one milling slick and one boulder with three milling slicks and measures 25 meters (north/south) x 6 meters (east-west). The Applicant has designed the project to avoid this resource and it is located in an area that is planned for open space; therefore no additional work or mitigation would be warranted. Since the resource would be avoided by the proposed project, no formal evaluation of the resource was performed by ESA PCR.

7.1.2 P-33-024883

Resource P-33-024883 was identified in a disturbed and isolated context and therefore the potential for intact subsurface archaeological deposits in the area where it was recorded by ESA PCR is low. As a result of these factors, P-33-024883 does not yield, or have the potential to yield information important to prehistory (Criterion 4 of the California Register) and therefore recommend as not eligible for listing in the California Register and does not qualify as a unique archaeological resource pursuant to CEQA. No additional work is necessary at this resource and impacts to it from the proposed project are not considered a significant impact on the environment.

7.2 BUILT ENVIRONMENT RESOURCES

As discussed in the previous chapter, no known built environment resources from the EIC records were recorded within the Study Area and no resources were identified during the pedestrian survey; therefore, no evaluation of built environment resources is necessary.

7.3 PALEONTOLOGICAL RESOURCES

As discussed in the previous chapter, no known paleontological resources from the SBCM records were recorded within the Study Area and no resources were identified during the pedestrian survey; therefore, no evaluation of paleontological resources is necessary.

8.0 IMPACTS/EFFECTS ANALYSIS

The purpose of this chapter is to discuss the potential impacts to archaeological, historical (built environment), and paleontological resources, and human remains associated with implementing the proposed project.

8.1 CEQA SIGNIFICANCE THRESHOLDS

8.1.1 Archaeological Resources

The current CEQA Guidelines state that a project will have a significant impact on the environment if it ***will cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5.***

According to the CEQA Guidelines, an archaeological resource is further defined as a resource that qualifies as a "historical resource"[6] pursuant to CEQA Guidelines Section 15064.5 or a "unique archaeological resource" pursuant to Section 21083.2 of the Public Resources Code. These terms are defined earlier in this report. Therefore, a project will have a significant impact on the environment if it will cause a "substantial adverse change" in the significance of a historical resource or "damage" to a unique archaeological resource.

A "substantial adverse change" (as defined in the CEQA Guidelines) is caused when one or more of the following occurs:

- Substantial adverse change in the significance of an historical resource means physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired.

- The significance of a historical resource is materially impaired when a project:

a. Demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the California Register of Historical Resources; or

b. Demolishes or materially alters in an adverse manner those physical characteristics that account for its inclusion in a local register of historical resources pursuant to Section 5020.1(k) of the Public Resources Code or its identification in a historical resources survey meeting the requirements of Section 5024.1(g) of the Public Resources Code, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or

c. Demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance and that justify its eligibility for

6 *A historical resource can be an archaeological object, site or district that is listed in or determined eligible for the CRHR.*

inclusion in the California Register of Historical Resources as determined by a lead agency for purposes of CEQA.

The CEQA Guidelines do not define "damage" when it comes to unique archaeological resources, but it can be reasonably interpreted as having a meaning similar to that of "substantial adverse change" (as defined above).

8.1.2 Historical Resources

The current CEQA Guidelines state that a project will have a significant impact on the environment if it ***will cause a substantial adverse change in the significance of a historical resource as defined in §15064.5.***

According to the CEQA Guidelines, a historical resource is further defined as a resource that qualifies for listing in the California Register or another federal or local register. The criteria for listing are defined earlier in this report. Therefore, a project will have a significant impact on the environment if it will cause a "substantial adverse change" in the significance of a historical resource. The definition of "substantial adverse change" is provided in the previous section, 8.1.1.

The *Secretary of the Interior's Standards for Rehabilitation* (Standards) are codified at 36 Code of Federal Regulations (CFR) Section 67.7. In most circumstances, the Standards are relevant in assessing whether there is a substantial adverse change under CEQA. Section 15064.5b(3) of the CEQA Guidelines states in part that ". . . a project that follows the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings* or the *Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* (1995), Weeks and Grimmer, shall be considered as mitigated to a level of less than a significant impact on the historic resource," and therefore may be considered categorically exempt.

8.1.3 Paleontological Resources

The current CEQA Guidelines state that a project will have a significant impact on the environment if it ***will directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.***

The CEQA Guidelines do not define "directly or indirectly destroy," but it can be reasonably interpreted as the physical damage, alteration, disturbance, or destruction of a paleontological resource.

8.1.4 Human Remains

The current CEQA Guidelines state that a project will have a significant impact on the environment if it ***will disturb any human remains, including those interred outside of formal cemeteries.***

The CEQA Guidelines do not define "disturb" but it can be reasonably interpreted as the physical damage, alteration, disturbance, or destruction of any human remains.

8.2 POTENTIAL IMPACTS

8.2.1 Project Description

As discussed earlier, the proposed project would include the construction of single-family residences, streets, infrastructure, unities, parks, open spaces, and off-site water and sewer lines. Excavations associated with implementation of the proposed project would occur across the majority of the Study Area.

8.2.2 Archaeological Resources

P-33-024882/CA-RIV-12,333 was identified in the northwestern portion of the Study Area. As discussed earlier, the Applicant has designed the project to avoid this resource and it is located in an area that is planned for open space; therefore no impacts to the resource from the proposed project would occur.

These findings, however, do not preclude the existence of undiscovered archaeological resources located below the ground surface and lacking surface manifestation, which may be encountered during construction excavations associated with the proposed project. It is possible to encounter buried archaeological resources given the proven prehistoric occupation of the region, the identification of multiple surface archaeological resources within the vicinity of the Study Area (including two archaeological resources within the Study Area and numerous resources recorded in the Reche Hills Complex – see Section 4.1.5 of this report), and the favorable natural conditions (e.g., ephemeral drainages, natural spring, and vegetation communities) that would have attracted prehistoric inhabitants to the area. Therefore, despite the heavy disturbances of the Study Area that may have displaced archaeological resources on the surface, it is possible that intact archaeological resources exist at depth. As a result, recommended mitigation measures are provided in the following chapter to reduce potentially significant impacts to previously undiscovered archaeological resources that may be accidentally encountered during project implementation to a less than significant level.

8.2.3 Historical Resources (Built Environment Resources)

Results from the CHRIS-EIC indicated that there were no previously recorded historical (or built environment) resources within the Study Area and no historical resources were identified during the pedestrian survey; therefore, no impact analysis of historical resources is necessary.

8.2.4 Paleontological Resources

Results of the paleontological resources records search through SBCM indicate that no vertebrate fossil localities from the SBCM records have been previously recorded within the Study Area or within a one-mile radius. Moreover, no paleontological resources were identified by ESA PCR during the pedestrian survey. These findings; however, do not preclude the existence of undiscovered paleontological resources located below the ground surface and lacking surface manifestation, which may be encountered during construction excavations associated with the proposed project. The Study Area has been previously mapped geologically as containing surface exposures of early Pleistocene-aged fan deposits, overlain across much of the Study Area by a thin sedimentary veneer of recent Holocene-aged alluvium. The northwestern portion of the Study Area is mapped as Cretaceous-aged tonalite. The tonalite and the surficial Holocene-aged alluvium have very limited to no potential to be conducive to retaining paleontological resources; however, the Pleistocene-aged fan deposits may have high a paleontological sensitivity, depending upon their lithology, as these sediments have yielded significant fossils of extinct animals from the Ice Age throughout the Inland Empire (Scott 2014). As a result, recommended mitigation measures are provided in the following chapter to reduce potentially significant impacts to previously undiscovered paleontological resources and/or unique geological features that may be accidentally encountered during project implementation to a less than significant level.

8.2.5 Human Remains

No known human remains have been identified from the CHRIS-EIC database within a half-mile radius of the Study Area. No human remains were identified during the pedestrian survey of the Study Area. However, these findings do not preclude the existence of previously unknown human remains located below the ground surface, which may be encountered during construction excavations associated with the proposed project. Similar to the discussion regarding archaeological resources above, it is also possible to encounter buried human remains during construction given the proven prehistoric occupation of the region, the identification of multiple surface archaeological resources within a half-mile of the Study Area, and the favorable natural conditions that would have attracted prehistoric inhabitants to the area. As a result, recommended mitigation measures are provided in the following chapter that would reduce potentially significant impacts to previously unknown human remains that may be unexpectedly discovered during project implementation to a less than significant level.

9.0 RECOMMENDED MITIGATION MEASURES

9.1 ARCHAEOLOGICAL RESOURCES

The following mitigation measures have been recommended to reduce potentially significant impacts to archaeological resources that are accidentally discovered during implementation of the proposed project to a less than significant level:

Mitigation Measure CULT-1: **Conduct Archaeological Sensitivity Training for Construction Personnel.** The Applicant shall retain a qualified professional archaeologist who shall conduct an Archaeological Sensitivity Training for construction personnel prior to commencement of excavation activities. The training session, shall be carried out by a cultural resources professional with expertise in archaeology, will focus on how to identify archaeological resources that may be encountered during earthmoving activities, and the procedures to be followed in such an event. The training session will include a Power Point presentation and/or handouts for all attendees. The basic topics to be addressed in the session include: a brief cultural and archaeological history of the area and the Applicant's and City's cultural resource compliance obligations; training in potential resources that may be encountered through the use of photographs or other illustrations; the duties of archaeological monitors; notification and other procedures to follow upon discovery of resources; and, the general steps that would be followed to conduct a salvage investigation if one is necessary. A sign-in sheet shall be compiled to track attendance and shall be submitted to the City with the Archaeological Monitoring Report.

Mitigation Measure CULT-2: **Monitor Construction Excavations for Archeological Resources in Younger Alluvial Sediments.** The Applicant shall retain a qualified archaeological monitor, who will work under the direction and guidance of a qualified professional archaeologist. The archaeological monitor shall be present during all construction excavations (e.g., grading, trenching, or clearing/grubbing) into non-fill younger Pleistocene alluvial sediments. Multiple earth-moving construction activities may require multiple archaeological monitors. The frequency of monitoring shall be based on the rate of excavation and grading activities, proximity to known archaeological resources, the materials being excavated (native versus artificial fill soils), and the depth of excavation, and if found, the abundance and type of archaeological resources encountered. Full-time monitoring can be reduced to part-time inspections if determined adequate by the project archaeologist.

Mitigation Measure CULT-3: **Cease Ground-Disturbing Activities and Implement Treatment Plan if Archaeological Resources Are Encountered.** In the event that archaeological resources are unearthed during ground-disturbing activities, ground-disturbing activities shall be halted or diverted away from the vicinity of the find so that the find can be evaluated. A buffer area shall be established around the find where construction activities shall not be allowed to continue. Work shall be allowed to continue outside of the buffer area. All archaeological resources unearthed by project construction activities shall be evaluated by a qualified professional archaeologist. The Applicant and City shall coordinate with the archaeologist to develop an appropriate treatment plan for the resources. Treatment may include implementation of archaeological data recovery excavations to remove the resource along with subsequent laboratory processing and analysis or preservation in place. The landowner, in consultation with the archaeologist, shall designate repositories in the event that archaeological material is recovered.

Mitigation Measure CULT-4: Prepare Report Upon Completion of Monitoring Services. The archaeological monitor under the direction of a qualified professional archaeologist shall prepare a final report at the conclusion of archaeological monitoring. The report shall be submitted to the Applicant and the Eastern Information Center, and representatives of other appropriate or concerned agencies to signify the satisfactory completion of the project and required mitigation measures. The report shall include a description of resources unearthed, if any, evaluation of the resources with respect to the California Register and CEQA, and treatment of the resources.

9.2 HISTORICAL RESOURCES (BUILT ENVIRONMENT RESOURCES)

The proposed project would not impact historical resources therefore no mitigation measures are recommended.

9.3 PALEONTOLOGICAL RESOURCES

The following mitigation measures have been recommended to reduce potentially significant impacts to paleontological resources that are accidentally discovered during implementation of the proposed project to a less than significant level:

Mitigation Measure CULT-5: Conduct Paleontological Sensitivity Training for Construction Personnel. The Applicant shall retain a qualified paleontologist who shall conduct a Paleontological Sensitivity Training for construction personnel prior to commencement of excavation activities. The training session, shall be carried out by a cultural resources professional with expertise in paleontology, will focus on how to identify paleontological resources that may be encountered during earthmoving activities, and the procedures to be followed in such an event. The training session will include a Power Point presentation and/or handouts for all attendees. The basic topics to be addressed in the session include: a brief cultural and geologic history of the area and the City cultural resource compliance obligations; training in potential resources that may be encountered through the use of photographs or other illustrations; the duties of paleontological monitors; notification and other procedures to follow upon discovery of resources; and, the general steps that would be followed to conduct a salvage investigation if one is necessary.

Mitigation Measure CULT-6: Monitor Construction Excavations for Paleontological Resources in Older Pleistocene Alluvial Deposits. The Applicant shall retain a qualified paleontological monitor, who will work under the guidance and direction of a qualified professional paleontologist. The paleontological monitor shall be present during all construction excavations (e.g., grading, trenching, or clearing/grubbing) into non-fill older Pleistocene alluvial deposits. Multiple earth-moving construction activities may require multiple paleontological monitors. The frequency of monitoring shall be based on the rate of excavation and grading activities, proximity to known paleontological resources and/or unique geological features, the materials being excavated (native versus artificial fill soils), and the depth of excavation, and if found, the abundance and type of paleontological resources and/or unique geological features encountered. Full-time monitoring can be reduced to part-time inspections if determined adequate by the qualified professional paleontologist.

Mitigation Measure CULT-7: Cease Ground-Disturbing Activities and Implement Treatment Plan if Paleontological Resources Are Encountered. In the event that paleontological resources and or unique geological features are unearthed during ground-disturbing activities, ground-disturbing activities shall be halted or diverted away from the vicinity of the find so that the find can be evaluated. A buffer area of at least 25 feet shall be established around the find where construction activities shall not be allowed to continue. Work shall be allowed to continue outside of the buffer area. The Applicant and City shall coordinate with a qualified professional paleontologist to develop an appropriate treatment plan for the resources. Treatment may include implementation of paleontological salvage excavations to remove the resource along with subsequent laboratory processing and analysis or preservation in place. At the paleontologist's discretion and to reduce any construction delay, the grading and excavation contractor shall assist in removing rock samples for initial processing. Any fossils encountered and recovered shall be prepared to the point of taxonomic identification and catalogued and curated to a suitable museum or other repository with a research interest in the materials, such as the San Bernardino County Museum or Western Science Center. If no institution accepts the fossil collection, they shall be donated to a local school in the area for educational purposes. Accompanying notes, maps, and photographs shall also be filed at the repository and/or school.

Mitigation Measure CULT-8: Prepare Report Upon Completion of Monitoring Services. Upon completion of the above activities, the paleontologist shall prepare a report summarizing the results of the monitoring and salvaging efforts, the methodology used in these efforts, as well as a description of the fossils collected and their significance. The report shall be submitted to the Applicant, City, the San Bernardino County Natural History Museum, and representatives of other appropriate or concerned agencies to signify the satisfactory completion of the project and required mitigation measures.

9.4 HUMAN REMAINS

Components of the proposed project that require excavation activities, the following mitigation measure is recommended to reduce potentially significant impacts to previously unknown human remains that are unexpectedly discovered during excavations to a less than significant level:

Mitigation Measure CULT-9: Cease Ground-Disturbing Activities and Notify County Coroner If Human Remains Are Encountered. If human remains are unearthed during implementation of the Proposed Project, the City shall comply with State Health and Safety Code Section 7050.5. The City shall immediately notify the County Coroner and no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to PRC Section 5097.98. If the remains are determined to be of Native American descent, the coroner has 24 hours to notify the Native American Heritage Commission (NAHC). The NAHC shall then identify the person(s) thought to be the Most Likely Descendent (MLD). The MLD may, with the permission of the landowner, inspect the site of the discovery of the Native American remains and may recommend to the landowner means for treating or disposing, with appropriate dignity, the human remains and any associated funerary objects. The MLD shall complete their inspection and make their recommendation within 48 hours of being granted access by the landowner to inspect the discovery. The recommendation may include the scientific removal and nondestructive analysis of human remains and cultural items associated with Native American burials. Upon the discovery of the Native American remains, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located, is not damaged or disturbed by further development activity until the landowner has discussed and conferred, as prescribed in this mitigation measure, with the MLD regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. The landowner shall discuss and confer with the descendants all reasonable options regarding the descendants' preferences for treatment. MLDs in the region typically recommend reburial of the remains as close to the original burial location as feasible accompanied by a ceremony. The MLD shall file a record of the reburial with the NAHC and the project archaeologist shall file a record of the reburial with the CHRIS-EIC.

If the NAHC is unable to identify a MLD, or the MLD identified fails to make a recommendation, or the landowner rejects the recommendation of the MLD and the mediation provided for in Subdivision (k) of Section 5097.94, if invoked, fails to provide measures acceptable to the landowner, the landowner or his or her authorized representative shall inter the human remains and items associated with Native American human remains with appropriate dignity on the facility property in a location not subject to further and future subsurface disturbance. A record of the reburial shall be filed with the NAHC and the CHRIS-EIC.

10.0 REFERENCES CITED

Ballester, Daniel
2009 DPR Site From for Resource P-33-017851. Record on file at the Eastern Information Center, University of California, Riverside.

Bean, Lowell J.
1978 *Cahuilla*. In R. F. Heizer, (ed.). Handbook of North American Indians. Vol. 8: California: 575-587. Washington, DC: Smithsonian Institute.

Bean, Lowell J. and Sylvia Brakke Vane
2002 The Native American Ethnography and Ethnohistory of Joshua Tree National Park: An Overview. Accessed online, February 2011; http://www.cr.nps.gov/history/online_books/jotr/index.htm

Boscana, Geronimo
1846 Chinigchinich; A Historical Account of the Origin, Customs, and Traditions of the Indians at the Missionary Establishment of San Juan Capistrano, Alta California; Called the Acagchemem Nation. In *Life in California*, by Alfred Robinson, pp. 227-341. Wiley & Putnam, New York.

City of Moreno Valley
2006 Final Program Environmental Impact Report for the City of Moreno Valley General Plan, Section 5.10-Cultural Resources, pg. 5.10-7. Report on file at City of Moreno Valley City Hall.

Chartkoff, J. L. and K. K. Chartkoff.
1984 *The Archaeology of California*. Menlo Park: Stanford University Press.

Erlandson, Jon M., Torben C. Rick, Terry L. Jones, and Judith F. Porcasi
2007 *One If By Land, Two If By Sea: Who Were the First Californians?* In T. Jones & K. Klar (eds.). California Prehistory: Colonization, Culture, and Complexity. Pages 53-62. Alta Mira Press.

Goldberg, Susan (editor)
2001 Metropolitan Water District of Southern California Eastside Reservoir Project: Final Report of Archaeological Investigations. Prepared for Metropolitan Water District of Southern California, Los Angeles. Applied Earthworks, Inc., Hemet, California.

Gunther, Jane D.
1984 Riverside California Place Names: Their Origins and Their Stories - Riverside: Rubidoux Printing Company.

Heizer, Robert F. (editor)
1978 *California*. Handbook of North American Indians, Vol. 8, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Johnson, John R., Thomas W. Stafford, Jr., Henry O. Ajie, and Don P. Morris
2002 Arlington Springs Revisited. *Proceedings of the Fifth California Islands Symposium*, edited by David R. Brown, Kathryn C. Mitchell and Henry W. Chaney, pp. 541–545. Santa Barbara Museum of Natural History, Santa Barbara.

Keller, Jean K. and Daniel F. McCarthy.
1989 Data Recovery at the Cole Canyon Site (CA-RIV-139), Riverside, California. *Pacific Coast Archaeological Society Quarterly.* 25(1).

Laylander, Don, and Angie Pham
2012 Preliminary Cultural Resources Assessment for Five Off-Site Alternatives to the Gregory Canyon Landfill Project, San Diego County, California. Prepared by ASM Affiliates, Inc., Carlsbad, California. Prepared for U.S. Army Corps of Engineers, Los Angeles, California.

McKenna, Jeanette
2008a A Phase I Cultural Resources Survey of Two Alternative Moreno Valley Unified School District Sites, City of Moreno Valley, Riverside County, California. Report on file at the Eastern Information Center, University of California, Riverside.

2008b DPR Site From for Resource CA-RIV-1064 (update). Record on file at the Eastern Information Center, University of California, Riverside.

Meighan, C. W.
1954 A Late Complex in Southern California Prehistory. *Southwestern Journal of Anthropology* 10:215–227.

Meltzer, David J., Donald K. Grayson, Gerardo Ardila, Alex W. Barker, Dena F. Dincauze, C. Vance Haynes, Francisco Mena, Lautaro Nuñez, and Dennis J. Stanford
1997 On the Pleistocene Antiquity of Monte Verde, Southern Chile. *American Antiquity* 62(4):659-663.

Moratto, Michael J.
1984 *California Archaeology*. Academic Press, San Diego.

Norris, Robert M. and Robert W. Webb
1990 Geology of California. John Wiley & Sons, Inc., New York, New York.

Parr, R. E., and B. Arkush
1987 DPR Site From for Resource CA-RIV-1064. Record on file at the Eastern Information Center, University of California, Riverside.

Porretta, Paul
1983 *Dedication of Historical Marker for Pochea Indian Village Site*, California Registered Historical Landmark No. 104 at Ramona Bowl, Hemet, California, October 2, 1983. Record on file at the Eastern Information Center, University of California, Riverside 92521-0418.

Robinson, John W. and Bruce D. Risher
1996 The San Jacintos: The Mountain Country from Banning to Borrego Valley. Big Santa Anita Historical Society, Arcadia, California.

Rogers, T.H.
1965 Geologic map of California, Santa Ana sheet. California Division of Mines and Geology. Scale 1:250,000.

Scott, Eric
2014 Paleontology Literature and Record Review, Proposed Residential Development, City of Moreno Valley, Riverside County, California.

Strong, William Duncan
1929 Aboriginal Society in Southern California. University of California Publications in American Archaeology and Ethnology 26:1-249. Berkeley.

U.S. Geological Survey Topographic Map
1976 7.5-minute series, Quadrant: Sunnymead, California

U.S. Geological Survey Topographic Map
1980 7.5-minute series, Quadrant: Sunnymead, California

Wallace, William J.
1955 A Suggested Chronology for Southern California Coastal Archaeology. *Southwestern Journal of Anthropology* 11:214-230.

Warren, Claude N.
1968 Cultural Tradition and Ecological Adaptation on the Southern California Coast. In Archaic Prehistory in the Western United States, C. Irwin-Williams, ed, pp. 1-4. *Eastern New Mexico University* Contributions *in Anthropology*. Portales.

White, Raymond C.
1963 Luiseño Social Organization. University of California Publications in American Archaeology and Ethnology 48:91-194. Berkeley.

APPENDIX A – Personnel Qualifications

ESA PCR

Kyle Garcia

Senior Archaeologist

EDUCATION

M.A., Anthropology (Archaeology Option), California State University Los Angeles, In Progress

B.A., Anthropology, (Physical/ Biological Emphasis), University of California, Santa Barbara

13 YEARS EXPERIENCE

CERTIFICATIONS/ REGISTRATION

Riverside County Registered Archaeologist #202

40-Hour HAZWOPER Training – Update, 2013

PROFESSIONAL AFFILIATIONS

Society for American Archaeology

Society for California Archaeology

Pacific Coast Archaeological Society

Kyle Garcia has 13 years of experience in the archaeology and prehistory of California with a specialization in faunal analysis. He is well-versed in the archaeological resources of California's coastal, interior, and island settings. He is skilled in evaluation historic and prehistoric archaeological resources; agency and Native American consultation; pedestrian surveys, testing and evaluation excavations, and construction monitoring; application of the California Quality Act (CEQA), the National Environmental Policy Act (NEPA), Section 106 of the Natural Historic Preservation Act (NHPA), and local regulations; and laboratory processing. During his tenure he has authored or contributed to more than 350 technical reports and sections to support all levels of CEQA and NEPA documents. In addition to his archaeological work, Kyle has been cross-trained in paleontological mitigation monitoring.

Relevant Experience

Kyle's portfolio of projects includes energy, water and transportation infrastructure; residential, commercial, mixed-use, institutional, and urban redevelopment serving public and private sector clients. He has conducted archaeological work throughout California.

Large-Scale Development Projects. Kyle directed the 1,400-acre field survey and the successful site recordation of over 150 prehistoric and historic archaeological resources per the Section 106 Process for a confidential project in Riverside County; served as the Deputy Project Manager for the 240-acre Archaeological Treatment & Restoration Plan for The Cove project that was subject to Section 106, responsible for the field survey, Native American consultation, final report, and supervised the thorough recordation and documentation of over 350 significant artifacts. In Arizona, he led crews on a pedestrian survey and site recordation of more than 200 historic and prehistoric archaeological resources during a Class III Inventory on an 11,000-acre portion of the La Osa Ranch Project site in Pinal County.

Water Infrastructure. Kyle has performed the archaeological and paleontological resources surveys and assessments for a number of regional water infrastructure projects including the Reservoir No. 1 Reconstruction Project MND for Burbank; the Pasadena Groundwater Storage Program; and recycled water facilities projects for San Clemente, the Town of Rosamond, and Palmdale.

Transportation Peer Reviews. Kyle is often sought after to conduct Peer Review services of controversial projects across southern California including the Needles Highway Safety Realignment Project for the County of San Bernardino, various infrastructure projects for Caltrans/San Bernardino Associated Governments, and the I-710 Corridor Project EIS/EIR for the City of Commerce.

Energy Projects. Kyle served as the Project Director for over 100 SCE projects, managing purchase orders totaling more than $1.5M during PCR's on-call cultural resources management contract to Southern California Edison (SCE).

Fatima Clark

Archeologist

EDUCATION

B.A., Anthropology, California State University, Fullerton, 2005

9 YEARS EXPERIENCE

SPECIALIZED TRAINING

Workshop: The Art and Science of Flintknapping, California Desert Studies Center, 2013

Successful CEQA, Compliance-Southern California Edison, Environmental Training, 2011

Cultural Resources Protection under CEQA and Other Legislative Mandates, UCLA Extension, 2010

PROFESSIONAL AFFILIATIONS

Society for California Archaeology

Fatima Clark has eight years of hands-on archaeological experience and is a practiced in project management and client and agency coordination. Her field experience is complimented by the course study and participation in numerous archaeological excavations in California, Arizona and Peru. In addition to her archaeology background, she has been cross trained in conducting paleontological surveys and monitoring and co-authored and managed associated reports.

Experience

Fatima has written CEQA-level technical reports, EIR sections, Initial Study sections, archaeological peer reviews, archaeological monitoring reports, and reports pursuant to Caltrans requirements. She is also experienced in performing archaeological testing, site recordation, pedestrian surveys, records searches through several California Historical Resources Information Systems-Information Centers, and monitoring for a wide variety of projects including mixed-use, residential, and energy, water, and road infrastructure projects.

Real Estate Development. Fatima has provided a full range of archaeological services to numerous projects throughout Southern California. Recent project experience includes the Uptown Newport Village Project in Newport Beach, the Shriners Hospital for Children in Pasadena, the San Juan Medical Office Building in San Juan Capistrano, and the Aidlin Property Residential Project in the Stevenson Ranch community of unincorporated Los Angeles County.

Infrastructure. Fatima has served a number of clients and lead agencies in the provision of a variety of archaeological services including municipalities, water agencies, Caltrans, large engineering firms, and energy providers. She also served as an in-house consultant to Southern California Edison for nearly six years during which time she worked on a wide variety of Environmental Compliance projects including the Deteriorated Pole and General Order 131D Programs and the Valley South Subtransmission (VSSP) Project. Fatima also performed the records search, Phase I pedestrian survey, Phase II testing, and monitoring for the SunEdison Cascade Solar Energy Project in the Sunfair Community of unincorporated San Bernardino County.

Her road and water infrastructure projects include serving as Project Manager for the I-10 Freeway/Pepper Avenue Interchange Project in Colton which in addition to the technical analysis involved coordination with the Prime Consultant, San Bernardino Associated Governments, and Caltrans' Environmental Unit. She is currently the Project Manager for the La Costa Chevron Drainage Improvements Project in Encinitas regarding the proposed repairs of an eroded gully into a Caltrans right-of-way requiring a Caltrans Extended Phase I excavation (XPHI). Other projects include the Badlands Landfill stockpile project for Riverside County, the Palos Verdes pipeline project and Crenshaw Reservoir project for the California Water Service Company, and the San Clemente Recycled Water project.

Christopher W. Purtell, RPA, SENIOR ARCHAEOLOGIST

Education

- M.A., Anthropology, California State University, Fullerton, 2013
- B.A., Anthropology/Archaeology, (Geography Minor), California State University, Dominguez Hills, 2005

Permits/Certifications

- Register of Professional Archaeologist (RPA), ID No. 990027

Continuing Education

- OSHA 24-hr HazWaste Operations Certification, 2013
- Writing the Perfect EA/FONSI, 2011
- 5-Phase Project Management, UCLA Extension, 2008
- Basic CEQA Workshop Series, Association of Environmental Professionals, 2005
- World Class TQM 40-Hour Boot Camp Workshop, Technical Change Associates Inc., 2001

Awards/Recognition

- Professional Distinction Award for Field and Laboratory Analysis, California State University, Fullerton, 2007–2008

Professional Affiliations

- Society for American Archaeology
- Society for California Archaeology

Summary

Christopher Purtell is an archaeologist with nine years of professional experience in environmental compliance, archaeological surveys, excavations, monitoring, data recovery, laboratory analysis, and in the development of mitigation and treatment plans. An experienced project manager, Mr. Purtell has more than six years of experience in a decision-making capacity on cultural resources projects in California.

As an RPA his training and background meet the U.S. Secretary of the Interior's Professional Qualifications Standards as a Principal Investigator and Field Director for prehistoric and historic archaeology (36 CFR 61).

Experience

Mr. Purtell has undertaken and contributed to work efforts for prehistoric and historic archaeology throughout California pursuant to the California Environmental Quality Act (CEQA), and the National Environmental Policy Act (NEPA), and Sections 106 and 110 of the National Historic Preservation Act (NHPA). He has authored and co-authored Cultural Resources Management Plans, Worker Environmental Awareness Programs (WEAP), cultural analyses for Fatal Flaw studies; environmental compliance documents, such as Initial Studies, Environmental Impact Reports, and Cultural Resources Technical Reports; and, has compiled California Department of Parks and Recreation (DPR) site records. As a field director, he has managed field crews in intensive pedestrian surveys, surface collections, shovel test pits, excavations, and the curation of artifacts.

He has successfully coordinated cultural resource mitigation recommendations with a variety of lead and regulatory agencies, including Los Angeles County, Kern County, Inyo County, and he has obtained Cultural Use Permits and Field Authorizations with the Bureau of Land Management (BLM), among others.

High-Profile Monitoring Projects: Mr. Purtell implemented and managed the Cultural Treatment Plan for the Vasquez Rocks Natural Area Park and Interpretive Center for the County of Los Angeles Department of Public Works. He led contractor coordination, Native American consultation, and the Phase II and Phase III investigations which led to the recovery and curation of over 150 artifacts during pre-construction, and the recovery and curation of 73 artifacts during construction monitoring. Working with the Los Angeles County Chief Executive Office, Mr. Purtell served as the project manager for the LA Plaza de Cultura y Artes, a part of the El Pueblo de Los Angeles Historic District, responsible for the cultural mitigation and construction monitoring activities and report preparation.

Energy Projects: Mr. Purtell has worked on and managed large-scale renewable energy projects in Central and Northern California including a full suite of cultural resources services. As the cultural resources manager for the 7,300-acre Catalina Renewable Energy Project in Kern County he managed the record search, Native American consultation, led the pedestrian survey, coordinated technicians and staffing, prepared the cultural resources technical report and assisted with Phase II excavations to mitigate project impacts. He served a similar role on the 8,300-acre Avalon Wind Energy Project in Kern, which also included acquisition of a BLM Field Authorization Permit. Additional projects include the Jawbone Wind Energy Project, the Timber Hills Wind Energy Project, the Pacific Wind Energy Project, and the Hoffman Summit Wind Project, all in Kern County. In addition to renewable projects, Mr. Purtell has also served as an archaeological monitor and contractor trainer to ensure recognition and protection of cultural resources discovered during Southern California Edison earth-moving activities associated with the installation of grounding rods and laterals at the San Fernando Substation.

Transportation Infrastructure Projects: Working for clients like the Metro and Los Angeles World Airports, Mr. Purtell has participated in numerous transportation infrastructure projects. He performed a Phase I archaeological and paleontological investigation, Native American consultation, and the cultural resources technical section for the 2014 Doran Street Grade Separation Project. Working with a prime consultant, he served as the cultural resources manager for the Runway 6L-24R Safety Area Improvement Project. He worked with the lead agency, project archaeologists, biologists, and scientists to perform various technical assessments. Beyond the coordination effort, Mr. Purtell led the CEQA/NEPA compliance documentation including Section 106 of the National Historic Preservation Act, archaeological and paleontological investigations /surveys, Native American consultation and cultural resources technical sections for the runway improvement.

APPENDIX B – Native American Consultation Documentation

STATE OF CALIFORNIA — Edmund G. Brown, Jr., Governor

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Blvd., ROOM 100
West SACRAMENTO, CA 95691
(916) 373-3710
Fax (916) 373-5471

November 24, 2014

Christopher W. Purtell
PCR Services Corporation
2121 Alton Parkway, Suite 100
Irvine, CA 92606

RE: 79 Acre Residential Development Site (APN 473-160-004) in the city of Moreno Valley, Riverside County. FAX (949) 753-7002

Dear Mr. Purtell,

A record search of the sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe or group. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 373-3712.

Sincerely,

Katy Sanchez

Katy Sanchez
Associate Government Program Analyst

Native American Contacts
Riverside County
November 21, 2014

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Ramona Band of Mission Indians
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Soboba Band of Mission Indians
Rosemary Morillo, Chairperson; Attn: Carrie Garcia
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Terry Hughes, Tribal Administrator
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Morongo Band of Mission Indians
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12700 Pumarra Road — Cahuilla, Serrano
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(951) 922-8146 Fax

Ramona Band of Cahuilla Indians
Manuel Hamilton, Vice Chairperson
P.O. Box 391670 — Cahuilla
Anza , CA 92539
admin@ramonatribe.com
(951) 763-4105
(951) 763-4325 Fax

Cahuilla Band of Indians
Luther Salgado, Chairperson
P.O. Box 391760 — Cahuilla
Anza , CA 92539
Chairman@cahuilla.net
(760) 763-5549
(760) 763-2631Tribal EPA

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed 79-Acre Residential Development Site (APN 473-160-004) in the city of Moreno Valley, Riverside County.

Native American Contacts
Riverside County
November 21, 2014

Ernest H. Siva
Morongo Band of Mission Indians Tribal Elder
9570 Mias Canyon Road — Serrano
Banning, CA 92220 — Cahuilla
siva@dishmail.net
(951) 849-4676

Soboba Band of Luiseno Indians
Joseph Ontiveros, Cultural Resource Department
P.O. BOX 487 — Luiseno
San Jacinto, CA 92581
jontiveros@soboba-nsn.gov
(951) 663-5279
(951) 654-5544, ext 4137
(951) 654-4198 Fax

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed 79-Acre Residential Development Site (APN 473-160-004) in the city of Moreno Valley, Riverside County.

December 5, 2014

Mr. Joseph Hamilton, Chairman
Ramona Band of Cahuilla Mission Indians
P.O. Box 391670
Anza, CA 92539

Re: PROPOSED 79-ACRE RESIDENTIAL DEVELOPMENT SITE (APN 473-160-004) IN THE CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA.

Dear Mr. Hamilton:

PCR Services Corporation (PCR) is preparing environmental documentation in compliance with the California Environmental Quality act for the proposed residential development (project) on an approximately 79-acre site (APN 473-160-004) located directly northwest of Ironwood Avenue and Nason Street in the City of Moreno Valley, Riverside County, California. The proposed project would include the construction of single-family residential houses, streets, infrastructure, unities, parks, and open spaces. The project site is currently undeveloped. The proposed project would include excavations across the project site to currently unknown depths.

On November 11, 2014, the Native American Heritage Commission (NAHC) was contacted. On December 4, 2014, the NAHC indicated that there have been no Native American cultural resources identified within their Sacred Lands File for the project location. The NAHC recommended that you be contacted. As part of this effort, and in compliance with federal, state, and local environmental regulations, we are initiating correspondence and consultation efforts regarding the identification of cultural resources and sacred lands within this project site and vicinity

In order to ensure that any areas containing cultural resources or sacred lands are considered, PCR requests any information you are willing to share regarding Native American or prehistoric resources (including properties, places, or archaeological sites) in the vicinity of the project site that may be affected by the proposed project. The project site is depicted on the Sunnymead, California United States Geologic Society 7.5' topographic quadrangle map in Section 34 of Township 2 South, Range 3 West, as shown in Figure 1, Records Search Map, attached.

Thank you for your assistance with our efforts to address possible Native American concerns that may be affected by the proposed project. If you have any questions or need additional information, please contact me at (949) 753-7001 or via email at c.purtell@pcrnet.com.

Sincerely,
PCR SERVICES CORPORATION

C W Purtell

Christopher W. Purtell, RPA
Senior Archaeologist I

December 5, 2014

Ms. Rosemary Morillo, Chairperson
Soboba Band of Mission Indians
P.O. Box 487
San Jacinto, CA 92581

Re: PROPOSED 79-ACRE RESIDENTIAL DEVELOPMENT SITE (APN 473-160-004) IN THE CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA.

Dear Ms. Morillo:

PCR Services Corporation (PCR) is preparing environmental documentation in compliance with the California Environmental Quality act for the proposed residential development (project) on an approximately 79-acre site (APN 473-160-004) located directly northwest of Ironwood Avenue and Nason Street in the City of Moreno Valley, Riverside County, California. The proposed project would include the construction of single-family residential houses, streets, infrastructure, unities, parks, and open spaces. The project site is currently undeveloped. The proposed project would include excavations across the project site to currently unknown depths.

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Sincerely,
PCR SERVICES CORPORATION

C W Purtell

Christopher W. Purtell, RPA
Senior Archaeologist I

December 5, 2014

Ms. Denisa Torres, Cultural Resources Manager
Morongo Band of Mission Indians
12700 Pumarra Road
Banning, CA 92220

Re: PROPOSED 79-ACRE RESIDENTIAL DEVELOPMENT SITE (APN 473-160-004) IN THE CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA.

Dear Ms. Torres:

PCR Services Corporation (PCR) is preparing environmental documentation in compliance with the California Environmental Quality act for the proposed residential development (project) on an approximately 79-acre site (APN 473-160-004) located directly northwest of Ironwood Avenue and Nason Street in the City of Moreno Valley, Riverside County, California. The proposed project would include the construction of single-family residential houses, streets, infrastructure, unities, parks, and open spaces. The project site is currently undeveloped. The proposed project would include excavations across the project site to currently unknown depths.

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Sincerely,
PCR SERVICES CORPORATION

C W Purtell

Christopher W. Purtell, RPA
Senior Archaeologist I

December 5, 2014

Mr. Manuel Hamilton, Vice Chairperson
Ramona Band of Cahuilla Indians
P.O. Box 391670
Anza, CA 92539

Re: PROPOSED 79-ACRE RESIDENTIAL DEVELOPMENT SITE (APN 473-160-004) IN THE CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA.

Dear Mr. Hamilton:

PCR Services Corporation (PCR) is preparing environmental documentation in compliance with the California Environmental Quality act for the proposed residential development (project) on an approximately 79-acre site (APN 473-160-004) located directly northwest of Ironwood Avenue and Nason Street in the City of Moreno Valley, Riverside County, California. The proposed project would include the construction of single-family residential houses, streets, infrastructure, unities, parks, and open spaces. The project site is currently undeveloped. The proposed project would include excavations across the project site to currently unknown depths.

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Sincerely,
PCR SERVICES CORPORATION

C W Purtell

Christopher W. Purtell, RPA
Senior Archaeologist I

December 5, 2014

Mr. John Gomez, Environmental Coordinator
Ramona Band of Mission Indians
P.O. Box 391670
Anza, CA 92539

Re: PROPOSED 79-ACRE RESIDENTIAL DEVELOPMENT SITE (APN 473-160-004) IN THE CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA.

Dear Mr. Gomez:

PCR Services Corporation (PCR) is preparing environmental documentation in compliance with the California Environmental Quality act for the proposed residential development (project) on an approximately 79-acre site (APN 473-160-004) located directly northwest of Ironwood Avenue and Nason Street in the City of Moreno Valley, Riverside County, California. The proposed project would include the construction of single-family residential houses, streets, infrastructure, unities, parks, and open spaces. The project site is currently undeveloped. The proposed project would include excavations across the project site to currently unknown depths.

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Thank you for your assistance with our efforts to address possible Native American concerns that may be affected by the proposed project. If you have any questions or need additional information, please contact me at (949) 753-7001 or via email at c.purtell@pcrnet.com.

Sincerely,
PCR SERVICES CORPORATION

C W Purtell

Christopher W. Purtell, RPA
Senior Archaeologist I

December 5, 2014

Mr. Terry Hughes, Tribal Administrator
Santa Rosa Band of Mission Indians
P.O. Box 609
Hemet, CA 92546

Re: PROPOSED 79-ACRE RESIDENTIAL DEVELOPMENT SITE (APN 473-160-004) IN THE CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA.

Dear Mr. Hughes:

PCR Services Corporation (PCR) is preparing environmental documentation in compliance with the California Environmental Quality act for the proposed residential development (project) on an approximately 79-acre site (APN 473-160-004) located directly northwest of Ironwood Avenue and Nason Street in the City of Moreno Valley, Riverside County, California. The proposed project would include the construction of single-family residential houses, streets, infrastructure, unities, parks, and open spaces. The project site is currently undeveloped. The proposed project would include excavations across the project site to currently unknown depths.

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Sincerely,
PCR SERVICES CORPORATION

C W Purtell

Christopher W. Purtell, RPA
Senior Archaeologist I

December 5, 2014

Mr. Robert Martin, Chairperson
Morongo Band of Mission Indians
12700 Pumarra Road
Banning, CA 92220

Re: PROPOSED 79-ACRE RESIDENTIAL DEVELOPMENT SITE (APN 473-160-004) IN THE CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA.

Dear Mr. Martin:

PCR Services Corporation (PCR) is preparing environmental documentation in compliance with the California Environmental Quality act for the proposed residential development (project) on an approximately 79-acre site (APN 473-160-004) located directly northwest of Ironwood Avenue and Nason Street in the City of Moreno Valley, Riverside County, California. The proposed project would include the construction of single-family residential houses, streets, infrastructure, unities, parks, and open spaces. The project site is currently undeveloped. The proposed project would include excavations across the project site to currently unknown depths.

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Sincerely,
PCR SERVICES CORPORATION

C W Purtell

Christopher W. Purtell, RPA
Senior Archaeologist I

December 5, 2014

Mr. Luther Salgado, Chairperson
Cahuilla Band of Indians
P.O. Box 391760
Anza, CA 92539

Re: PROPOSED 79-ACRE RESIDENTIAL DEVELOPMENT SITE (APN 473-160-004) IN THE CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA.

Dear Mr. Salgado:

PCR Services Corporation (PCR) is preparing environmental documentation in compliance with the California Environmental Quality act for the proposed residential development (project) on an approximately 79-acre site (APN 473-160-004) located directly northwest of Ironwood Avenue and Nason Street in the City of Moreno Valley, Riverside County, California. The proposed project would include the construction of single-family residential houses, streets, infrastructure, unities, parks, and open spaces. The project site is currently undeveloped. The proposed project would include excavations across the project site to currently unknown depths.

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Thank you for your assistance with our efforts to address possible Native American concerns that may be affected by the proposed project. If you have any questions or need additional information, please contact me at (949) 753-7001 or via email at c.purtell@pcrnet.com.

Sincerely,
PCR SERVICES CORPORATION

C W Purtell

Christopher W. Purtell, RPA
Senior Archaeologist I

December 5, 2014

Mr. Ernest H. Siva, Tribal Elder
Morongo Band of Mission Indians
9570 Mias Canyon Road
Banning, CA 92220

Re: PROPOSED 79-ACRE RESIDENTIAL DEVELOPMENT SITE (APN 473-160-004) IN THE CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA.

Dear Mr. Siva:

PCR Services Corporation (PCR) is preparing environmental documentation in compliance with the California Environmental Quality act for the proposed residential development (project) on an approximately 79-acre site (APN 473-160-004) located directly northwest of Ironwood Avenue and Nason Street in the City of Moreno Valley, Riverside County, California. The proposed project would include the construction of single-family residential houses, streets, infrastructure, unities, parks, and open spaces. The project site is currently undeveloped. The proposed project would include excavations across the project site to currently unknown depths.

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Sincerely,
PCR SERVICES CORPORATION

C W Purtell

Christopher W. Purtell, RPA
Senior Archaeologist I

December 5, 2014

Mr. Joseph Ontiveros, Cultural Resources Department
Soboba Band of Luiseno Mission Indians
P.O. Box 487
San Jacinto, CA 92581

Re: PROPOSED 79-ACRE RESIDENTIAL DEVELOPMENT SITE (APN 473-160-004) IN THE CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA.

Dear Mr. Ontiveros:

PCR Services Corporation (PCR) is preparing environmental documentation in compliance with the California Environmental Quality act for the proposed residential development (project) on an approximately 79-acre site (APN 473-160-004) located directly northwest of Ironwood Avenue and Nason Street in the City of Moreno Valley, Riverside County, California. The proposed project would include the construction of single-family residential houses, streets, infrastructure, unities, parks, and open spaces. The project site is currently undeveloped. The proposed project would include excavations across the project site to currently unknown depths.

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Sincerely,
PCR SERVICES CORPORATION

C W Purtell

Christopher W. Purtell, RPA
Senior Archaeologist I

December 15, 2014

SUBJECT:
Proposed 79-Acre Residential Development Site (APN 473-160-004) In the city of Morneno Valley, Riverside County, California.

Dear
Christopher W. Purtell, RPA
Senior Archaeologist I

Thank you for contacting the Morongo Band of Mission Indians regarding the above referenced project. The Tribe greatly appreciates the opportunity to review the project and, respectfully, offer the following comments.

The project is outside of the Tribe's current reservation boundaries but within an area that may be considered a traditional use area or one in which the Tribe has cultural ties (e.g. Cahuilla/Serrano territory). However, the Morongo Band of Mission Indians asks that you impose specific conditions regarding cultural and/or archaeological resources and buried cultural materials on any development plans or entitlement applications as follows:

- If human remains are encountered during grading and other construction excavation, work in the immediate vicinity shall cease and the County Coroner shall be contacted pursuant to State Health and Safety Code §7050.5.

- In the event that Native American cultural resources are discovered during project development/construction, all work in the immediate vicinity of the find shall cease and a qualified archaeologist meeting Secretary of Interior standards shall be hired to assess the find. Work on the overall project may continue during this assessment period.

If significant Native American cultural resources are discovered, for which a Treatment Plan must be prepared, the developer or his archaeologist shall contact the Morongo Band of Mission Indians

("Tribe")[1]. If requested by the Tribe, the developer or the project archaeologist shall, in good faith, consult on the discovery and its disposition (e.g. avoidance, preservation, return of artifacts to tribe, etc.).

If I may be of further assistance with regard to this matter, please do not hesitate to contact me at your convenience.

Very truly yours,

MORONGO BAND OF MISSION INDIANS

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[1] The Morongo Band of Mission Indians realizes that there may be additional tribes claiming cultural affiliation to the area; however, Morongo can only speak for itself. The Tribe has no objection if the archaeologist wishes to consult with other tribes and if the city wishes to revise the condition to recognize other tribes.

APPENDIX C – Paleontological Resources Records Search Results

2024 Orange Tree Lane, Redlands, California 92374 | Phone: 909.798.8606
www.SBCounty.gov

SAN BERNARDINO COUNTY

Museum

Leonard X. Hernandez
Interim Museum Director

26 November 2014

PCR Services Corporation
attn: Christopher W. Purtell, RPA, Senior Archaeologist I
One Venture, Suite #150
Irvine, CA 92618

re: **PALEONTOLOGY LITERATURE AND RECORDS REVIEW, PROPOSED RESIDENTIAL DEVELOPMENT, CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA**

Dear Mr. Purtell,

The Division of Geological Sciences of the San Bernardino County Museum (SBCM) has completed a literature review and records search for the above-named development in the City of Moreno Valley, Riverside County, California. Specifically, the proposed project property is located in the southwestern quadrant of section 34, Township 2 South, Range 3 West, San Bernardino Base and Meridian, as seen on the Sunnymead, California 7.5' United States Geological Survey topographic quadrangle map (1967 edition, photorevised 1980).

Previous mapping of the proposed property (Rogers, 1965; Morton and Matti, 2001) indicates that the majority of the proposed study area is situated upon surface exposures of early Pleistocene fan deposits (= unit **Qvof$_a$**), overlain across much of the property by a thin sedimentary veneer of recent alluvium (= **Qya$_a$**). The recent alluvial sediments have low paleontologic sensitivity. In contrast, the Pleistocene fan deposits may have high paleontologic sensitivity, depending upon their lithology. Pleistocene alluvium elsewhere throughout Riverside County and the Inland Empire has been reported to yield significant fossils of extinct animals from the Ice Age (Jefferson, 1991; Reynolds and Reynolds, 1991; Scott and Cox, 2008; Springer and others, 2009, 2010; Scott, 2010). Fossils recovered from these Pleistocene sediments represent extinct taxa including mammoths, mastodons, ground sloths, dire wolves, sabre-toothed cats, large and small horses, large and small camels, and bison, as well as plant macro- and microfossils (Jefferson, 1991; Reynolds and Reynolds, 1991; Anderson and others, 2002; Scott and Cox, 2008; Springer and others, 2009, 2010; Scott, 2010). If not previously disturbed by development, and depending upon the lithology exhibited, these sediments have high potential to contain significant nonrenewable paleontologic resources.

The northwestern portion of the study area is mapped (Morton and Matti, 2001) as Cretaceous tonalite (= unit **Kt**). These granitic rocks have no potential to contain fossil resources, and so are assigned low paleontologic sensitivity.

For this review, I conducted a search of the Regional Paleontologic Locality Inventory (RPLI) at the SBCM. The results of this search indicate that no previously-recorded fossil resource localities from Pleistocene older alluvium are present within the boundaries of the proposed development property, nor from at least within one mile in any direction.

Recommendations

The results of the literature review and the search of the RPLI at the SBCM demonstrate that the proposed development property is situated for the most part upon Pleistocene older alluvial deposits that, if not previously disturbed by development and depending upon their lithology, have high potential to contain paleontologic resources. A qualified vertebrate paleontologist must develop a program to mitigate impacts to nonrenewable paleontologic resources. This mitigation program must be consistent with the provisions of the California Environmental Quality Act (Scott and Springer, 2003), as well as with regulations currently implemented by the County of Riverside. This program should include, but not be limited to:

1. Monitoring of excavation in areas identified as likely to contain paleontologic resources by a qualified paleontologic monitor. Areas requiring monitoring include all previously-undisturbed Pleistocene older alluvial sediments present, at the surface or at depth, within the boundaries of the property. Paleontologic monitors should be equipped to salvage fossils as they are unearthed, to avoid construction delays, and to remove samples of sediments that are likely to contain the remains of small fossil invertebrates and vertebrates. Monitors must be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring may be reduced or eliminated if the potentially-fossiliferous units described herein are determined upon exposure and examination by qualified paleontologic personnel to have low potential to contain fossil resources.

2. Preparation of recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. Preparation and stabilization of all recovered fossils are essential in order to fully mitigate adverse impacts to the resources (Scott and others, 2004).

3. Identification and curation of specimens into an established, accredited museum repository with permanent retrievable paleontologic storage. These procedures are also essential steps in effective paleontologic mitigation (Scott and others, 2004) and CEQA compliance (Scott and Springer, 2003). The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities. Mitigation of adverse impacts to significant paleontologic resources is not complete until such curation into an established, accredited museum repository has been fully completed and documented.

4. Preparation of a report of findings with an appended itemized inventory of specimens. The report and inventory, when submitted to the appropriate Lead Agency along with confirmation of the curation of recovered specimens into an established, accredited museum repository, would signify completion of the program to mitigate impacts to paleontologic resources.

References

Anderson, R.S., M.J. Power, S.J. Smith, K.B. Springer and E. Scott, 2002. Paleoecology of a Middle Wisconsin deposit from southern California. Quaternary Research 58(3): 310-317.

Jefferson, G.T., 1991. A catalogue of late Quaternary vertebrates from California: Part Two, mammals. Natural History Museum of Los Angeles County Technical Reports, No. 7.

Reynolds, S.F.B. and R.L. Reynolds, 1991. The Pleistocene beneath our feet: near-surface Pleistocene fossils in inland southern California basins. *In* M.O. Woodburne, S.F.B. Reynolds, and D.P. Whistler (eds.), Inland Southern California: the last 70 million years. Redlands, San Bernardino County Museum Special Publication 38(3&4), p. 41-43.

Rogers, T.H., 1965. Geologic map of California, Santa Ana sheet. California Division of Mines and Geology. Scale 1:250,000.

Scott, E., 2010. Extinctions, scenarios, and assumptions: changes in latest Pleistocene large herbivore abundance and distribution in western North America. *In* E. Scott and G. McDonald (eds.), Faunal dynamics and extinction in the Quaternary: Papers honoring Ernest L. Lundelius, Jr. Quaternary International 217: 225-239.

Scott, E. and S.M. Cox, 2008. Late Pleistocene distribution of *Bison* (Mammalia; Artiodactyla) in the Mojave Desert of southern California and Nevada. *In* X Wang and L.G. Barnes (eds.), Geology and Vertebrate Paleontology of Western and Southern North America, Contributions in Honor of David P. Whistler. Natural History Museum of Los Angeles County Science Series No. 41, p. 359 - 382.

Scott, E. and K. Springer, 2003. CEQA and fossil preservation in southern California. The Environmental Monitor, Fall 2003, p. 4-10, 17.

Scott, E., K. Springer and J.C. Sagebiel, 2004. Vertebrate paleontology in the Mojave Desert: the continuing importance of "follow-through" in preserving paleontologic resources. *In* M.W. Allen and J. Reed (eds.) The human journey and ancient life in California's deserts: Proceedings from the 2001 Millennium Conference. Ridgecrest: Maturango Museum Publication No. 15, p. 65-70.

Springer, K., E. Scott, J.C. Sagebiel, and L.K. Murray, 2009. The Diamond Valley Lake local fauna: late Pleistocene vertebrates from inland southern California. *In* L.B. Albright III (ed.), Papers on geology, vertebrate paleontology, and biostratigraphy in honor of Michael O. Woodburne. Museum of Northern Arizona Bulletin 65:217-235.

Springer, K., E. Scott, J.C. Sagebiel, and L.K. Murray, 2010. Late Pleistocene large mammal faunal dynamics from inland southern California: the Diamond Valley Lake local fauna. *In* E. Scott and G. McDonald (eds.), Faunal dynamics and extinction in the Quaternary: papers honoring Ernest L. Lundelius, Jr. Quaternary International 217: 256-265.

Please do not hesitate to contact us with any further questions you may have.

Sincerely,

Eric Scott, Curator of Paleontology
Division of Geological Sciences
San Bernardino County Museum

IRONWOOD VILLAGE

Determination of Biologically Equivalent or Superior Preservation

Prepared for
1BH1 LLC

September 2016

ESA PCR

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1.0 Introduction

1.1 Background and Purpose

This document presents the results of a Determination of Biologically Equivalent or Superior Preservation (DBESP) conducted by ESA PCR for the approximately 89.05-acre (78.48 acres on-site and 10.57-acre off-site) (collectively, the "study area") proposed single-family residential development associated with Assessor's Parcel Number (APN) 473-160-004 located in the City of Moreno Valley, Riverside County, California, as required under Section 6.1.2, Riparian/Riverine and Vernal Pools policy of the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) (Riverside County Integrated Project/RCIP, 2003; Dudek & Associates, 2003). No MSHCP Riparian Areas or vernal pools occur within the study area. However, the study area does support MSHCP Riverine Areas and as such requires a DBESP analysis for any impacts proposed to these areas. This DBESP provides details on the MSHCP Riverine Areas located within the project study area in addition to proposed impacts and compensatory mitigation for compliance with Section 6.1.2 of the MSHCP.

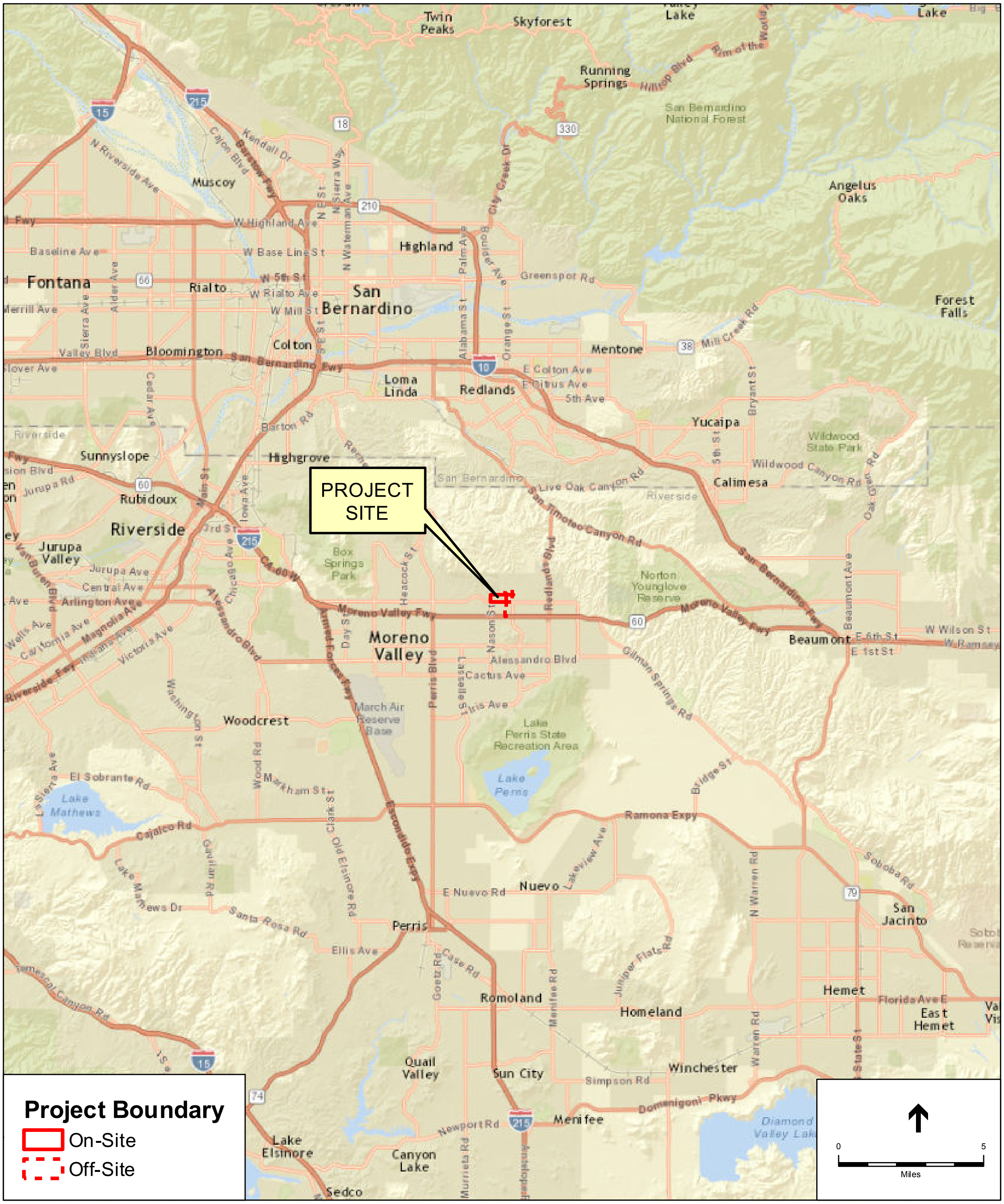
1.2 Definition of the Study Area

The approximately 89.05-acre study area is regionally situated north of State Route (SR) 60 and northeast of Interstate (I) 215 (**Figure 1**, *Regional Map*). Specifically, the study area is located northeast of the intersection of Ironwood Avenue and Nason Street in the City of Moreno Valley. The study area is depicted on the U.S. Geological Survey (USGS) 7.5' Sunnymead topographic quadrangle (S34, T2S, R3W & S3, T3S, R3W) (USGS, 1967; Earth Survey, 2015), as shown in **Figure 2**, *Vicinity Map.* The specific locations and extend of the on-site and off-site study areas are depicted on **Figure 3**, *Study Areas*. The six (6) off-site study areas are associated with four types of proposed project activities including manufactured slopes, road improvements, a sewer line extension, and water line extensions (1 proposed and 2 alternatives) as described below:

Manufactured Slopes (West & East) – There are two (2) off-site study area locations proposed to support manufactured slopes, including one area adjacent to Nason Street (West) and a second area adjacent to the eastern boundary of the on-site study area (East).

Road Improvements – There is one (1) road improvement area proposed between the area located directly north of Ironwood Avenue and south of the on-site study area boundary.

Sewer Line – There is one (1) sewer line area which is proposed to connect at the southeast corner of the on-site study area at the intersection of Ironwood Avenue and Oliver Street and extend south along Oliver Avenue, ultimately ending at the SR-60 freeway.

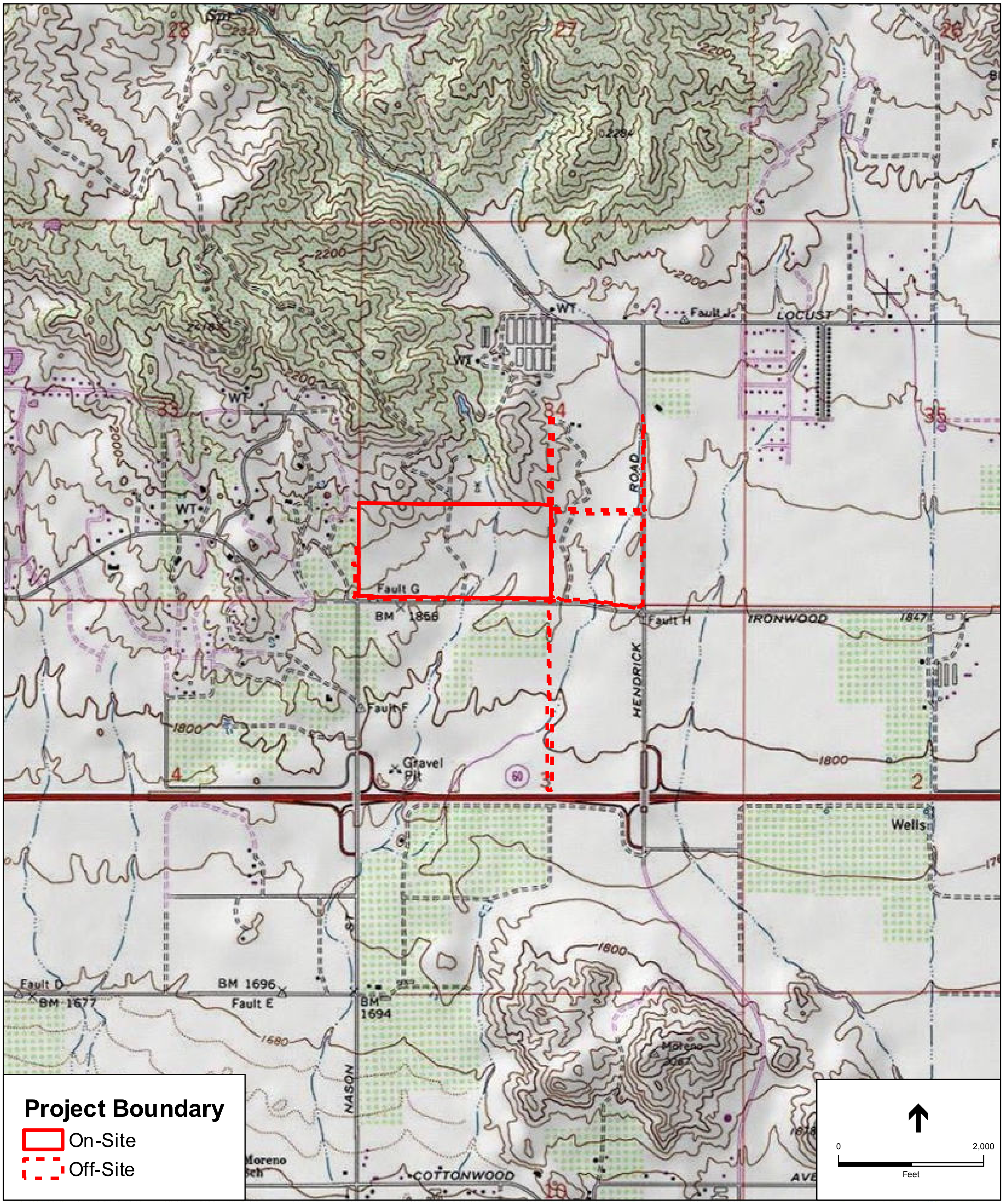


SOURCE: ESRI Street Map, 2009.

Ironwood Village Project
Figure 1
Regional Map

ESA PCR

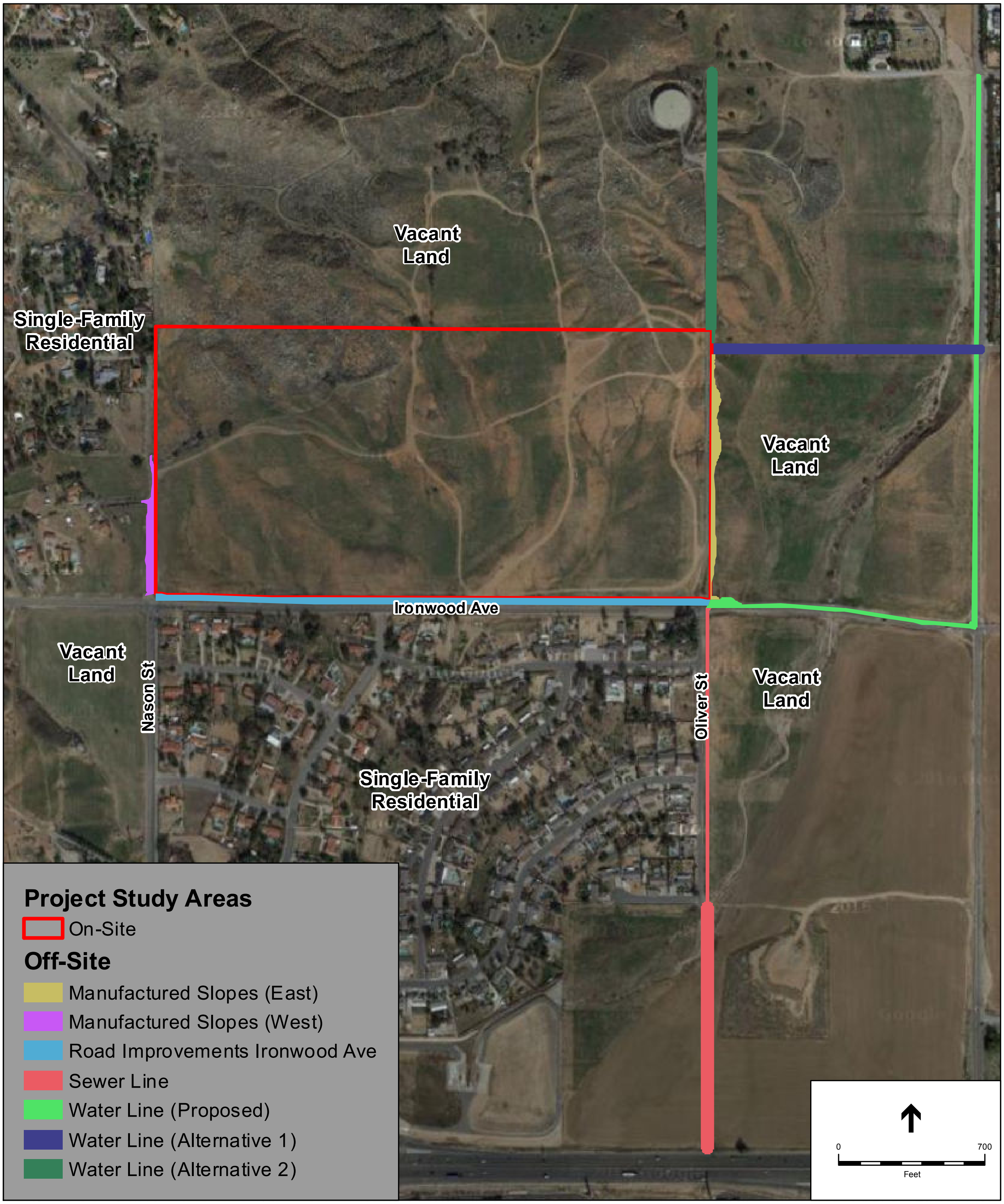
Attachment: DBESP Report (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))



SOURCE: USGS Topographic Series (Sunnymead, CA).

Ironwood Village Project
Figure 2
Vicinity Map

ESA PCR



SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project
Figure 3
Study Areas

ESA PCR

Water line (Proposed and Alternatives) – Although the exact location of the final water line extension is still unknown, one proposed alignment and two (2) alternative alignments were assessed as part of the off-site project study areas. The Proposed Water Line would commence at the intersection of Ironwood Avenue and Oliver Street and extend east along Ironwood Avenue, continuing north along Moreno Beach Drive, and terminating at the intersection of Moreno Beach Drive and Kalmia Avenue. Water Line Alternative 1 would connect the water line at the northeast corner of the on-site study area and extend north terminating near an existing off-site water tower. Water Line Alternative 2 would commence at the northeastern corner of the on-site study area and extend east toward the intersection of Moreno Beach Drive and Juniper Avenue.

It should be noted that only one of the water line alignments will ultimately be implemented by the project. However, given the relatively small amount of impacts to Riverine Areas proposed by the water alignments, this DBESP analyzes the cumulative impacts to MSHCP Riverine resources as if all water line alignments were to be implemented in order to provide a conservative analysis. Ultimately, impacts to MSHCP Riverine resources will be slightly reduced once the final water line alignment is chosen.

The topography on-site is generally flat with gently rolling hills throughout the study area and steeper rock outcrops on the northwest corner. On-site elevations range from the lowest of approximately 1,830 feet above mean sea level (MSL) along the southern boundary of the study area to a high of approximately 1,975 feet above MSL along the northwest boundary of the study area. The topography of the off-site study areas are generally flat with the exception of the proposed water line area that extends north from the northeastern corner of the study area, which consists of a fairly steep east-facing slope supporting some native vegetation and rocky outcrops. Elevations within the off-site areas range from the lowest of approximately 1,793 feet above MSL at the southern end of the proposed sewer line to a high of approximately 1,948 feet above MSL at the steepest portion of the proposed water line area. Representative photographs of the study area are included in **Figures 4a** and **4b**, *Site Photographs*.

1.3 Relationship to the MSHCP

The study area is located within the Reche Canyon/Badlands Plan of the MSHCP. The MSHCP is a multi-jurisdictional Habitat Conservation Plan to maintain biological and ecological diversity within a rapidly urbanizing region. Under the MSHCP, participating jurisdictions (in this case, the City of Moreno Valley) are authorized to allow "take" of specified plant and wildlife species within the MSHCP Plan Area. In addition, the wildlife agencies, namely CDFW and USFWS, allow take of habitat or individual species outside of the MSHCP Conservation Area in exchange for the assembly and management of a coordinated MSHCP Conservation Area. The study area is not within or adjacent to a criteria cell, as shown in **Figure 5**, *Relationship to the MSHCP*. A criteria cell is defined as a "unit within the Criteria Area" for which descriptions are provided "to guide assembly of the Additional Reserve Lands". Since the study area is not within a criteria cell, the project is not subject to the Habitat Acquisition and Negotiation Strategy (HANS) process. The HANS process applies to properties within a MSHCP criteria cell which may be needed for inclusion in the MSHCP Conservation Area.

PHOTOGRAPH 1. View of the brittlebush scrub community, facing northeast.

PHOTOGRAPH 2. View of the rock outcrop/Riversidean sage scrub community, facing north.

PHOTOGRAPH 3. View of the ruderal community in foreground and the laurel sumac scrub/ruderal community in the background to the left, facing southwest.

SOURCE: ESA PCR, 2016

Ironwood Village Project

Figure 4a

Site Photographs

ESA PCR

PHOTOGRAPH 4. View of the ruderal/Riversidean sage scrub community, facing southeast.

PHOTOGRAPH 5. View of the ruderal community, facing northwest.

PHOTOGRAPH 6. View of the ruderal community within the off-site water line extension area, facing south.

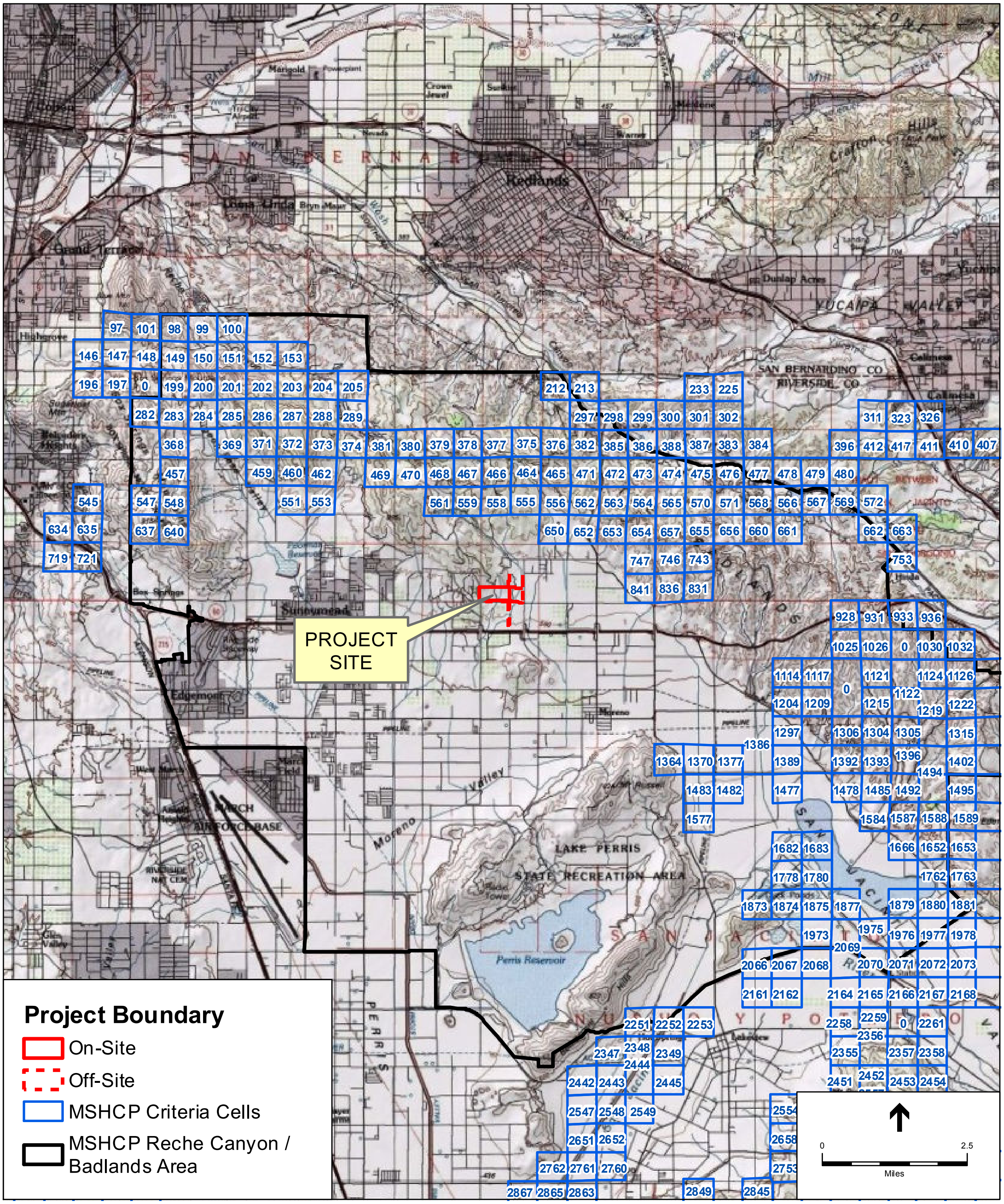
SOURCE: ESA PCR, 2016

Ironwood Village Project

Figure 4b

Site Photographs

ESA PCR



SOURCE: USGS Topographic Series; MSHCP.

Ironwood Village Project

Figure 5

Relationship to the MSHCP

ESA PCR

Although the study area is not within a criteria cell, it is still subject to other plan wide requirements of the MSHCP. The Applicant is required to pay the Local Development Mitigation Fee established in the MSHCP Implementation Agreement (Section 8.5.1 of the MSHCP), comply with the Riparian/Riverine policy (Section 6.1.2 of the MSHCP), and conduct burrowing owl surveys since the study area is within the Burrowing Owl Survey Area (Section 6.3.2 of the MSHCP). The study are is not within the MSHCP's Narrow Endemic Plant Species Survey Area (Section 6.1.3 of the MSHCP), Criteria Area Species Survey Area, Amphibian Species Survey Area, or Mammal Species Survey Area (Section 6.3.2 of the MSHCP). However, the study area is within the Stephens' kangaroo rat (SKR) habitat conservation plan (HCP) boundaries and will be required to pay the SKR mitigation fee for coverage under the HCP.[1]

The study area is not within any Core or Linkage areas as identified by the MSHCP (Dudek & Associates, 2003). There is one proposed linkage (Proposed Linkage 4) approximately 2.1 miles to the north of the study area and one existing core (Core H) roughly 4.0 miles to the south of the study area. Proposed Linkage 4 would include upland habitat within Reche Canyon, which would provide connection to Box Springs Reserve, the Badlands, and San Bernardino County. The open area directly to the north of the study area does directly connect to Proposed Linkage 4. Existing Core H includes Lake Perris State Recreation Area and San Jacinto Wildlife Area. There is no direct connection from the study area to Core H, which are separated by urban development.

1 *http://www.skrplan.org/index.html; SKR is an Adequately Conserved species under the MSHCP. However, coverage is only provided under the MSHCP in areas within the MSHCP boundaries that are outside the boundaries of the SKR HCP.*

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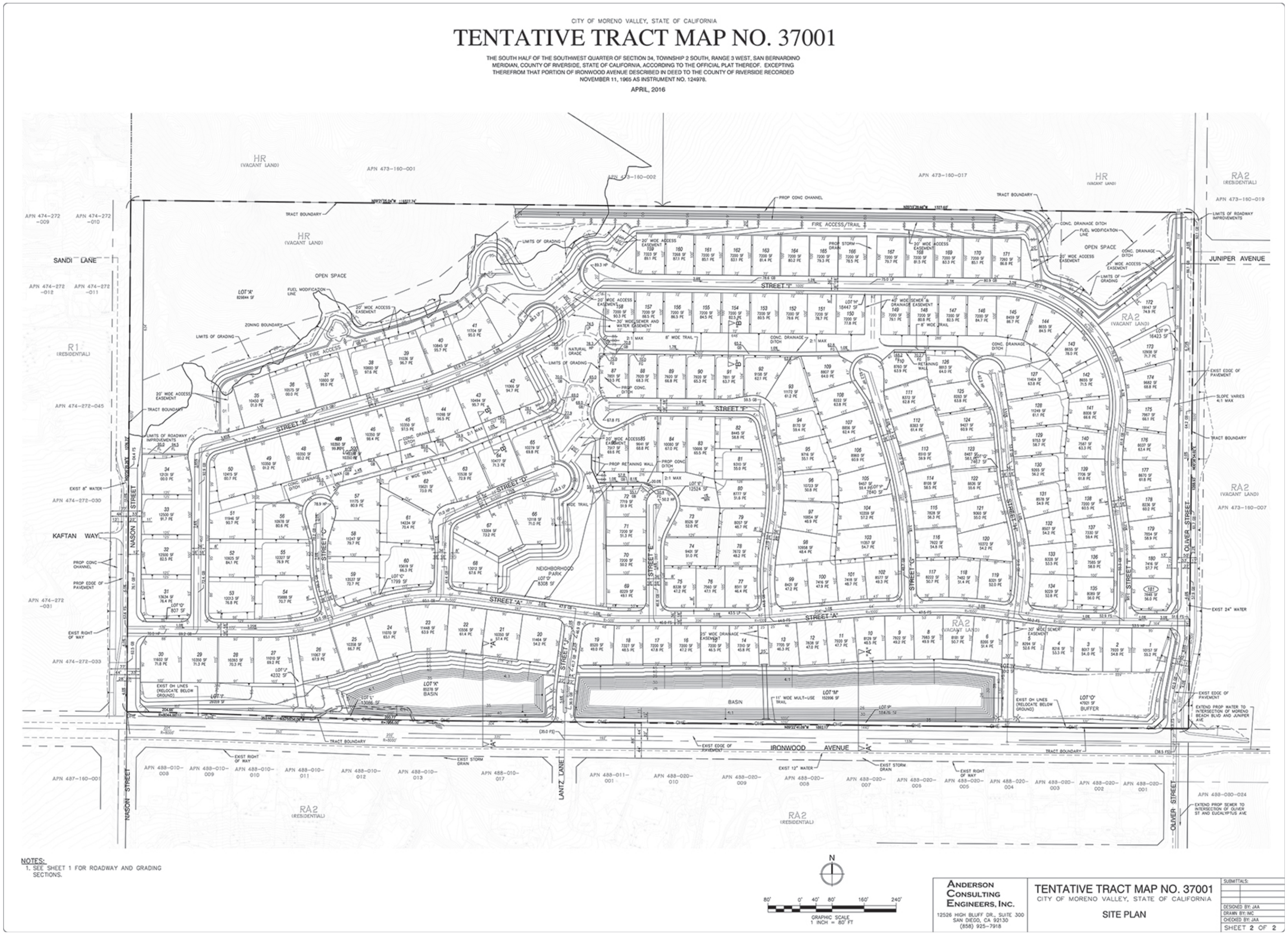
2.0 Project Description

2.1 Proposed Project

The 89.05 acre study area is a proposed single-family residential development that will occupy approximately 38.5 acres, as shown in (**Figure 6**, *Site Plan*).[2] The remaining on-site acreage (39.98 acres) will be open space areas, which will consist of community open space areas that will be planted as appropriate to the project's climate, the proposed on-site mitigation area and avoided areas in the northwestern and northeastern corner of the study area, which encompass native vegetation and rock outcroppings that will be preserved. Per Figure 3, there are four types of off-site improvement areas associated with the project totaling 10.57 acres, including manufactured slope areas, road improvements, a sewer line extension, and water line extensions comprised of one (1) proposed alignment & two (2) alternative alignments. Sewer and water lines will be extended onto the study area from existing utilities. Primary access to the development would occur from Ironwood Avenue between Nason Street and Oliver Street, immediately opposite from and north of Lantz Lane. Secondary access would be provided by driveways on both Nason Street and Oliver Street just north of Ironwood Avenue.

The study area supports two drainage systems identified as Drainage A and Drainage Complex B. The drainages support field indicators associated with USACE, RWQCB, and CDFW (collectively "the resource agencies") jurisdictional waters. The limits of CDFW jurisdictional streambed resources were found to be consistent with the definition of Riverine Areas as defined by Section 6.1.2 of the MSHCP. Drainage A is an unvegetated roadside ditch that enters the Ironwood Avenue Right-of-Way and flows on-site adjacent to the southern boundary. Drainage A exits the study area via a corrugated metal pipe (CMP) that runs under Ironwood Avenue. Drainage Complex B occurs within the off-site areas and comprises the mainstem Drainage B feature and five smaller tributaries (Drainages B1 through B5). The mainstem feature identified as Drainage B is an ephemeral sandy wash that originates off-site to the northwest of the study area along Reche Canyon Road. Drainage B meanders south/southwest and crosses the off-site Water Line Alternative 1 and sewer line area, ultimately entering a detention basin located directly northeast of the Nason Street exit of the SR-60.

2 The project site plan does not depict the conceptual on-site mitigation area presented as Figure 10 in Section 7.3 below. However, the feasibility of providing the necessary on-site mitigation area into the site design has been evaluated by the project engineer, and the mitigation area will be integrated into the final project design should the resource agencies prefer on-site mitigation as part of subsequent regulatory permitting.



SOURCE: Anderson Consulting Engineers, Inc., 2016

Ironwood Village Project

Figure 6

Site Plan

ESA PCR

Drainages B1 through B5 are minor ephemeral drainages that drain very small and localized watersheds located directly west of the existing water district road which runs parallel to the eastern boundary of the study area. Drainage B5 supports marginal, yet more substantial flows than Drainages B1 through B4, and was likely formed by controlled release from the water tank structure directly to the west which outlets directly into the drainage via a large corrugated metal pipe structure. Drainage A and Drainage Complex B are further described in Section 4.4, *Riverine Areas Setting* and Section 5.1, *Assessment of Riparian/Riverine and Vernal Pool Resources*, below.

2.2 Project Alternatives

The sensitive biological resources on the study area are limited to Drainage A and Drainage Complex B that support ephemeral habitats and are considered jurisdictional features and MSHCP Riverine Areas. The study area does not support any habitats that qualify as MSHCP Riparian Areas. Avoidance of sensitive biological resources on the study area is not feasible as impacts are necessary to provide slope stabilization to support the proposed residential development and infrastructure improvements, including road improvements along Ironwood Avenue and extension of water and sewer lines to the proposed development from existing off-site utilities. Permanent impacts proposed to MSHCP Riverine Areas total 0.077 acre and include: Drainage A (0.059 acre), Drainage B (0.011 acre), Drainage B2 (<0.001), Drainage B3 (<0.001), Drainage B4 (<0.001) and Drainage B5 (0.007 acre). The remaining impacts to MSHCP Riverine Areas (totaling 0.088 acre) are temporary impacts associated with the extension of the off-site sewer and water lines to the study area. All though the drainages will either be permanently or temporarily impacted, the drainages are ephemeral systems with limited watersheds and support little to no native vegetation. Impacts to vegetation within the drainages will be limited to small patches of upland vegetation, including brittlebush scrub, buckwheat scrub, and Riversidean sage scrub.

Impacts to MSHCP Riverine Areas addressed in this report are based on a worst-case scenario in regards to impacts to MSHCP Riverine Areas, which assesses impacts associated with all Alternative Water Lines. However, it should be noted that once the Alternative Water Line route is chosen, actual impacts to MSHCP Riverine Areas will be slightly less. Therefore, when addressing mitigation, the acreage of presumed mitigation will be based on a 2:1 ratio of TOTAL riverine impacts with the caveat that once the alternative is chosen, impacts and mitigation may be slightly reduced.

2.3 100 Percent Avoidance Analysis

In accordance with the MSHCP, a 100 percent avoidance alternative was considered to determine if a project could be developed on the property that avoided 100 percent of the MSHCP Riverine Areas present. The study area supports two drainage systems (Drainage A and Drainage Complex B), which are briefly described above and in further detail in section 4.4, *Riverine Features*, of this report. Drainage A, which occurs on-site and off-site, and Drainage Complex B (i.e. mainstem Drainage B and its tributaries), which occurs within the off-site areas, were determined to meet the definition of MSHCP Riverine Areas.

In order to avoid all impacts to Riverine Areas, the project could not provide infrastructure improvements, including road improvements and water and sewer line extensions and support the developable acreage necessary to make the project economically feasible. Furthermore, since the proposed project is not within a MSHCP criteria cell, removing any possible development would place additional development pressure on areas within MSHCP criteria cells.

In summary, the 100 percent avoidance alternative was determined to be infeasible because it would not allow the Applicant to provide the required infrastructure improvements while realizing project objectives, and it would increase development pressure within MSHCP criteria cells. Additionally, the project has minimized permanent impacts to a maximum[3] of just 0.077 acre of low function and value habitat (based on the limited watershed and presence of minimal upland vegetation) within the drainages. Therefore, no further analysis was considered by the project proponent with regard to 100 percent avoidance or any part thereof.

2.4 Other Alternatives Considered

No other alternatives beyond those discussed in sections 2.1 and 2.2, above, were considered for the development based on the economical infeasibility and low function and value of the biological resources identified.

[3] Actual impacts will be reduced further upon determination of the final water line alignment.

3.0 Methodology

The biological resources of the study area are documented in the Biological Resources Assessment (BRA) (ESA PCR, 2016) (refer to attached **Appendix A**, *Biological Resources Assessment*). An overview of the methods is provided below.

3.1 Literature Review

Assessment of the study area began with a review of relevant maps and literature on the biological resources of the study area and surrounding vicinity. The California Natural Diversity Database (CNDDB), a CDFW species account database; the MSHCP; and the California Native Plant Society (CNPS) Online Inventory of Rare and Endangered Plans were reviewed for all pertinent information regarding the localities of known observations of sensitive species and habitats in the vicinity of the study area. Federal register listings, protocols, and species data provided by the USFWS and CDFW were reviewed in conjunction with anticipated Federally and State listed species potentially occurring within the vicinity as necessary. In addition, numerous regional flora and fauna field guides were utilized to assist in the identification of species and suitable habitats.

3.2 Field Investigations

The following field investigations were conducted by ESA PCR on the study area. The detailed methodology for each type of survey can be found in section 3.0 of the BRA Report, which is attached as Appendix A.

- A general biological survey and vegetation mapping were conducted by ESA PCR Senior Biologist Ezekiel Cooley on September 19, 2014.
- A Riparian/Riverine Areas assessment was conducted by ESA PCR Principal Regulatory Scientist Amir Morales on September 19 and December 10, 2014.
- Focused plant surveys were conducted within:
  - the study area and off-site sewer line area on May 13, 2015 by ESA PCR Biologists Ezekiel Cooley, Amy Lee, and Lauren Singleton and on July 20, 2015 by Amy Lee;
  - the off-site proposed and alternative water line areas on May 23 and July 5, 2016 by Amy Lee; and

- the off-site eastern manufactured slope area on July 5, 2016 by Amy Lee; however, a spring focused plant survey has not yet been conducted in this area.4

- Focused burrowing owl surveys were conducted within:

  - the study area and off-site manufactured slopes, road improvement, and sewer line areas from May to July 2015 by ESA PCR Biologists Ezekiel Cooley, Amy Lee, and Lauren Singleton; and

  - the proposed and alternative off-site water line areas from April to July 2016 by Amy Lee and Lauren Singleton.

[4] *The western manufactured slope area was not surveyed since it does not support suitable habitat for special-status plant species.*

4.0
Description of Available Biological Information

This section summarizes the biological resources of the study area and proposed impacts as documented in the BRA, attached as Appendix A. Observed species lists are included as Appendix A to the BRA.

4.1 Plant Communities

The on-site study area totals 78.48 acres, including 69.01 acres of non-native dominated plant communities, 6.62 acres of native plant communities, 2.15 acres of sparsely vegetated rock outcrop/Riversidean sage scrub, and 0.70 acre of developed areas. Non-native plant communities include 38.04 acres of ruderal areas, 2.29 acres of ruderal/Riversidean sage scrub, 28.68 acres of disturbed areas. Native plant communities include 2.34 acres of brittlebush scrub, 0.31 acre of brittlebush scrub/ruderal, 0.09 acre of buckwheat scrub/ruderal, 0.78 acre of laurel sumac scrub/ruderal, and 3.10 acres of Riversidean sage scrub.

The off-site study areas totals 10.57 acres, including 7.15 acres of non-native dominated plant communities, 0.64 acre of native plant communities, 0.05 acre of sparsely vegetated river wash area, and 2.66 acres of developed areas. Non-native communities consist of 2.50 acres of ruderal areas, 0.04 acre of ruderal/brittlebush scrub, 0.43 acre of ruderal/Riversidean sage scrub, and 4.18 acres of disturbed areas. Native plant communities include 0.27 acre of brittlebush scrub, 0.21 acre of brittlebush scrub/ruderal, 0.04 acre of buckwheat scrub/ruderal, and 0.12 acre of Riversidean sage scrub, and 0.07 acre of Riversidean sage scrub/ruderal.

Descriptions and a map of the plant communities are provided in Section 4.2 and Figure 7, respectively, of the BRA prepared by ESA PCR included as Appendix A of this DBESP (2016) (Appendix A). On and off-site permanent impacts are proposed by the project to 69.96 acres of non-native plant communities, 2.91 acres of native plant communities, 0.01 acre of sparsely vegetated river wash, and 2.93 acres of developed areas. An additional 1.50 acres of impacts will occur as a result of on-site fuel modification activities as well as 5.22 acres of temporary on and off-site impacts. The total acreages of each plant community mapped within the study area, the proposed impacts to those communities, and proposed avoidance acreages are summarized in **Table 1**, *Existing and Impacted Acres of Plant Communities*.

TABLE 1
EXISTING AND IMPACTED ACRES OF PLANT COMMUNITIES

Plant Communities	Existing (acres)			Permanent Impacts (acres)			On-site Fuel Modification Impacts (acres)	Temporary Impacts (acres)		
	On-site	Off-site	Total	On-site	Off-site	Total		On-site	Off-site	Total
Brittlebush Scrub	2.34	0.27	2.61	0.87	0.05	0.92	0.32	0.46	0.23	0.69
Brittlebush Scrub/Ruderal	0.31	0.21	0.52	0.30	0.21	0.51	-	0.01	-	0.01
Buckwheat Scrub/Ruderal	0.09	0.04	0.13	0.09	0.04	0.13	-	-	-	-
Laurel Sumac Scrub/Ruderal	0.78	-	0.78	0.36	-	0.36	0.26	0.16	-	0.16
Riversidean Sage Scrub	3.10	0.12	3.22	0.95	0.03	0.98	0.19	0.24	0.09	0.33
Riversidean Sage Scrub/Ruderal	-	0.07	0.07	-	0.01	0.01	-	-	0.06	0.06
Rock Outcrop/Riversidean Sage Scrub	2.15	-	2.15	-	-	-	0.06	-	-	-
River Wash	-	0.05	0.05	-	0.01	0.01	-	-	0.04	0.04
Ruderal	38.04	2.50	40.54	36.94	0.72	37.66	0.35	0.14	1.78	1.92
Ruderal/Brittlebush Scrub	-	0.04	0.04	-	0.01	0.01	-	-	0.03	0.03
Ruderal/Riversidean Sage Scrub	2.29	0.43	2.72	1.32	0.43	1.75	0.13	0.03	-	0.03
Disturbed	28.68	4.18	32.86	27.74	2.80	30.54	0.19	0.15	1.37	1.52
Developed	0.70	2.66	3.36	0.7	2.23	2.93	-	<0.01	0.43	0.43
Total	**78.48**	**10.57**	**89.05**	**69.27**	**6.54**	**75.81**	**1.50**	**1.19**	**4.03**	**5.22**

SOURCE: ESA PCR, 2014 & 2016

4.2 Special-status Plant Species

Special-status plants include those listed, or candidates for listing, by the USFWS and CDFW; and species considered special-status by the CNPS (Lists 1A, 1B, and 2). Several special-status and CNPS-listed species were reported in the vicinity based on CNDDB and CNPS, totaling 65 species within the 9-quadrangle search. Of the 65 species reported in the vicinity of the study area, 12 species were identified as having a potential to occur within the study area based on the literature review and existing habitat, as listed in Appendix B to the BRA. The remaining 53 species were not considered to have a potential to occur based on the literature review and habitat present on the study area. Focused plant surveys were conducted in 2015 and off-site road improvement and sewer line areas and in 2016 on the off-site water line areas; none of the species determined to have a potential to occur on the study area and off-site water and sewer line study areas were observed. A summer focused survey was conducted within the off-site eastern manufactured slope area in 2016; however, a spring survey has not yet been conducted within this area. The off-site western manufactured slope area does not support suitable habitat for special-status plant species.

4.3 Special-status Wildlife Species

Sensitive wildlife species include those species listed as Endangered or Threatened under the Federal Endangered Species Act (FESA) or the California Endangered Species Act (CESA), candidates for listing by the USFWS or CDFW, and Species of Special Concern to the CDFW. Several sensitive wildlife species were reported in the vicinity based on CNDDB, totaling 43 species within the 9-quadrangle search. A total of 19 species were identified as having a potential to occur based on the literature review and habitat present on the study area. Of the species with the potential to occur, focused surveys were conducted for the burrowing owl in accordance with recommended protocols due to the presence of potentially suitable habitat on the study area. The remaining 24 species were not considered to have a potential to occur within the study area due to lack of suitable habitat or the location of these areas were outside of the species' range. A summary table of these species is provided in Appendix C to the BRA. The remaining 19 species with potential to occur are discussed further below in section 4.3.1, *Species with Potential to Occur*.

4.3.1 Species with Potential to Occur

The following 19 species were determined to have a potential to occur on the study area:

Coast horned lizard (*Phrynosoma blainvillii*): This reptile species is a state species of special concern and is a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers sandy riparian and sage scrub habitats, but also occurs in valley-foothill, hardwood, conifer, pine-cypress, juniper and annual grassland habitats below 6,000 feet. Habitats include open country, especially sandy areas, washes, flood plains, and windblown deposits.

Coast horned lizard was determined to have a moderate potential to occur within the study area based on the presence of some potentially suitable habitat on the northwestern corner of the on-site area, which includes Riversidean sage scrub and brittlebush scrub. Harvester ants, this species main food source, were also observed (although the food source was not seen in the area supporting suitable habitat). Although habitat and a food source potentially exist on the study area, the majority of the potentially suitable habitat is disturbed and higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the study area. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Orange-throated whiptail (*Aspidoscelis hyperythra*): This reptile species is a state species of special concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers chaparral, non-native grassland, Riversidean sage scrub, and juniper and oak woodlands. It is often associated with riparian areas and alluvial fan sage scrub habitats.

Orange-throated whiptail was determined to have a moderate potential to occur within the study area based on the presence of some potentially suitable habitat on the northwestern corner of the on-site area, which includes Riversidean sage scrub and brittlebush scrub. These areas support perennial plants that may host this species preferred food source (termites).

Although habitat and a food source potentially exist on the study area, the majority of the suitable habitat is disturbed and higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the study area. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Red Diamond Rattlesnake (*Crotalus ruber*): This reptile species is a state species of special concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers chaparral, woodland, and arid desert habitats in rocky areas with dense vegetation.

Red diamond rattlesnake was determined to have a moderate potential to occur within the study area based on the presence of some potentially suitable habitat on the northwestern corner of the on-site area, which includes Riversidean sage scrub and brittlebush scrub. Although these areas support some vegetation and crevices within the rock outcrops, the vegetation is not dense and rock crevices available for cover are limited. Higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the study area. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Golden Eagle (*Aquila chrysaetos*): This raptor is a state fully protected species and is protected by the Bald and Golden Eagle Protection Act; it is also a Covered Species pursuant to the Western Riverside County MSHCP. This species nests on cliff faces and tall trees. Foraging habitat includes open country, including grasslands and early successional stages of forest and shrub habitats.

Golden eagle was determined to have a potential to occur only to forage within the study area based on the presence of a few fossorial mammal burrows within the disturbed areas on-site, suggesting the presence of small mammals that could provide a possible food source. However, the potential for foraging was considered very low since the majority of the site is surrounded by development and is highly disturbed, making it a less optimal habitat. This species is not expected to nest due to lack of cliffs on the study area, which is their preferred nesting habitat. Additionally, there is only one CNDDB occurrence record within the vicinity. This record was a breeding pair observed in fall 1979, spring 1980, and fall 1980 in San Timoteo Canyon, approximately 6.0 miles to the northeast. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Swainson's hawk (*Buteo swainsoni*): This bird species is listed as threatened by the state and is a Covered Species pursuant to the Western Riverside County MSHCP. It prefers Great Basin grasslands, riparian forests, riparian woodlands, and valley and foothill grasslands.

Swainson's hawk was determined to have a potential for foraging only within the study area based on the presence of a few fossorial mammal burrows within the disturbed areas on-site, suggesting the presence of small mammals that could provide a possible food source. However, the potential for foraging was considered low since the majority of the site is surrounded by development and is highly disturbed, making it a less optimal habitat. This species is not expected to nest due to the limited number of trees on the study area and the proximity of the trees to roads and residential homes, which could create some noise disturbance.

Additionally, there are only two CNDDB occurrence records of nesting individuals within the vicinity; both records are from over 100 years ago. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Burrowing owl (*Athene cunicularia*): This bird species is a state species of special concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers coastal prairie, coastal scrub, Great Basin scrub, Mojavean desert scrub, Sonoran desert scrub, valley and foothill grassland and disturbed habitats. It is known to occur in the study area vicinity based on CNDDB and the MSHCP, and the study area is within the MSHCP Burrowing Owl Survey Area, an overlay in the MSHCP that requires additional surveys.

Burrowing owl was determined to have potential to occur within the study area based on the presence of suitable habitat that was identified during the Step I survey, including disturbed, low-growing vegetation, bare ground, and a few small fossorial mammal burrows. Step II surveys were conducted from May to July 2015 within the study area and off-site sewer line area and slope stabilization areas. Step II surveys were conducted from April to July 2016 within the off-site water line areas. The subsequent Step II surveys did not identify individual burrowing owls, active burrowing owl burrows, or signs of burrowing owls within the survey area. Therefore, the study area and adjacent buffer area do not currently support burrowing owls. The results are also outlined in a separate survey reports included in the attached BRA as Appendices D and E.

Loggerhead shrike (*Lanius ludovicianus*): This bird species is listed as a state species of special concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers broadleaved upland forest, desert wash, Joshua tree woodland, Mojavean desert scrub, pinyon and juniper woodlands, riparian woodland, and Sonoran desert scrub habitats.

Loggerhead shrike was observed foraging within the northwestern corner of study area during the third burrowing owl survey conducted on July 2, 2015. This area supports suitable foraging habitat for this species, which includes Riversidean sage scrub and brittlebush scrub. The potential for nesting for this species is considered moderate based on the presence of shrubs on the northwestern corner. Although this area supports shrubs that may be suitable for nesting, the northwestern corner is adjacent to developed, residential areas; higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the study area.

Coastal California gnatcatcher (*Polioptila californica californica*): This bird species is listed as Federally Threatened, state species of special concern, and a Covered Species pursuant to the Western Riverside County MSHCP. This species is an obligate inhabitant of coastal sage scrub habitat.

This species was observed on the study area during the focused burrowing owl survey conducted on May 13, 2015. Only one individual was heard during the survey.

Northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*): This mammal species is listed as a state species of special concern and a Covered Species pursuant to the Western Riverside County MSHCP. It prefers chaparral and coastal sage scrub habitats, in addition to grassland and Riversidean alluvial fan sage scrub habitats.

Northwestern San Diego pocket mouse was determined to have a moderate potential to occur within the study area based on the presence of suitable coastal scrub and chaparral habitat (e.g. brittle bush scrub, Riversidean sage scrub) in the northwestern portion and small fossorial mammal burrows. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Stephens' kangaroo rat (*Dipodomys stephensi*): This mammal species is listed as federally endangered and state threatened. Take Authorization for Stephens' kangaroo rat is provided by the SKR HCP within its plan boundaries, and by the Western Riverside County MSHCP for areas outside of the SKR HCP but within the MSHCP area plan boundaries (this species is a MSHCP Covered Species). This species prefers open grasslands or sparse shrub lands within sandy to sandy loam soils and low clay and gravel content.

Stephens' kangaroo rat was determined to have a moderate potential to occur within the study area based on the presence of suitable shrub habitat (e.g. brittle bush scrub, Riversidean sage scrub) in the northwestern portion and small fossorial mammal burrows. The study area is not within any core reserves identified by the SKR HCP. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Los Angeles pocket mouse (*Perognathus longimembris brevinasus*): This mammal species is listed as a state species of special concern and a conditionally Covered Species pursuant to the Western Riverside County MSHCP (surveys are required for areas within the survey overlay, with potential conservation). It prefers sparsely vegetated habitat areas within coastal sage scrub communities and in patches of fine sandy soils associated with washes.

Los Angeles pocket mouse was determined to have a moderate potential to occur within the study area based on the presence of suitable Riversidean sage scrub habitat in the northwestern portion. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

San Diego black-tailed jackrabbit (*Lepus californicus bennettii*): This mammal species is a California Species of Special Concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers open brushlands and scrub habitats.

San Diego black-tailed jackrabbit was determined to have a moderate potential to occur within the study area. The majority of the study area supports suitable habitat for this species, including the Riversidean sage scrub on the northwestern corner and the ruderal areas (which support some short grasses). However, this species is highly conspicuous and no incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

San Diego desert woodrat: This mammal species is a California Species of Special Concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers coastal scrub and chaparral habitats with areas containing rock outcrops and cliffs.

San Diego desert woodrat was determined to have a moderate potential to occur within the study area based on the presence of suitable habitat (e.g. Riversidean sage scrub, rock outcrop/Riversidean sage scrub) in the northwestern portion and small fossorial mammal burrows. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Southern Grasshopper Mouse (*Onychomys torridus ramona*): This mammal species is a state species of special concern. This species prefers grasslands, desert areas, and especially scrub with friable soils.

Southern grasshopper mouse was determined to have a potential to occur within the study area based on the presence of suitable shrub habitat (e.g. brittle bush scrub and Riversidean sage scrub) in the northwestern portion and small fossorial mammal burrows. However, the potential was considered low since this species has not been recorded on CNDDB within the vicinity of study area since 1938. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

American badger (*Taxidea taxus*): This mammal species is a state species of special concern. This species prefers grasslands, desert areas, and especially scrub with friable soils.

American badger was determined to have a potential to occur within the study area based on the presence of shrubs within the Riversidean sage scrub habitat on the northwestern corner of the study area. A few fossorial mammal burrows were observed, suggesting the presence of small mammals that could provide a possible food source. However, the potential was considered low since the majority of the site is surrounded by development and a large portion of suitable habitat is disturbed. Additionally, this species has not been recorded within the vicinity since 1908. No signs of this species were observed during any site surveys conducted in 2015.

Western Mastiff Bat (*Eumops perotis californicus*): This mammal species is a state species of special concern. This species prefers chaparral, cismontane woodlands, coastal scrub, and valley and foothill grassland habitats.

Western mastiff bat was determined to have a potential to occur for foraging only within the study area. However, the potential was considered low since although bats in this family are known to be strong fliers and can fly long distances to forage, habitat on the study area is disturbed and the majority is surrounded by development. This species preferred roosting habitat is not present on the study area and the nearest CNDDB occurrence record is from1990 approximately 3.0 miles to the southwest of the study area, in an area that is now a residential development. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Pocketed free-tailed bat (*Nyctinomops femorasaccus*): This bat species is a state species of special concern and occurs in more arid habitats, roosting in rock crevices, caverns, or buildings.

Pocketed free-tailed bat was determined to have a potential to occur for roosting only within the study area based on the presence of rock outcrops. However, this potential was considered very low since this species typically prefers steeper cliffs for roosting habitat. Although little is known regarding home range for this species, the potential for roosting is also unlikely since the study area does not support adjacent foraging habitat (CDFW, 2000). There are only 2 CNDDB occurrence records in the vicinity. The nearest record is from 1985 approximately 6.5 miles to the southwest of the study area near March Air Force Base. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Lesser long-nosed bat (*Leptonycteris verbabuenae*): This bat species is a federally endangered species and occurs in more arid habitats, such as desert grasslands and shrublands.

Pocketed free-tailed bat was determined to have a potential to occur for roosting and foraging. Potential night roosts included a limited number of trees and rock crevices on the northwestern corner of the project and scattered cactus may provide feeding opportunities. Although day roosting habitat (caves or mines) are not present on the study area, this species can travel long distances between day roosting and foraging sites. However, the potential was considered very low for both roosting and foraging since this species not typically found in California and recorded sightings are typically vagrant migrants. There is only 1 CNDDB occurrence record within the vicinity from 1993, approximately 9.5 miles to the northeast in a residential neighborhood of Yucaipa. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Pallid bat (*Leptonycteris verbabuenae*): This bat species is a federally endangered species and occurs in more arid habitats, such as desert grasslands and shrublands.

Pocketed free-tailed bat was determined to have a potential to occur for roosting and foraging. Potential night roosts included a limited number of trees and rock crevices on the northwestern corner of the project and scattered cactus may provide feeding opportunities. only within the study area based on the presence of rock outcrops. Although day roosting habitat (caves or mines) is not present on the study area, this species can travel long distances between day roosting and foraging sites. However, the potential was considered very low for both roosting and foraging since this species not typically found in California and recorded sightings are typically vagrant migrants. There is only 1 CNDDB occurrence record within the vicinity from 1993, approximately 9.5 miles to the northeast in a residential neighborhood of Yucaipa. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

4.3.2 Migratory Birds and Raptors

The study area supports some potential nesting and foraging habitat for nesting birds and raptors, primarily in the northwestern corner of the study area where there are shrubs and some trees. Several species of birds were observed on-site and were identified by CNDDB as potentially occurring within the 9-quadrangle search area.

Raptors observed on-site include Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), and American kestrel (*Falco sparverius*). There is also a foraging potential for listed raptors within the 9-quadrangle search area according to CNDDB, such as golden eagle (State Fully Protected) and Swainson's hawk (Federally Threatened), though the potential of foraging is considered low and neither are expected to nest on-site. These special-status bird species are listed in Appendix C to the attached BRA.

4.4 Riverine Areas Setting

The study area is located within rolling valley topography located southeast of Reche Canyon and south/southwest of The Badlands mountain range. The study area is located within the Santa Ana Watershed and generally drains toward the south, eventually reaching the Perris Valley Storm Drain, which ultimately reaches the San Jacinto River and then Canyon Lake. The USGS Sunnymead topographic Quadrangle depicts a blueline stream originating in the foothills to the north with headwaters located approximately 2,000 linear feet from the on-site study area. The mapped blueline drainage feature enters the study area near the center of the northern project boundary and bisects the property. The property has been subjected to seasonal dry-farming and/or weed abatement activities for decades. Based on the jurisdictional assessments performed by ESA PCR, no discernible streambed or indicators of flow were observed within the area historically mapped as a blueline drainage feature during the September 19, 2014 assessment of Riparian/Riverine Areas. In order to determine if indicators of flow reestablish following moderate rain events, Amir Morales returned to investigate the study area following a series of early December 2014 storm events yielding a total of nearly 2-inches of rain over three consecutive days. In our experience, this amount of rain would have reestablished some evidence of flow capable of eroding a streambed. However, no ordinary water mark, sediment deposition/sorting, debris wracks, bed/bank, streambed associated vegetation, or other flow indicators were observed immediately following the consecutive rain events, and no vegetation was observed as establishing in those areas based on review of recent and historical imagery of the site. As a result, it was determined that no MSHCP Riparian/Riverine Areas occur within the area depicted as a USGS blueline drainage feature mapped within the study area.

It was noted that the USGS Sunnymead Quadrangle depicts a small water feature at the off-site headwaters of the blueline drainage feature, approximately 2,000 linear feet north of the study area where the feature originates. As such, it is feasible that the mapped water feature was formed in association with a historic stock pond, which may have supported a small drainage that ultimately extended to the study area when water was historically discharged from the pond feature and/or significant storm events caused it to overflow. However, based on review of current aerial imagery in Google Earth, no water feature appears to persist within the off-site headwaters in the current condition capable of supporting a discernible streambed. Consequently, the only Riverine Area identified within the on-site study area during the December 2014 site visit is a minor roadside ditch identified as Drainage A, which extends into the off-site Ironwood Avenue right-of-way. Riverine indicators within the off-site study areas are therefore limited to Drainage Complex B, comprised of a mainstem drainage identified as Drainage B, and its tributaries identified as Drainages B1 through B5.

No riparian and/or hydrophytic vegetation communities were observed on the study area that would warrant the need for a formal wetland analysis, and no depressional features were observed. Therefore, no wetland or vernal pool resources were determined to occur within the project study area.

Drainage A and Drainage Complex B are considered to meet the MSHCP definition of Riverine Areas (rather than MSHCP Riparian Areas) since they are supported by ephemeral[5] flows and do not support riparian vegetation communities. The extent of Riverine Areas associated with Drainage A and Drainage Complex B are considered to be equivalent to the extent of CDFW jurisdiction. Riverine Areas associated with the two drainage systems are discussed in further detail in Section 5.1, *Assessment of Riparian/Riverine and Vernal Pool Resources*, below.

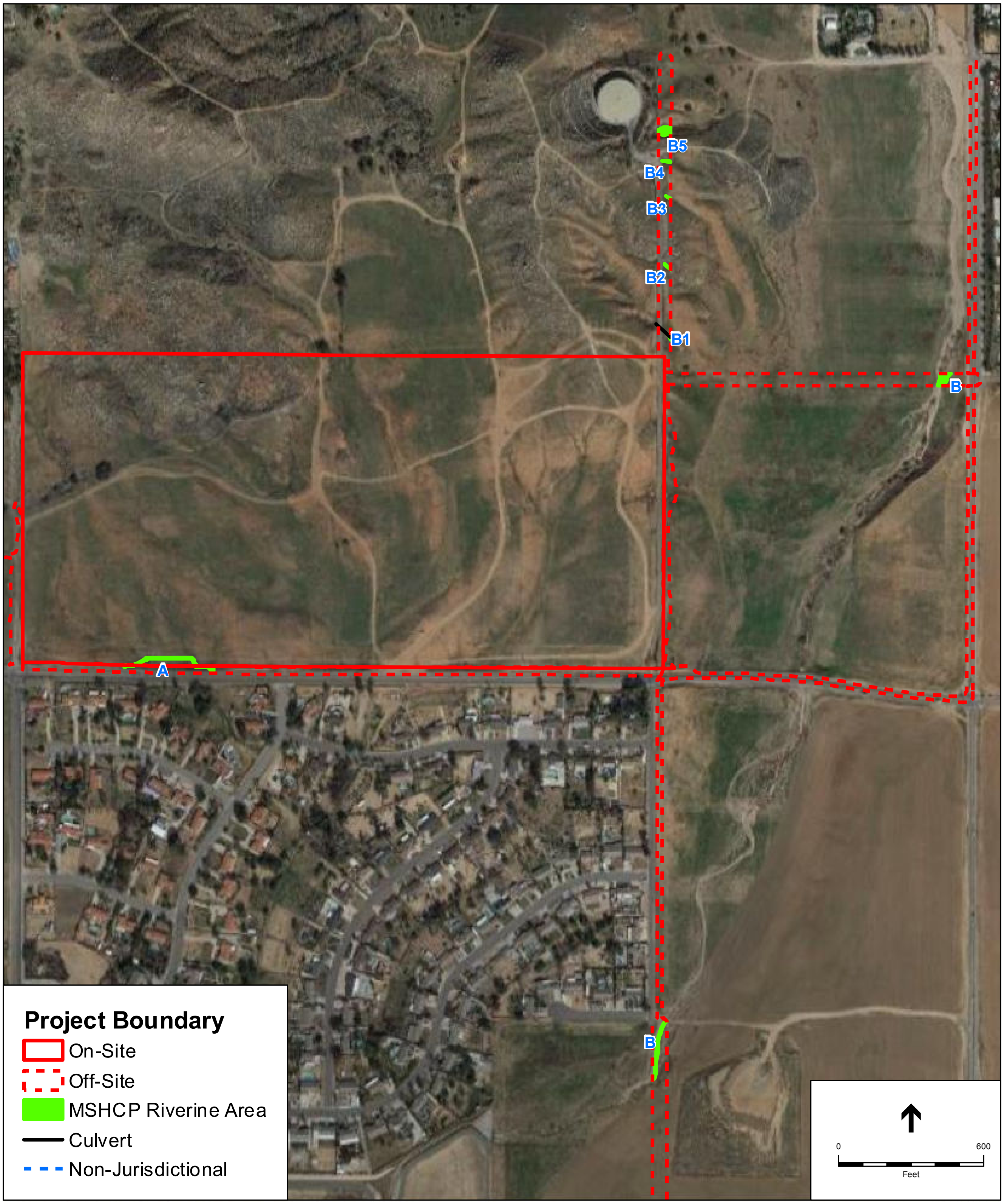
5 *Ephemeral drainages are streambeds that generally convey runoff during, and immediately after, a storm event.*

5.0
Assessment of Riparian/Riverine and Vernal Pool Resources

5.1 Assessment of Riparian/Riverine and Vernal Pool Features

Section 6.1.2, *Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools*, of the MSHCP provides for the protection of Riparian/Riverine Areas and Vernal Pools within the MSHCP Plan Area. Riparian/Riverine areas are defined in the MSHCP as "lands which contain habitat dominated by trees, shrubs, persistent emergents, or emergent mosses and lichens, which occur close to or which depend upon soil moisture from a nearby fresh water source; or areas with fresh water flow during all or a portion of the year." Vernal pools are defined in the MSHCP as "seasonal wetlands that occur in depression areas that have wetlands indicators of all three parameters (soils, vegetation, and hydrology) during the wetter portion of the growing season but normally lack wetlands indicators of hydrology and/or vegetation during the drier portion of the growing season."

As shown in **Figure 7**, *MSHCP Riverine Areas*, the study area supports 0.165 acre of Riverine Areas, including 0.59 acre in Drainage A (0.046 acre on-site and 0.013 acre off-site), 0.069 acre in off-site Drainage B, 0.001 acre in off-site Drainages B1, 0.001 acre in off-site Drainage B2, 0.001 acre in off-site Drainage B3, 0.001 acre in off-site Drainage B4, and 0.033 acre in off-site Drainage B5. This acreage is equivalent to the CDFW jurisdiction for these drainages. All drainages meet the definition of Riverine Areas since they are supported by ephemeral flows and do not support any vegetation that is dependent on hydrology from the drainages. The acreages of MSHCP Riverine Areas in Drainage A and Drainage Complex B are summarized in **Table 2**, *MSHCP Riverine Areas*. Other types of aquatic features that could provide suitable habitat for MSHCP vernal pool species, such as fairy shrimp, are not present within the study area (i.e. vernal pools, swales, vernal pool-like ephemeral ponds, seasonal ponds, stock ponds, or other human-modified depressions such as tire ruts, etc.). Photographs of the drainages are provided in **Figures 8a** and **8b,** *Drainage Photographs*. Detailed descriptions of Drainage A and Drainage Complex B are provided in sections 5.1.1 and 5.1.2 below.

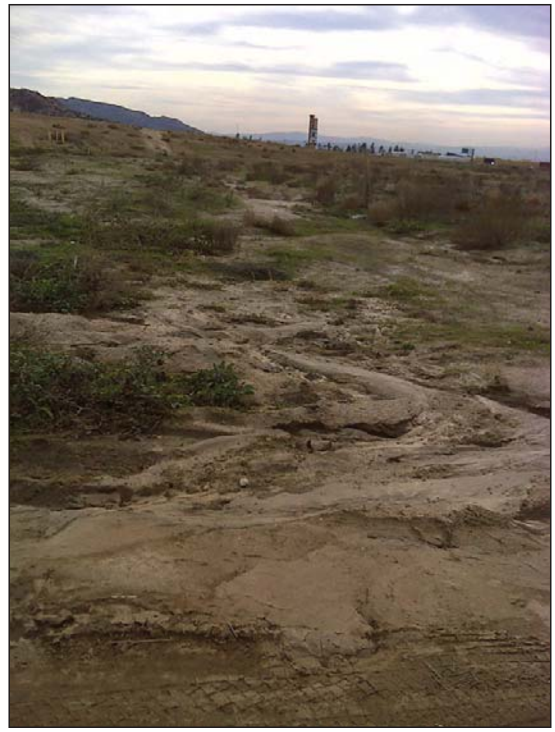


SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project
Figure 7
MSHCP Riverine Areas

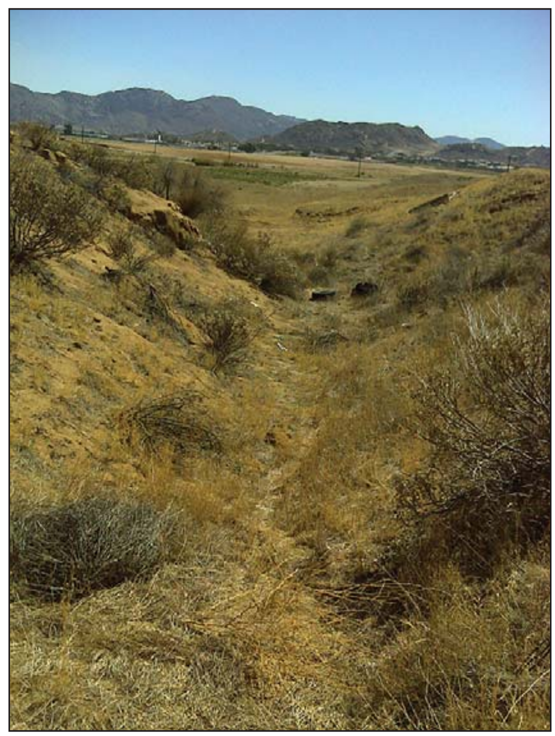
FSA PCR

PHOTOGRAPH 1. View of Drainage A, facing northwest (upstream).



PHOTOGRAPH 2. View of Drainage B within the off-site sewer line area, facing south (downstream).

PHOTOGRAPH 3. View of Drainage B within the off-site water line area, facing north (upstream).



PHOTOGRAPH 4. View of Drainage B1, facing southeast (downstream).

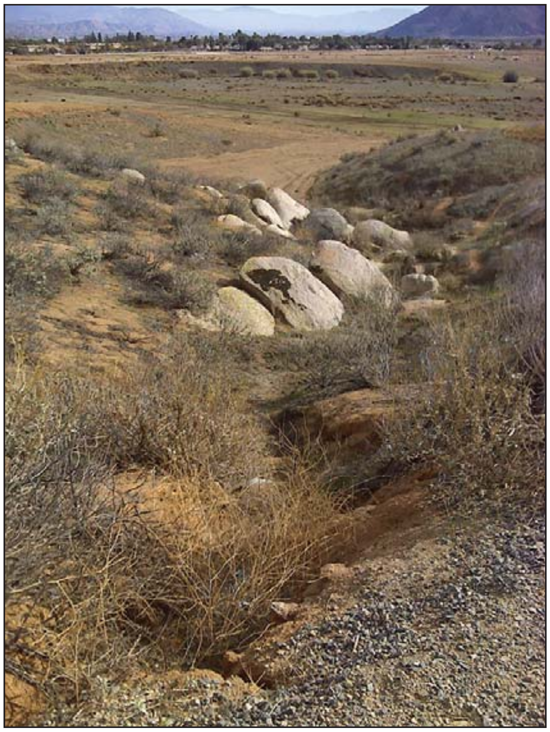
SOURCE: ESA PCR, 2016

Ironwood Village Project

Figure 8a

Drainage Photographs

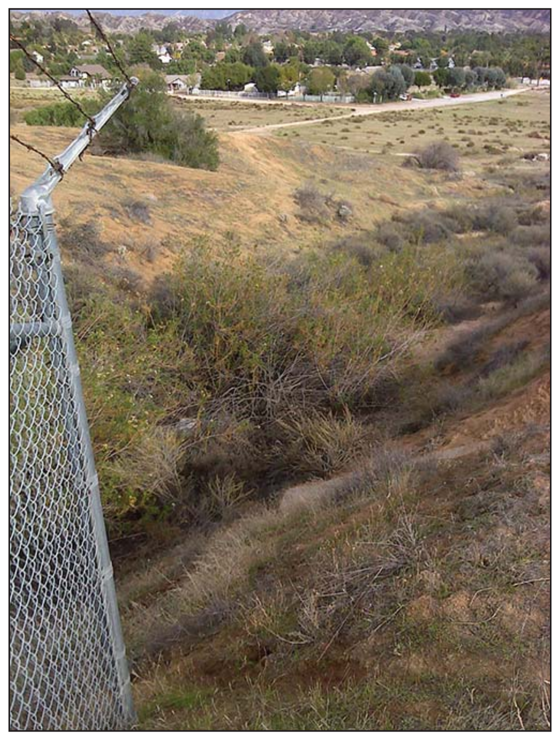
ESA PCR



PHOTOGRAPH 5. View of Drainage B2, facing southeast (downstream).

PHOTOGRAPH 6. View of Drainage B3, facing southeast (downstream).

PHOTOGRAPH 7. View of Drainage B4, facing southeast (downstream).



PHOTOGRAPH 8. View of Drainage B5, facing northeast (downstream).

SOURCE: ESA PCR, 2016

Ironwood Village Project

Figure 8b

Drainage Photographs

ESA PCR

TABLE 2
MSHCP RIVERINE AREAS[A]

Drainage (Study Area)	Length (ft)	Area (acres)	Riparian/Riverine Classification
A (On-Site)	285	0.046	Riverine
A (Off-Site)	111	0.013	Riverine
B (Off-Site)	306	0.069	Riverine
B1 (Off-Site)	0*	0.001	Riverine
B2 (Off-Site)	32	0.001	Riverine
B3 (Off-Site)	25	0.001	Riverine
B4 (Off-Site)	34	0.001	Riverine
B5 (Off-Site)	35	0.033	Riverine
Total	**828**	**0.165**	

NOTES:

** Less than one linear foot of jurisdiction occurs within Drainage B1 as the majority of the drainage within the off-site study area is associated with an existing corrugated metal pipe that was not quantified.*

Source: ESA PCR, 2014

5.1.1 Drainage A (MSHCP Riverine Area)

Drainage A is an unvegetated roadside ditch that establishes only when rain events generate sufficient runoff from Ironwood Avenue to erode a small channel through sandy disturbed soils. The ephemeral ditch enters the Ironwood Avenue Right-of-Way within the off-site study area then enters the on-site study area along the southern project boundary, extending for approximately 285 linear feet. The ditch then enters a corrugated metal pipe (CMP) beneath Ironwood Avenue, which is ultimately conveyed through the rural residential development to the south and into a water quality basin adjacent to SR-60. Drainage A measures approximately 3 feet in channel width and contains sandy loam soils that are periodically disturbed by weed abatement activities. A photograph of Drainage A is provided in Figure 8a.

Drainage A within the on and off-site study area supports a total of approximately 396 linear feet of ephemeral unvegetated roadside ditch, containing 0.46 acre of on-site and 0.013 acre of off-site CDFW jurisdictional streambed/MSHCP Riverine Areas totaling 0.059 acre.

5.1.2 Drainage Complex B (MSHCP Riverine Area)

Drainage B

Drainage B is an ephemeral sandy wash that originates off-site approximately 2 miles to the northwest along Reche Canyon Road. The drainage meanders along the road until it reaches the valley floor extending across Trust Way, crossing Kalmia Avenue, and then conveys runoff along the west side of Moreno Beach Drive for approximately a quarter-mile prior to crossing the off-site Water Line Alternative 1.

The drainage feature then extends south/southwest for another quarter-mile before entering a culvert beneath Ironwood Avenue and meandering for another quarter-mile prior to entering the off-site sewer line study area. Drainage B then continues for approximately 700 linear feet toward the southwest ultimately entering a detention basin located directly northeast of the Nason Street exit of SR-60. Drainage B within the off-site study areas ranges from approximately 4-10 feet in channel width and is entirely unvegetated. Soils within the wash are comprised of loamy sands of the Tujunga series consistent with the mapping by NRCS. Photographs of Drainage B are provided in Figure 8b.

Drainage B within the off-site sewer line and Water Line Alternative 1 total approximately 306 linear feet of unvegetated ephemeral sandy wash totaling approximately 0.069 acre of CDFW jurisdictional streambed/MSHCP Riverine Areas.

Drainages B1- B5

Drainages B1 through B5 are minor ephemeral drainages that with the exception of Drainage B5 (which appears to accept flow from a water tank bypass pipe) function to drain a very limited watershed west of the existing water district road that runs parallel to the eastern boundary of the study area. Drainage B5 appears to support flows from two small slope v-ditches as well as a pipe at its headwaters that appears to drain the existing water tank directly to the west, and was likely formed by controlled releases from the water tank structure. Otherwise, no natural watershed capable eroding such an incised drainage feature occurs upstream. Drainages B1 through B3 have small CMP culverts that convey limited runoff west of the water district road and support very weak indicators of flow and/or bed and bank. Drainage B4 does not support a pipe culvert rather a small pipe that drains surface flow from a small v-ditch directly west of the road. No discernible indicators associated with a streambed such as an ordinary high water mark, sediment deposition/sorting, debris wracks, or streambed associated vegetation were observed within Drainages B1-B4 immediately following the consecutive rain events of early December 2014. However, Drainages B1 through B4 do support topographic low points with banks typical of headwater swales. Drainage B5 was presumed to support Riverine Areas due to the presence of an ordinary high water mark, which ultimately became indiscernible after approximately 1,000 linear feet. Drainages B1 through B5 were all presumed to support CDFW jurisdictional streambed/MSHCP Riverine Areas.

Drainages B1 through B4 exhibit sparse upland scrub vegetation and ruderal grasses and are otherwise unvegetated. Drainage B5 supports a small patch of mule fat along approximately 15 linear feet of the headwaters directly downstream of the water tank pipe and mostly upland scrub vegetation beyond. Drainages B1 through B5 contain CDFW jurisdictional channel widths ranging from 0.5 to 3 feet, while Drainage B5 exhibits USACE jurisdiction averaging approximately 2 feet in channel width and a CDFW channel width approximately averaging 10 feet. Drainage Complex B drainage features all were observed to support sandy loam soils. Photographs of Drainage Complex B are provided in Figures 8a and 8b.

Drainage Complex B (Drainages B1 through B5) total approximately 0.037 acre of CDFW jurisdictional streambed/MSHCP Riverine Areas.

5.2 Assessment of Riparian/Riverine and Vernal Pool Plant and Wildlife Species

5.2.1 Riparian/Riverine Plant Species

A habitat assessment was conducted for species listed in Section 6.1.2, *Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools*, of the MSHCP. The results are presented in **Table 3**, *MSHCP Riparian/Riverine Plant Species*. Only one Riparian/Riverine plant species was determined to have a potential to occur on the study area, namely smooth tarplant (*Centromadia pungens* ssp. *laevis*). This species was considered to have a potential to occur only within the riverine habitat associated with the on- and off-site drainages; however, smooth tarplant was not observed during any of the focused plant surveys and therefore was concluded to be absent from the study area. The remaining MSHCP Riparian/Riverine plant species are not expected to occur within the study area due to the lack of suitable habitat or the location of the study area.

TABLE 3
MSHCP RIPARIAN/RIVERINE PLANT SPECIES

Species	Potential to Occur within the Study Area
Brand's phacelia *Phacelia stellaris*	Not expected to occur. This species has not been recorded in the Moreno Valley area. There is only one occurrence record in CNDDB within Riverside County, which was observed in 2000 in the City of Riverside near the Santa Ana River.
California Orcutt grass *Orcuttia californica*	Not expected to occur due to the lack of vernal pools.
Coulter's matilija poppy *Romneya coulteri*	Not expected to occur. This perennial plant has conspicuous flowers that would have been detected during the focused plant surveys if present.
Engelmann oak *Quercus engelmannii*	Not expected to occur. This is a conspicuous tree species that would have been detected during the focused plant surveys if present.
Fish's milkwort *Polygala cornuta* var. *fishiae*	Not expected to occur. The majority of occurrence records of this species on CNDDB are confined to the Santa Ana Mountains.
graceful tarplant *Holocarpha virgata* ssp. *Elongate*	Not expected to occur due to disturbance on-site. The study area is outside of the species' range; there are no known records of this species within the flatter agricultural areas east of the Santa Ana Mountains.
lemon lily *Lilium parryi*	Not expected to occur due to the lack of suitable habitat. Also, the study area is outside the species' range; this species is restricted to the San Jacinto Mountains. The study area is outside of species' elevation range.
Mojave tarplant *Deinandra mohavensis*	Not expected to occur. The study area is outside the species range; this species is restricted to the San Jacinto Mountains. The study area is outside of species' elevation range.
mud nama *Nama stenocarpum*	Not expected to occur due to the lack of wetlands. None were incidentally observed during any surveys (this species can occasionally occur in non-wetlands).
ocellated Humboldt lily *Lilium humboldtii* ssp. *Ocellatum*	Not expected to occur due to high disturbance within the drainages and lack of shade. This species is typically found at higher elevations.
Orcutt's brodiaea *Brodiaea orcuttii*	Not expected to occur due to the lack of vernal pools.

Species	Potential to Occur within the Study Area
Parish's meadowfoam *Limnanthes alba* ssp. *Parishii*	Not expected to occur due to the lack of suitable habitat. Also, the study area is outside the species' range; this species is restricted to the Santa Rosa Plateau within the MSHCP Plan Area. The study area is outside of this species' elevation range.
prostrate navarretia *Navarretia prostrata*	Not expected to occur due to the lack of suitable habitat. Also, the study area is outside the species' range; this species is restricted to the Santa Rosa Plateau within the MSHCP Plan Area. The study area does not support suitable vernal pool habitat.
San Diego button-celery *Eryngium aristulatum* var. *parishii*	Not expected to occur. The study area is outside the species' range; this species is restricted to the Santa Rosa Plateau within the MSHCP Plan Area. The study area does not support suitable vernal pool habitat.
San Jacinto Valley crownscale *Atriplex coronata* var. *notatior*	Not expected to occur due to the lack of suitable alkaline habitat.
San Miguel savory *Satureja chandleri*	Not expected to occur due to the lack of suitable metavolcanic substrate habitat.
Santa Ana River woollystar *Eriastrum densifolium* ssp. *sanctorum*	Not expected to occur due to lack of suitable habitat. The study area is outside the species range; this species is restricted to the Santa Ana River and alluvial fan sage scrub habitat.
slender-horned spineflower *Dodecahema leptoceras*	Not expected to occur due to the lack of alluvial fan habitat.
smooth tarplant *Centromadia pungens* ssp. *Laevis*	Potential, but not observed. This species was not observed during the focused plant surveys.
southern California black walnut *Juglans californica*	Not expected to occur. This is a conspicuous tree species that would have been detected if present.
spreading navarretia *Navarretia fossalis*	Not expected to occur due to the lack of vernal pools.
thread-leaved brodiaea *Brodiaea filifolia*	Not expected to occur due to the lack of vernal pools.
vernal barley *Hordeum intercedens*	Not expected to occur due to the lack of vernal pools.

Source: ESA PCR, 2016

5.2.2 Riparian/Riverine Wildlife Species

Habitat assessments were conducted for wildlife species listed in Section 6.1.2, *Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools*, of the MSHCP. The results are presented in **Table 4**, *MSHCP Riparian/Riverine Wildlife Species*. No riparian/riverine wildlife species are expected to occur on the study area due to the lack of suitable habitat.

TABLE 4
MSHCP RIPARIAN/RIVERINE WILDLIFE SPECIES

Species	Potential to Occur within the Study Area
arroyo toad *Anaxyrus californicus*	Not expected to occur due to the lack of suitable habitat (perennial streams).
mountain yellow-legged frog *Rana muscosa*	Not expected to occur due to the lack of suitable habitat (perennial streams).
California red-legged frog *Rana aurora draytonii*	Not expected to occur due to the lack of suitable habitat (perennial streams).
bald eagle *Haliaeetus leucocephalus*	Not expected to occur due to the lack of suitable habitat for foraging and nesting.
least Bell's vireo *Vireo bellii pusillus*	Not expected to occur due to the lack of suitable habitat for foraging and nesting.
American peregrine falcon *Falco peregrinus anatum*	Not expected to occur due to the lack of suitable habitat for foraging and nesting (cliffs overlooking open areas or large bodies of water).
southwestern willow flycatcher *Empidonax traillii extimus*	Not expected to occur due to the lack of suitable habitat for foraging and nesting.
western yellow-billed cuckoo *Coccyzus americanus occidentalis*	Not expected to occur due to the lack of suitable habitat for foraging and nesting; outside of the species range.
Santa Ana sucker *Catostomus santaanae*	Not expected to occur due to the lack of suitable habitat (perennial streams).
Riverside fairy shrimp *Streptocephalus woottoni*	Not expected to occur due to the lack of suitable habitat (vernal pools).
vernal pool fairy shrimp *Branchinecta lynchi*	Not expected to occur due to the lack of suitable habitat (vernal pools).
Santa Rosa Plateau fairy shrimp *Linderiella santarosae*	Not expected to occur due to the lack of suitable habitat (vernal pools).

Source: ESA PCR, 2016

5.3 Assessment of Riverine Ecological Processes

The MSHCP Riverine Areas located on the study area support 0.059 acre in Drainage A (0.046 acre on-site and 0.013 acre off-site), 0.069 acre in off-site Drainage B, 0.001 acre in off-site Drainages B1, 0.001 acre in off-site Drainage B2, 0.001 acre in off-site Drainage B3, 0.001 acre in off-site Drainage B4, and 0.033 acre in off-site Drainage B5. Based on the limited watersheds and ephemeral nature of these features, the drainages have a reduced capacity to provide functions, including flood storage, groundwater recharge, flood flow attenuation, velocity dissipation, nutrient and sediment transport and trapping, carbon transport, and toxicant trapping from the stormwater and nuisance urban runoff entering these features. The ephemeral water sources most likely do not provide a large contribution to the hydrology of the downstream watershed and associated habitats for Conserved Species, such as the San Jacinto River where the flows ultimately drain. Furthermore, Drainage A and Drainage Complex B provide limited to no habitat for wildlife species. Drainage A is within a disturbed area that supports little to no associated vegetation and is unlikely to facilitate wildlife movement. Drainage B is a USGS mapped blueline stream and supports some ruderal and non-native vegetation (e.g. giant reed

[*Arundo donax*]) with small patches of sparsely vegetated riverwash areas outside of the project study areas. The smaller tributaries (Drainages B1 through B5) are also ephemeral drainages with limited upland vegetation, which initiate at the peak of a nearby but small ridge. Due to the limited vegetation and watershed, the tributaries do not facilitate wildlife movement through the study area. Based on this assessment, the biological and hydrological functions and values of the MSHCP Riverine Area associated with Drainage A (on-site and off-site portions) and the off-site Drainage Complex B are low.

6.0
Unavoidable Impacts to Riparian/Riverine and Vernal Pool Areas

6.1 Direct Impacts

Direct impacts are considered to be those that involve the loss, modification or disturbance of natural habitats (i.e., vegetation or plant communities), which in turn, directly affect plant and wildlife species dependent on that habitat. Direct impacts also include the destruction of individual plants or wildlife, which is typically the case in species of low mobility (i.e., plants, amphibians, reptiles, and small mammals). The collective loss of individuals in these manners may also directly affect regional population numbers of a species or result in the physical isolation of populations thereby reducing genetic diversity and, hence, population stability.

As noted above, impacts (permanent and temporary) will be slightly reduced once the water line alternative is chosen. If the Alternative 1 Water Line is chosen, permanent and temporary direct impacts to Drainages B1 through B5 will be avoided. If Alternative 2 Water Line is chosen, permanent direct impacts to 0.007 acre and temporary direct impacts to 0.03 acre of Drainage B will be avoided.

6.1.1 Permanent Direct Impacts

As shown in **Figure 9**, *Impacts to Jurisdictional Features and MSHCP Riverine Areas*, and **Table 5**, *Existing and Proposed Impacts to MSHCP Riverine Areas*, the proposed project would result in permanent direct impacts to 0.059 acre of MSHCP Riverine Areas in Drainage A, including 0.046 acre of on-site MSHCP Riverine Areas and 0.013 acre of off-site MSHCP Riverine Areas. On and off-site impacts to the MSHCP Riverine Areas within Drainage A would occur to weedy species dominated by non-native species typical of ruderal areas. Drainage A does not support any MSHCP Riparian Areas. In addition, Drainage A does not support or have the potential to support any protected plant or wildlife species. The on-site impacts to Drainage A will occur as a result of grading activities and development of the site. The off-site impacts to Drainage A will occur as a result of road improvements proposed for Ironwood Avenue.

The proposed project would result in permanent direct impacts to 0.018 acre of MSHCP Riverine Areas off-site in the Drainage Complex B, including 0.011 acre permanent off-site impacts in Drainage B, <0.001 acre of permanent off-site impacts in Drainage B2, <0.001 acre of permanent off-site impacts in Drainage B3, <0.001 acre of permanent off-site impacts in Drainage B4 and 0.007 acre of permanent off-site impacts in Drainage B5.

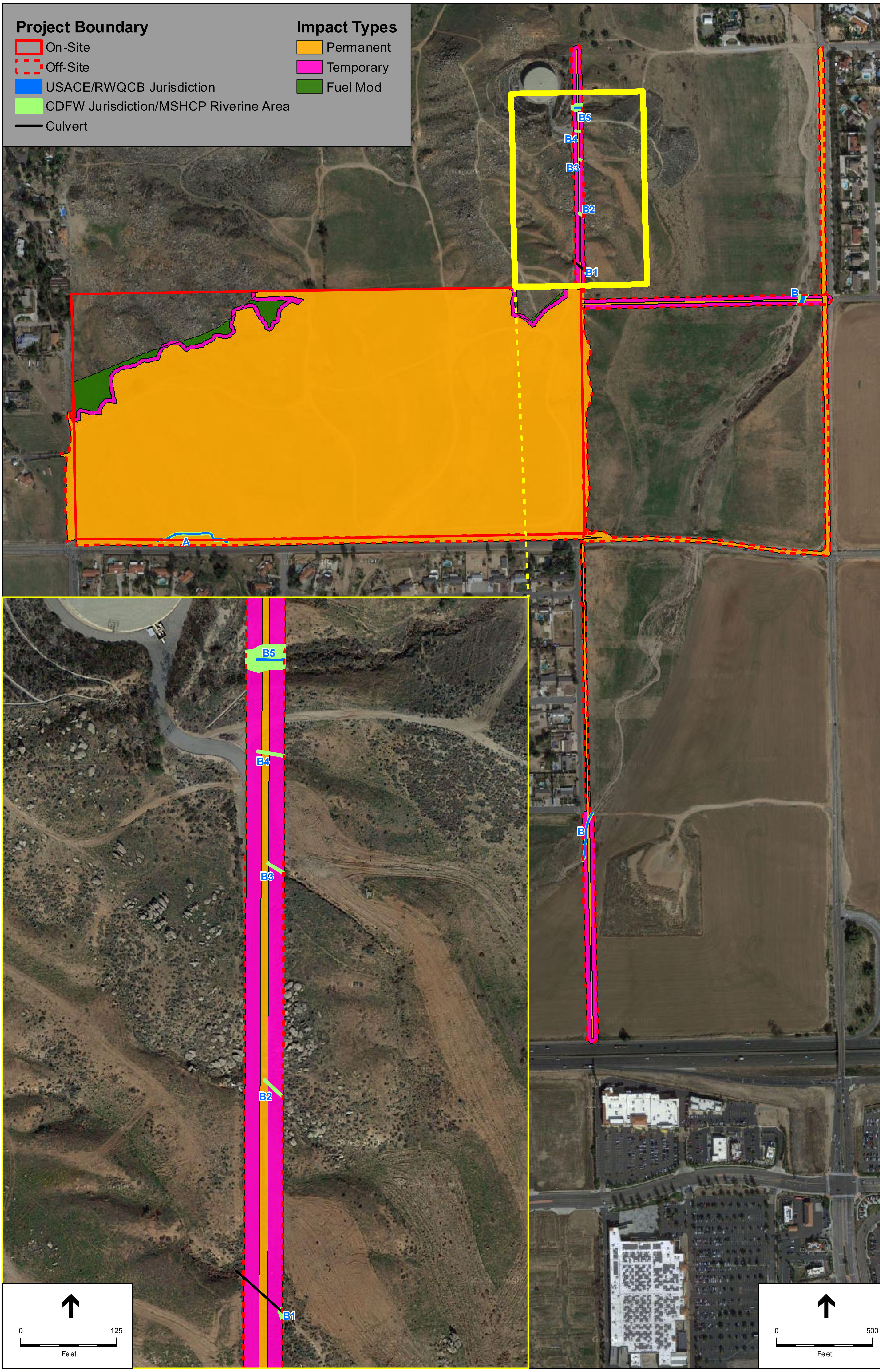
TABLE 5
EXISTING AND PROPOSED IMPACTS TO MSHCP RIVERINE AREAS

Drainage	Existing (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)
Drainage A (On-Site)	0.046	0.046	-
Drainage A (Off-Site)	0.013	0.013	-
Drainage B (Off-Site)	0.069	0.011	0.058
Drainage B1 (Off-Site)	0.001	0.000	0.001
Drainage B2 (Off-Site)	0.001	<0.001[b]	0.001
Drainage B3 (Off-Site)	0.001	<0.001[c]	0.001
Drainage B4 (Off-Site)	0.001	<0.001[d]	0.001
Drainage B5 (Off-Site)	0.033	0.007	0.026
Total	**0.165**	**0.077**	**0.088**

NOTES:
[a] MSHCP Riverine Areas are presumed equivalent to CDFW jurisdiction.
[b] Impacts are considered negligible; actual acreage of impacts to four decimal places is 0.0003 acre.
[c] Impacts are considered negligible; actual acreage of impacts to four decimal places is 0.0001 acre.
[d] Impacts are considered negligible; actual acreage of impacts to four decimal places is 0.0004 acre.

Source: ESA PCR, 2016.

No permanent or direct impacts are proposed on-site within the Drainage Complex B. Impacts to the MSHCP Riverine Areas within Drainage B would be limited to areas of low biological function and value as this drainage was found to be sparsely vegetated with non-native invasive vegetation comprised of patches of arundo within the study area. Impacts to MSHCP Riverine Areas within Drainage B1 through B4 would occur to mostly unvegetated areas with only sparse patches of upland vegetation and ruderal grasses. Impacts to MSHCP Riverine Areas within Drainage B5 would be limited to a small patch of approximately 15 linear foot strip of mule fat. None of the plant communities found within the Drainage Complex B are considered high quality habitats. Further, the mule fat within Drainage B5 is of low quality, lacks composition and structure and is non-contiguous with larger riparian systems off-site. In addition, Drainage Complex B does not support or have the potential to support any protected plant or animal species. The off-site impacts to Drainage Complex B will occur as a result of the proposed sewer line along Oliver Street and the proposed Alternatives 1 and 2 Water Lines to the north and east of the property. In summary, permanent direct impacts to MSHCP Riverine Areas (on-site and off-site) within Drainages A and B total 46.7 percent of the total 0.165 acre of MSHCP Riverine Areas on the study area.



SOURCE: Google Maps, 2015.

Ironwood Village Project

Figure 9

Impacts to Jurisdictional Features and MSHCP Riverine Areas

ESA PCR

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6.1.2 Temporary Direct Impacts

As shown in Figure 9 and Table 5, temporary direct impacts are proposed to 0.088 acre of Riverine Areas off-site within the Drainage Complex B, including 0.058 acre of temporary direct off-site impacts in Drainage B, 0.001 acre of temporary direct off-site impacts in Drainage B1, 0.001 acre of temporary direct off-site impacts in Drainage B2, 0.001 acre of temporary direct off-site impacts in Drainage B3, 0.001 acre of temporary direct off-site impacts in Drainage B4 and 0.026 acre of temporary direct off-site impacts in Drainage B5. No temporary direct on-site impacts are proposed in Drainage Complex B. Further, no temporary direct on-site or off-site impacts are proposed in Drainage A. Temporary direct impacts to drainages within the study area are equivalent to the extent of impacts to CDFW streambed and total 53.3 percent of the total 0.165 acre of MSHCP RiverineAreas.

Similar to the proposed permanent direct off-site impacts to Drainage Complex B, the 0.088-acre of proposed temporary direct off-site impacts to the Drainage Complex B are associated with two types of impacts, including impacts associated with the proposed sewer line along Oliver Street and the proposed alternative water lines to the north and east of the property. Temporary direct impacts to vegetation within Drainage Complex B will be limited to sparse patches of upland vegetation and ruderal grasses as well as a small, low quality patch of mule fat within Drainage B5. Temporary impacts to the drainages will be returned to pre-project contours, which is described further in section 7.4, below.

6.2 Indirect Impacts

Indirect impacts are considered to be those that involve the effects of increases in ambient levels of sensory stimuli (e.g., noise, light), unnatural predators (e.g., domestic cats and other non-native animals), competitors (e.g., exotic plants, non-native animals), public use, and hydrology (hydrologic regime, flood storage, flood flow modification, nutrient retention and transformation, sediment trapping and transport, toxic trapping). Indirect impacts may be associated with the construction and/or eventual habitation/operation of a project; therefore, these impacts may be both short-term and long-term in their duration. These impacts are commonly referred to as “edge effects” and may result in changes in the behavioral patterns of wildlife and reduced wildlife diversity and abundance in habitats adjacent to study area. Measures to address potential indirect impacts are provided in section 7.2 of this report.

6.2.1 Permanent Indirect Impacts

Permanent indirect impacts include the effects of increases in ambient levels of sensory stimuli (e.g. noise, light), unnatural predators (e.g. domestic cats and other non-native animals), competitors (e.g. exotic plants, non-native animals), and trampling and unauthorized recreational use due to the increase in human population. Other permanent indirect effects may occur that are related to water quality and storm water management, including trash/debris, toxic materials, and dust. Permanent indirect impacts may be associated with the eventual habitation/operation of a project.

The potential for permanent indirect impacts from water quality and storm water management from the proposed development will be addressed through the project's design features, as outlined in sections 7.2 and 7.5 of this report.

6.2.2 Temporary Indirect Impacts

Temporary indirect impacts may be associated with the construction and eventual habitation/operation of a project; therefore, these impacts may be both short-term and long-term in their duration. Temporary indirect impacts may include increases in ambient levels of sensory stimuli (e.g. noise, light), dust, and trampling due to construction within the study area.

The potential for temporary indirect impacts from water quality and storm water management during construction of the development will be addressed through the project's design features, as outlined in sections 7.2 and 7.5 of this report.

7.0
Project Avoidance, Design Features, and Mitigation Measures

Impacts to MSHCP Riverine Areas were limited to the greatest extent feasible, as discussed in section 2.2 above and section 7.1 below. The design features and mitigation measures to compensate for unavoidable direct permanent impacts to these areas and indirect edge effects are discussed in this section under 7.2 and 7.3. The on-site mitigation approach discussed in this document is conceptual as the final design of the project is still in review for entitlement and any compensatory mitigation will ultimately be reviewed and approved as part of regulatory permits pursuant to Sections 404 and 401 of the Clean Water Act and Section 1602 of the California Fish & Game Code that will occur concurrently subsequent to the CEQA entitlement process. However, the mitigation ratios and mitigation types described in this section would not change and would be subject to a detailed Habitat Mitigation & Monitoring Plan (HMMP) in the event that the conceptual on-site mitigation described below is accepted by the resource agencies as part of future regulatory permitting and/or conditions of those permits. Therefore, the mitigation measures proposed in the project BRA and in this DBESP are written to allow for compensatory mitigation to be satisfied either on-site or off-site, in the event that more appropriate off-site mitigation is available and preferred by the resource agencies as part of subsequent DBESP approval and/or regulatory permitting by the resource agencies. This flexibility in the compensatory streambed mitigation approach has been developed for the project in light of the fact that some agencies such as the USACE have a preference for off-site mitigation credits over on-site mitigation, when available. Temporary impacts to the drainages will be returned to pre-project contours, which is also described in this section in 7.4 below.

7.1 Avoidance

Complete on-site and off-site avoidance 0.059 acre of the severely degraded roadside ditch associated with Drainage A is not feasible due to project-related water quality management requirements and the City required road improvements to Ironwood Avenue. However, on-site and off-site impacts to MSHCP Riverine Areas within Drainage A will only occur to a minimal area that was artificially created by the prior construction of Ironwood Avenue, totaling 0.046 acre on-site and 0.013 acre off-site permanent impacts. Flows within Drainage A establish only when rain events generate sufficient runoff from Ironwood Avenue to erode a small channel through sandy disturbed soils that are seasonally weed abated. Drainage A only exists because Ironwood Avenue does not contain curb-and-gutter facilities that would generally contain sheetflow from the road prior to discharge into off-site areas. Drainage A therefore collects this sheetflow for a short period of time after rain events and does not support vegetation which could potentially support sensitive wildlife species. As such, the functions and values of Drainage A are considered very low and have not historically existed. The project proposes to construct a water quality basin, where Drainage A occurs on-site, which would serve to treat project-related flows, providing a greater benefit to groundwater recharge and dissipation of flows prior to entering off-site streambed areas. Off-site, 0.013 acre of Drainage A located within the Ironwood Avenue would be impacted as a result of improvements to Ironwood Avenue within the road right-of-way. As a result, Drainage A will be rerouted from the location it enters the off-site areas underground and into a stormdrain that will continue to carry flows through the rural residential development to the south and into the water quality basin adjacent to SR-60. In summary, the Riverine functions and values of this drainage will not be lost as a result of the proposed project. This drainage will continue to function in its currently capacity by carrying flows downstream.

A majority of the impacts (0.088 acre) within Drainage Complex B will be temporary in nature and will be recontoured to pre-project conditions following construction. This will allow re-establishment of the channel and vegetation, which therefore provides long-term avoidance. This is equivalent to 53.3 percent of the total 0.165 acre of Riverine Areas on and off-site. Permanent direct off-site impacts to 0.018 acre of MSHCP Riverine Areas within Drainage Complex B have been limited to areas subject to City required infrastructure necessary for development of the study area (i.e., sewer line and Alternatives 1 and 2 Water Lines). Impacts associated with the Alternative 2 Water Line may not occur if it is determined that the Alternative 1 Water Line route is more feasible. Should this be the case, than the project will avoid an additional 0.007 acres of permanent impacts and 0.03 acre of temporary impacts associated with Drainages B1 through B5. As such, long-term avoidance of MSHCP Riverine Areas on and off-site would then be equivalent to 77.6 percent of the total 0.165 acre of Riverine Areas on and off-site.

7.2 Design Features

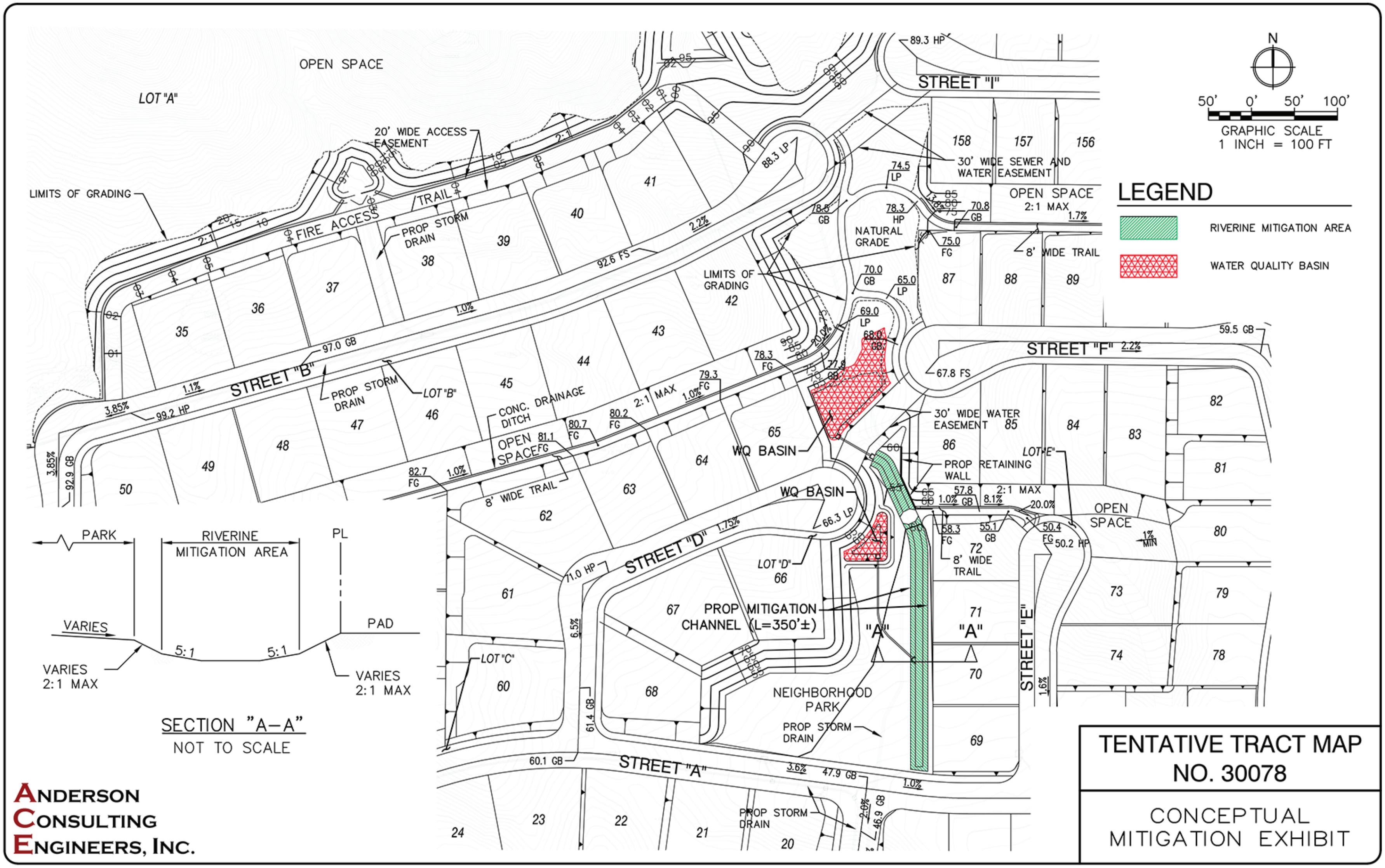
The project will be required to prepare a Water Quality Management Plan (WQMP) and Storm Water Pollution Prevention Plan (SWPPP) consistent with RWQCB, City of Moreno Valley, and County of Riverside requirements. These documents will outline measures and Best Management Practices (BMPs) to address water quality issues both during construction and post-construction, and to mitigate post-project flow rates to less than or equal to pre-project levels. Examples of measures and BMPs include minimizing urban runoff, minimizing the impervious footprint, constructing basins and swales, providing educational materials to residents, activity restrictions such as prohibiting dumping of oils, paint or masonry waste into streets and storm drains, requiring covered trash receptacles, and street sweeping. The Home Owner's Association (HOA) will be responsible for operations and maintenance of the post-construction BMPs. Detailed designs of the measures and BMPs, and operations and maintenance requirements including specific activities and checklists, will be provided during the final engineering.

7.3 Mitigation for Direct Impacts to MSHCP Riverine Areas

This DBESP proposes two (2) options for mitigation that will be determined as part of DBESP approvals and regulatory permitting, the processing of which is anticipated to occur somewhat concurrently to ensure only one mitigation option is ultimately required. Therefore, both on-site mitigation and off-site mitigation options are proposed in this DBESP in order to compensate for permanent impacts to MSHCP Riverine Areas (equivalent to CDFW jurisdictional areas) required to construct the project, in order to ensure that either on-site or off-site mitigation opportunities evaluated in this report are capable of providing biologically equivalent or superior preservation pursuant to requirements of the MSHCP. As such, compensatory mitigation for permanent impacts to Riverine Areas within the project study area is proposed at a minimum 2:1 ratio of mitigation-to-impacts. Maximum impacts to Riverine Areas may be as much as 0.07 acre, for a total of 0.14 acre of mitigation required depending on the which alternative water line is chosen. In addition, temporary impacts to as much as 0.088 acre of MSHCP Riverine Areas would be returned to pre-project conditions and revegetated with native species consistent with pre-project conditions, if any. The mitigation will be designed to provide habitat that is of higher quality than those Riverine areas impacted by the project. The proposed mitigation plan is shown on **Figure 10**, *Conceptual On-Site Mitigation*. The mitigation plan discussed in this document and shown on Figure 10 is conceptual as the final design of the project is still in review for entitlement. As such the mitigation plan could change slightly, if necessary, during final plan approval, including the mitigation configuration. However, the other components of the plan such as the goals, mitigation ratio and expected functional gains and success criteria described in this section would not change. The final configuration and specific details such as plant palettes and monitoring and management methods for the mitigation will be outlined in a Habitat Mitigation and Monitoring Plan (HMMP) that will be approved by the regulatory agencies during the processing of regulatory permits following adoption of the project Mitigated Negative Declaration.

7.3.1 Conceptual Mitigation Plan (On-Site Option vs. Off-Site Option)

Due to the uncertainty in the forthcoming regulatory permit application process, this DBESP is proposing both on-site and off-site mitigation options for impacts to MSHCP Riverine Areas (equivalent to CDFW jurisdictional areas) on the study area to demonstrate how either option will provide biologically equivalent or superior preservation pursuant to requirements of the MSHCP. The DBESP will also serve to support the Project's determination under the California Environmental Quality Act (CEQA), that impacts to jurisdictional areas are considered less than significant through the implementation of either mitigation option. The on-site mitigation option will include the creation or restoration of Riparian/Riverine habitat with upland transitional plant species. Currently, there are no agency approved mitigation banks or in-lieu fee programs available in the watershed to provide off-site compensatory mitigation.



SOURCE: Anderson Consulting Engineers, Inc., 2016

Ironwood Village Project

Figure 10
Conceptual On-Site Mitigation

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However, off-site mitigation opportunities do occur in adjacent watersheds subject to agency approval and may require higher mitigation ratios. Additional opportunities may arise in the future for off-site mitigation during forthcoming regulatory permit processing subject to agency approval. For example, potential opportunities could occur on lands owned by a local resource conservation district, the County of Riverside Regional Conservation Authority (RCA) or on alternate off-site lands as part of a collaborative group of developers. If approved by the regulatory agencies, off-site mitigation would provide more wide-reaching watershed benefits than on-site mitigation if part of a larger effort and/or within an area with greater habitat diversity, and would be preserved in perpetuity and managed by a pre-identified entity or entities. As such, on-site mitigation within a small ephemeral system provided by the permittee would be replaced by off-site mitigation within a larger drainage system in the watershed and pre-secured for in-perpetuity preservation and management by an agency-approved entity. Off-site mitigation is preferred by the USACE as it has been demonstrated to have a higher rate of success than on-site mitigation in general. Based on these reasons, off-site mitigation, if available in the future, may be preferred over the on-site option. On-site mitigation may also be deemed inadequate if the agencies require an increased mitigation ratio as part of the regulatory permitting process and are incapable meeting that ratio on-site, the agencies revise the regulatory requirements associated with on-site mitigation, or if USACE determine the mitigation is not consistent with their guidelines (known as the “Mitigation Rule”). The on-site mitigation would be proposed at a minimum 2:1 ratio for total impacts to acreage. If mitigated off-site, and within the Santa Ana Watershed mitigation is also proposed at a minimum 2:1 ratio. If mitigation cannot be established within the Santa Ana watershed, mitigation will be met at a 3:1 ratio.

Both the on-site and off-site mitigation opportunities would require regulatory agency approval during the permitting process discussed in the preceding paragraph. The intent is to provide the same mitigation to satisfy the requirements of the regulatory agencies and RCA, thus avoiding double-mitigating for impacts to the same streambed resources. The on-site and off-site mitigation would provide compensation for the loss of primarily unvegetated ephemeral habitat by enhancing habitat with riparian and/or riparian transition vegetation and removing non-native weeds. Details of the on-site mitigation (if implemented), including plant palette, monitoring term, and success criteria, will be included in a five-year HMMP prepared for the proposed Project during the permitting process with the USACE and RWQCB to obtain a Section 404 Nationwide Permit and a Section 401 Water Quality Certification under the Clean Water Act (CWA), respectively, and the CDFW to obtain a Streambed Alteration Agreement (SAA) under Section 1602 of the California Fish and Game Code. The off-site mitigation option would be part of a larger mitigation effort that would be implemented, monitored and maintained pursuant to an existing document prepared for the entire program. The expected functional gains and success of both the on-site and off-site mitigation options are discussed in section 7.3.2 below[6].

[6] Due to the uncertainty in the forthcoming regulatory permit application process, this DBESP is proposing both an on-site and off-site mitigation for impacts to MSHCP Riverine Areas (equivalent to CDFW jurisdictional areas) on the study area to demonstrate how either option will provide biologically equivalent or superior preservation pursuant to requirements of the MSHCP. The DBESP will also serve to support the Project’s determination under CEQA that impacts to jurisdictional areas are considered less than significant through the implementation of either mitigation option.

On-Site Mitigation Option

If the on-site mitigation is implemented, potential opportunities would include mitigating total permanent direct impacts to as much as 0.077 acre at a 2:1 ratio through the creation of habitat on-site (establishment). The mitigation area will be located within the northwestern section of the development area in the vicinity of two water quality basins and a neighborhood park as depicted on Figure 10. Establishment would occur by planting riparian/riverine habitat and transitional upland habitat within an open space area that will be constructed downstream from a water quality basin. The specific goals of the mitigation are as follows:

1. Restore the hydrological function of the study area as a result of permanent impacts to Drainages by creating a riparian/riverine and upland transitional habitat that functions to transport and filter water. The mitigation area will be supported by the increased flows as a result of treated run-off from the proposed development flows that will be discharged from a water quality basin north and west of the mitigation area.

2. Create riparian/riverine and upland transitional habitat with a diversity of native species appropriate for Riverine Areas in proximity to the site, in order to provide potential habitat for wildlife species, which is currently lacking on the study area. Native streambed vegetation proposed for planting would include species appropriate for the local area and the hydrology of the channel. Planting of additional species would increase the diversity of vegetation and provide higher quality habitat for wildlife species. In addition, the plant palette would include a range of herbaceous and shrub species planted as seed, cuttings, and/or container stock to provide vegetation structure that would further increase the wildlife value of the habitat.

3. Develop and monitor the mitigation area in accordance with a resource agency approved HMMP that will include qualitative and quantitative monitoring measures and specific success criteria goals.

4. Preserve the mitigation area in perpetuity through an appropriate legal preservation mechanism that will be approved by the regulatory agencies during the permitting process.

Off-Site Mitigation Option

The off-site mitigation would include establishment, restoration and/or enhancement[7] of habitat associated with existing drainages within the Santa Ana watershed or possibly within an adjacent watershed. Feasible off-site mitigation opportunities as close to the study area as possible would be selected and it should be noted that off-site mitigation outside of the Santa Ana watershed, if approved by the resource agencies, will require a higher mitigation ratio to adequately offset project impacts. It is expected that habitat enhancement would include removal of non-native weed species and planting with native riparian habitat, as appropriate. If off-site mitigation is proposed on land purchased for mitigation by the project, a HMMP will be prepared and provided to the regulatory agencies for review and approval. As mentioned above, proof of off-site

[7] Proposed off-site establishment, restoration, and/or enhancement follow the definitions provided by the Santa Ana RWQCB, which are also consistent with USACE definitions. Establishment creates an aquatic resource at a site where that resource was not historically present. Restoration is divided into two categories: re-establishment and rehabilitation. Re-establishment returns natural/historic functions to a site while rehabilitation improves multiple functions of a degraded site. Enhancement improves one or two functions of an existing aquatic resource.

mitigation purchase would be provided to the regulatory agencies for participation in an approved mitigation bank, in-lieu fee program, private bank, or off-site permittee responsible mitigation opportunities.

7.3.2 Summary of Mitigation Compensation

The proposed mitigation provides a 2:1 ratio of compensation to as much as 0.077 acre of permanent impacts to MSHCP Riverine Areas, for a total of 0.154 acre of riparian/riverine and upland transitional habitat creation. The final acreage of mitigation will be based on the total final impacts, which could be slightly less than 0.077 acre based on which Alternative Water Line is chosen. The drainages are considered of low function and value and are primarily unvegetated with the exception of a few patches of native and non-native invasive vegetation. The mitigation would provide compensation for impacts to limited function and values of the existing drainages at a net gain by improving the channel morphology through creation of a system with a more defined bed and bank, providing additional hydrology, eliminating the current disturbance that the drainages are subjected to, and creating habitat where none currently exists.

7.3.3 Expected Functional Gains of the Mitigation On-Site Mitigation

On-Site Mitigation

The on-site mitigation set forth in section 7.3.1 above will compensate for the loss of on and off-site MSHCP Riverine Areas on the study area. The on-site mitigation would result in higher function and value drainages than currently exist. The drainages proposed for impacts are considered low function and value in their current state due to the structure of the drainages, the limited hydrologic regime, and the lack of vegetation. Based on these factors, the drainages do not currently support any potential habitat for MSHCP Riparian/Riverine species. An increase in function and value as a result of the mitigation would be achieved through the creation of a streambed channel, creation of riparian habitat, and improving the hydrologic regime. Any planting would be designed to provide species diversity by planting additional species not currently known to occur on-site but that are known to occur in similar habitats in the vicinity; provide vegetation structure by planting herbaceous, shrub and tree species; and provide native cover, all of which do not currently exist in the drainages. Considering these factors, the following functional gains would be expected as a result of the mitigation:

1. Compensation for impacts to low quality disturbed drainages that are primarily unvegetated by replacing with riparian/riverine and transitional upland habitat that will provide biogeochemical and water quality functions.

The mitigation would include planting with appropriate native species for the area that are consistent with the expected hydrology for the drainages. The existing drainages proposed for impacts are highly disturbed and primarily unvegetated with only sparse patches of a few native and non-native species. The planting would be designed to provide native species diversity, vegetation structure, and native cover within the habitat utilizing the limited native species observed on-site and other similar habitats in the area. As such, the proposed replacement of disturbed drainages with riparian/riverine and transitional upland habitat would improve water quality and provide biogeochemical functions within the watershed. Specifically, the vegetation will result in increased trapping of sediment, and the microbial action in the root zone of plants removes toxins, nitrogen, and other nutrients from the runoff, thereby improving water quality and helping to reduce the impacts of non-point source pollution (Schaefer and Brown, 1992) through natural filtering of pollutants (bio-filtration effects). Heterotrophic microorganisms, which thrive in riparian areas, are also responsible for converting detritus from leaf litter and other dead organic matter into consumable organic matter. This organic material forms the base for the riparian food chain and, within the drainages, can be released downstream as dissolved organic matter (Gregory, et al., 1991; Schaefer and Brown, 1992). Knight and Bottorff (1984) reported that up to 1000g/m2/yr of detritus are processed by aquatic macrophytes in riparian zones and this provides a food chain base for these ecosystems, promoting their biodiversity. Improvement of water quality and biogeochemical functions will take place as these nutrients pass through the drainages and are transformed or sequestered into the plant tissue. In addition, the deposition of fine and coarse woody debris will provide important habitat for amphibians, reptiles, and other wildlife.

2. Compensation for impacts to low quality disturbed drainages that are primarily unvegetated by replacing with native riparian/riverine and transitional upland habitat that will provide hydrologic functions.

The disturbed drainage channels will be replaced with a defined drainage channel that is vegetated with native species. This will provide improved energy dissipation and storage during storm events. In addition, the drainage will be supported by existing hydrology and flows from the development post-construction, resulting in an increase in hydrologic input to support the vegetation. Increasing plant cover also stabilizes soil to deter channel and habitat degradation by storm flows. Interception and retention of storm flows by vegetation regulates sharp run-off peaks and slows discharges over a longer time period to avoid erosional issues and may also contribute to groundwater recharge.

3. Compensation for impacts to low quality disturbed drainages that are primarily unvegetated by replacing with defined drainage channels vegetated with native riparian habitat that will provide biological functions.

The planting of native vegetation will provide potential habitat for wildlife that utilize drainage areas, which does not occur under current conditions. The planting will provide a diversity of plant species with structural and spatial diversity to encourage wildlife species to utilize the habitat for foraging, cover and/or breeding.

Off-Site Mitigation

The off-site mitigation set forth in section 7.3.1 above will compensate for the loss of primarily ruderal and ephemeral habitat within the study area. Although a site-specific analysis of off-site mitigation cannot be completed at present since the resource agencies have yet to determine what they will accept as compensatory mitigation for the project, the mitigation would be expected to include the creation, restoration, and/or enhancement of a drainage with native species, likely within a larger drainage system than supported on the study area. The off-site mitigation would result in a higher function and value than the primarily ruderal and ephemeral habitat currently on the study area, which is consistent with the proposed on-site mitigation option. However, the off-site mitigation also has a potential to provide higher function and value than the on-site mitigation from a regional benefit perspective. For example if new drainage habitat was created, the mitigation was part of a larger drainage system, and/or the mitigation was part of a wider-reaching mitigation effort. Considering these factors, the following functional gains would be expected:

1. Compensation for impacts to the primarily ruderal and ephemeral habitat with native vegetated habitat will provide biogeochemical and water quality functions.

The off-site mitigation would be expected to include removal of non-native species and planting with natives, as appropriate. The impacted drainages on the study area currently support vegetation that is primarily non-native. As such, the proposed native vegetation would provide water quality and biogeochemical functions consistent with the on-site mitigation option described above. In addition, improving these functions within a larger drainage system and/or as part of a wider-reaching mitigation effort would have the potential to provide a more regional collective benefit to the watershed.

2. Compensation for impacts to the primarily ruderal and ephemeral habitat with native vegetated habitat will provide hydrologic functions.

Native vegetation will provide energy dissipation and storage during storm events that is currently not provided on the study area. Increasing plant cover also stabilizes soil to deter channel and habitat degradation by storm flows. The improvement of these functions is consistent with the on-site mitigation option described above. In addition, improving these functions within a larger drainage system and/or as part of a wider-reaching mitigation effort would have the potential to provide a more collective benefit to the watershed.

3. Compensation for impacts to the primarily ruderal and ephemeral habitat with native vegetated habitat will provide biological functions.

Native vegetation will increase potential wildlife habitat by providing more diversity of plant species, forage and cover for wildlife, consistent with the on-site mitigation option described above. In addition, improving these functions within a larger drainage system and/or as part of a wider-reaching mitigation effort would have the potential to provide a more collective benefit to the watershed.

7.3.4 Success Criteria for the Mitigation

In addition to compensating for streambed loss, the mitigation will provide native plant cover for wildlife habitat and to stabilize the drainage system. The success criteria below will be incorporated into a final HMMP for the on-site mitigation following approval by the regulatory agencies.

1. The habitat mitigation will contribute to regional biodiversity in perpetuity.

The proposed mitigation will include the goal of creating a drainage channel with improved morphology, a native species plant cover, and hydrology provided by existing flows and treated flows from the development. This will create habitat for wildlife populations within the mitigation and general area to ensure a more diverse habitat structure and stable watershed, and also improve the hydrologic conditions both on-site and downstream of the study area. The on-site mitigation is proposed for conservation in perpetuity pursuant to a conservation easement, deed restriction, restrictive covenant, or other appropriate legal mechanism as approved by the regulatory agencies.

2. The habitat mitigation will be self-sustaining and will not require supplemental watering or outside input for recruitment and propagation of plant species.

A HMMP will be prepared for the on-site mitigation and will include a number of specific interim and ultimate success criteria over a five-year program that would require the site to then be self-sustaining. Typically mitigation sites are required to demonstrate survival without irrigation for a minimum of two years before the regulatory agencies will deem the mitigation complete.

3. The entire range of biological components, processes, and interactions will be present in each community.

As discussed above, success criteria will be developed as part of the HMMP that will include criteria related to habitat structural diversity, habitat coverage and spatial diversity, percent of non-native vegetation, and hydrologic regime, and will allow for monitoring of the expected range of biological components, processes and interactions within the mitigation area.

4. Natural processes of ecological succession will be allowed to occur.

The success criteria and/or goals in the HMMP will ensure the long-term survivability of the habitats created, including self-sustaining habitat that will follow natural ecological succession including processes such as nutrient cycling.

Off-Site Mitigation

In addition to compensating for streambed loss, the off-site mitigation will provide increased native plant cover for wildlife habitat and to stabilize the drainage system, consistent with the on-site mitigation option described above. For banks or in-lieu fee programs it is expected that the success criteria below are already incorporated into a restoration plan prepared for the entire effort. However, if lands are secured for off-site mitigation, these success criteria will be incorporated into a final HMMP to ensure long-term success of the mitigation.

1. The mitigation will contribute to regional biodiversity in perpetuity.

The proposed mitigation will include the goal of increasing native plant cover and removing non-native weeds. This will create habitat for wildlife populations within the mitigation site and general area to ensure a more diverse habitat structure and stable watershed. Off-site mitigation within an approved mitigation bank, private bank, or in-lieu free program will be part of a larger mitigation effort benefitting the regional watershed that is preserved in perpetuity typically through an existing preservation mechanism. For off-site land purchased for preservation, a preservation mechanism will be established to ensure in-perpetuity conservation of the mitigation.

2. The habitat mitigation will be self-sustaining and will not require supplemental watering or outside input for recruitment and propagation of plant species.

For off-site mitigation on acquired lands, a HMMP will be prepared and will include a number of specific interim and ultimate success criteria over a five-year program that would require the site to be self-sustaining, consistent with the on-site mitigation option described above. It is expected that agency approved mitigation banks, in-lieu fee programs, and private banks would have existing success criteria outlined in a plan prepared as part of the larger mitigation effort. The plan is expected to include criteria for demonstrating the mitigation is self-sustaining, which is typical for mitigation plans.

3. The entire range of biological components, processes, and interactions will be present in each community.

As discussed above, success criteria will be developed as part of the HMMP or are anticipated to be part of existing plans for approved mitigation banks, in-lieu fee programs, and private banks. These will, or are expected to, include criteria related to habitat structural diversity, habitat coverage and spatial diversity, percent of non-native vegetation, and hydrologic regime, and will allow for monitoring of the expected range of biological components, processes and interactions within the mitigation site.

4. Natural processes of ecological succession will be allowed to occur.

The success criteria and/or goals in the HMMP or existing plans will ensure the long-term survivability of the habitats created, including self-sustaining habitat that will follow natural ecological succession including processes such as nutrient cycling.

7.4 Returning Temporary Impact Areas to Pre-project Contours

A total of 0.088 acre of Drainage Complex B is proposed for temporary impacts to allow for construction of the sewer and water line. Consistent with the definition of "temporary impacts" recognized by the resource agencies, temporarily impacted drainages will be returned to pre-project contours and revegetated where appropriate.

7.5 Project Design Features and Mitigation Measures to Address Edge Effects

Section 6.1.4, *Guidelines Pertaining to the Urban/Wildlands Interface*, of the MSHCP presents a number of guidelines that are intended to address indirect effects associated with locating developments in proximity to a MSHCP Conservation Area. These guidelines address the quantity and quality of any runoff generated by the development, night lighting, noise, and domestic predators. The study area is not within or adjacent to any Criteria Cells and, as such, development of these areas is not expected to result in indirect effects to MSHCP Conservation Areas related to night lighting, noise, and grading/land development. However, runoff from the study area has the potential to affect the quantity and quality of water downstream to MSHCP Conservation Areas within the watershed, in addition to transporting non-native plant seeds. Furthermore, the study area supports MSHCP Riverine Areas up and down stream of Drainage Complex B. Although mitigation is proposed for temporary impacts to recontour the areas back to pre-project conditions, allowing for re-establishment of the channel and vegetation, the project has a potential to indirectly effect up and downstream areas during and following construction. Project design features are proposed that will address indirect impacts of the proposed project and to minimize edge effects beyond the limits of grading at the urban/wildlands interface, consistent with Section 6.1.4 of the MSHCP.

Drainage (Urban and Storm Water Runoff): The project will be required to comply with flood and water quality standards, including preparation of a WQMP and SWPPP as outlined in section 7.2 above. As such, no indirect effects from the quantity and quality of run-off will occur to the avoided MSHCP Riverine Areas or mitigation area, or to any downstream MSHCP Conservation Areas. The project will be required to maintain flows, treat the water, maintain water quality, and address flood control/erosion pursuant to RWQCB and County of Riverside standards. Examples of measures and BMPs that may be required include the construction of water quality basins, the implementation of street sweeping and waste management, dust-control measures during construction, and providing education materials to inform the residents on water quality issues. Thus all water leaving the development will be treated and will be discharged at rates that will prevent downstream erosion, and the frequency of storm events discharging to the drainages will not be affected. This is expected to allow the continued survival of the habitat. These measures will avoid any indirect effects from the development drainage in MSHCP Riverine Areas on and off-site (including the mitigation area) and in downstream MSHCP Conservation Areas as a result of the proposed project.

Toxic Material: Construction of the proposed project will incorporate erosion control measures (e.g., sand bags and/or straw wattles as appropriate) around the perimeter of the work area to ensure all water leaving the site is filtered and an increase in siltation does not occur. In addition, for the long-term operation of the Project, the measures and BMPs outlined in the WQMP and SWPPP will treat project-generated flows and remove pollutants (see above and also section 7.2 of this report). These measures will avoid any indirect effects from toxic materials to avoided MSHCP Riverine Areas on-site (including the mitigation area) and to downstream MSHCP Conservation Areas as a result of the proposed project.

Trash/Debris: The project will be required to minimize and address the amount of trash/debris created by the development, and avoid trash/debris from entering downstream areas. These may include activity restrictions placed on the occupants, the distribution of educational materials, street sweeping and waste management, and will be outlined in the project's WQMP and SWPPP. These measures will avoid any indirect effects from trash/debris to nearby MSHCP Riverine Areas located off-site and/or to downstream MSHCP Conservation Areas as a result of the proposed project.

Lighting: The project has been designed to minimize night lighting while remaining compliant with City ordinances related to street lighting. All lighting will be directed away from off-site MSHCP Riverine Areas and/or mitigation areas both during construction and post-construction. As such, no effects from lighting are anticipated to these areas.

Noise: The proposed use of the site for residential development is not anticipated to result in noise-generating activities apart from increased traffic noise. The project will comply with all City requirements pertaining to noise and traffic standards.

Invasives: No invasive, non-native plant species listed in Table 6-2 of the MSHCP, Plants That Should Be Avoided Adjacent To The MSHCP Conservation Area, will be utilized in the landscape plans. This will avoid dispersal of invasive plant seeds in the watershed.

Barriers: The MSHCP requires the incorporation of barriers, such as native landscaping, rocks/boulders, fencing, walls, and/or signage, for proposed land uses adjacent to preservation areas to minimize unauthorized public access, trampling, introduction of urban wildlife, and/or illegal dumping within the preservation areas. The proposed project is not located adjacent to any preservation areas, but is located adjacent to MSHCP Riverine Areas and associated mitigation. The project will include fences and/or walls around the entire development, including adjacent to the MSHCP Riverine Areas.

Grading/Land Development and/or Fuel Modification Activities: Manufactured slopes are contained within the study area identified and do not extend beyond the limits analyzed in this report or into any proposed avoidance and mitigation areas. Brush management, as well as all ground disturbing activities associated with construction and operation of the project development, will also be contained within the project's impact footprint and shall not encroach into the avoided areas in accordance with Section 6.4 of the MSHCP. Off-site impacts are limited to manufactured slope areas, road improvements, sewer line extension, and water line extensions and will be mitigated as described in this document.

The Fuels Management guidelines presented in Section 6.4 of the MSHCP are intended to address brush management activities around new development within or adjacent to the MSHCP Conservation Area. Fuel modification has been incorporated into the project design and does not extend into off-site or into the proposed mitigation area.

7.6 Measures to Address MSHCP Riparian/Riverine Species

The project proposes the following mitigation measure (MM) to ensure compliance with the Migratory Bird Treaty Act. Conditions of Approval (COAs) recommended to the City of Moreno Valley as part of the project CEQA document are also proposed to address compliance with regulatory permitting of impacts to jurisdictional areas (all of which are also considered MSHCP Riverine Areas) and compliance with the MSHCP. The MM and COAs are provided in the BRA (section 7.2 in Appendix A) and are also included verbatim below. The on-site and off-site mitigation proposed in this DBESP would be considered to provide compensation for impacts to jurisdictional drainages pursuant to COA BIO-2, in addition to MSHCP Riverine Areas pursuant to COA BIO-3.

MM BIO-3 Prior to the issuance of any grading permit that would remove potentially suitable nesting habitat for raptors or songbirds, the project applicant shall demonstrate to the satisfaction of the City that either of the following have been or will be accomplished:

1. Vegetation removal activities shall be scheduled outside the nesting season (September 1 to February 14 for songbirds; September 1 to January 14 for raptors) to avoid potential impacts to nesting birds.

2. Any construction activities that occur during the nesting season (February 15 to August 31 for songbirds; January 15 to August 31 for raptors) will require that all suitable habitat be thoroughly surveyed for the presence of nesting birds by a qualified biologist before commencement of clearing. If any active nests are detected a buffer of 300 feet (500 feet for raptors) around the nest adjacent to construction will be delineated, flagged, and avoided until the nesting cycle is complete. The buffer may be modified and/or other recommendations proposed as determined appropriate by the biological monitor to minimize impacts.

COA BIO-2 Prior to the issuance of any grading permit for permanent impacts in the areas designated as jurisdictional features, the project applicant shall obtain regulatory permits from the USACE, RWQCB, and CDFW. The following shall be incorporated into the permitting, subject to approval by the regulatory agencies:

1. On-site or off-site creation, restoration and/or enhancement of USACE/RWQCB jurisdictional "waters of the U.S." within the Santa Ana watershed at a ratio no less than 2:1 or within an adjacent watershed at a ratio no less than 3:1 for permanent impacts, and for any temporary impacts to restore the impact area to pre-project conditions (i.e. pre-project contours). Off-site mitigation may occur on land acquired for the purpose of in-perpetuity preservation as approved by the resource agencies, or through the purchase of mitigation credits at a resource agency-approved off-site mitigation bank or in-lieu fee program.

2. On-site or off-site creation, restoration, and/or enhancement of CDFW jurisdictional streambed within the Santa Ana watershed at a ratio no less than 2:1 or within an adjacent watershed at a ratio no less than 3:1 for permanent impacts, and for any temporary impacts to restore the impact area to pre-project conditions (i.e. pre-project contours). Off-site mitigation may occur on land acquired for the purpose of in-perpetuity preservation as approved by the resource agencies, or through the purchase of mitigation credits at a resource agency-approved off-site mitigation bank or in-lieu fee program.

Purchase of any mitigation credits through an agency-approved mitigation bank or in-lieu fee program should occur prior to any impacts to jurisdictional drainages. Any mitigation proposed on land acquired for the purpose of in-perpetuity mitigation that is not part of an agency-approved mitigation bank or in-lieu fee program shall include the creation, restoration, and/or enhancement of similar streambed habitat pursuant to a resource agency-approved HMMP. The HMMP shall be prepared prior to any impacts to jurisdictional features, and shall provide details as to the implementation of the mitigation, maintenance, and future monitoring of mitigation areas. The goal of the mitigation shall be to create, restore, and/or enhance similar habitat with equal or greater function and value than the impacted habitat.

COA BIO-3 Prior to the issuance of any grading permit the project applicant shall comply with all of the provisions of the MSHCP, including payment of the MSHCP Local Development Mitigation Fee, compliance with Section 6.1.2 of the MSHCP pertaining to Riparian/Riverine Areas, implementation of drainage, toxics and non-native species guidelines pertaining to the Urban/Wildlands Interface in Section 6.1.4 of the MSHCP, and compliance with Section 6.3.2 of the MSHCP pertaining to Burrowing Owl Survey Area requirements.

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Determination of Biologically Equivalent or Superior Preservation

Section 6.1.2 of the MSHCP, Volume I, Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools, is intended to ensure protection of Riparian/Riverine Areas within the entire MSHCP Plan Area such that habitat values are preserved for those species within the MSHCP Conservation Area. The project site and off-site areas support disturbed Riverine areas that do not support any sensitive species listed in Section 6.1.2 of the MSHCP.

The proposed project, inclusive of all project design features and mitigation measures, is biologically superior to an avoidance alternative by replacing low function and value disturbed MSHCP Riverine Areas with a higher function and value riparian habitat typical of similar drainage systems in the local area, and by avoiding any potential impacts to downstream areas through implementation of measures to address water quality and dispersal of non-native seeds downstream. A summary of this statement is provided below based on the analysis in this report, and further assessed in Sections 8.1 through 8.3.

- The proposed permanent impacts are limited to a maximum of 0.077 acre of the total 0.165 acre of MSHCP Riverine Areas both on-site and off-site. The majority of these impacts are due to City required infrastructure and road improvements, with a small acreage of impacts required for a water quality basin associated with Drainage A. The MSHCP Riverine Areas proposed for impacts have a low function and value due to ongoing disturbance and the absence of vegetation and/or signs of hydrology for most of the year.

- The remaining 0.088-acre of the total 0.165 acre of MSHCP Riverine Areas will be temporarily impacted to allow construction of City required infrastructure and road improvements off-site.

- The proposed mitigation for impacts is at a 2:1 ratio for total permanent impacts which could be as high as 0.154 acre. This will include riparian/riverine and transitional upland habitat creation that will provide higher function and value habitat than the existing condition by creating habitat with native species coverage that also provides consistent hydrology through existing flows and treated discharge from the development. As a result, the impacts to low function and value drainages will be compensated by providing a net gain in acreage and functions and values, including habitat that currently does not exist. The net increase in native habitat acreage would provide improved functions such as water quality, water storage and wildlife habitat. Temporary impacts will be returned to pre-project contours consistent with the resource agencies definition of temporary impacts.

- If on-site mitigation occurs, it will be conserved in perpetuity through a conservation easement, deed restriction, restrictive covenant, or other appropriate legal mechanism as approved by the regulatory agencies. Preservation will ensure protection of MSHCP Riverine

Areas as intended pursuant to Volume I, Section 6.1.2 of the MSHCP, *Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools*. The preserved mitigation area is proposed to occur within dedicated open space. Currently the on-site drainages are unprotected and are largely non-existent due to disturbance.

- The success of the mitigation would be ensured through an approved project-specific HMMP that will be prepared and submitted to the USACE, RWQCB, and CDFW for review and/or approval as part of the regulatory permitting process. The mitigation would be monitored regularly pursuant to a five-year program, and analyzed against a number of interim and target success criteria. The success criteria will ensure that the mitigation efforts are successful.

- The project is not located within or adjacent to any MSHCP Conservation Areas but will avoid indirect impacts to the on-site mitigation area and any protected areas downstream through measures that will be proposed in the WQMP and SWPPP to manage daily nuisance flows and initial first flush storm flows generated by the development. As such, the water discharged downstream will be treated for both sediment and pollutants. Also, current flow rates to downstream areas will be maintained to prevent erosion, but the overall volume of water discharged downstream will increase providing at minimum sufficient hydrology to maintain and even increase downstream habitats. The native plant species coverage in the mitigation area is also expected to provide biofiltration and water quality benefits for the watershed system.

- A number of additional project design features have been incorporated to address edge effects (i.e., indirect impacts) such as noise, lighting, and non-native invasive species.

8.1 Effects on Riparian/Riverine Planning Species

- The study area is within the Burrowing Owl Survey Area and Riverine resources were found on-site. As such, focused surveys for burrowing owl were conducted due to the presence of potentially suitable habitat for this species within the study area. Habitat assessments were also conducted for the Riparian/Riverine planning species listed under Section 6.1.2 of the MSHCP. The results of the burrowing owl focused surveys were negative, and pre-construction surveys will be conducted to confirm continued absence. For the Riparian/Riverine species, suitable habitat was determined present on the study area for one Riparian/Riverine planning species, smooth tarplant. However, smooth tarplant was not observed during any of the focused plant surveys and therefore was concluded to be absent from the study area. As such, no significant effects on Riparian/Riverine planning species (or burrowing owl) are expected to occur as a result of the Project.

- The proposed mitigation (on-site and off-site) will include riparian/riverine and transitional upland habitat creation and planting with native riparian/riparian-transition habitat, as appropriate, at a minimum 2:1 ratio to total impacts. This will increase the acreage of native habitat and replace non-native habitats with riparian/riparian-transition habitat that has increased spatial, structural and species diversity to encourage wildlife use. The mitigation will also improve water quality and hydrology functions. As such, the proposed mitigation will improve the quality of the habitat for wildlife species and provide potential habitat for Riparian/Riverine planning species.

- The improved quality of water and expected increase in volume of water due to impervious surfaces and additional input (e.g., from irrigation; the flow rate will not increase), would be beneficial to the on-site mitigation and areas downstream of the project for supporting any existing wildlife habitat and potentially allowing additional habitat to establish.

8.2 Effects on Conserved Habitats

- The proposed project impacts low function and value MSHCP Riverine areas that are subject to on-going disturbance. The mitigation would improve the function and value of the hydrology in the area by creating structure, hydrology, and vegetation in the created riparian channel. As such, the project impacts would be compensated by a net gain of streambed acreage and of biogeochemical, hydrologic and habitat functions to benefit MSHCP conserved habitats. The on-site mitigation area will be within dedicated open space lots. In addition, the mitigation area would be protected in perpetuity through a conservation easement, deed restriction, restrictive covenant, or other appropriate legal mechanism as approved by the regulatory agencies. The mitigation would therefore contribute to the acreage of conserved habitats within the MSHCP.

- The proposed project would contribute higher function and value habitat to be conserved within the MSHCP. The MSHCP Riverine Areas proposed for impacts are primarily unvegetated due to ongoing disturbance, and therefore lacks native species cover to provide appropriate habitat features for the Riparian/Riverine wildlife species listed under Section 6.1.2 of the MSHCP. The main function of the drainages in their current condition is conveyance of flows during large storm events, with limited ecological functions (i.e., limited sediment transport, transport of nutrients and aquatic chemicals to downstream waters, seasonal flood storage, flood flow attenuation, toxicant trapping, and velocity dissipation). The proposed mitigation would provide these ecological functions through the creation of a riparian channel, hydrology from existing and treated development flows, and planting of native species that would occur pursuant to an agency approved HMMP. The mitigation would be designed to provide wildlife habitat that could potentially support species listed in Section 6.1.2 of the MSHCP. Furthermore, the mitigation would allow for greater nutrient and toxicant trapping, which would be beneficial to downstream water quality. The on-site mitigation is within a dedicated open space area, and the mitigation area itself will be protected in perpetuity through an appropriate and approved legal mechanism, as described in the preceding bullet.

8.3 Effects on Linkages and Functions of the MSHCP Conservation Area

- The project site and off-site areas are not located within or adjacent to any MSHCP Cores, Linkages or Conservation Areas, and measures have been incorporated into the project design to avoid potential indirect edge effects to such areas through drainage, including maintaining the flows and improving water quality to downstream areas. As such, the project would not impact the functions of any MSHCP Cores, Linkages or Conservation Areas.

- The proposed project impacts low function and value Riverine Areas subject to ongoing disturbance that would be replaced with a net gain of higher function and value riparian habitat by the proposed mitigation that will be preserved in perpetuity.

- The project's WQMP and SWPPP will ensure that water quality standards are met. The flow rate will be similar to existing conditions; however the volume of water will increase which will be beneficial to the on-site mitigation and downstream areas by providing increased hydrology to support wildlife habitat functions. In addition, measures proposed in these documents will protect against flooding, prevent downstream erosion, and improve water quality by filtering pollutants from previously untreated flows. Thus, all water leaving the study area will be of a higher quality compared to existing site conditions. The mitigation is also expected to provide additional biofiltration functions through the planting of native vegetation. As such, both the project development and mitigation would improve the overall water quality of flows downstream and within MSHCP Conservation Areas, and potentially provide habitat for MSHCP planning species, making this a superior alternative to the existing disturbed conditions.

9.0
References

CDFW. 2000. California Wildlife Habitat Relationships System: Pocketed Free-tailed Bat. State of California, The Resources Agency. May 2000.

Dudek & Associates. 2003. Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). Final MSHCP, Volumes I and II. Prepared for County of Riverside Transportation and Lands Management Agency by Dudek & Associates, Inc. Approved June 17, 2003.

Gregory, S. V., F. J. Swanson, W. A. McKee, and K. W. Cummins. 1991. An Ecosystem Perspective of Riparian Zones. BioScience, Vol. 41(8), pp. 540-551.

Knight, A. W. and R. L. Bottorff. 1984. The Importance of Riparian Vegetation to Stream Ecosystems in California Riparian Systems; Ecology, Conservation, and Productive Management, R. E. Warner and K. M. Hendrix (eds.). University of California Press, Berkeley, California.

NRCS (Natural Resources Conservation Service). 2015. Web Soil Survey. Available online (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx). Accessed December 16, 2015.

ESA PCR. 2016. Biological Resources Assessment, Ironwood Village Project, City of Moreno Valley, Riverside County, California (Preliminary Working Draft). August 2016.

RCIP (Riverside County Integrated Project). 2003. MSHCP. http://www.rcip.org/conservation.htm.

Schaefer, J. M. and M. T. Brown. 1992. Designing and Protecting River Corridors for Wildlife. Rivers. Vol. 3(1). pp. 14-26.

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Appendix A

Biological Resources Assessment

IRONWOOD VILLAGE

Biological Resources Assessment

Prepared for
1BH1 LLC

August 2016

IRONWOOD VILLAGE

Biological Resources Assessment

Prepared for
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1.0 INTRODUCTION

1.1 Background and Purpose

This report presents the findings of a Biological Resources Assessment & Western Riverside County Multiple Species Habitat Conservation Plan Consistency Analysis conducted by **ESA PCR** for the approximately 78.48-acre project site proposed for development of a single-family residential development associated with Assessor's Parcel Number (APN) 473-160-004 and approximately 10.57-acre off-site areas (collectively, the "study area"). The study area is located directly northeast of the intersection of Ironwood Avenue and Nason Street within the City of Moreno Valley, in Riverside County, California. The purpose of this study is to satisfy the requirements of the Western Riverside County Multiple Species Habitat Conservation (MSHCP), the California Environmental Quality Act (CEQA), and to supplement subsequent regulatory applications pursuant to Sections 404 and 401 of the Clean Water Act (CWA) and Section 1602 of the California Fish & Game Code (CF&G).

1.2 Sources

This Biological Resources Assessment & MSHCP Consistency Analysis (collectively, the "BRA") is based on information compiled through field reconnaissance and appropriate reference materials. A general biological survey, vegetation mapping, and investigation of jurisdictional waters and wetlands was conducted by ESA PCR. Focused surveys for special-status plant species and burrowing owl (*Athene cunicularia*) were also conducted. The information sources used in preparation of this BRA are provided in Section 9, *References*.

1.3 Study Area Location

The approximately 78.48-acre on-site study area and approximately10.57-acre off-site study areas are regionally situated north of State Route (SR) 60 and northeast of Interstate (I) 215 (**Figure 1**, *Regional Map*). Specifically, the study area is located northeast of the intersection of Ironwood Avenue and Nason Street in the City of Moreno Valley. The on-site and off-site project study areas are depicted on the U.S. Geological Survey (USGS) 7.5' Sunnymead topographic quadrangle (S34, T2S, R3W & S3, T3S, R3W) (USGS, 1967; Earth Survey, 2015), as shown in **Figure 2**, *Vicinity Map.* The specific location of each project study area is depicted on **Figure 3**, *Study Areas*. Off-site study areas associated with four types of proposed project improvements include manufactured slopes, road improvements, a sewer line extension, and water line extensions and described in detail below:

Manufactured Slopes (West & East) – There are two (2) off-site study area locations proposed to support manufactured slopes, including one area adjacent to Nason Street (West) and a second area adjacent to the eastern boundary of the project site (East).

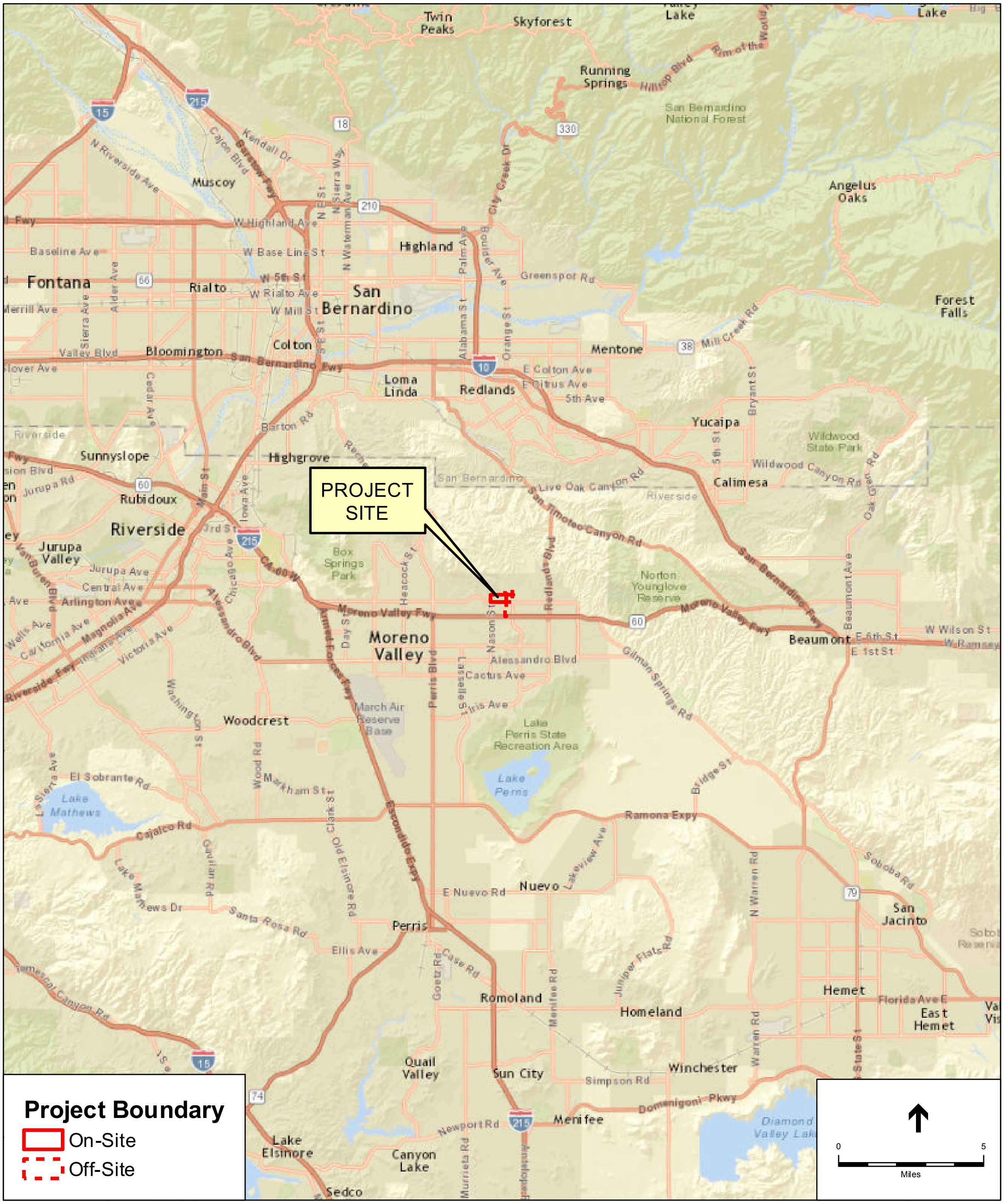
Road Improvements – There is one (1) road improvement area proposed between the area located directly north of Ironwood Avenue and south of the project site boundary.

Sewer Line – The sewer line is proposed to connect at the southeast corner of the project site at the intersection of Ironwood Avenue and Oliver Street and extend south along Oliver Avenue, ultimately ending at the SR-60 freeway.

Water line (Proposed and Alternatives) – Although the exact location of the final water line extension is still unknown, one proposed alignment and two (2) alternative alignments were assessed as part of the off-site project study areas. The Proposed Water Line would commence at the intersection of Ironwood Avenue and Oliver Street and extend east along Ironwood Avenue, continuing north along Moreno Beach Drive, and terminating at the intersection of Moreno Beach Drive and Kalmia Avenue. Water Line Alternative 1 would connect the water line at the northeast corner of the project site and extend north to an existing off-site water tower. Water Line Alternative 2 would commence at the northeastern corner of the project site and extend east toward the intersection of Moreno Beach Drive and Juniper Avenue.

1.4 Scope of Study

The scope of this BRA encompasses descriptions of the project, methods of study, and existing site conditions including vegetation communities and the potential for special-status biological resources, followed by an evaluation of impacts to special-status biological resources pursuant to CEQA thresholds and compliance with the Western Riverside County MSHCP. Avoidance, minimization, and/or mitigation measures are proposed to reduce any potential adverse effects to biological resources to less than significant under CEQA where appropriate.

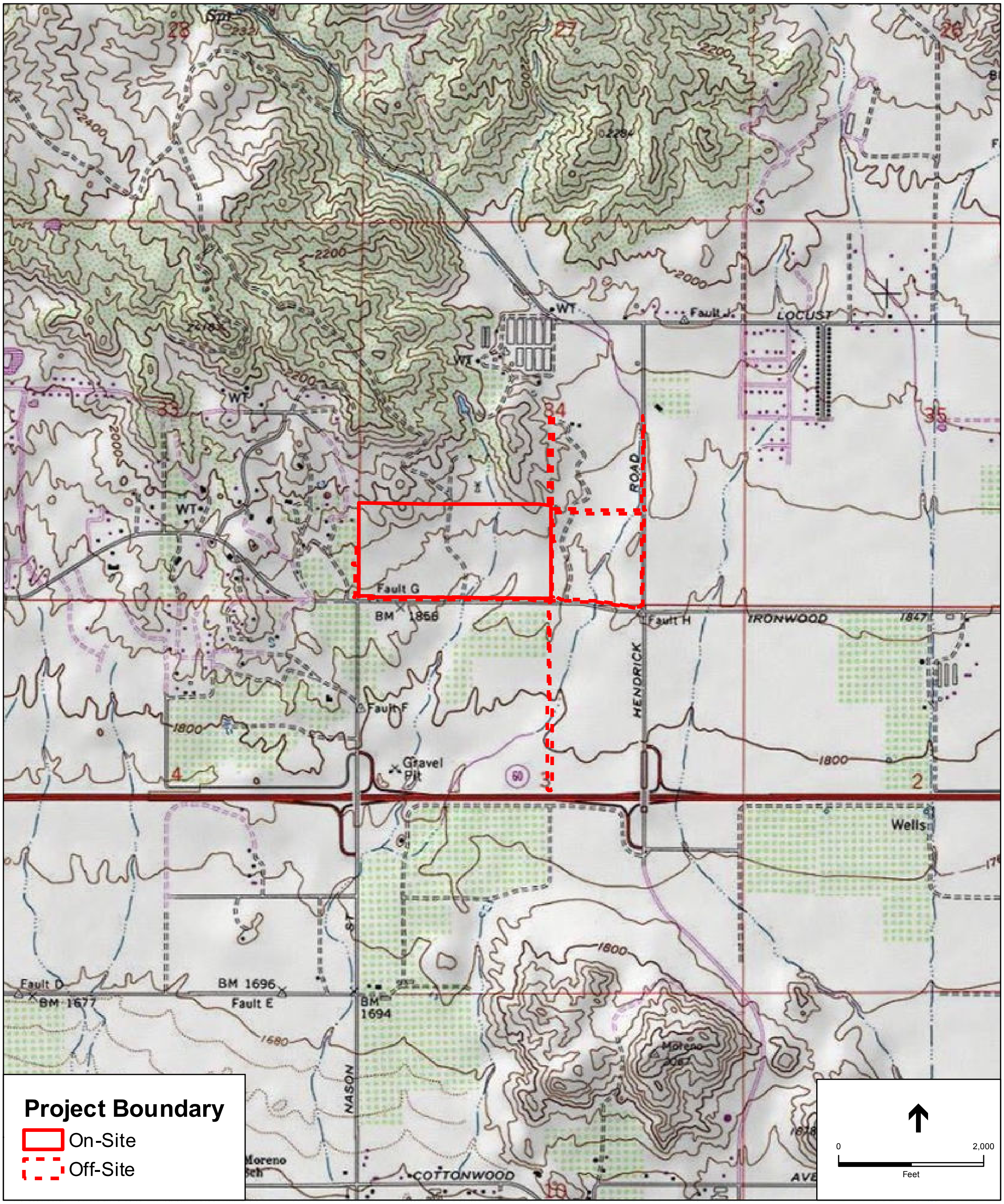


SOURCE: ESRI Street Map, 2009.

Ironwood Village Project
Figure 1
Regional Map

ESA PCR

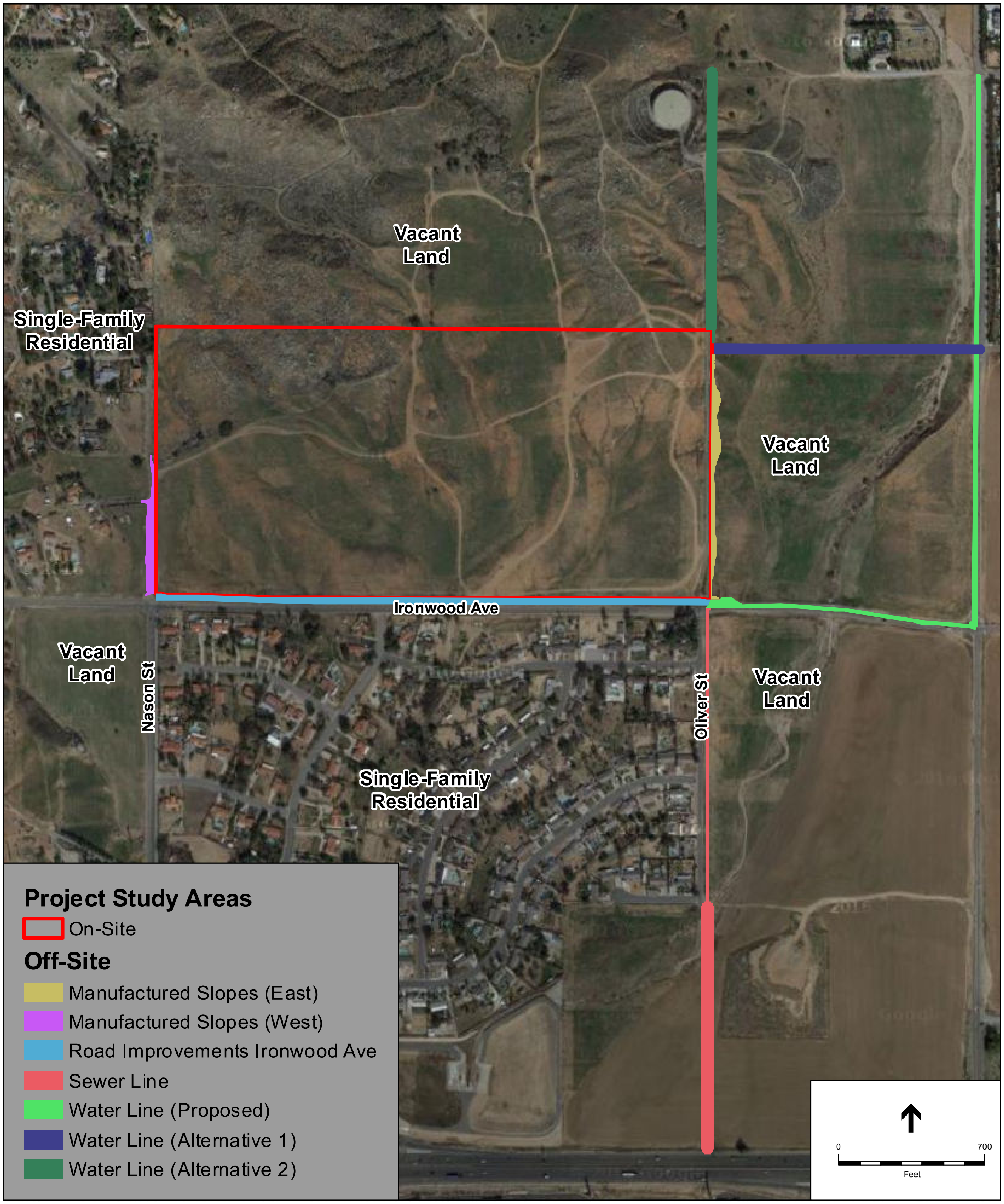
Attachment: DBESP Report (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))



SOURCE: USGS Topographic Series (Sunnymead, CA).

Ironwood Village Project
Figure 2
Vicinity Map

ESA PCR



SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project
Figure 3
Study Areas

ESA PCR

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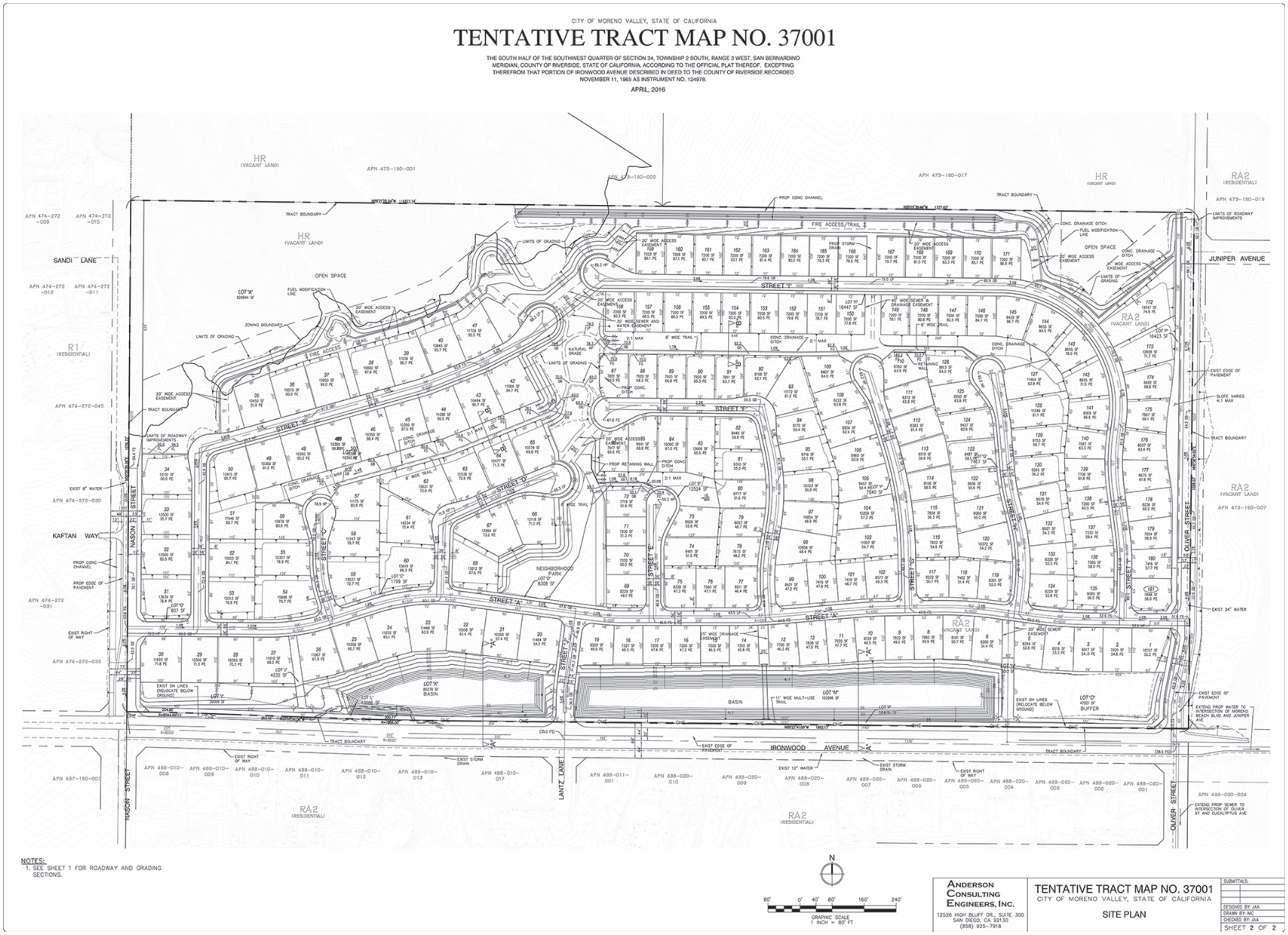
2.0 PROJECT DESCRIPTION

2.1 Project Description

The 78.48-acre project site is a proposed single-family residential development occupying approximately 38.5 acres, as shown in (**Figure 4**, *Site Plan*). The remaining acreage will be open space areas, which will consist of community open space areas that will be planted as appropriate to the project's climate and avoided areas in the northwestern and northeastern corner of the project site, which encompass native vegetation and rock outcroppings that will be preserved. Per Figure 3, there are four types of off-site areas associated with the project totaling 10.57 acres, including manufactured slope areas, road improvements, sewer line extension, and water line extensions (proposed and alternative). Sewer and water lines will be extended onto the site from existing utilities. Primary access to the development would occur from Ironwood Avenue between Nason Street and Oliver Street, immediately opposite from and north of Lantz Lane. Secondary access would be provided by driveways on both Nason Street and Oliver Street just north of Ironwood Avenue.

2.2 Project Avoidance

The project study areas consist primarily of non-native vegetation characterized by ruderal vegetation and disturbed areas that consist of little to no vegetation. There are some areas that support native plant communities, such as Riversidean sage scrub and brittlebush scrub, which predominantly reside in the northwestern corner of the on-site study area. The project proposes avoidance of the northwestern and northeastern corners of the on-site study area, which are located on hillsides that transition into the foothills of the Badlands mountain range located to the north of the project site. These avoided areas will be maintained as natural open space to preserve the scenic views of the hillsides from the City of Moreno Valley. The project on- and off-site study areas also support two drainage systems, which include Drainage A and Drainage Complex B, approximately 40% of which will be avoided.



SOURCE: Anderson Consulting Engineers, Inc., 2016

Ironwood Village Project

Figure 4

Site Plan

ESA PCR

3.0 METHODS OF STUDY

3.1 Approach

This BRA is based on information compiled through field reconnaissance and appropriate reference materials. Surveys included a general biological survey and vegetation mapping; an investigation of jurisdictional waters; focused plant surveys; and focused burrowing owl surveys.

3.2 Literature Review

Assessment of the study area began with a review of relevant literature on the biological resources of the study area and surrounding vicinity. The California Natural Diversity Database (CNDDB), a California Department of Fish and Wildlife (CDFW) species account database, was reviewed for all pertinent information regarding the localities of known observations of special-status species and habitats in the vicinity of the study area (CDFW, 2015). The vicinity of the study area included the following USGS topographic quadrangles: San Bernardino South, Redlands, Yucaipa, Riverside East, El Casco, Steele Peak, Perris, and Lakeview. Federal register listings, protocols, and species data provided by the United States Fish and Wildlife Service (USFWS) (USFWS, 2015a), CDFW and the California Native Plant Society (CNPS, 2015) were reviewed in conjunction with anticipated Federally and State listed species potentially occurring within the vicinity. Other data sources reviewed include USFWS critical habitat maps (USFWS, 2015b) and United States Department of Agriculture Natural Resources Conservation Service (NRCS) soils mapping (NRCS, 2015). In addition, numerous regional flora and fauna field guides were utilized to assist in the identification of species and suitable habitats, in addition to relevant local policies such as the *Western Riverside County Multiple Species Habitat Conservation Plan* (MSHCP) (Dudek & Associates, 2003). A list of all relevant references reviewed is included in Section 9.0, *References*.

3.3 Field Investigations

A general biological survey and vegetation mapping was conducted by ESA PCR Senior Biologist Ezekiel Cooley on September 19, 2014 and investigations of jurisdictional waters were conducted by Principal Regulatory Scientist Amir Morales on September 19 and December 10, 2014. The observed vegetation communities, jurisdictional features, and other biological features or species observations of interest were mapped on aerial photographs. Biological surveys were conducted over all on-site and off-site study areas, with special attention to sensitive habitats such as those suitable for the burrowing owl and those areas potentially supporting special-status flora. The only exception is an off-site study area located directly east of the project study area proposed to support manufactured slopes. The eastern manufactured slopes support suitable habitat for special-status plant species and a spring focused survey has not yet been conducted. As such, a mitigation measure addressing the potential for special-status plants to occur within this off-site area is included in Section 7.2.1 of this BRA. The following summarizes the extent of focused surveys conducted within the study areas identified on Figure 3.

Focused plant surveys were conducted within:

- the project site and off-site road improvement and sewer line areas on May 13, 2015 by ESA PCR Biologists Ezekiel Cooley, Amy Lee, and Lauren Singleton and on July 20, 2015 by Amy Lee;
- the off-site proposed and alternative water line areas on May 23 and July 5, 2016 by Amy Lee; and
- the off-site manufactured slope areas on July 5, 2016 by Amy Lee. However, a spring focused plant survey has not been conducted within the off-site manufactured slope area located directly east of the site.

Focused burrowing owl surveys were conducted within:

- the project site and off-site manufactured slopes, road improvement, proposed water line, and sewer line areas from May to July 2015 by ESA PCR Biologists Ezekiel Cooley, Amy Lee, and Lauren Singleton; and
- the alternative off-site water line areas from April to July 2016 by Amy Lee and Lauren Singleton.

During the course of all field visits, an inventory of plant and wildlife species observed was compiled. The methods for these field investigations are described in detail below.

3.3.1 Plant Community Mapping

Plant communities were mapped directly in the field utilizing a 125-scale (1”=125’) aerial photograph focusing on dominant plant species. Plant community names, codes, and descriptions follow *A Manual of California Vegetation, Second Edition* (Sawyer, Keeler-Wolf, and Evens, 2009) or Holland’s *Preliminary Descriptions of the Terrestrial Natural Communities of California* (1986). The California Natural Community Code (CaCodes) or Holland’s Element Code is in parentheses next to each community name, when applicable. After completing the fieldwork, the plant community polygons were digitized using Geographic Information System (GIS) technology to calculate acreages.

3.3.2 Sensitive Habitats

Sensitive habitats are listed by CDFW on their *List of Vegetation Alliances and Associations* (CDFW, 2010).[1] Communities on this list are given a Global (G) and State (S) rarity ranking on a scale of 1 to 5, where communities with a ranking of 5 are the most common and communities

1 *Available online at: http://www.dfg.ca.gov/biogeodata/vegcamp/natural_comm_list.asp*

with a ranking of 1 are the rarest and of the highest priority to preserve. These high priority communities are denoted on the CDFW list with asterisks. For the purpose of this report, sensitive habitats are those communities that have a state ranking of S3 or rarer. Any sensitive habitats located on the study area were identified based on the mapped natural communities (see section 3.3.1, *Plant Community Mapping*).

3.3.3 General Plant Inventory

All plant species observed during the general and focused surveys were either identified in the field or collected and later identified using taxonomic keys. Plant taxonomy follows Baldwin (2012). Common plant names, when not available from Baldwin, were taken from Munz (1974) and/or Clarke (2007). Since common names vary significantly between references, scientific names are included upon initial mention of each species; common names consistent throughout the report are employed thereafter. All plant species observed were recorded in field notes. Special-status plant species are discussed below in section 3.3.4, *Special-status Plant Species*.

3.3.4 Special-status Plant Species

The potential for special-status plant species was assessed based upon the known occurrence of species in the area as identified from CDFW, USFWS and CNPS databases (see Section 3.2, *Literature Review*), and the presence or absence of suitable habitat within the study area based on plant community mapping (see section 3.3.1, *Plant Community Mapping*). Suitable habitat was defined as areas with appropriate vegetation communities, soils and/or topography (elevation at MSL) to support the species based on known occurrences in those habitats and/or CDFW and CNPS documented habitat descriptions for the species. The definitions of suitable habitat were then compared against the vegetation mapping conducted for the study area and local knowledge. A table of special-status plant species for which potentially suitable habitat occurs within the study area was prepared, and the potential for occurrence for each species was determined following completion of the vegetation mapping conducted during the field survey.

Due to the presence of potentially suitable habitat, focused plant surveys were conducted on the project site and off-site road improvement and sewer line areas by ESA PCR biologists Ezekiel Cooley, Amy Lee, and Lauren Singleton on May 13, 2015 and by Amy Lee on July 20, 2015. Focused plant surveys were also conducted on the off-site water line areas by Amy Lee on March 23, 2016 and July 5, 2016. Although a summer focused plant survey was conducted within the manufactured slope areas on July 5, 2016 by Amy Lee, a spring survey has not yet been performed in these areas. The manufactured slope area located west of the project boundary does not support suitable habitat for plants associated with the spring survey requirement. However, the manufactured slope area located east of the project boundary does require completion of a spring focused plant survey as summarized in Section 7.1.2 below. All focused plant surveys conducted to date were implemented in accordance with published agency guidelines (CDFW, 2009; CDFW, 2000a; and USFWS, 2000) and during the appropriate blooming periods of potential plant species to ensure detection of any special-status plants.

3.3.5 General Wildlife Inventory

All wildlife species observed within the study area, as well as any diagnostic sign (call, tracks, nests, scat, remains, or other sign), were recorded in field notes. Binoculars and regional field guides were utilized for the identification of wildlife, as necessary. Wildlife taxonomy follows Stebbins (2003) and California Herps (2015) for amphibians and reptiles, the American Ornithologists' Union (1998) for birds, and Jameson and Peeters (1988) for mammals. Since common names vary significantly between references, scientific names are included upon initial mention of each species; common names consistent throughout the report are employed thereafter. All wildlife species detected were recorded in field notes. Special-status wildlife species are discussed below in section 3.3.6, *Special-status Wildlife Species*.

3.3.6 Special-status Wildlife Species

The potential for special-status wildlife species was assessed based upon the known occurrence of species in the area as identified from CDFW and USFWS databases (see section 3.2, *Literature Review*), and the presence or absence of suitable habitat within the study area based on plant community mapping (see section 3.3.1, *Plant Community Mapping*). Suitable habitat was defined as areas with appropriate vegetation communities and/or topography (elevation at MSL) to support the species based on known occurrences in those habitats and/or CDFW and USFWS documented habitat descriptions for the species. The definitions of suitable habitat were then compared against the vegetation mapping conducted for the study area as well as local knowledge. A table of special-status wildlife species for which potentially suitable habitat occurs within the study area was prepared, and the potential for occurrence for each species was determined following completion of the vegetation mapping conducted during the field survey.

Due to the presence of potentially suitable habitat and MSHCP requirements, focused surveys were conducted for burrowing owl. A summary of the survey methodology is provided below; a separate survey report was also prepared following completion of the focused surveys. No other focused surveys were conducted for special-status wildlife species.

Burrowing Owl

The study area supports potentially suitable habitat for burrowing owl. As such, focused surveys for burrowing owl were conducted on the project site and off-site manufactured slopes, road improvement, proposed water line, and sewer line areas by ESA PCR biologists Ezekiel Cooley, Amy Lee, and Lauren Singleton on May 13; June 3; and July 2 and 27, 2015. Focused burrowing owl surveys were conducted within the off-site alternative water areas by Lauren Singleton on April 28, 2016 and by Amy Lee on May 23; June 9; and July 7, 2016. Step I and Step II surveys for burrowing owls were conducted on the project site and off-site areas in accordance with the County of Riverside's *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area* (County of Riverside, 2006). Step I is a Habitat Assessment and Step II consists of Locating Burrows and Burrowing Owls.

Suitable habitat was identified during the Step I Habitat Assessment, which was conducted by Ezekiel Cooley on September 19, 2014 during the general biological survey, including disturbed, low-growing vegetation; bare ground; and a few small fossorial mammal burrows. Suitable habitat included disturbed, low-growing vegetation; bare ground; and a few small fossorial mammal burrows. Due to the presence of suitable habitat identified during the Step I survey, Step II surveys were conducted within the study area plus a 150-meter (approximately 500 feet) buffer zone around the perimeter of the study area (collectively, the “survey area”). Step II surveys focused on the detection of BUOW individuals, small fossorial mammal burrows potentially suitable for BUOW, and BUOW diagnostic sign (e.g., molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance). Transects were utilized, spaced no more than 100 feet apart, to allow 100 percent visual coverage of the ground surface. The four surveys were conducted during the burrowing owl breeding season (March 1 to August 31) on separate days between two hours before sunset to one hour after or one hour before sunrise to two hours after.[2]

3.3.7 Regional Connectivity/Wildlife Movement Corridor

An analysis of wildlife movement was conducted based on information compiled from the literature, analysis of aerial photographs and topographic maps, direct observations made in the field during survey work, and an analysis of existing wildlife movement functions. Relative to corridor issues, the focus of this assessment was to determine if the change of the existing land use within the study area would have significant impacts on the regional wildlife movement associated with the study area as well as the immediate vicinity.

The Western Riverside County MSHCP was reviewed to identify any linkage or Core Areas proposed for preservation on the study area (Dudek & Associates, 2003). Additionally, the South Coast Missing Linkages: A Wildland Network for the South Coast Ecoregion document was reviewed (South Coast Wildlands, 2008).

3.3.8 Investigation of Jurisdictional Waters

A jurisdictional determination of existing on-site drainage and wetland features was conducted by ESA PCR Principal Regulatory Scientist Amir Morales on September 19 and December 10, 2014. The purpose of the delineation was to assess the location, extent and acreage of “waters of the U.S.” and/or wetlands under the jurisdiction of the U.S. Army Corps of Engineers (USACE) and Regional Water Quality Control Board (RWQCB), and the limits of streambed and associated riparian habitat under the jurisdiction of CDFW. All areas were delineated using the protocol stipulated by CDFW under Section 1600-1607 of the California Fish and Wildlife Code, and by the USACE and RWQCB under Section 404 and Section 401 of the Clean Water Act (CWA), respectively. No potential for wetlands or other special aquatic sites were observed within project study areas. Therefore, a wetland delineation using the procedures stipulated in the USACE Wetland Delineation Manual (Environmental Laboratory, 1987) and Arid West Supplement (USACE, 2008a and USACE, 2008b) were not performed or warranted for this project.

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2 For projects within the Western Riverside County MSHCP plan area, it has been PCR’s experience that the County of Riverside has preferred that Step II surveys be conducted at least one week apart.

The potential for USACE jurisdictional “waters of the U.S.” was based primarily on the presence or absence of jurisdictional field indicators consistent with the USACE guidelines (USACE, 2008a) such as the presence of an OHWM and/or secondary indicators of hydrology, including evidence of the deposition of debris, scour, sediment sorting, and changes in vegetation. The extent of CDFW jurisdiction was assessed based on the limits of the defined bed and bank and includes riparian streambed associated vegetation, where applicable. If these criteria were met, data was collected to estimate the length and width of jurisdictional features potentially regulated by the resource agencies. Upon completion of the field work, documentation of all jurisdictional wetlands, waters, and streambed were completed. The documentation included a map illustrating the location, extent and acreage of all jurisdictional features. Downstream surface connections to known USACE jurisdictional waters were also evaluated in the field and by using satellite imagery and mapping, for the purpose of establishing a connection (i.e. federal nexus) to “waters of the U.S.,” where applicable. The results of the ESA PCR jurisdictional assessment are subject to review and approval by the resource agencies as part of future regulatory permits for the project, if required.

4.0 EXISTING CONDITIONS

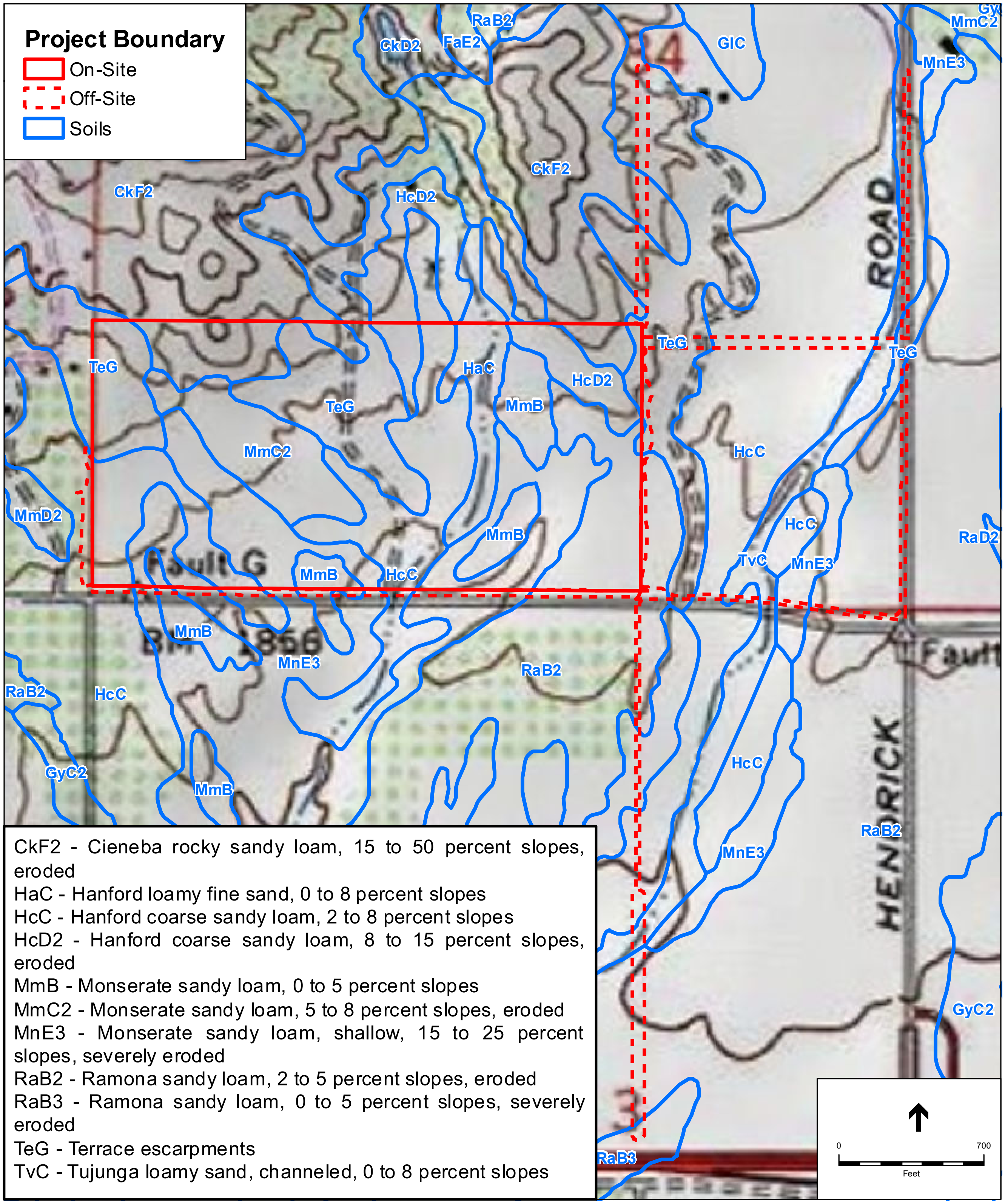
4.1 Characteristics of the Study Area and Surrounding Area

4.1.1 On-Site Characteristics

The approximately 79-acre project site and the 10.57-acre off-site areas are located in the City of Moreno Valley in Riverside County. The project site consists primarily of non-native vegetation characterized by ruderal vegetation and disturbed areas that consist of little to no vegetation. There are some areas that support native plant communities, such as Riversidean sage scrub and brittlebush scrub, which predominantly reside in the northwestern corner of the project site. The study area supports two drainage systems observed to support field indicators associated with USACE, RWQCB, and CDFW (collectively "the resource agencies") jurisdictional waters, referred to in this report as Drainage A and Drainage Complex B, although only Drainage A occurs on-site. The topography on-site is generally flat with gently rolling hills throughout the project site and steeper rock outcrops on the northwest corner. On-site elevations range from the lowest of approximately 1,830 feet above mean sea level (MSL) along the southern boundary of the project site to a high of approximately 1,975 feet above MSL along the northwest boundary of the site. On-site mapped soils in the project area include nine soil types as follows (NRCS, 2015), as shown in **Figure 5**, *Soils Map*:

- Cieneba rocky sandy loam, 15 to 50 percent slopes, eroded;
- Hanford loamy fine sand, 0 to 8 percent slopes;
- Hanford coarse sandy loam, 2 to 8 percent slopes;
- Hanford coarse sandy loam, 8 to 15 percent slopes, eroded;
- Monserate sandy loam, 0 to 5 percent slopes;
- Monserate sandy loam, 5 to 8 percent slopes, eroded ;
- Monserate sandy loam, shallow, 15 to 25 percent slopes, severely eroded;
- Ramona sandy loam, 2 to 5 percent slopes, eroded; and
- Terrace escarpments.

Immediate surrounding land uses include residential development to the south and west and vacant land to the north and east. The entire project site is within the Reche Canyon/Badlands Area Plan of the MSHCP (**Figure 6**, *Relationship to the MSHCP*).

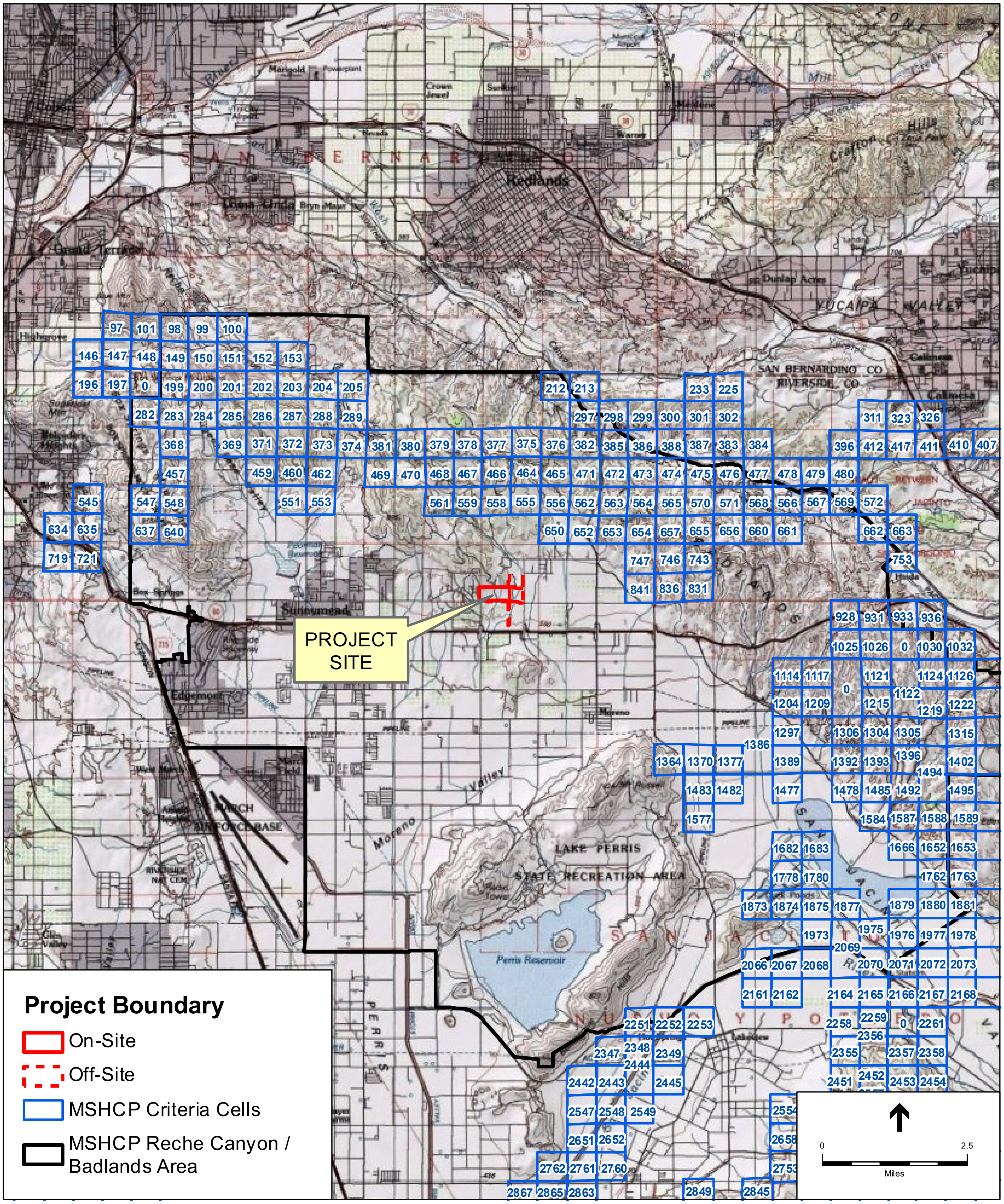


CkF2 - Cieneba rocky sandy loam, 15 to 50 percent slopes, eroded
HaC - Hanford loamy fine sand, 0 to 8 percent slopes
HcC - Hanford coarse sandy loam, 2 to 8 percent slopes
HcD2 - Hanford coarse sandy loam, 8 to 15 percent slopes, eroded
MmB - Monserate sandy loam, 0 to 5 percent slopes
MmC2 - Monserate sandy loam, 5 to 8 percent slopes, eroded
MnE3 - Monserate sandy loam, shallow, 15 to 25 percent slopes, severely eroded
RaB2 - Ramona sandy loam, 2 to 5 percent slopes, eroded
RaB3 - Ramona sandy loam, 0 to 5 percent slopes, severely eroded
TeG - Terrace escarpments
TvC - Tujunga loamy sand, channeled, 0 to 8 percent slopes

SOURCE: USGS Topographic Series (Sunnymead, CA), USDA NRCS SSURGO.

Ironwood Village Project
Figure 5
Soils Map

ESA PCR



SOURCE: USGS Topographic Series; MSHCP.

Ironwood Village Project

Figure 6

Relationship to the MSHCP

ESA PCR

4.1.2 Off-Site Characteristics

The 10.57-acre off-site areas include the proposed manufactured slopes, road improvements, sewer line, and water line areas. The off-site areas are dominated by ruderal vegetation and disturbed areas with only a small acreage of native brittlebush scrub and Riversidean sage scrub. The off-site areas also support some areas of sparsely vegetated river wash areas. A portion of Drainage A and the entirety of Drainage Complex B occurs within the off-site area. The topography of the off-site areas is generally flat with the exception of the proposed northern water line area near an existing water tank, which consists of a fairly steep east-facing slope supporting some native vegetation and rocky outcrops. Elevations within the off-site areas range from the lowest of approximately 1,793 feet above MSL at the southern end of the proposed sewer line to a high of approximately 1,948 feet above MSL at the steepest portion of the proposed water line area. Off-site mapped soils in the project area include seven soil types as follows (NRCS, 2015), as shown in Figure 5:

- Cieneba rocky sandy loam, 15 to 50 percent slopes, eroded;
- Hanford course sandy loam, 2 to 8 percent slopes;
- Monserate sandy loam, shallow, 15 to 25 percent slopes, severely eroded
- Ramona sandy loam, 0 to 5 percent slopes, severely eroded;
- Ramona sandy loam, 2 to 5 percent slopes, eroded;
- Terrace escarpments; and
- Tujunga loamy sand, channeled, 0 to 8 percent slopes.

Land uses immediately surrounding the off-site sewer line include a residential community to the west, SR-60 to the south, and vacant land to the north and east. Land uses immediately surrounding the potential water line areas include residential development to the north, east, and southwest and vacant land to the south and west. Since the proposed manufactured slope areas are directly adjacent to the project site, surrounding land uses are identical to those described in section 4.1.1 above.

4.2 Plant Communities

Descriptions of each of the plant communities found within the study area are provided below, with CDFW CaCodes or Holland Element Codes in parentheses next to each community name. The locations of each of the plant communities are shown in **Figure 7**, *Plant Communities*. **Table 1**, *Plant Communities*, lists each of the plant communities observed, as well as the acreage within the study area. Representative photographs of plant communities found within the study area are included in **Figures 8a** and **8b**, *Site Photographs*.

TABLE 1
PLANT COMMUNITIES

Plant Communities	On-site (acres)	Off-site (acres)
Brittlebush Scrub	2.34	0.27
Brittlebush Scrub/Ruderal	0.31	0.21
Buckwheat Scrub/Ruderal	0.09	0.04
Laurel Sumac Scrub/Ruderal	0.78	-
Riversidean Sage Scrub	3.10	0.12
Riversidean Sage Scrub/Ruderal	-	0.07
Rock Outcrop/Riversidean Sage Scrub	2.15	-
River Wash	-	0.05
Ruderal	38.04	2.50
Ruderal/Brittlebush Scrub	-	0.04
Ruderal/Riversidean Sage Scrub	2.29	0.43
Disturbed	28.68	4.18
Developed	0.70	2.66
Total	**78.48**	**10.57**

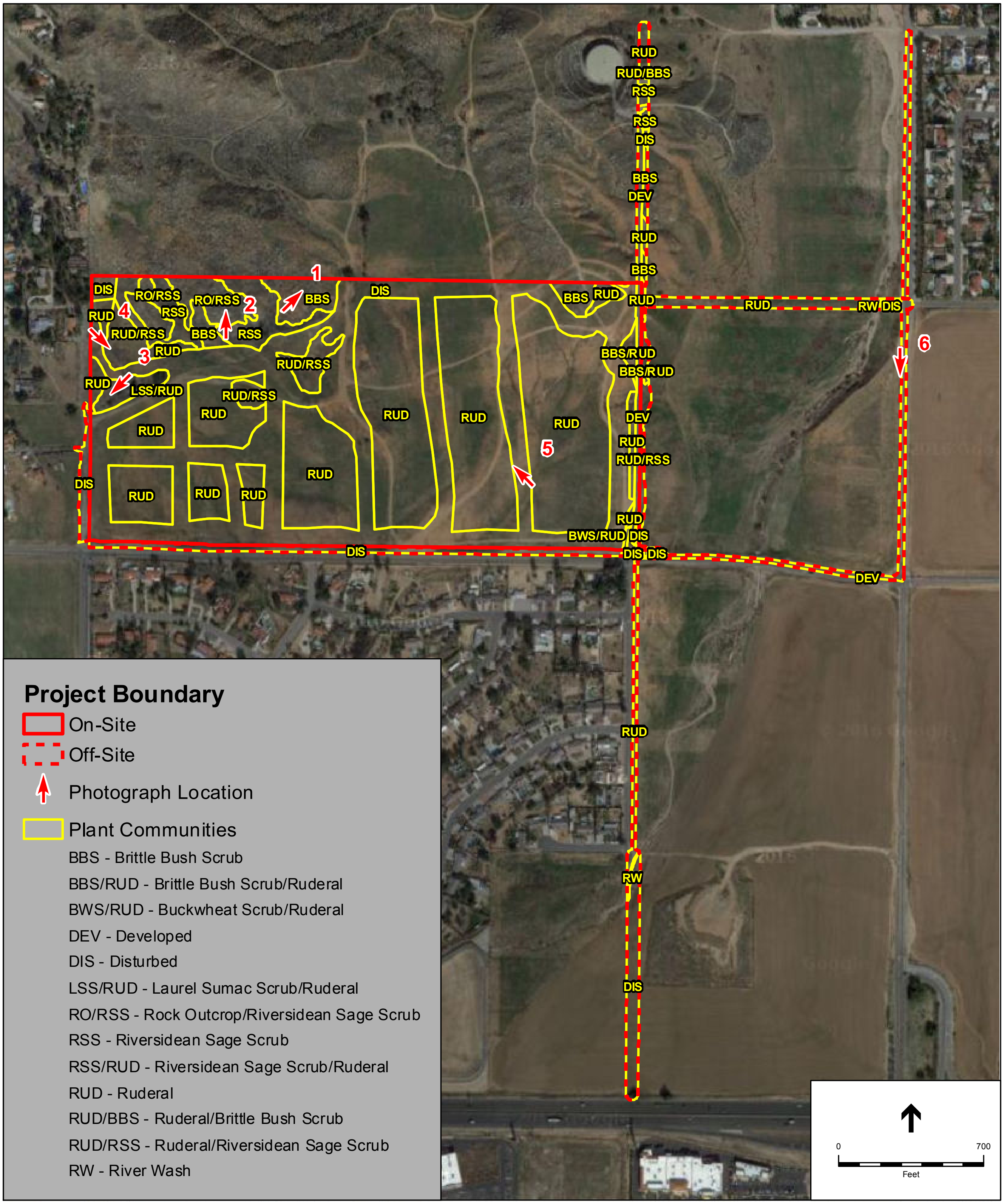
SOURCE: ESA PCR, 2016

4.2.1 Brittlebush Scrub (CaCode 33.030.00)

Brittlebush scrub is a drought tolerant subtype of Riversidean sage scrub dominated by an almost monotypic community of brittlebush (*Encelia farinosa*). Associated species observed within this community included sparsely growing California buckwheat (*Eriogonum fasciculatum*), California sagebrush (*Artemisia californica*), and chia (*Salvia columbariae*). Brittlebush scrub on-site occurs primarily in two patches on the northwestern corner of the project site and a smaller patch in the northeastern corner, comprising approximately 2.34 acres on-site. There is also a small patch of this community located within the off-site water line areas, occupying approximately 0.27 acre off-site.

4.2.2 Brittlebush Scrub/Ruderal (CaCode 33.030.00/Not Applicable)

Brittlebush scrub/ruderal is dominated by species found within the brittlebush scrub community (primarily brittlebush) with interspersed ruderal species. In addition to brittlebush, associated native species found in this community included native species such as blue elderberry (*Sambucus nigra ssp. caerulea*), common fiddleneck (*Amsinckia intermedia*), dove weed (*Croton setigerus*), mule fat (*Baccharis salicifolia*), pinebush (*Ericameria pinifolia*), and western ragweed (*Ambrosia psilostachya*). The ruderal community is described in further detail below (see section 4.2.9). Brittlebush scrub/ruderal occurs on-site in a small area along the eastern boundary in the northeastern portion of the project site and comprises approximately 0.31 acre. There is also a small patch of this community located within the eastern manufactured slope area, occupying approximately 0.21 acre off-site.



SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project
Figure 7
Plant Communities

FSA PCR

PHOTOGRAPH 1. View of the brittlebush scrub community, facing northeast.

PHOTOGRAPH 2. View of the rock outcrop/Riversidean sage scrub community, facing north.

PHOTOGRAPH 3. View of the ruderal community in foreground and the laurel sumac scrub/ruderal community in the background to the left, facing southwest.

Note: Refer to Figure 7 for photograph locations.

SOURCE: ESA PCR, 2016

Ironwood Village Project

Figure 8a

Site Photographs

ESA PCR

PHOTOGRAPH 4. View of the ruderal/Riversidean sage scrub community, facing southeast.

PHOTOGRAPH 5. View of the ruderal community, facing northwest.

PHOTOGRAPH 6. View of the ruderal community within the off-site water line extension area, facing south.

Note: Refer to Figure 7 for photograph locations.

SOURCE: ESA PCR, 2016

ESA PCR

Ironwood Village Project
Figure 8b
Site Photographs

4.2.3 Buckwheat Scrub/Ruderal (CaCode 32.040.02/Not Applicable)

Buckwheat scrub/ruderal community is dominated by California buckwheat (*Eriogonum fasciculatum*) and other species commonly associated with the buckwheat scrub community, including pinebush and brittlebush. This community also supports interspersed areas of ruderal vegetation; the ruderal community is described in further detail below (see section 4.2.9). Buckwheat scrub/ruderal community occurs within one small patch on-site (0.09 acre) and within the off-site eastern manufactured slope area (0.04 acre).

4.2.4 Laurel Sumac Scrub/Ruderal (CaCode 45.455.00/Not Applicable)

Laurel sumac scrub/ruderal is primarily composed of those species found within the laurel sumac scrub community, which is dominated by laurel sumac (*Malosma laurina*) and often associated with other drought-tolerant shrubs, such as California buckwheat or black sage (*Salvia mellifera*). While this community largely consists of species found within the laurel sumac scrub community, ruderal species are interspersed throughout the community. The ruderal community is described in further detail below (see section 4.2.9). Laurel sumac scrub/ruderal community occurs in one area along the western boundary and comprises approximately 0.78 acre on-site only.

4.2.5 Riversidean Sage Scrub (Holland Element Code 32700)

Riversidean sage scrub is characterized by low growing shrubs adapted to semi-arid Mediterranean climate, and are most often found on steep or low gradient slopes that are rarely flooded. This community is fairly open and dominated by California sagebrush, California buckwheat, , and foxtail chess. Other associated species include pinebush, brittlebush, and caterpillar phacelia (*Phacelia cicutaria*). The Riversidean sage scrub community occurs in two patches on the northwestern corner of the project site and comprises approximately 3.10 acres on-site. There is also a small patch of this community located within the off-site water line areas, occupying approximately 0.12 acre off-site.

4.2.6 Riversidean Sage Scrub/Ruderal (Holland Element Code 32700/ Not Applicable)

Riversidean sage scrub/ruderal is primarily composed of those species found within the Riversidean sage scrub community, which is described in section 4.2.5 above. While this community largely consists of species found within the Riversidean sage scrub community, ruderal species are interspersed throughout the community. The ruderal community is described in further detail below (see section 4.2.9). Riversidean sage scrub/ruderal community occurs in one area along the western boundary and comprises approximately 0.07 acre off-site only.

4.2.7 Rock Outcrop/Riversidean Sage Scrub (Not Applicable/Element Code 32700)

Rock outcrop/Riversidean sage scrub includes rock outcrop areas, which consist of rocky, sparsely vegetated areas typically found along the hillsides on the northwest corner of the project site, and is interspersed with vegetation that is characteristic of the Riversidean sage scrub community described in section 4.2.5 above. Additional associated species observed in the rock outcrop/Riversidean sage scrub communities on-site included cane cholla (*Cylindropuntia californica* var. *parkeri*) and two-color rabbit tobacco (*Pseudognaphalium bicolor*). There are two patches of rock outcrop/Riversidean sage scrub on the northwestern corner of the project site, which occupies approximately 2.15 acres on-site only.

4.2.8 River Wash (Not Applicable)

River wash consists of prevailingly coarse-textured but variable material, ranging from sand to gravel. It usually is flood-swept, though it may lie slightly above present overflows. The sandy areas are loose with some silt and other fine materials. Sparse vegetation within the river wash areas include giant reed (*Arundo donax*), flatspine bur ragweed (*Ambrosia acanthicarpa*), pucturevine (*Tribulus terrestris*), and common sunflower (*Helianthus anuus*). River wash areas comprise approximately 0.05 acre off-site only associated with the mainstem Drainage B within the sewer line and water line areas.

4.2.9 Ruderal (Not Applicable)

Ruderal vegetation is found in areas heavily disturbed by human activities, such as roadsides, graded fields, and manufactured slopes. Within the study area, ruderal species observed include cheeseweed (*Malva parviflora*), cudweed aster (*Corethrogyne filaginifolia*), foxtail chess (*Bromus madritensis* ssp. *rubens*), gum tree (*Eucalyptus* sp.), London rocket (*Sisymbrium irio*), Mediterranean schismus (*Schismus barbatus*), Mexican palo verde (*Parkinsonia aculeata*), ripgut grass (*Bromus diandrus*), shortpod mustard (*Hirschfeldia incana*), tocalote (*Centaurea melitensis*), tree tobacco (*Nicotiana glauca*), wild oat (*Avena* sp.), and wild radish (*Raphanus raphanistrum*). Ruderal areas dominant the project site and comprised approximately 38.04 acres on-site. The ruderal community is also prominent throughout the off-site areas, totaling 2.50 acres.

4.2.10 Ruderal/Brittlebush Scrub (Not Applicable/ CaCode 33.030.00)

Ruderal/brittlebush scrub is dominated by ruderal, weedy species but exhibit sparse, remnant species associated with the brittlebush scrub community. The brittlebush scrub and ruderal communities are described above in sections 4.2.1 and 4.2.9, respectively. Only one small ruderal/brittlebush scrub patch was observed within the water line area, consisting of approximately 0.04 acre off-site only.

4.2.11 Ruderal/Riversidean Sage Scrub (Not Applicable/Holland Element Code 32700)

Ruderal/Riversidean sage scrub is dominated by ruderal, weedy species but exhibit sparse, remnant species associated with the Riversidean sage scrub community. The Riversidean sage scrub and ruderal communities are described above in sections 4.2.5 and 4.2.9, respectively. The ruderal/Riversidean sage scrub community occupies the northwestern corner and the center of the project site, consisting of approximately 2.29 acres on-site. This community also occurs within the eastern manufactured slope area, consisting of approximately 0.43 acre off-site.

4.2.12 Disturbed (Not Applicable)

Disturbed areas are heavily affected by human activities, including dirt roads, graded fields, and manufactured slopes; as a consequence, these areas support little to no vegetation. While ruderal areas comprise the majority of the project site, disturbed areas account for much of the remaining space occupying approximately 28.68 acres on-site. Disturbed areas dominate the off-site areas, consisting of 4.18 acres.

4.2.13 Developed (Not Applicable)

Developed areas are associated with an unpaved access road that occurs along the eastern boundary of the project site and off-site manufactured slope areas. Developed areas occupied approximately 0.70 acre on-site and 2.66 acres off-site.

4.3 General Plant Inventory

The plant communities discussed above are comprised of numerous plant species. Observations regarding the plant species present were made during the field visits to the study area, and a list of all plant species observed is provided in **Appendix A**, *Floral and Faunal Compendium*. Special-status plant species occurring or potentially occurring within the study area are discussed below in section 4.7.5, *Special-status Plant Species*.

4.4 General Wildlife Inventory

The plant communities discussed above provide habitat for common wildlife species. Observations regarding the wildlife species present were made during the field visits to the study area, and a list of all species observed is provided in **Appendix A**. Special-status wildlife species occurring or potentially occurring are discussed below in section 4.7.6, *Special-status Wildlife Species*.

4.5 Wildlife Movement

4.5.1 Overview

Wildlife corridors link together areas of suitable habitat that are otherwise separated by rugged terrain, changes in vegetation, or human disturbance. The fragmentation of open space areas by urbanization creates isolated "islands" of wildlife habitat. In the absence of habitat linkages that allow movement to adjoining open space areas, various studies have concluded that some wildlife species, especially the larger and more mobile mammals, will not likely persist over time in fragmented or isolated habitat areas because they prohibit the infusion of new individuals and genetic material (MacArthur and Wilson, 1967; Soulé, 1987; Harris and Gallagher, 1989; Bennett, 1990).

Corridors effectively act as links between different populations of a species. A group of smaller populations (termed "demes") linked together via a system of corridors is termed a "metapopulation." The long-term health of each deme within the metapopulation is dependent upon its size and the frequency of interchange of individuals (immigration vs. emigration). The smaller the deme, the more important immigration becomes, because prolonged inbreeding with the same individuals can reduce genetic variability. Immigrant individuals that move into the deme from adjoining demes mate with individuals and supply that deme with new genes and gene combinations that increases overall genetic diversity. An increase in a population's genetic variability is generally associated with an increase in a population's health and long-term viability.

Corridors mitigate the effects of habitat fragmentation by: (1) allowing animals to move between remaining habitats, which allows depleted populations to be replenished and promotes genetic diversity; (2) providing escape routes from fire, predators, and human disturbances, thus reducing the risk that catastrophic events (such as fires or disease) will result in population or local species extinction; and (3) serving as travel routes for individual animals as they move within their home ranges in search of food, water, mates, and other needs (Noss, 1983; Fahrig and Merriam, 1985; Simberloff and Cox, 1987; Harris and Gallagher, 1989).

Wildlife movement activities usually fall into one of three movement categories: (1) dispersal (e.g., juvenile animals from natal areas, individuals extending range distributions); (2) seasonal migration; and, (3) movements related to home range activities (foraging for food or water, defending territories, searching for mates, breeding areas, or cover). Although the nature of each of these types of movement is species specific, large open spaces will generally support a diverse wildlife community representing all types of movement. Each type of movement may also be represented at a variety of scales from non-migratory movement of amphibians, reptiles, and some birds on a "local" level to home ranges encompassing many square-miles for large mammals moving on a "regional" level. A number of terms have been used in various wildlife movement studies, such as "wildlife corridor," "travel route," and "wildlife crossing" to refer to areas in which wildlife move from one area to another. To clarify the meaning of these terms and facilitate the discussion on wildlife movement in this study, these terms are defined as follows:

<u>Travel Route</u>: A landscape feature (such as a ridgeline, drainage, canyon, or riparian strip) within a larger natural habitat area that is used frequently by animals to facilitate movement and provide access to necessary resources (e.g., water, food, cover, den areas). The travel route is generally preferred because it provides the least amount of topographic resistance in moving from one area to another; it contains adequate food, water, and/or cover while moving between habitat areas; and provides a relatively direct link between target habitat areas.

Wildlife Corridor: A piece of habitat, usually linear in nature, that connects two or more habitat patches that would otherwise be fragmented or isolated from one another. Wildlife corridors are usually bounded by urban land areas or other areas unsuitable for wildlife. The corridor generally contains suitable cover, food, and/or water to support species and facilitate movement while in the corridor. Larger, landscape-level corridors (often referred to as “habitat or landscape linkages”) can provide both transitory and resident habitat for a variety of species.

Wildlife Crossing: A small, narrow area, relatively short in length and generally constricted in nature, that allows wildlife to pass under or through an obstacle or barrier that otherwise hinders or prevents movement. Crossings typically are manmade and include culverts, underpasses, drainage pipes, and tunnels to provide access across or under roads, highways, pipelines, or other physical obstacles. These are often “choke points” along a movement corridor.

4.5.2 Wildlife Movement Within the Study Area

As previously described, wildlife movement activities occur at a variety of scales from a “local” level to a “regional” level. Regional movement through the study area is restricted due to the urbanization of the region and the proximity to a major freeway (SR-60) (refer to **Figure 9**, *Regional Aerial Photograph*). The study area is immediately surrounded by residential development to the south and west. Although there is vacant land directly to the north and east of the study area, the land to the east is highly disturbed and mostly cleared of natural vegetation and there are a number of residential communities adjacent to the eastern boundary of the vacant land. Additionally, the study area is located about 0.5 mile to north of the SR-60. Although regional movement through this area is likely limited, there is some potential for local movement through the study area via the open area directly to the north which comprises the foothills of the Badlands. Although the study area connects to the open area to the north, the study area is dominated by ruderal and disturbed areas with limited native vegetation.

The project site only supports one ephemeral drainage that conveys minor road runoff from Ironwood Avenue with no associated vegetation (Drainage A), which is unlikely to facilitate wildlife movement. Additionally, Drainage A initiates on-site and meanders for approximately 396 linear feet before exiting the project site via a culvert beneath Ironwood Avenue. Drainage Complex B occurs within the off-site areas and comprises the mainstem Drainage B, which is a USGS mapped blueline stream, and five small tributaries (Drainages B1 through B5). The mainstem Drainage B does support some ruderal and non-native vegetation (e.g. giant reed). Drainage B appears to initiate in the foothills of the Badlands to the north of the off-site areas and becomes channelized just west of the off-site sewer line area.

SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project

Figure 9

Regional Aerial Photograph

ESA PCR

Due to the limited vegetation within Drainage B and lack of connection to suitable habitat downstream due to development, Drainage B is not expected to function as a wildlife movement corridor. The smaller tributaries (Drainages B1 through B5) are also ephemeral drainages with limited upland vegetation, which initiate at the peak of a small ridge upstream from the off-site water line area and appear to support little to no surface connection to the mainstem Drainage B likely due to decades of disturbance from agriculture and/or weed abatement activities. Drainage B5 does not appear to support any natural watershed and appears to be relict in nature. Vegetation within the drainage appears to be supported by artificial discharges from the water tank blow-off pipe observed at the headwaters of Drainage B5. Due to the limited vegetation and watershed, as well as the disturbed nature of the downstream areas off-site, the tributaries do not facilitate wildlife movement through the study area.

The study area is not within any Core or Linkage areas as identified by the MSHCP (Dudek & Associates, 2003). There is one proposed linkage (Proposed Linkage 4) approximately 2.1 miles to the north of the study area and one existing core (Core H) roughly 4.0 miles to the south of the study area. Proposed Linkage 4 would include upland habitat within Reche Canyon and provide connection to Box Springs Reserve, the Badlands, and San Bernardino County. The open area directly to the north of the study area does directly connect to Proposed Linkage 4. Existing Core H includes Lake Perris State Recreation Area and San Jacinto Wildlife Area. There is no direct connection from the study area to Core H, which are separated by urban development. The study area is not within any linkages identified by the South Coast Missing Linkages report; the nearest linkage design identified is for the San Bernardino–San Jacinto Connection located approximately 3.5 miles to the east (South Coast Wildlands, 2008). Since the study area is not identified as a linkage by the MSHCP or South Coast Wildlands, and it does not support habitat that connects two or more habitat patches that would otherwise be fragmented or isolated from one another, the study area is not considered a wildlife corridor. The study area may provide limited opportunities for wildlife movement, more likely for local wildlife movement as described below.

Movement on a smaller or "local" scale could occur within the study area for species that are less restricted in movement pathway requirements or are adapted to urban areas (e.g., raccoon [*Procyon lotor*], stripped skunk [*Mephitis mephitis*], coyote [*Canis latrans*], and bird species in general). Habitat within the study area is dominated by ruderal and disturbed areas with some portions supporting native vegetation, including brittlebush scrub, buckwheat scrub, and Riversidean sage scrub. As such, it likely supports some wildlife movement within the study area and/or nearby areas for foraging and shelter. Data gathered from the biological survey indicates that the study area contains habitat that supports common species of invertebrates, reptiles, birds, and small mammals. The home range and average dispersal distance of many of these species may be entirely contained within the study area and immediate vicinity.

Populations of animals such as insects, reptiles, small mammals, and a few bird species may find all their resource requirements without moving far or outside of the study area at all. Occasionally, individuals expanding their home range or dispersing from their parental range could attempt to move outside of the study area, if feasible, based on the surrounding restrictions to movement from development (see above). Bird species may fly over the development and freeways to utilize the study area for foraging, although this is expected to be limited due to the high level of human activity in the region and higher quality foraging habitats in nearby open areas with less human disturbance, particularly the Badlands to the north.

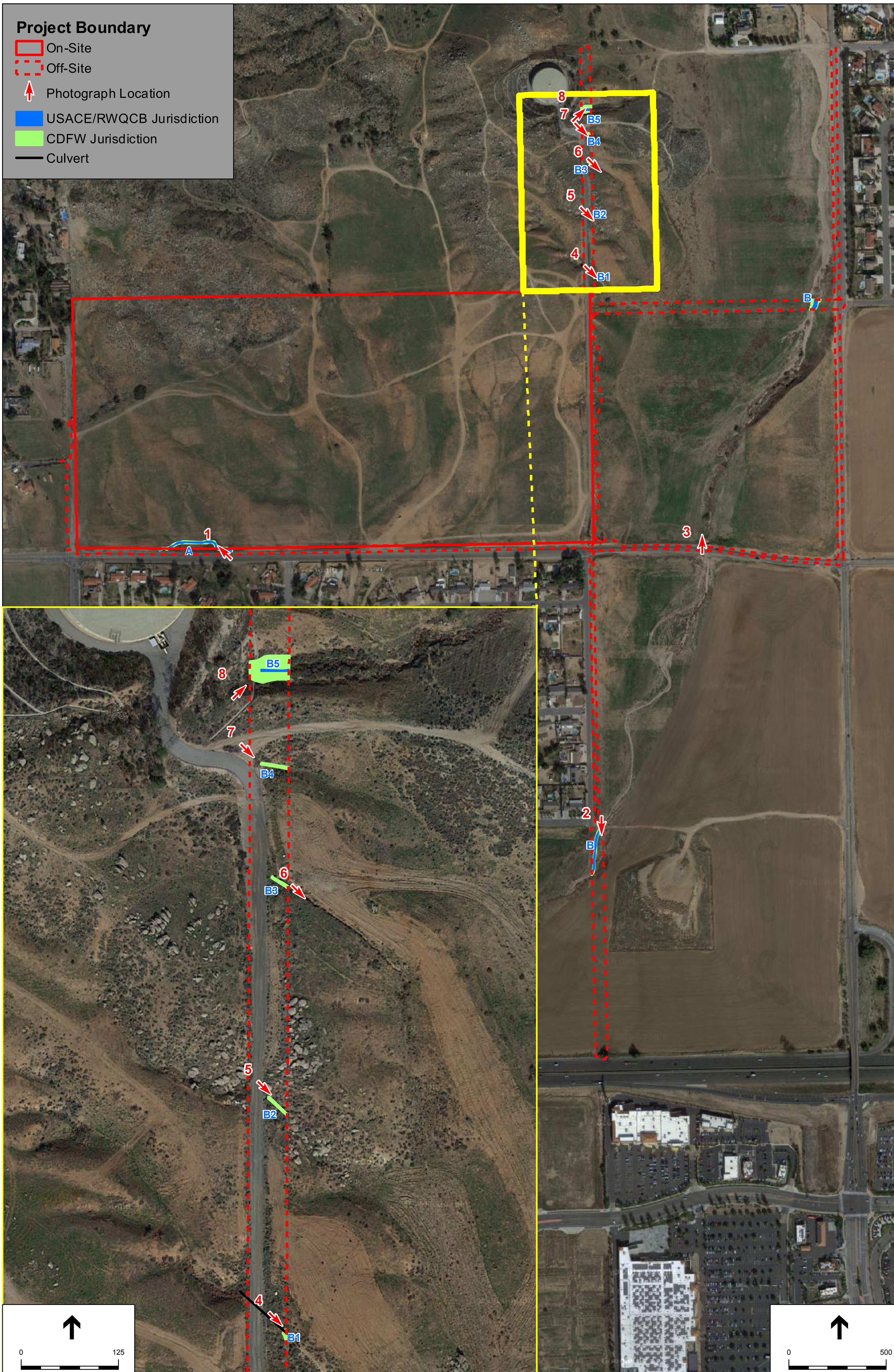
In summary, the study area may support live-in and movement habitat for species on a local scale (i.e., some live-in and at least marginal movement habitat for invertebrates, reptiles, birds, and small mammal species). However, due to surrounding development, the proximity to the I-60 freeway, and the ephemeral nature and limited watershed of the drainages, the study area likely provides little to no function to facilitate movement for wildlife species on a regional scale and it is not identified as a regionally important dispersal or seasonal migration corridor by the MSHCP or by South Coast Wildlands.

4.6 Jurisdictional Waters

An investigation of on- and off-site jurisdictional waters was performed by Amir Morales, Principal Regulatory Scientist, on September 19, 2014. An additional site visit was conducted by Amir Morales on December 10, 2014 following a series of storm events that occurred on December 2, 3, and 4, 2014 totaling nearly two inches of rain in that period.[3] Based on the results of the investigation, Drainage A and Drainage Complex B (Drainages B & B1through B5) were determined to support a total of approximately 0.057 acre of USACE/RWQCB "waters of the U.S." and 0.165 acre of CDFW jurisdictional streambed (**Figure 10**, *Jurisdictional Features*). A summary of jurisdictional features assessed within the study area is provided in **Table 2**, *Jurisdictional Features*. Photographs of drainage features are provided as **Figures 11a** and **11b**, *Drainage Photographs*.

The study area is located within rolling valley topography located southeast of Reche Canyon and south/southwest of The Badlands mountain range. The study area is located within the San Jacinto Watershed and generally drains toward the south, eventually reaching the Perris Valley Storm Drain which ultimately reaches the San Jacinto River and then Canyon Lake. The USGS Sunnymead topographic Quadrangle depicts a blueline stream originating in the foothills to the north with headwaters located approximately 2,000 linear feet from the on-site study area. The mapped blueline drainage feature enters the project site near the center of the northern project boundary and bisects the property. The property has been subjected to seasonal dry-farming and/or weed abatement activities for several decades. Based on the jurisdictional assessments performed by ESA PCR, no discernible streambed or indicators of flow were observed within the area historically mapped as a blueline drainage feature during the September 19, 2014 jurisdictional delineation. In order to determine if jurisdictional field indicators reestablish following moderate rain events, Amir Morales returned to investigate the site following a series of early December 2014 storm events yielding nearly 2-inches of rain over three consecutive days. In our experience, this amount of rain would have reestablished some evidence of flow capable of eroding a streambed and/or supporting some jurisdictional field indicators based on the USACE's arid delineation guidelines.

3 Based on WeatherCurrents.com precipitation data accessed at http://weathercurrents.com/morenovalley/ArchiveDec2014.do obtained on July 26, 2016.



SOURCE: Google Maps, 2015.

Ironwood Village Project
Figure 10
Jurisdictional Features

ESA PCR

Attachment: DBESP Report (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

TABLE 2
JURISDICTIONAL FEATURES

Drainage (Study Area)	Length (ft)	USACE/ RWQCB (acres)	CDFW (acres)	Flow Classification
A (On-Site)	285	0.023	0.046	Ephemeral
A (Off-Site)	111	0.007	0.013	Ephemeral
Drainage A Subtotal	***396***	***0.030***	***0.059***	
B (Off-Site)	306	0.026	0.069	Ephemeral
B1 (Off-Site)[b]	0[a]	N/A	0.001	Ephemeral
B2 (Off-Site) [b]	32	N/A	0.001	Ephemeral
B3 (Off-Site) [b]	25	N/A	0.001	Ephemeral
B4 (Off-Site) [b]	34	N/A	0.001	Ephemeral
B5 (Off-Site)	35	0.002	0.033	Ephemeral
Drainage Complex B Subtotal	***432***	***0.028***	***0.106***	
Total	**828**	**0.058**	**0.165**	

[a] Less than one linear foot of jurisdiction occurs within Drainage B1 as the majority of the drainage within the off-site study area is associated with an existing corrugated metal pipe that was not quantified.

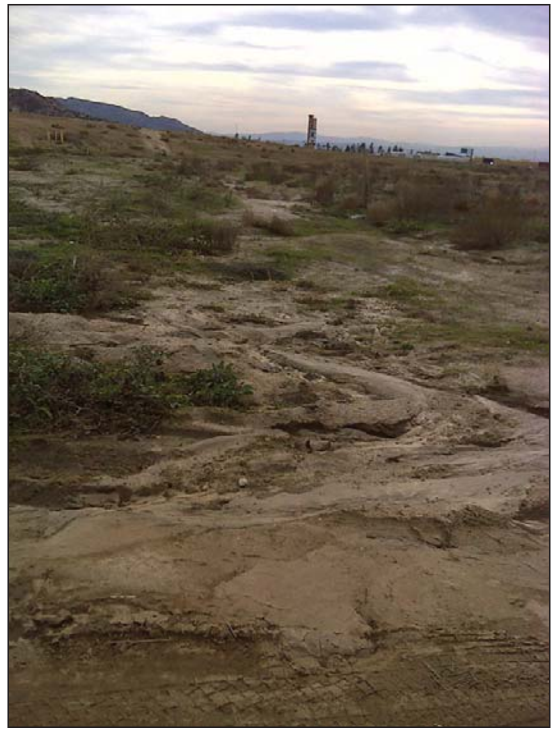
[b] Drainage did not support jurisdictional field indicators associated with “waters of the U.S” regulated by the USACE and RWQCB pursuant to the Clean Water Act.

SOURCE: ESA PCR, 2014

However, no ordinary water mark, sediment deposition/sorting, debris wracks, bed/bank, streambed associated vegetation, or other jurisdictional field indicators were observed immediately following the consecutive rain events. As a result, it was determined that no jurisdiction occurs within the area mapped as a blueline drainage feature within the study area.

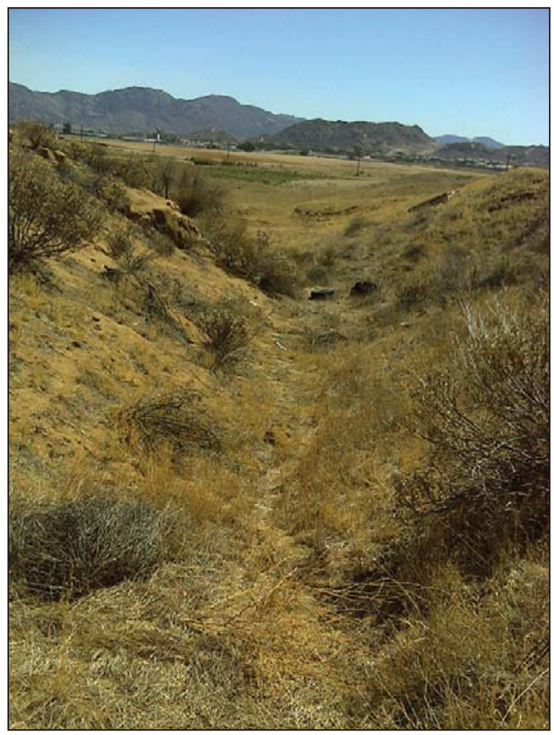
It was noted that the USGS Sunnymead Quadrangle depicts a small water feature at the off-site headwaters, located approximately 2,000 linear feet north of the site where the blueline feature initiates. As such, it is feasible that the mapped water feature is associated with a historic stock pond, which may have supported a small drainage that ultimately extended to the project study area when water was historically discharged from the feature and/or significant storm events caused it to overflow. However, based on review of current aerial imagery in Google Earth, no water feature appears to persist within the off-site headwaters in the current condition capable of supporting a discernible streambed. Consequently, the only jurisdictional feature identified within the on-site study area during the December 2014 site visit is a minor roadside ditch identified as Drainage A. Jurisdiction within the off-site study areas is limited to a mainstem drainage identified as Drainage B, and Drainage Complex B which is comprised of tributary Drainages B1through B5. No riparian and/or hydrophytic vegetation communities were observed on the study area that would warrant the need for a formal wetland analysis. Therefore, no jurisdictional wetlands or special aquatic sites were determined to occur within the project study areas. The following provides a summary of jurisdictional drainage features identified within the project study areas:

PHOTOGRAPH 1. View of Drainage A, facing northwest (upstream).



PHOTOGRAPH 2. View of Drainage B within the off-site sewer line area, facing south (downstream).

PHOTOGRAPH 3. View of Drainage B within the off-site water line area, facing north (upstream).



PHOTOGRAPH 4. View of Drainage B1, facing southeast (downstream).

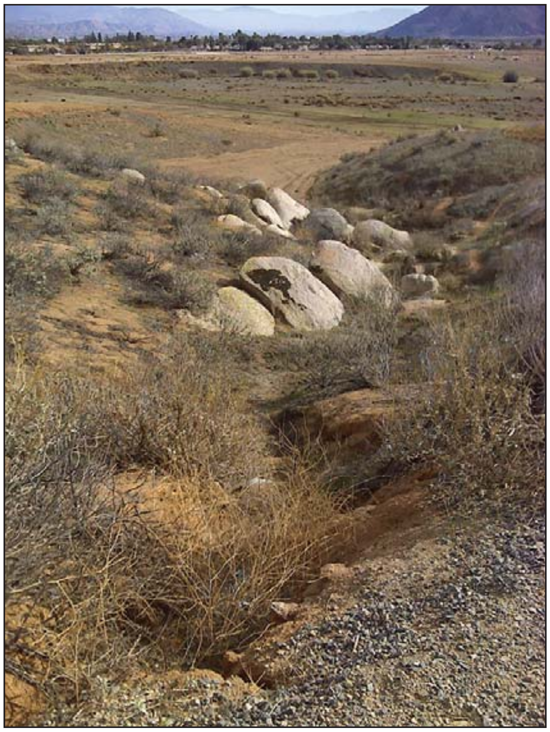
Note: Refer to Figure 10 for photograph locations.

SOURCE: ESA PCR, 2016

Ironwood Village Project

Figure 11a
Drainage Photographs

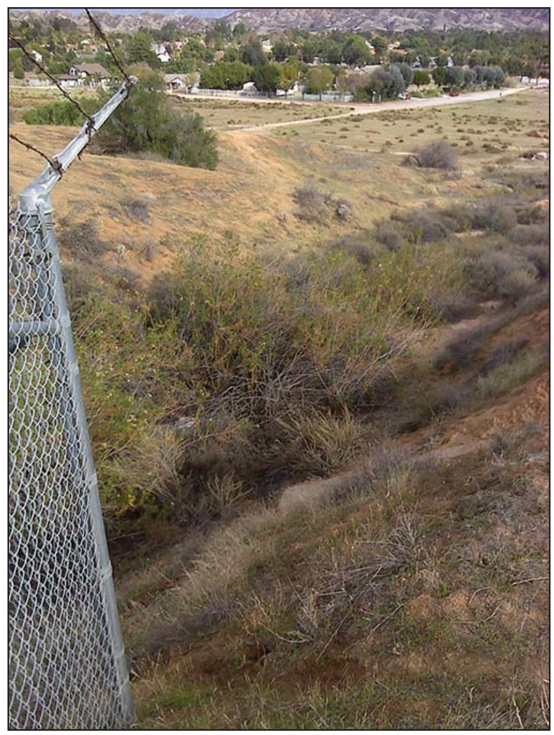
ESA PCR



PHOTOGRAPH 5. View of Drainage B2, facing southeast (downstream).

PHOTOGRAPH 6. View of Drainage B3, facing southeast (downstream).

PHOTOGRAPH 7. View of Drainage B4, facing southeast (downstream).



PHOTOGRAPH 8. View of Drainage B5, facing northeast (downstream).

Note: Refer to Figure 10 for photograph locations.

SOURCE: ESA PCR, 2016

Ironwood Village Project

Figure 11b

Drainage Photographs

ESA PCR

4.6.1 Drainage A

Drainage A is an unvegetated roadside ditch that establishes only when rain events generate sufficient runoff from Ironwood Avenue to erode a small channel through sandy disturbed soils. The ephemeral ditch enters the Ironwood Avenue Right-of-Way within the off-site study area then enters the on-site study area along the southern project boundary, extending for approximately 285 linear feet. The ditch then enters a corrugated metal pipe (CMP) beneath Ironwood Avenue which is ultimately conveyed through the rural residential development to the south and into a water quality basin adjacent to SR-60. Drainage A ranged from 2 to 3 feet in jurisdictional channel width and contains sandy loam soils that are periodically disturbed by weed abatement activities. A photograph of Drainage A is provided in Figure 11a.

Drainage A within the on-and off-site study area supports a total of approximately 396 linear feet of ephemeral unvegetated roadside ditch, containing 0.023 acre of on-site and 0.007 acre of off-site non-wetland USACE "waters of the U.S" totaling 0.030 acre, as well as 0.46 acre of on-site and 0.013 acre of off-site CDFW jurisdictional streambed totaling 0.059 acre.

4.6.2 Drainage Complex B

4.6.2.1 Drainage B

Drainage B is an ephemeral sandy wash that originates off-site approximately 2 miles to the northwest along Reche Canyon Road. The drainage meanders along the road until it reaches the valley floor extending across Trust Way, crossing Kalmia Avenue, and then conveys runoff along the west side of Moreno Beach Drive for approximately a quarter-mile prior to crossing the off-site Water Line Alternative 1. The drainage feature then extends south/southwest for another quarter-mile before entering a culvert beneath Ironwood Avenue and meandering for another quarter-mile prior to entering the off-site sewer line study area. Drainage B then continues for approximately 700 linear feet toward the southwest ultimately entering a detention basin located directly northeast of the Nason Street exit of SR-60. Drainage B within the off-site study areas ranges from approximately 4-10 feet in USACE/CDFW channel width and is entirely unvegetated. Soils within the wash are comprised of loamy sands of the Tujunga series consistent with the mapping by NRCS. Photographs of Drainage B are provided in Figure 11a.

Drainage B within the off-site sewer line and Water Line Alternative 1 total approximately 306 linear feet of unvegetated ephemeral sandy wash totaling approximately 0.026 acre of non-wetland USACE/RWQCB "waters of the U.S." and 0.069 acre of CDFW jurisdictional streambed.

4.6.2.2 Drainages B1- B5

Drainages B1through B5 are minor ephemeral drainages that with the exception of Drainage B5 (which appears to accept flow from a water tank bypass pipe) function to drain a very limited watershed west of the existing water district road that runs parallel to the eastern boundary of the project site. Drainage B5 appears to support flows from two small slope v-ditches as well as a pipe at its headwaters that appears to drain the existing water tank directly to the west, and was likely formed by controlled releases from the water tank structure. Otherwise, no natural watershed capable eroding such an incised drainage feature occurs upstream. Drainages B1 through B3 have small CMP culverts that convey limited runoff west of the water district road and support very weak indicators of flow and/or bed and bank. Drainage B4 does not support a pipe culvert rather a small pipe that drains surface flow from a small v-ditch directly west of the road. No discernible indicators associated with "waters of the U.S." such as an ordinary high water mark, sediment deposition/sorting, debris wracks, streambed associated vegetation, or other USACE jurisdictional field indicators indicative of the arid southwest region were observed within Drainages B1-B4 immediately following the consecutive rain events of early December 2014. However, Drainages B1 through B4 do support topographic low points with banks typical of headwater swales. Drainage B5 was presumed to support USACE/RWQCB jurisdiction due to the presence of an ordinary high water mark, which ultimately became indiscernible after approximately 1,000 linear feet. Given the reasonable proximity to Drainage B5 observed in the field in light of periodic disturbance to the sandy soils from weed abatement activities, Drainage B5 was presumed to be regulated as "waters of the U.S." Drainages B1through B5 were all presumed to support CDFW jurisdictional streambed.

Drainages B1 through B4 exhibit sparse upland scrub vegetation and ruderal grasses and are otherwise unvegetated. Drainage B5 supports a small patch of mule fat along approximately 15 linear feet of the headwaters directly downstream of the water tank pipe and mostly upland scrub vegetation beyond. Drainages B1through B5 contain CDFW jurisdictional channel widths ranging from 0.5 to 3 feet, while Drainage B5 exhibits USACE jurisdiction averaging approximately 2 feet in channel width and a CDFW channel width approximately averaging 10 feet. Drainage Complex B drainage features all were observed to support sandy loam soils. Photographs of Drainage Complex B are provided in Figures 11a and 11b.

Drainage B5 within the Water Line Alternative 2 study area totals approximately 0.002 acre of non-wetland ephemeral "waters of the U.S." regulated by the USACE/RWQCB. Drainage Complex B (Drainages B1 through B5) total approximately 0.037 acre of CDFW jurisdictional streambed and associated vegetation.

4.7 Special-status Biological Resources

The following discussion describes the plant and wildlife species present, or potentially present, within the study area that have been afforded special recognition by Federal, State, or local resource conservation agencies and organizations. These species have declining or limited population sizes, usually resulting from habitat loss. Also discussed are habitats that are unique, of relatively limited distribution, or of particular value to wildlife. Protected special-status species are classified by either Federal or State resource management agencies, or both, as threatened or endangered, under provisions of the Federal and State Endangered Species Acts (FESA and CESA, respectively).

4.7.1 Federal Special-status Resource Protection and Classifications

4.7.1.1 FESA

The FESA of 1973 defines an endangered species as “any species which is in danger of extinction throughout all or a significant portion of its range.” A threatened species is defined as “any species which is likely to become an Endangered species within the foreseeable future throughout all or a significant portion of its range.” Under provisions of Section 9(a)(1)(B) of the FESA, unless properly permitted, it is unlawful to “take” any listed species. “Take” is defined in Section 3(18) of FESA: “...harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” Further, the USFWS, through regulation, has interpreted the terms “harm” and “harass” to include certain types of habitat modification as forms of “take.” These interpretations, however, are generally considered and applied on a case-by-case basis and often vary from species to species. In a case where a property owner seeks permission from a federal agency for an action which could affect a federally listed plant or animal species, the property owner and agency are required to consult with USFWS pursuant to Section 7 of the ESA if there is a federal nexus, or pursuant to Section 10 of the ESA. Section 9(a)(2)(b) of the FESA addresses the protections afforded to listed plants.

All references to Federally-protected species in this BRA include the most current published status or candidate category to which each species has been assigned by USFWS. For purposes of this assessment the following acronyms are used for Federal status species, as applicable:

- FE Federally-listed as Endangered
- FT Federally-listed as Threatened
- FPE Federally proposed for listing as Endangered
- FPT Federally proposed for listing as Threatened
- FPD Federally proposed for delisting
- FC Federal candidate species (former C1 species)

Some of the USFWS offices maintain a database of listed species within their jurisdiction, for example the Sacramento[4] and Carlsbad[5] offices. The Carlsbad USFWS Office jurisdiction encompasses the counties of Los Angeles, Orange, Riverside, San Bernardino, Imperial, and San Diego.

4.7.1.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) protects individuals as well as any part, nest, or eggs of any bird listed as migratory. In practice, Federal permits issued for activities that potentially

4 http://www.fws.gov/sacramento/ES_Species/Lists/es_species_lists-overview.htm
5 http://www.fws.gov/carlsbad/SpeciesStatusList/CFWO_Species_Status_List.htm

impact migratory birds typically have conditions that require pre-disturbance surveys for nesting birds. In the event nesting is observed, a buffer area with a specified radius must be established, within which no disturbance or intrusion is allowed until the young have fledged and left the nest, or it has been determined that the nest has failed. If not otherwise specified in the permit, the size of the buffer area varies with species and local circumstances (e.g., presence of busy roads, intervening topography, etc.), and is based on the professional judgment of a monitoring biologist. A list of migratory bird species protected under the MBTA is published by USFWS.

4.7.1.3 Federal Clean Water Act, Section 404

Section 404 of the Clean Water Act (CWA) regulates the discharge of dredged or fill material into waters of the U.S. and authorizes the Secretary of the Army, through the Chief of Engineers, to issue permits for such actions. Implementing regulations for the CWA define waters of the U.S. as "rivers, creeks, streams, and lakes extending to their headwaters and any associated wetlands." Wetlands are defined as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions." The permit review process entails an assessment of potentially adverse impacts to USACE jurisdictional waters of the U.S.

Over the years, the USACE has modified its regulations, typically due to evolving policy or judicial decisions, through the issuance of Regulatory Guidance Letters, memorandums, or more expansive instruction guidebooks. These guidance documents help to update and define how jurisdiction is claimed, and how these waters of the U.S. will be regulated. The most recent, significant modification occurred on June 5, 2007, subsequently updated in December 2008, when the USACE and the U.S. Environmental Protection Agency (USEPA) issued a series of guidance documents outlining the requirements and procedures, effective immediately, to establish jurisdiction under Section 404 of the CWA and the Section 10 of the Rivers and Harbors Act of 1899. These documents are intended to be used for all jurisdictional delineations and provide specific guidance for the jurisdictional determination of potentially jurisdictional features affected by the U.S. Supreme Court rulings in *Rapanos v. the United States* and *Carabell v. the United States* 547 U.S. 715 (2006) (jointly referred to as *Rapanos*).

The *Rapanos* case outlines the conditions and criteria used by the USACE to assess and claim jurisdiction over non-isolated, non-navigable, ephemeral tributaries. Under a plurality ruling, the Court noted that certain "not relatively permanent" (i.e., ephemeral), non-navigable tributaries must have a "significant nexus" to downstream traditional navigable waters to be jurisdictional. An ephemeral tributary has a significant nexus to downstream navigable "waters" when it has "more than a speculative or an insubstantial effect on the chemical, physical, and/or biological integrity of a Traditional Navigable Water (TNW)." A significant nexus is established through the consideration of a variety of hydrologic, geologic and ecological factors specific to the particular drainage feature in question. For drainage features that do not meet the significant nexus criteria, a significant nexus determination is provided by the USACE to the USEPA for the final determination of federal jurisdiction. Drainage features that do not meet the significant nexus criteria based on completion of an AJD, and/or are determined to be isolated pursuant to the SWANCC ruling (see below), may still be regulated by California Department of Fish and

Wildlife (CDFW) under Fish and Game Code Section 1600 or the Regional Water Quality Control Board (RWQCB) under the Porter-Cologne Water Quality Act.

On January 15, 2003, the USACE and USEPA issued a Joint Memorandum to provide clarifying guidance regarding the United States Supreme Court ruling in the *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers*, No. 99-1178 (January 9, 2001) ("the SWANCC ruling"), (Federal Register: Vol. 68, No. 10.). This ruling held that the CWA does not give the federal government regulatory authority over non-navigable, isolated, intrastate waters. As a result of this decision, some previously regulated depressional areas such as mudflats, sandflats, wetlands, prairie potholes, wet meadows, playa lakes, natural ponds, and vernal pools, which are not hydrologically connected to other intra- or inter-state "waters of the U.S.," are no longer regulated by the USACE.

4.7.1.4 Federal Clean Water Act, Section 401

The mission of the RWQCB is to develop and enforce water quality objectives and implement plans that will best protect the beneficial uses of the state's waters, recognizing local differences in climate, topography, geology, and hydrology. The California RWQCB is responsible for implementing compliance not only with state codes such as the California Water Code, but also some federal acts such as Section 401 of the CWA. Section 401 of the CWA requires that any applicant for a federal permit for activities that involve a discharge to waters of the state shall provide the federal permitting agency with a certification from the state in which the discharge is proposed that states that the discharge will comply with the applicable provisions under the federal CWA.[6] As such, before the USACE will issue a CWA Section 404 permit, applicants must apply for and receive a Section 401 water quality certification (WQC) from the RWQCB. The RWQCB regulates "discharging waste, or proposing to discharge waste, within any region that could affect "waters of the state" (Water Code § 13260 (a)), pursuant to provisions of the Porter-Cologne Water Quality Control Act which defines RWQCB jurisdictional "waters of the state" as "any surface water or groundwater, including saline waters, within the boundaries of the state" (Water Code § 13050 (e)).

With the exception of isolated waters and wetlands, most discharges of fill to waters of the state are also subject to a CWA Section 404 permit. If a CWA Section 404 permit is not required for the project, the RWQCB may still require issuance of Waste Discharge Requirements (WDR) under the Porter-Cologne Water Quality Control Act. The RWQCB may regulate isolated waters that are not under jurisdiction of the USACE through issuance of WDR's. However, projects that obtain a Section 401 WQC are simultaneously enrolled in a statewide general WDR. Processing of Section 401 WQC's generally requires submittal of 1) a construction storm water pollution prevention plan (SWPPP), 2) a final water quality technical report that demonstrates that post-construction storm water Best Management Practices (BMPs) comply with the local design standards for municipal storm drain permits (MS4 permits) implemented by the State Water Resources Control Board effective January 1, 2011, and 3) a conceptual Habitat Mitigation and Monitoring Plan (HMMP) to compensate for permanent impacts to RWQCB waters, if any. In

6 33 USC 1341 *(a) (1)*.

addition to submittal of a draft CEQA document, a WQC application typically requires a discussion of avoidance and minimization of impacts to RWQCB jurisdictional resources, and efforts to protect beneficial uses as defined by the local RWQCB basin plan for the project. The RWQCB cannot issue a Section 401 WQC until the project CEQA document is certified by the lead agency.

4.7.2 State of California Special-status Resource Protection and Classifications

4.7.2.1 CESA

California's Endangered Species Act (CESA) defines an endangered species as:

> *…a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease.*

The State defines a threatened species as:

> *…a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by this chapter. Any animal determined by the commission as rare on or before January 1, 1985 is a threatened species.*

Candidate species are defined as:

> *…a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that the commission has formally noticed as being under review by the department for addition to either the list of endangered species or the list of threatened species, or a species for which the commission has published a notice of proposed regulation to add the species to either list.*

Candidate species may be afforded temporary protection as though they were already listed as threatened or endangered at the discretion of the Fish and Wildlife Commission. Unlike the FESA, CESA does not include listing provisions for invertebrate species.

Article 3, Sections 2080 through 2085, of the CESA addresses the taking of threatened or endangered species by stating:

> *…no person shall import into this State, export out of this State, or take, possess, purchase, or sell within this State, any species, or any part or product thereof, that the commission determines to be an endangered species or a threatened species, or attempt any of those acts, except as otherwise provided.*

Under the CESA, "take" is defined as, "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

Additionally, some special-status mammals and birds are protected by the State as Fully Protected Mammals or Fully Protected Birds, as described in the California Fish and Wildlife Code, Sections 4700 and 3511, respectively.

California Species of Special Concern are species designated as vulnerable to extinction due to declining population levels, limited ranges, and/or continuing threats. Informally listed species are not protected per se, but warrant consideration in the preparation of biological assessments. For some species, the CNDDB is only concerned with specific portions of the life history, such as roosts, rookeries, or nest areas.

For the purposes of this BRA, the following acronyms are used for State status species, as applicable:

- SE State-listed as Endangered
- ST State-listed as Threatened
- SR State-listed as Rare
- SCE State candidate for listing as Endangered
- SCT State candidate for listing as Threatened
- SFP State Fully Protected
- SSC California Species of Special Concern

Protection of Birds

Section 3503.5 of the California Fish and Game Code states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto." Activities that result in the abandonment of an active bird of prey nest may also be considered in violation of this code. In addition, California Fish and Game Code, Section 3511 prohibits the taking of any bird listed as fully protected, and California Fish and Game Code, Section 3515 states that is it unlawful to take any non-game migratory bird protected under the MBTA.

4.7.2.2 State of California Fish and Game Code, Section 1602

Section 1602 of the California Fish and Game Code requires any entity (e.g., person, state or local government agency, or public utility) who proposes a project that will substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake to notify the CDFW of the proposed project. In the course of this notification process, the CDFW will review the proposed project as it affects streambed habitats within the project area. The CDFW may then place conditions in the Section 1602 Streambed Alteration Agreement to avoid, minimize, and mitigate any potentially significant adverse impacts within CDFW jurisdictional limits.

4.7.2.3 California Native Plant Society

The CNPS is a private plant conservation organization dedicated to the monitoring and protection of special-status species in California. CNPS has compiled an inventory comprised of the information focusing on geographic distribution and qualitative characterization of Rare, Threatened, or Endangered vascular plant species of California (CNPS 2012). The list serves as the candidate list for listing as Threatened and Endangered by CDFW. CNPS has developed five categories of rarity, of which Ranks 1A, 1B, and 2 are particularly considered special-status:

- Rank 1A Presumed extinct in California.
- Rank 1B Plants Rare, Threatened, or Endangered in California and elsewhere.
- Rank 2 Plants Rare, Threatened, or Endangered in California, but more common elsewhere.
- Rank 3 Plants about which we need more information – a review list.
- Rank 4 Plants of limited distribution – a watch list.

The CNPS recently added "threat ranks" which parallel the ranks used by the CNDDB. These ranks are added as a decimal code after the CNPS List (e.g., Rank 1B.1). The threat codes are as follows:

- .1 – Seriously endangered in California (over 80% of occurrences threatened/high degree and immediacy of threat);
- .2 – Fairly endangered in California (20-80% occurrences threatened);
- .3 – Not very endangered in California (<20% of occurrences threatened or no current threats known).

Special-status species that occur or potentially could occur within the study area is based on one or more of the following: (1) the direct observation of the species within the study area during any field surveys; (2) a record reported in the CNDDB; and (3) the study area is within known distribution of a species and contains appropriate habitat.

4.7.2.4 Sensitive Plant Communities

Sensitive plant communities include those habitat types considered rare by resource agencies, namely the CDFW, due to their scarcity and/or their ability to support State and Federally-listed Endangered, Threatened, and Rare vascular plants, as well as several special-status bird and reptile species. CDFW maintains a natural plant community list, the *List of California Terrestrial Natural Communities*.[7] Special-status natural communities (also referred to by CDFW as 'rare' or 'special concern') are identified on the list by an asterisk and are considered high priority vegetation types (CDFW, 2010; CDFW, 2000a).

7 Available online at: http://www.dfg.ca.gov/biogeodata/vegcamp/natural_comm_list.asp.

4.7.3 Local Special-status Resource Protection and Classifications

Western Riverside County MSHCP

The study area is within the Western Riverside County MSHCP which was adopted by the Riverside County Board of Supervisors (June 17, 2003). The MSHCP functions as an Habitat Conservation Plan (HCP) pursuant to Section 10(a)(1)(B) of the FESA and as a Natural Communities Conservation Plan (NCCP) under the NCCP Act of 2001. The USFWS and CDFW have authorized the take of a number special-status plant and wildlife species (Covered Species) within the MSHCP Plan Area in exchange for the assembly and management of a coordinated MSHCP Conservation Area.

Stephens' Kangaroo Rat Habitat Conservation Plan

The Stephens' kangaroo rat (SKR) HCP provides Take Authorization for SKR within its boundaries as implemented by legal agreements executed among the Riverside County Habitat Conservation Agency (RCHCA), its member agencies, USFWS, CDFW, BLM , U.S. Department of Interior, State of California Resources Agency, and other agencies as appropriate.[8] The MSHCP provides Take Authorization for SKR outside the boundaries of the SKR HCP, but within the MSHCP Plan Area boundaries. The seven core reserves established by the SKR HCP will be managed as part of the MSHCP Conservation Area consistent with the SKR HCP.

The study area is within the boundaries of the SKR HCP but is not within any of the core reserves. As such, the project would be required to pay a SKR mitigation fee for coverage under the SKR HCP.

4.7.4 Sensitive Plant Communities

The study area does not support any communities considered by CDFW as sensitive habitats.

4.7.5 Special-status Plant Species

Special-status plants include those listed, or candidates for listing, by the USFWS and CDFW; and species considered special-status by the CNPS (particularly Lists 1A, 1B, and 2). Several special-status plant species were reported in the vicinity based on CNDDB and CNPS, totaling 65 species within the 9-quadrangle search (as indicated in **Appendix B**, *Special-Status Plant Species*). A total of 12 species were identified as having a potential to occur within the study area based on the literature review and existing habitat on the study area, as listed in Appendix B. Focused plant surveys were conducted in 2015 on the project site and off-site road improvement and sewer line areas and in 2016 on the off-site water line areas; none of the species determined to have a potential to occur on the project site and off-site water and sewer line areas were observed. A summer focused survey was conducted within the off-site eastern manufactured slope area in 2016; however, a spring survey has not yet been conducted within this area. The western manufactured slope areas do not support suitable habitat for special-status plant species.

8 *http://www.skrplan.org/index.html*

4.7.6 Special-status Wildlife Species

Special-status wildlife include those species listed as Endangered or Threatened under the FESA or CESA, candidates for listing by the USFWS or CDFW, and species of special concern to the CDFW. Several special-status wildlife species were reported in the vicinity based on CNDDB, totaling 43 species within the 9-quadrangle search. A total of 19 species were identified as having a potential to occur within or use the study area based on the literature review and habitat present on the study area, as listed in **Appendix C**, *Special-status Wildlife Species*.

In addition, focused surveys were conducted for the burrowing owl in accordance with recommended protocols and the potential for foraging and nesting migratory bird and raptor species were also analyzed due to known presence within the study area or within the vicinity (see Appendix C). The species with a potential to occur on the study area are discussed below, including the results of the burrowing owl surveys and the migratory birds and raptors assessment.

Species With Potential to Occur On-site

Coast horned lizard (*Phrynosoma blainvillii*): This reptile species is a state species of special concern and is a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers sandy riparian and sage scrub habitats, but also occurs in valley-foothill, hardwood, conifer, pine-cypress, juniper and annual grassland habitats below 6,000 feet. Habitats include open country, especially sandy areas, washes, flood plains, and windblown deposits.

Coast horned lizard was determined to have a moderate potential to occur within the study area based on the presence of some potentially suitable habitat on the northwestern corner of the on-site area, which includes Riversidean sage scrub and brittlebush scrub. Harvester ants, this species main food source, were also observed (although the food source was not seen in the area supporting suitable habitat). Although habitat and a food source potentially exist on the study area, the majority of the potentially suitable habitat is disturbed and higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the study area. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Orange-throated whiptail (*Aspidoscelis hyperythra*): This reptile species is a state species of special concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers chaparral, non-native grassland, Riversidean sage scrub, and juniper and oak woodlands. It is often associated with riparian areas and alluvial fan sage scrub habitats.

Orange-throated whiptail was determined to have a moderate potential to occur within the study area based on the presence of some potentially suitable habitat on the northwestern corner of the on-site area, which includes Riversidean sage scrub and brittlebush scrub. These areas support perennial plants that may host this species preferred food source (termites). Although habitat and a food source potentially exist on the study area, the majority of the potentially suitable habitat is disturbed and higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the study area. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Red Diamond Rattlesnake (*Crotalus ruber*): This reptile species is a state species of special concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers chaparral, woodland, and arid desert habitats in rocky areas with dense vegetation.

Red diamond rattlesnake was determined to have a moderate potential to occur within the study area based on the presence of some potentially suitable habitat on the northwestern corner of the on-site area, which includes Riversidean sage scrub and brittlebush scrub. Although these areas support some vegetation and crevices within the rock outcrops, the vegetation is not dense and rock crevices available for cover are limited. Higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the study area. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Golden Eagle (*Aquila chrysaetos*): This raptor is a state fully protected species and is protected by the Bald and Golden Eagle Protection Act; it is also a Covered Species pursuant to the Western Riverside County MSHCP. This species nests on cliff faces and tall trees. Foraging habitat includes open country, including grasslands and early successional stages of forest and shrub habitats.

Golden eagle was determined to have a potential to occur only to forage within the study area based on the presence of a few fossorial mammal burrows within the disturbed areas on-site, suggesting the presence of small mammals that could provide a possible food source. However, the potential for foraging was considered very low since the majority of the site is surrounded by development and is highly disturbed, making it a less optimal habitat. This species is not expected to nest due to lack of cliffs on the study area, which is their preferred nesting habitat. Additionally, there is only one CNDDB occurrence record within the vicinity. This record was a breeding pair observed in fall 1979, spring 1980, and fall 1980 in San Timoteo Canyon, approximately 6.0 miles to the northeast. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Swainson's hawk (*Buteo swainsoni*): This bird species is listed as threatened by the state and is a Covered Species pursuant to the Western Riverside County MSHCP. It prefers Great Basin grasslands, riparian forests, riparian woodlands, and valley and foothill grasslands.

Swainson's hawk was determined to have a potential for foraging only within the study area based on the presence of a few fossorial mammal burrows within the disturbed areas on-site, suggesting the presence of small mammals that could provide a possible food source. However, the potential for foraging was considered low since the majority of the site is surrounded by development and is highly disturbed, making it a less optimal habitat. This species is not expected to nest due to the limited number of trees on the study area and the proximity of the trees to roads and residential homes, which could create some noise disturbance. Additionally, there are only two CNDDB occurrence records of nesting individuals within the vicinity; both records are from over 100 years ago. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Burrowing owl: This bird species is a state species of special concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers coastal prairie, coastal scrub, Great Basin scrub, Mojavean desert scrub, Sonoran desert scrub, valley and foothill grassland and disturbed habitats. It is known to occur in the project vicinity based on CNDDB and the MSHCP, and the study area is within the MSHCP Burrowing Owl Survey Area, an overlay in the MSHCP that requires additional surveys.

Burrowing owl was determined to have potential to occur within the study area based on the presence of suitable habitat that was identified during the Step I survey, including disturbed, low-growing vegetation, bare ground, and a few small fossorial mammal burrows. Step II surveys were conducted from May to July 2015 within the project site and off-site manufactured slopes, road improvement, proposed water line, and sewer line areas. Step II surveys were conducted from April to July 2016 within the off-site alternative water line areas. The subsequent Step II surveys did not identify individual burrowing owls, active burrowing owl burrows, or signs of burrowing owls within the survey area. Therefore, the study area and adjacent buffer area do not currently support burrowing owls. The results are also outlined in a separate survey reports attached as **Appendix D**, 2015 *Burrowing Owl Focused Survey Report* and **Appendix E**, 2016 *Burrowing Owl Focused Survey Report*.

Loggerhead shrike (*Lanius ludovicianus*): This bird species is listed as a state species of special concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers broadleaved upland forest, desert wash, Joshua tree woodland, Mojavean desert scrub, pinyon and juniper woodlands, riparian woodland, and Sonoran desert scrub habitats.

Loggerhead shrike was observed foraging within the northwestern corner of study area during the third burrowing owl survey conducted on July 2, 2015. This area supports suitable foraging habitat for this species, which includes Riversidean sage scrub and brittlebush scrub. The potential for nesting for this species is considered moderate based on the presence of shrubs on the northwestern corner. Although this area supports shrubs that may be suitable for nesting, the northwestern corner is adjacent to developed, residential areas; higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the study area.

Coastal California gnatcatcher (*Polioptila californica californica*): This bird species is listed as Federally Threatened, state species of special concern, and a Covered Species pursuant to the Western Riverside County MSHCP. This species is an obligate inhabitant of coastal sage scrub habitat.

This species was observed on the study area during the focused burrowing owl survey conducted on May 13, 2015. Only one individual was heard during the survey.

Northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*): This mammal species is listed as a state species of special concern and a Covered Species pursuant to the Western

Riverside County MSHCP. It prefers chaparral and coastal sage scrub habitats, in addition to grassland and Riversidean alluvial fan sage scrub habitats.

Northwestern San Diego pocket mouse was determined to have a moderate potential to occur within the study area based on the presence of suitable coastal scrub and chaparral habitat (e.g. brittle bush scrub, Riversidean sage scrub) in the northwestern portion and small fossorial mammal burrows. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Stephens' kangaroo rat (*Dipodomys stephensi*): This mammal species is listed as federally endangered and state threatened. Take Authorization for Stephens' kangaroo rat is provided by the SKR HCP within its plan boundaries, and by the Western Riverside County MSHCP for areas outside of the SKR HCP but within the MSHCP area plan boundaries (this species is a MSHCP Covered Species). This species prefers open grasslands or sparse shrub lands within sandy to sandy loam soils and low clay and gravel content.

Stephens' kangaroo rat was determined to have a moderate potential to occur within the study area based on the presence of suitable shrub habitat (e.g. brittle bush scrub, Riversidean sage scrub) in the northwestern portion and small fossorial mammal burrows. The study area is not within any core reserves identified by the SKR HCP. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Los Angeles pocket mouse (*Perognathus longimembris brevinasus*): This mammal species is listed as a state species of special concern and a conditionally Covered Species pursuant to the Western Riverside County MSHCP (surveys are required for areas within the survey overlay, with potential conservation). It prefers sparsely vegetated habitat areas within coastal sage scrub communities and in patches of fine sandy soils associated with washes.

Los Angeles pocket mouse was determined to have a moderate potential to occur within the study area based on the presence of suitable Riversidean sage scrub habitat in the northwestern portion. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

San Diego black-tailed jackrabbit (*Lepus californicus bennettii*): This mammal species is a California Species of Special Concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers open brushlands and scrub habitats.

San Diego black-tailed jackrabbit was determined to have a moderate potential to occur within the study area. The majority of the study area supports suitable habitat for this species, including the Riversidean sage scrub on the northwestern corner and the ruderal areas (which support some short grasses). However, this species is highly conspicuous and no incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

San Diego desert woodrat: This mammal species is a California Species of Special Concern and a Covered Species pursuant to the Western Riverside County MSHCP. This species prefers coastal scrub and chaparral habitats with areas containing rock outcrops and cliffs.

San Diego desert woodrat was determined to have a moderate potential to occur within the study area based on the presence of suitable habitat (e.g. Riversidean sage scrub, rock outcrop/Riversidean sage scrub) in the northwestern portion and small fossorial mammal burrows. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Southern Grasshopper Mouse (*Onychomys torridus ramona*): This mammal species is a state species of special concern. This species prefers grasslands, desert areas, and especially scrub with friable soils.

Southern grasshopper mouse was determined to have a potential to occur within the study area based on the presence of suitable shrub habitat (e.g. brittle bush scrub and Riversidean sage scrub) in the northwestern portion and small fossorial mammal burrows. However, the potential was considered low since this species has not been recorded on CNDDB within the vicinity of study area since 1938. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

American badger (*Taxidea taxus*): This mammal species is a state species of special concern. This species prefers grasslands, desert areas, and especially scrub with friable soils.

American badger was determined to have a potential to occur within the study area based on the presence of shrubs within the Riversidean sage scrub habitat on the northwestern corner of the study area. A few fossorial mammal burrows were observed, suggesting the presence of small mammals that could provide a possible food source. However, the potential was considered low since the majority of the site is surrounded by development and a large portion of suitable habitat is disturbed. Additionally, this species has not been recorded within the vicinity since 1908. No signs of this species were observed during any site surveys conducted in 2015.

Western Mastiff Bat (*Eumops perotis californicus*): This mammal species is a state species of special concern. This species prefers chaparral, cismontane woodlands, coastal scrub, and valley and foothill grassland habitats.

Western mastiff bat was determined to have a potential to occur for foraging only within the study area. However, the potential was considered low since although bats in this family are known to be strong fliers and can fly long distances to forage, habitat on the study area is disturbed and the majority of the study area is surrounded by development. This species preferred roosting habitat is not present on the study area and the nearest CNDDB occurrence record is from1990 approximately 3.0 miles to the southwest of the study area, in an area that is now a residential development. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Pocketed free-tailed bat (*Nyctinomops femorasaccus*): This bat species is a state species of special concern and occurs in more arid habitats, roosting in rock crevices, caverns, or buildings.

Pocketed free-tailed bat was determined to have a potential to occur for roosting only within the study area based on the presence of rock outcrops. However, this potential was considered very low since this species typically prefers steeper cliffs for roosting habitat. Although little is known regarding home range for this species, the potential for roosting is also unlikely since the study area does not support adjacent foraging habitat (CDFW, 2000b). There are only 2 CNDDB occurrence records in the vicinity. The nearest record is from 1985 approximately 6.5 miles to the southwest of the study area near March Air Force Base. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Lesser long-nosed bat (*Leptonycteris verbabuenae*): This bat species is a federally endangered species and occurs in more arid habitats, such as desert grasslands and shrublands.

Pocketed free-tailed bat was determined to have a potential to occur for roosting and foraging. Potential night roosts included a limited number of trees and rock crevices on the northwestern corner of the project and scattered cactus may provide feeding opportunities. Although day roosting habitat (caves or mines) are not present on the study area, this species can travel long distances between day roosting and foraging sites. However, the potential was considered very low for both roosting and foraging since this species not typically found in California and recorded sightings are typically vagrant migrants. There is only 1 CNDDB occurrence record within the vicinity from 1993, approximately 9.5 miles to the northeast in a residential neighborhood of Yucaipa. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Pallid bat (*Leptonycteris verbabuenae*): This bat species is a federally endangered species and occurs in more arid habitats, such as desert grasslands and shrublands.

Pocketed free-tailed bat was determined to have a potential to occur for roosting and foraging. Potential night roosts included a limited number of trees and rock crevices on the northwestern corner of the project and scattered cactus may provide feeding opportunities. Although day roosting habitat (caves or mines) is not present on the study area, this species can travel long distances between day roosting and foraging sites. However, the potential was considered very low for both roosting and foraging since this species not typically found in California and recorded sightings are typically vagrant migrants. There is only one CNDDB occurrence record within the vicinity from 1993, approximately 9.5 miles to the northeast in a residential neighborhood of Yucaipa. No incidental sightings of this species occurred during any site surveys conducted in 2015 and 2016.

Migratory Birds and Raptors

The study area supports some potential nesting and foraging habitat for nesting birds and raptors, primarily in the northwestern corner of the study area where there are shrubs and some trees. Several species of birds were observed on-site (see Appendix A) and were identified by CNDDB as potentially occurring within the 9-quadrangle search area (see Appendix C). Raptors observed on-site include Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), and American kestrel (*Falco sparverius*). There is also a foraging potential for listed raptors within the 9-quadrangle search area according to CNDDB, such as golden eagle (State Fully Protected) and Swainson's hawk (Federally Threatened), though the potential of foraging is considered low and neither are expected to nest on-site (see Appendix C).

4.7.7 Study Area's Relationship to the Western Riverside County MSHCP

This section provides a discussion of the study area's relationship to the MSHCP policies, including the location within the MSHCP Area Plan, Criteria Cells, and cores and linkages, and the presence of MSHCP protected biological resources.

4.7.7.1 Location of the Study Area within the MSHCP Area Plan and Criteria Cells

The entire study area is within the Reche Canyon/Badlands Area Plan (see Figure 6) of the MSHCP but is not within a Criteria Cell, a designated Cell Group, or a subunit within the Southwest Area Plan that requires conservation of land for inclusion in the MSHCP Conservation Area (Riverside County TLMA, 2015).

4.7.7.2 Location of the Study Area within MSHCP Cores and Linkages

As mentioned previously in section 4.5.2, *Wildlife Movement within the Study Area*, the study area is not within any cores or linkages (i.e., Special Linkage Areas) as identified in the Reche Canyon/Badlands Area Plan.

4.7.7.3 Riparian/Riverine Areas and Vernal Pools

Section 6.1.2, *Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools,* of the MSHCP provides for the protection of Riparian/Riverine Areas and Vernal Pools within the MSHCP Plan Area. Riparian/Riverine areas are defined in the MSHCP as "lands which contain habitat dominated by trees, shrubs, persistent emergents, or emergent mosses and lichens, which occur close to or which depend upon soil moisture from a nearby fresh water source; or areas with fresh water flow during all or a portion of the year." Vernal pools are defined in the MSHCP as "seasonal wetlands that occur in depression areas that have wetlands indicators of all three parameters (soils, vegetation, and hydrology) during the wetter portion of the growing season but normally lack wetlands indicators of hydrology and/or vegetation during the drier portion of the growing season."

As shown in **Figure 12**, *MSHCP Riverine Areas*, and summarized in **Table 3**, *MSHCP Riverine* Areas, The project study areas support a total 0.165 acre of MSHCP Riverine Areas including 0.059 acre in Drainage A (0.046 acre on-site and 0.013 acre off-site), 0.070 acre in Drainage B, 0.001 acre in Drainage B1, 0.001 acre in Drainage B2, 0.001 acre in Drainage B3, 0.002 acre in Drainage B4, and 0.033 acre in Drainage B5. All drainages are considered MSHCP Riverine Areas (rather than MSHCP Riparian Areas) since they are supported by ephemeral[9] flows and do not support riparian vegetation communities. No vernal pools occur within the on- and off-site study areas. Due to the presence of MSHCP Riverine features, the project will require a Determination of Biologically Equivalent or Superior Preservation (DBESP) analysis for any impacts proposed to these areas. The DBESP is required to provide details on any proposed impacts and compensatory mitigation for compliance with MSHCP requirements for submittal to the County of Riverside Environmental Programs Department (EPD), subject to approval by the

[9] Riparian drainages are streambeds that generally convey runoff during, and immediately after, a storm event.

County of Riverside Regional Conservation Authority (RCA) and the State and Federal Wildlife Agencies (CDFW and USFWS).

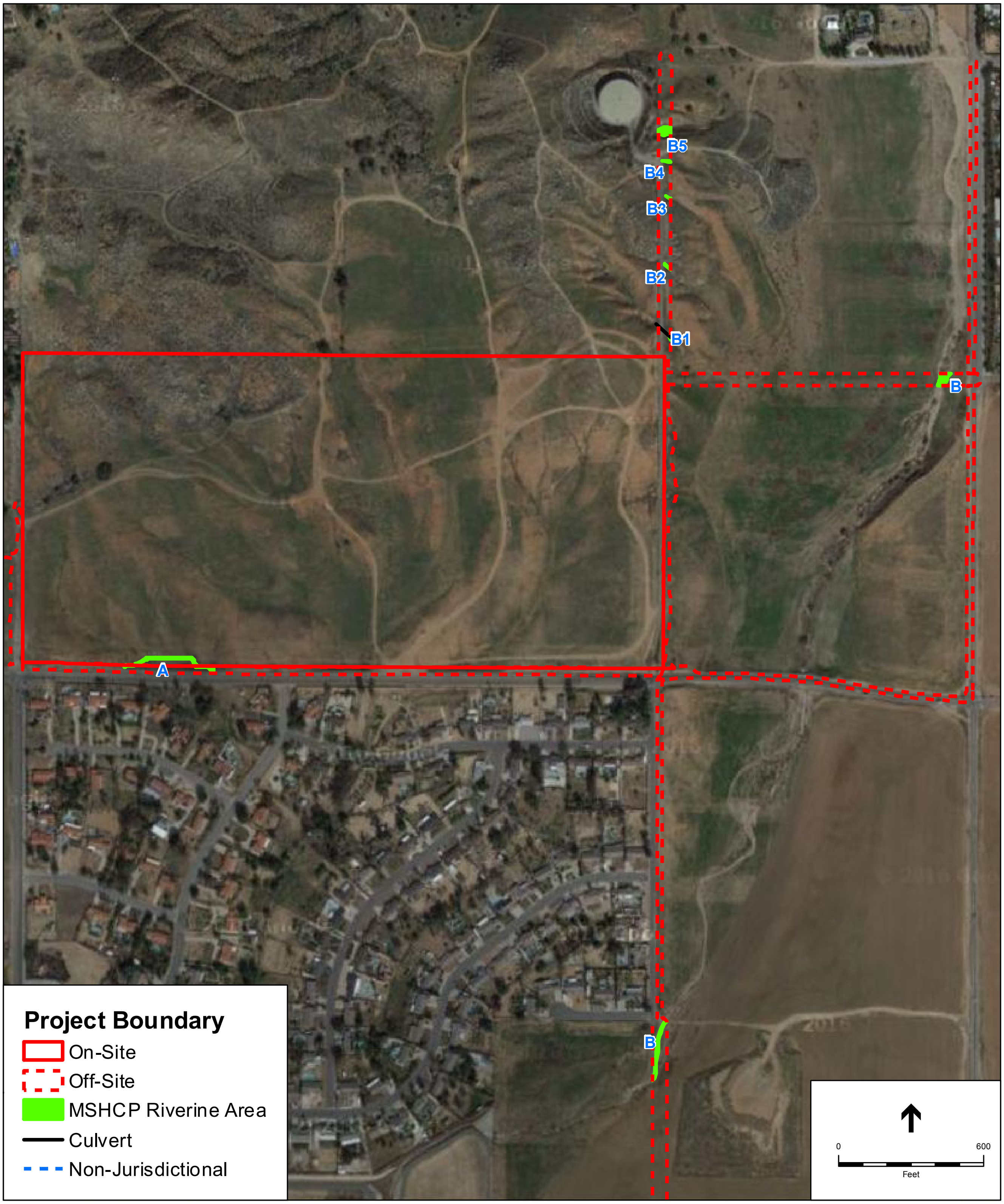
TABLE 3
MSHCP RIVERINE AREAS

Drainage (Study Area)	Length (ft)	Area (acres)	Riparian/Riverine Flow Classification
A (On-Site)	285	0.046	Riverine
A (Off-Site)	111	0.013	Riverine
B (Off-Site)	306	0.069	Riverine
B1 (Off-Site)	0*	0.001	Riverine
B2 (Off-Site)	32	0.001	Riverine
B3 (Off-Site)	25	0.001	Riverine
B4 (Off-Site)	34	0.001	Riverine
B5 (Off-Site)	35	0.033	Riverine
Total	**828**	**0.165**	

** Less than one linear foot of jurisdiction occurs within Drainage B1 as the majority of the drainage within the off-site study area is associated with an existing corrugated metal pipe that was not quantified.*

Source: ESA PCR, 2014

The biological function and value of the on- and off-site Riverine Areas within Drainage A and Drainage Complex B include the transport of water, which is limited based on the ephemeral flows of the drainage and limited watershed. The function and value of the drainages are also limited since they are primarily unvegetated and support only some small patches of upland and/or ruderal vegetation. Other types of aquatic features that could provide suitable habitat for Riparian/Riverine species, such as fairy shrimp, are not present within the study area (i.e. vernal pools, swales, vernal pool-like ephemeral ponds, seasonal ponds, stock ponds, or other human-modified depressions such as tire ruts, etc.).



SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project

Figure 12

MSHCP Riverine Areas

FSA PCR

Riparian/Riverine Plant Species

A habitat assessment was conducted for species listed in Section 6.1.2, *Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools*, of the MSHCP. The results are presented in **Table 4**, *MSHCP Riparian/Riverine Plant Species*. Only one Riparian/Riverine plant species was determined to have a potential to occur on the study area, namely smooth tarplant (*Centromadia pungens* ssp. *laevis*). This species was considered to have a potential to occur only within the riverine habitat associated with the on- and off-site drainages; however, smooth tarplant was not observed during any of the focused plant surveys and therefore was concluded to be absent from the project site. The remaining MSHCP Riparian/Riverine plant species are not expected to occur within the study area due to the lack of suitable habitat or the location of the study area.

TABLE 4
MSHCP RIPARIAN/RIVERINE PLANT SPECIES

Species	Potential to Occur within the Study Area
Brand's phacelia *Phacelia stellaris*	Not expected to occur. This species has not been recorded in the Moreno Valley area. There is only one occurrence record in CNDDB within Riverside County, which was observed in 2000 in the City of Riverside near the Santa Ana River.
California Orcutt grass *Orcuttia californica*	Not expected to occur due to the lack of vernal pools.
Coulter's matilija poppy *Romneya coulteri*	Not expected to occur. This perennial plant has conspicuous flowers that would have been detected during the focused plant surveys if present.
Engelmann oak *Quercus engelmannii*	Not expected to occur. This is a conspicuous tree species that would have been detected during the focused plant surveys if present.
Fish's milkwort *Polygala cornuta* var. *fishiae*	Not expected to occur. The majority of occurrence records of this species on CNDDB are confined to the Santa Ana Mountains.
graceful tarplant *Holocarpha virgata* ssp. *Elongate*	Not expected to occur due to disturbance on-site. The study area is outside of the species' range; there are no known records of this species within the flatter agricultural areas east of the Santa Ana Mountains.
lemon lily *Lilium parryi*	Not expected to occur due to the lack of suitable habitat. Also, the study area is outside the species' range; this species is restricted to the San Jacinto Mountains. The study area is outside of species' elevation range.
Mojave tarplant *Deinandra mohavensis*	Not expected to occur. The study area is outside the species range; this species is restricted to the San Jacinto Mountains. The study area is outside of species' elevation range.
mud nama *Nama stenocarpum*	Not expected to occur due to the lack of wetlands. None were incidentally observed during any surveys (this species can occasionally occur in non-wetlands).
ocellated Humboldt lily *Lilium humboldtii* ssp. *ocellatum*	Not expected to occur due to high disturbance within the drainages and lack of shade. This species is typically found at higher elevations.
Orcutt's brodiaea *Brodiaea orcuttii*	Not expected to occur due to the lack of vernal pools.
Parish's meadowfoam *Limnanthes alba* ssp. *parishii*	Not expected to occur due to the lack of suitable habitat. Also, the study area is outside the species' range; this species is restricted to the Santa Rosa Plateau within the MSHCP Plan Area. The study area is outside of this species' elevation range.

Species	Potential to Occur within the Study Area
prostrate navarretia *Navarretia prostrata*	Not expected to occur due to the lack of suitable habitat. Also, the study area is outside the species' range; this species is restricted to the Santa Rosa Plateau within the MSHCP Plan Area. The study area does not support suitable vernal pool habitat.
San Diego button-celery *Eryngium aristulatum* var. *parishii*	Not expected to occur. The study area is outside the species' range; this species is restricted to the Santa Rosa Plateau within the MSHCP Plan Area. The study area does not support suitable vernal pool habitat.
San Jacinto Valley crownscale *Atriplex coronata* var. *notatior*	Not expected to occur due to the lack of suitable alkaline habitat.
San Miguel savory *Satureja chandleri*	Not expected to occur due to the lack of suitable metavolcanic substrate habitat.
Santa Ana River woollystar *Eriastrum densifolium* ssp. *sanctorum*	Not expected to occur due to lack of suitable habitat. The study area is outside the species range; this species is restricted to the Santa Ana River and alluvial fan sage scrub habitat.
slender-horned spineflower *Dodecahema leptoceras*	Not expected to occur due to the lack of alluvial fan habitat.
smooth tarplant *Centromadia pungens* ssp. *laevis*	Potential, but not observed. This species was not observed during the focused plant surveys.
southern California black walnut *Juglans californica*	Not expected to occur. This is a conspicuous tree species that would have been detected if present.
spreading navarretia *Navarretia fossalis*	Not expected to occur due to the lack of vernal pools.
thread-leaved brodiaea *Brodiaea filifolia*	Not expected to occur due to the lack of vernal pools.
vernal barley *Hordeum intercedens*	Not expected to occur due to the lack of vernal pools.

SOURCE: ESA PCR, 2016

Riparian/Riverine Wildlife Species

Habitat assessments were conducted for wildlife species listed in Section 6.1.2, *Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools*, of the MSHCP. The results are presented in **Table 5**, *MSHCP Riparian/Riverine Wildlife Species*. No riparian/riverine wildlife species are expected to occur on the study area due to the lack of suitable habitat.

TABLE 5
MSHCP RIPARIAN/RIVERINE WILDLIFE SPECIES

Species	Potential to Occur within the Study Area
arroyo toad *Anaxyrus californicus*	Not expected to occur due to the lack of suitable habitat (perennial streams).
mountain yellow-legged frog *Rana muscosa*	Not expected to occur due to the lack of suitable habitat (perennial streams).
California red-legged frog *Rana aurora draytonii*	Not expected to occur due to the lack of suitable habitat (perennial streams).

Species	Potential to Occur within the Study Area
bald eagle *Haliaeetus leucocephalus*	Not expected to occur due to the lack of suitable habitat for foraging and nesting.
least Bell's vireo *Vireo bellii pusillus*	Not expected to occur due to the lack of suitable habitat for foraging and nesting.
American peregrine falcon *Falco peregrinus anatum*	Not expected to occur due to the lack of suitable habitat for foraging and nesting (cliffs overlooking open areas or large bodies of water).
southwestern willow flycatcher *Empidonax traillii extimus*	Not expected to occur due to the lack of suitable habitat for foraging and nesting.
western yellow-billed cuckoo *Coccyzus americanus occidentalis*	Not expected to occur due to the lack of suitable habitat for foraging and nesting; outside of the species range.
Santa Ana sucker *Catostomus santaanae*	Not expected to occur due to the lack of suitable habitat (perennial streams).
Riverside fairy shrimp *Streptocephalus woottoni*	Not expected to occur due to the lack of suitable habitat (vernal pools).
vernal pool fairy shrimp *Branchinecta lynchi*	Not expected to occur due to the lack of suitable habitat (vernal pools).
Santa Rosa Plateau fairy shrimp *Linderiella santarosae*	Not expected to occur due to the lack of suitable habitat (vernal pools).

SOURCE: ESA PCR, 2016

4.7.7.4 Narrow Endemic Plant Species Survey Area

The study area is not within the Narrow Endemic Plant Species Survey Area; therefore, no surveys were required for Narrow Endemic plant species.

4.7.7.5 Additional Survey Needs and Procedures

Section 6.3.2, *Additional Survey Needs and Procedures*, of the MSHCP provides for additional survey needs for the burrowing owl, as well as a number of special-status plant, amphibian, and mammal species.

Burrowing Owl Survey Area

The study area is within the Burrowing Owl Survey Area; therefore, in compliance with the Western Riverside County MSHCP, surveys are required for this species. As discussed above in section 4.7.6 Special-status Wildlife Species, Step I and Step II surveys conducted for the project following Western Riverside County MSHCP protocol were negative. Although the site does not currently support burrowing owls, pre-construction surveys are required within 30 days of ground disturbance based on the presence of suitable habitat.

Criteria Area Species Survey Area

The study area is not within the Criteria Area Species Survey Area; therefore, no surveys were required for Criteria Area plant species.

Amphibian Species Survey Area

The study area is not within the Amphibian Species Survey Area; therefore, no surveys are required.

Mammal Species Survey Area

The study area is not within the Mammal Species Survey Area; therefore, no surveys are required.

4.7.7.6Urban/Wildlands Interface

Section 6.1.4, *Guidelines Pertaining to the Urban/Wildlands Interface*, of the MSHCP presents a number of guidelines that are intended to address indirect effects associated with locating developments in proximity to a Western Riverside County MSHCP Conservation Area. These guidelines address the quantity and quality of any runoff generated by the development (i.e., drainage and toxics), night lighting, noise, non-native invasive plant species, barriers to humans and animal predators, and grading/land development encroachment.

The study area is not within or in the vicinity of any Criteria Cells (see Figure 6) and, as such, development of the site is not expected to result in indirect effects to MSHCP Conservation Areas related to night lighting, noise, and grading/land development, and barriers would not be necessary. Drainage A and Drainage Complex B ultimately drain to the San Jacinto River, which is a Constrained Linkage (19) and where Criteria Cells are located. Runoff from the site therefore has the potential to affect the quantity and quality of water downstream, in addition to the transport of plant seeds. Since the project will be required to comply with flood and water quality standards[10], no indirect effects from the quantity and quality of run-off will occur to downstream areas. At minimum, no invasive, non-native plant species listed in Tables 6-2 of the MSHCP, *Plants That Should Be Avoided Adjacent To The MSHCP Conservation Area*, will be utilized in the landscape plans. This will avoid dispersal of invasive plant seeds in the watershed. Despite the study area not being within any Criteria Cells or adjacent to any MSHCP Conservation Areas, it does support one on-site drainage and one off-site drainage complex that are considered Riverine Areas. The above measures will avoid indirect impacts to these drainages from runoff and invasive species.

10 The project will be required to prepare a Water Quality Management Plan and Storm Water Pollution Prevention Plan consistent with Regional Water Quality Control Board and County requirements that will outline measures such as Best Management Practices (BMPS) to address water quantity and quality, and to address any potential flooding.

5.0 THRESHOLDS OF SIGNIFICANCE

The environmental impacts relative to biological resources are assessed using impact significance threshold criteria which mirror the policy statement contained in the CEQA, Section 21001(c) of the California Public Resources Code. Accordingly, the State Legislature has established it to be the policy of the State to:

> *"Prevent the elimination of fish or wildlife species due to man's activities, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities..."*

Determining whether or not a project may have a significant effect, or impact, plays a critical role in the CEQA process. According to CEQA, Section 15064.7, Thresholds of Significance, each public agency is encouraged to develop and adopt (by ordinance, resolution, rule, or regulation) thresholds of significance that the agency uses in the determination of the significance of environmental effects. A threshold of significance is an identifiable quantitative, qualitative or performance level of a particular environmental effect, non-compliance with which means the effect will normally be determined to be significant by the agency and compliance with which means the effect normally will be determined to be less than significant. In the development of thresholds of significance for impacts to biological resources CEQA provides guidance primarily in Section 15065, Mandatory Findings of Significance, and the State CEQA Guidelines, Appendix G, *Environmental Checklist Form*. Section 15065(a) states that a project may have a significant effect where:

> *"The project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or wildlife community, reduce the number or restrict the range of an endangered, rare, or threatened species..."*

Appendix G of the State CEQA Guidelines is more specific in addressing biological resources and encompasses a broader range of resources to be considered, including: candidate or other special-status species; riparian habitat or other special-status natural communities; Federally protected wetlands; fish and wildlife movement corridors; local policies or ordinances protecting biological resources; and, adopted HCPs. This is done in the form of a checklist of questions to be answered during the Initial Study leading to the preparation of the appropriate environmental documentation for a project [i.e., Negative Declaration, Mitigated Negative Declaration, or Environmental Impacts Report (EIR)]. Because these questions are derived from standards in other laws, regulations, and other commonly used thresholds, it is reasonable to use these standards as a basis for defining significance thresholds in an EIR. Therefore, for the purpose of this analysis, impacts to biological resources are considered potentially significant (before considering offsetting mitigation measures) if one or more of the following conditions would result from implementation of the proposed Project.

Threshold BIO-A Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Wildlife Service.

Note: Threshold BIO-A also encompasses the threshold on the Riverside County Environmental Assessment/Initial Study form as follows: "Have a substantial adverse effect, either directly or through habitat modifications, on any endangered, or threatened species, as listed in Title 14 of the California Code of Regulations (Sections 670.2 or 670.5) or in Title 50, Code of Federal Regulations (Sections 17.11 or 17.12)."

Threshold BIO-B Have a substantial adverse effect on any riparian habitat or other sensitive plant community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U. S. Fish and Wildlife Service.

Threshold BIO-C Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

Threshold BIO-D Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery areas.

Threshold BIO-E Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

Threshold BIO-F Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

For the purposes of this impact analysis the following definitions apply:

- "Substantial adverse effect" means loss or harm of a magnitude which, based on current scientific data and knowledge would: (1) substantially reduce population numbers of a listed, candidate, sensitive, rare, or otherwise special status species; (2) substantially reduce the distribution of a sensitive plant community/habitat type; or (3) eliminate or substantially impair the functions and values of a biological resource (e.g., streams, wetlands, or woodlands) in a geographical area defined by interrelated biological components and systems. In the case of this analysis, the prescribed geographical area is considered to be the region that includes the USGS topographic quadrangle for the study area, namely Sunnymead. For some species, the geographic area may extend to the vicinity of the study area based on known distributions of the species. The vicinity of the study area is considered to comprise the following USGS topographic quadrangles: San Bernardino South, Redlands, Yucaipa, Riverside East, El Casco, Steele Peak, Perris, and Lakeview.

- "Conflict" means contradiction of a magnitude, which based on foreseeable circumstances, would preclude or prevent substantial compliance.

- "Rare" means: (1) that the species exists in such small numbers throughout all, or a significant portion of, its range that it may become endangered if its environment worsens; or (2) the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and may be considered "threatened" as that term is used in the FESA.

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6.0 PROJECT RELATED IMPACTS

6.1 Regulatory Setting

Special-status species are provided protection by either Federal or State resource management agencies, or both, under provisions of the FESA and CESA.

There are a number of performance criteria and standard conditions that must be met as part of any review and approval of the proposed project. These include compliance with all of the terms, provisions, and requirements with applicable laws that relate to Federal, State, and local regulating agencies related to potential impacts to special-status plant and wildlife species, wetlands, riparian habitats, and blue lined stream courses. The following summarizes federal and state regulations, and CNPS, as previously discussed in section 4.7, *Special-Status Biological Resources*.

6.1.1 Federal Regulations

As previously discussed in section 4.7.1, Federal Sensitive Resource Protection and Classifications of this BRA, under provisions of Section 9(a)(1)(B) of the FESA, unless properly permitted, it is unlawful to "take" any listed species. In a case where a property owner seeks permission from a Federal agency for an action which could affect a Federally-listed plant and animal species, the property owner and agency are required to consult with USFWS to obtain appropriate permits. Section 9(a)(2)(b) of the FESA addresses the protections afforded to listed plants. In addition to FESA, take of migratory birds, or bald or golden eagles, require permits pursuant to the MBTA and the Bald and Golden Eagle Protection Act, respectively. Furthermore, any impacts to USACE and RWQCB jurisdictional waters would require permitting pursuant to Sections 404 and 401 of the CWA, respectively.

6.1.2 State of California Regulations

As previously discussed in section 4.7.2, *State of California Sensitive Resource Protection and Classifications* of this BRA, Article 3, Sections 2080 through 2085, of the CESA addresses the taking of threatened or endangered species. Exceptions authorized by the State to allow "take" require permits or memoranda of understanding and can be authorized for "endangered species, threatened species, or candidate species for scientific, educational, or management purposes." Sections 1901 and 1913 of the California Fish and Wildlife Code provide that notification is required by an initiator prior to disturbance. State regulations also exist for protection of birds pursuant to the MBTA, and for acquiring permits for impacts to CDFW jurisdictional streambeds pursuant to Section 1602 of the Fish and Game Code.

6.1.3 California Native Plant Society

As previously discussed in section 4.7.2, *State of California Sensitive Resource Protection and Classifications* of this BRA, the CNPS has compiled an inventory comprised of the information focusing on geographic distribution and qualitative characterization of rare, threatened, or endangered vascular plant species of California which classifies plant species into categories of rarity. Informally ranked species are not protected per se, but warrant consideration in the preparation of biological assessments.

6.1.4 Local Regulations

The study area is within the adopted Western Riverside County MSHCP Plan area. The Western Riverside County MSHCP provides permits for the take of all species identified in the MSHCP as covered and conditionally covered, so long as the conditions imposed are satisfied (see also sections 4.7.3 and 4.7.7 above).

6.2 Project Related Impacts

The analysis in section *6.3 Impact Analysis* of this BRA examines the potential impacts to plant and wildlife resources that may occur as a result of implementation of the project. For the purpose of this assessment, project-related impacts take two forms, direct and indirect. Direct impacts are considered to be those that involve the loss, modification or disturbance of natural habitats (i.e., vegetation or plant communities), which in turn, directly affect plant and wildlife species dependent on that habitat. Direct impacts also include the destruction of individual plants or wildlife, which is typically the case in species of low mobility (i.e., plants, amphibians, reptiles, and small mammals). The collective loss of individuals in these manners may also directly affect regional population numbers of a species or result in the physical isolation of populations thereby reducing genetic diversity and, hence, population stability.

Indirect impacts are considered to be those that involve the effects of increases in ambient levels of sensory stimuli (e.g., noise, light), unnatural predators (e.g., domestic cats and other non-native animals), and competitors (e.g., exotic plants, non-native animals). Indirect impacts may be associated with the construction and/or eventual habitation/operation of a project; therefore, these impacts may be both short-term and long-term in their duration. These impacts are commonly referred to as “edge effects” and may result in changes in the behavioral patterns of wildlife and reduced wildlife diversity and abundance in habitats adjacent to study area.

The determination of impacts in this analysis is based on both the proposed project development plan and the biological values of the habitat and/or sensitivity of plant and wildlife species to be affected. Any recommended mitigation measures to address impacts are discussed in section 7.0 below, and compliance with existing regulations are also outlined in section 7.0 as Conditions of Approval.

The biological values of resources within, adjacent to, and outside the area to be affected by the proposed project were determined by consideration of several factors, as applicable. These included the overall size of habitats to be affected, the study area’s previous land uses and disturbance history, the study area's surrounding environment and regional context, the on-site biological diversity and abundance, the presence of special-status plant and wildlife species, the study area's importance to regional populations of these species, and the degree to which on-site habitats are limited or restricted in distribution on a regional basis and, therefore, are considered sensitive in themselves. Therefore, the focus of this impacts analysis is on sensitive plant communities/habitats, resources that play an important role in the regional biological systems, and special-status species.

Impacts to biological resources as a result of project development were analyzed in GIS using Computer-Aided Design (CAD) data of the project footprint and guidelines on temporary impact areas for the drainage crossings, both provided by the project engineer. Acreages of impacts were calculated by overlaying the CAD data and adding the fuel modification zones over GPS data of biological resources collected by ESA PCR during the surveys.

6.3 Impact Analysis

6.3.1 Impacts to Special-Status Species

Threshold BIO-A: Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Wildlife Service?

Less than Significant with Mitigation Incorporated

6.3.1.1 Special-Status Plant Species

Development of the study area would result in the direct removal of numerous common plant species; a list of plant species observed within the study area is included in Appendix A. Common plant species present within the study area occur in large numbers throughout the region and their removal does not meet the significance thresholds defined in Section 5.0, *Thresholds of Significance* above. Therefore, impacts to common plant species would not be considered a significant impact and no mitigation measures are required.

A total of 53 special-status plant species of the 65 species identified as occurring in the project vicinity in available databases (see section 4.7.5 above) are not expected to occur within the study area due to the lack of suitable habitat or because the site is outside the known distribution or elevation range for the species. These species are listed in Appendix B. As discussed in section 4.7.5, above, the remaining 12 special-status plant species were determined to have a potential to occur on the study area; however, these 12 species are not expected to occur within the project site or off-site water and sewer line areas since focused surveys conducted within these areas were negative. As such, no impacts to special-status plant species would occur as a result development on the project site and within the proposed off-site water and sewer lines and no mitigation is required.

Although a summer focused survey was performed within the off-site manufactured slope area to the east of the project site, a spring focused survey has not been conducted within this off-site area. Of the 12 species with a potential to occur, seven (7) species are not expected to occur within the off-site manufactured slope area since these species were not detected during the summer focused survey or the area does not support suitable habitat, including California screw most (*Tortula californica*), smooth tarplant, San Bernardino aster (*Symphyotrichum defoliatum*), chaparral sand-verbena (*Abronia villosa* var. *aurita*), long-spined spineflower (*Chorizanthe polygonoides* var. *longispina*), salt spring checkerbloom (*Sidalcea neomexicana*), and mesa horkelia (*Horkelia cuneate* var. *puberula*). The blooming period of the remaining five (5) species with the potential to occur within the off-site manufactured slope area east of the project boundary fall outside of the summer survey window, which include Nevin's barberry (*Berberis nevinii*), Jaeger's bush milk-vetch (*Astragalus pachypus* var. *jaegeri*), round-leaved filaree (*California macrophylla*), Parry's spineflower (*Chorizanthe parryi* var. *parryi*), and white-bracted spineflower (*Chorizanthe xanti* var. *leucotheca*). Of these five species, Nevin's barberry, Jaeger's bush milk-vetch, and round-leaved filaree are covered by the MSHCP. Parry's spineflower and white-bracted spineflower are not currently covered by the MSHCP and impacts to these individuals, if present, would be significant. As such, a mitigation measure is prescribed as MM BIO-1 in section 7.2.1, which requires a spring focused plant survey to be conducted within the off-site manufactured slope area located directly east of the site prior to ground disturbance in the appropriate blooming period (between April and June) to determine the presence/absence of Parry's spineflower and white-bracted spineflower. If either or both of these species are found within the off-site eastern manufactured slope area, MM BIO-1 outlines the necessary actions that are required to reduce impacts to the special-status plant species to less than significant.

6.3.1.2 Special-status Wildlife Species

Development of the study area would result in the disruption and removal of habitat and the loss and displacement of common wildlife species. A list of wildlife species observed within the study area is included in Appendix A. Due to the limited amount of native habitat to be removed and the level of existing disturbance from human activity within the vicinity (e.g., nearby development), these impacts would not be expected to reduce the general wildlife populations below self-sustaining levels within the region and impacts to common wildlife species do not meet the significance thresholds defined in Section 5.0, *Thresholds of Significance* above. Therefore, impacts to common wildlife species would not be considered a significant impact and no mitigation measures are required.

A total of 25 special-status wildlife species of the 43 species identified as occurring in the project vicinity in available databases (see section 4.7.6 above) are not considered to have a potential to occur within the study area due to the lack of suitable habitat or because the site is outside the known distribution range for the species. These species are listed in Appendix C. Since these species are not expected to be present on the study area, no impacts would occur as a result of project development and no mitigation measures are required.

As discussed in section 4.7.6, above, the remaining 19 special-status wildlife species were determined to have a potential to occur on the study area. Of these species, focused surveys were conducted for burrowing owl, which is conditionally covered by the MSHCP with additional surveys and mitigation required as discussed in further detail below. Of the remaining 17 potential special-status wildlife species, 12 species are covered by the MSHCP with no survey or conservation requirements for the study area, including coast horned lizard, orange-throated whiptail, red diamondback rattlesnake, golden eagle, Swainson's hawk, loggerhead shrike, coastal California gnatcatcher, northwestern San Diego pocket mouse, Stephens' kangaroo rat (covered by the SKR HCP), Los Angeles pocket mouse, San Diego black-tailed jackrabbit, and San Diego desert woodrat. Therefore, assuming payment of the applicable fees (the MSHCP Local Development Mitigation Fee and the SKR HCP fee for the Stephens' kangaroo rat) and compliance with required guidelines in the MSHCP (see section 7.2.5 below), no additional mitigation is required for these species.

The remaining six (6) species, the southern grasshopper mouse, American badger, western mastiff bat, pocketed free-tailed bat, lesser long-nosed bat, and pallid bat are not covered by the MSHCP. These species are listed as species of special concern by the CDFW and do not carry a federal or state listing as threatened or endangered. These species are considered to have a low to very low potential to occur on the study area based on the limited habitat and/or quality of the habitat, and no significant impacts are anticipated to these species as described below. The study area also has the potential to support migratory birds and raptors that are discussed further in 6.2.4.2 of this report.

- No significant impact to southern grasshopper mouse since this species is only considered to have a low potential to occur as it has not been recorded on CNDDB within the vicinity of the study area since 1938.

- No significant impact to American badger since this species was considered to have low potential to occur. The majority of the site is surrounded by development and a large portion of suitable habitat is disturbed. Additionally, this species has not been recorded on CNDDB within the vicinity of the study area since 1908.

- No significant impact to western mastiff bat since this species was only considered to have a low potential to occur for foraging with no suitable roosting habitat on the study area. Although bats in this family are known to be strong fliers and can fly long distances to forage, there is only a low probability that these species will travel to the study area based on the disturbance present on the study area and presence of surrounding development. The nearest CNDDB occurrence record of this species was recorded in 1990 approximately 3.0 miles to the southwest of the study area.

- No significant impact to pocketed free-tailed bat since this species was only considered to have a very low potential to occur for roost with no suitable roosting habitat on the study area. The potential for roosting was considered very low since this species typically prefers steeper cliffs for roosting habitat. Although little is known regarding home range for this species, the potential for roosting is also unlikely since the study area does not support adjacent foraging habitat.[11] There are only two CNDDB occurrence records in the vicinity.

11 CDFW. 2000. California Wildlife Habitat Relationships System: Pocketed Free-tailed Bat. State of California, The Resources Agency. May 2000.

The nearest record is from 1985 approximately 6.5 miles to the southwest of the study area near March Air Force Base.

- No significant impact to lesser long-nosed bat since this species was only considered to have a very low potential to roost and forage on the study area. The potential was considered low since this species is not typically found in California. Records in California are typically vagrant migrants. This species has only been recorded once on CNDDB within the vicinity of the study area, which was in 1993 approximately 9.5 miles to the northeast in a residential neighborhood of Yucaipa.

- No significant impact to pallid bat since this species was only considered to have a very low potential to roost and forage on the study area. The potential was considered very low because of evidence of disturbance on the study area and the presence of surrounding development to the south, northeast, and west; this species is highly sensitive to disturbance. Additionally, this species has not been recorded on CNDDB within the vicinity since 1929.

The above six species were not considered for coverage under the MSHCP, indicating that regionally significant populations of these species do not exist within the MSHCP boundaries. Based on the above discussion, the study area is not capable of supporting large populations of these species and a loss of a few individuals, if present, would not expect to reduce regional population numbers. Therefore, any impacts to these species would be less than significant and no mitigation measures are considered required.

Burrowing Owl

The study area supports potentially suitable burrowing owl (Species of Special Concern) habitat, but no active burrowing owl burrows, signs, or individuals were found on-site during the Step I and Step II surveys.

Although the study area does not currently support burrowing owls, a pre-construction survey is required in compliance with the MSHCP. Specifically, in accordance with the County of Riverside's *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area* (County of Riverside, 2006), a pre-construction survey for burrowing owl within the study area is required within 30 days prior to ground disturbance to avoid potential direct take of burrowing owls in the future. A Condition of Approval (COA BIO-1) requiring this survey is provided in section 7.2.2 below, in addition to a recommended mitigation measure (MM BIO-2) should burrowing owls be present in the future. Mitigation is proposed consistent with the burrowing owl mitigation guidelines published by CDFW (CDFW, 2012).

6.3.2 Impacts to Sensitive Plant Communities

Threshold BIO-B: Would the project have a substantial adverse effect on any riparian habitat or other sensitive plant community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U. S. Fish and Wildlife Service?

No Impacts (Sensitive Plant Communities)

Less than Significant with Regulatory Compliance (CDFW Jurisdiction)

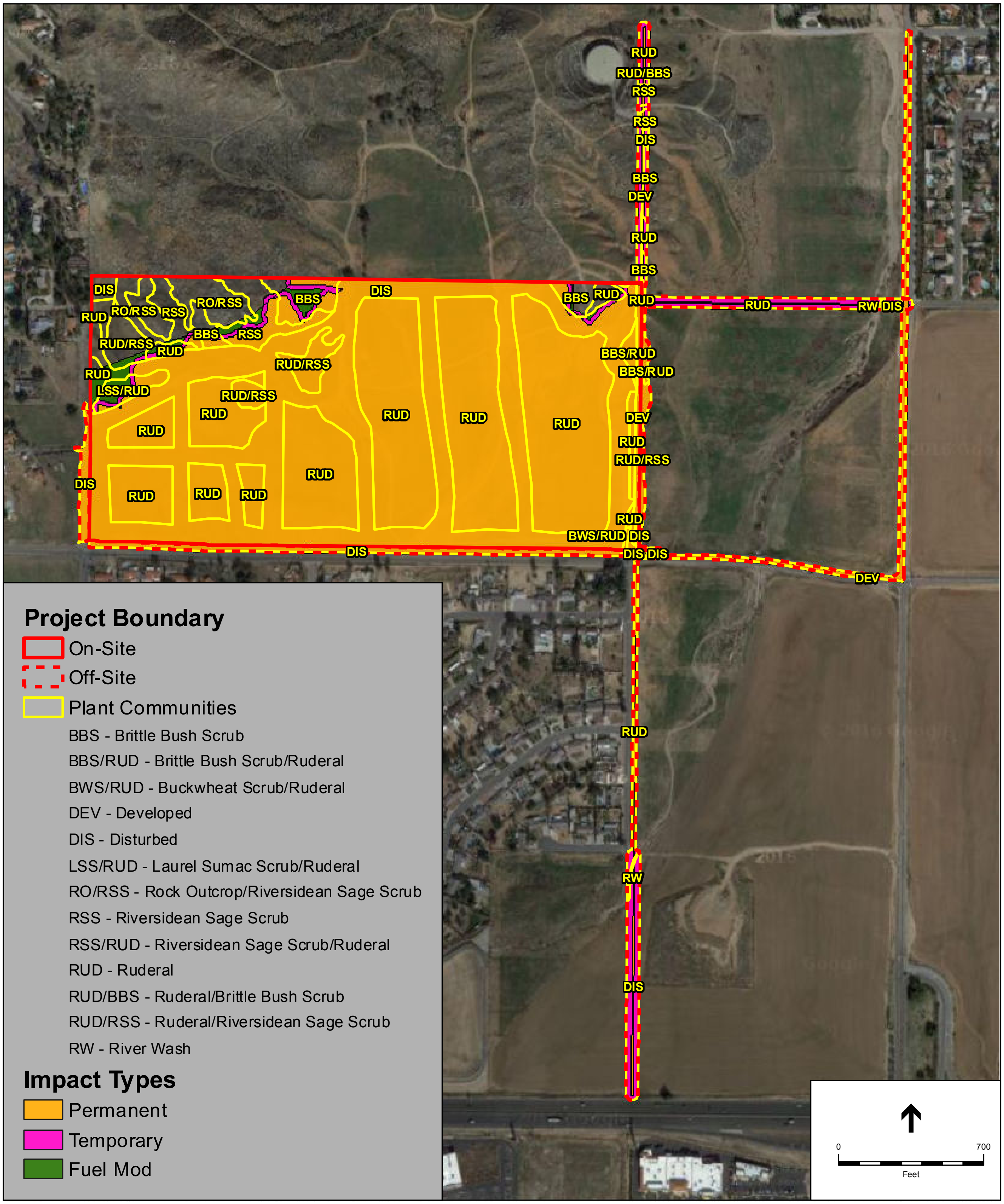
6.3.2.1 Sensitive Plant Communities

Sensitive plant communities were not observed within the study area; therefore, no impacts would occur. There are seven native communities on the study area that total 9.48 acres, including brittlebush scrub, brittlebush scrub/ruderal, buckwheat scrub/ruderal, laurel sumac scrub/ruderal, Riversidean sage scrub, Riversidean sage scrub/ruderal, and rock outcrop/Riversidean sage scrub. Permanent impacts to native communities on the study area are proposed to 2.91 acres, which is only 3.8 percent of the total proposed permanent impacts (75.81 acres) to plant communities. The majority of permanent impacts are proposed to ruderal (37.66 acres) and disturbed (30.54 acres) areas, which are dominated by non-native species. Impacts to these areas comprise 90.0 percent of the total impacts to plant communities on the study area. In addition to permanent impacts, 0.83 acres of fuel modification and 1.25 acres of temporary impacts are proposed to native communities on the study area. Impacts to plant communities are shown in **Figure 13**, *Impacts to Plant Communities* and **Table 6**, *Existing and Proposed Impacts to Plant Communities*.

TABLE 6
EXISTING AND PROPOSED IMPACTS TO PLANT COMMUNITIES

Plant Communities	Existing (acres)	Permanent Impacts (acres)	Fuel Modification Impacts (acres)	Temporary Impacts (acres)
Brittlebush Scrub	2.61	0.92	0.32	0.69
Brittlebush Scrub/Ruderal	0.52	0.51	0.00	0.01
Buckwheat Scrub/Ruderal	0.13	0.13	0.00	0.00
Laurel Sumac Scrub/Ruderal	0.78	0.36	0.26	0.16
Riversidean Sage Scrub	3.22	0.98	0.19	0.33
Riversidean Sage Scrub/Ruderal	0.07	0.01	0.00	0.06
Rock Outcrop/Riversidean Sage Scrub	2.15	0.00	0.06	0.00
River Wash	0.05	0.01	0.00	0.04
Ruderal	40.54	37.66	0.35	1.92
Ruderal/Brittlebush Scrub	0.04	0.01	0.00	0.03
Ruderal/Riversidean Sage Scrub	2.72	1.75	0.13	0.03
Disturbed	32.86	30.54	0.19	1.52
Developed	3.36	2.93	0.00	0.43
Total	**89.05**	**75.81**	**1.50**	**5.22**

SOURCE: ESA PCR, 2016



SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project

Figure 13

Impacts to Plant Communities

ESA PCR

6.3.2.2 CDFW Jurisdiction

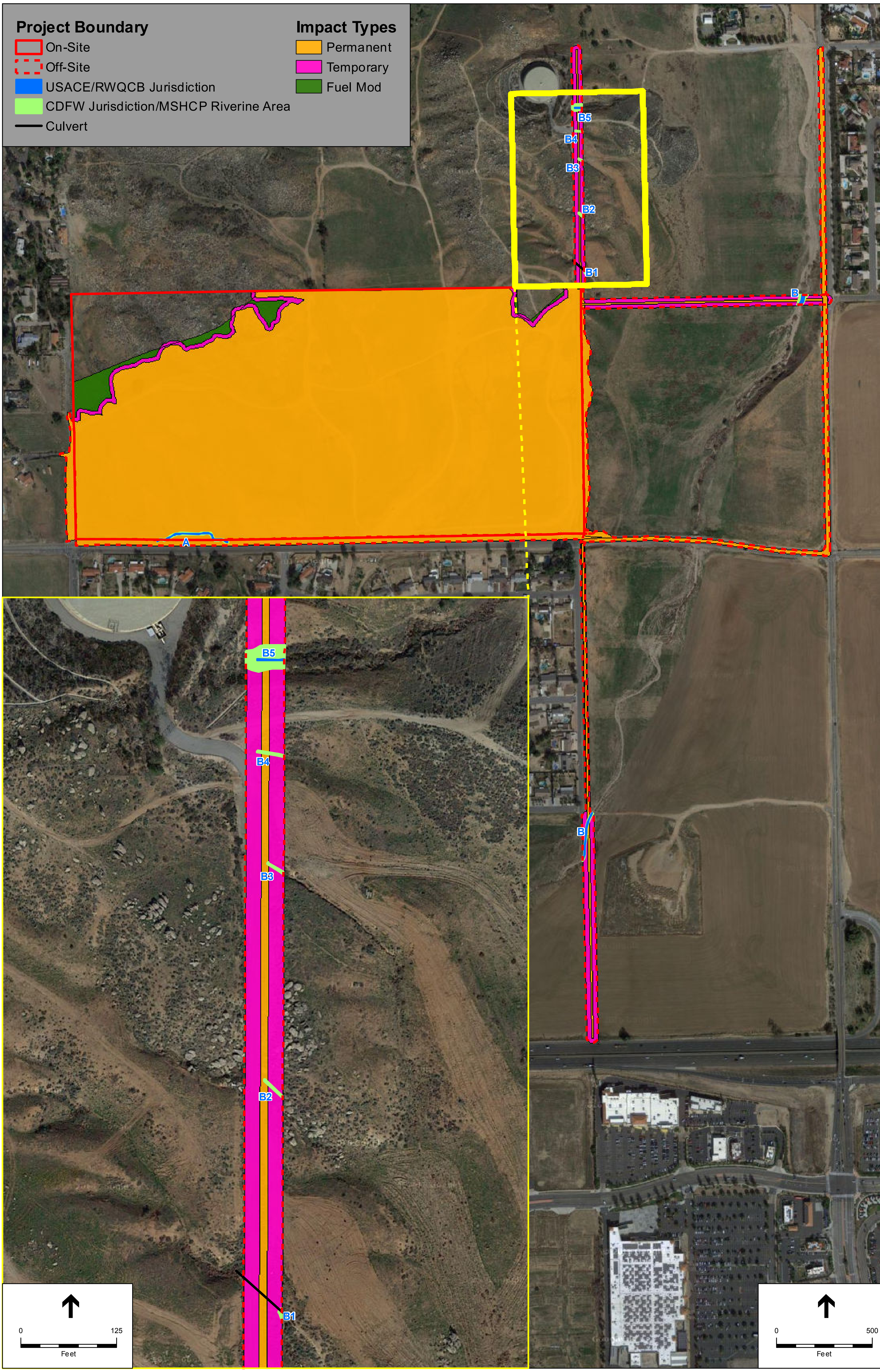
The project study areas support drainages that are considered CDFW jurisdictional streambeds pursuant to Section 1602 of the California Fish and Game Code and are proposed for impacts. Drainage A and Drainage Complex B are all jurisdictional, of which permanent impacts are proposed to Drainages A, B, B2, B3, B4, and B5 totaling 0.077 acre of permanent impacts (including 0.046 acre on-site and 0.031 acre off-site), as shown on **Figure 14**, *Impacts to Jurisdictional Features and MSHCP Riverine Areas*. Existing and impact acreages are summarized in **Table 7**, *Permanent Impacts to CDFW Jurisdictional Features and MSHCP Riverine Areas*. The permanent impacts total approximately 47 percent of the total 0.165 acre of CDFW jurisdiction identified within the on-site and off-site study areas. It should be noted that this report presumes combined impacts associated with the proposed water line alignment and two alternative alignments will occur. However, only one water line alignment will ultimately by implemented. Therefore, permanent and temporary impacts to CDFW jurisdictional waters will be slightly reduced once the final water line alignment is determined. Compensatory mitigation for permanent impacts to CDFW jurisdictional waters will be required for the project based only on impacts associated with the final water line alignment as part of subsequent CDFW Section 1602 permitting requirements. Temporarily impacted CDFW jurisdictional areas will be restored to pre-project conditions following completion of construction.

TABLE 7
IMPACTS TO CDFW JURISDICTIONAL FEATURES AND MSHCP RIVERINE AREAS[a]

Drainage (Study Area)	Existing (acres)	Permanent Impacts (acres)	Temporary Impacts (acres)
Drainage A (On-Site)	0.046	0.046	-
Drainage A (Off-Site)	0.013	0.013	-
Drainage B (Off-Site)	0.069	0.011	0.058
Drainage B1 (Off-Site)	0.001	0.000	0.001
Drainage B2 (Off-Site)	0.001	0.000[b]	0.001
Drainage B3 (Off-Site)	0.001	0.000[c]	0.001
Drainage B4 (Off-Site)	0.001	0.000[d]	0.001
Drainage B5 (Off-Site)	0.033	0.007	0.026
Total	**0.165**	**0.077**	**0.088**

NOTES:
[a] MSHCP Riverine Areas are presumed equivalent to CDFW jurisdiction.
[b] Impacts are considered negligible; actual acreage of impacts to four decimal places is 0.0003 acre.
[c] Impacts are considered negligible; actual acreage of impacts to four decimal places is 0.0001 acre.
[d] Impacts are considered negligible; actual acreage of impacts to four decimal places is 0.0004 acre.

SOURCE: ESA PCR, 2016.



SOURCE: Google Maps, 2015.

Ironwood Village Project

Figure 14

Impacts to Jurisdictional Features and MSHCP Riverine Areas

ESA PCR

Impacts to CDFW jurisdictional features would be required to comply with Section 1602 of the California Fish and Game Code, including applying for a permit and providing compensatory streambed mitigation as stated above. A Condition of Approval (COA BIO-2) is proposed in section *7.2.3 Measures to Mitigate Potentially Significant Impacts to Jurisdictional Features* of this BRA to comply with the compensatory mitigation requirement of this regulation, subject to approval by CDFW. Compliance with Section 1602 of the California Fish and Game Code would reduce impacts to a less than significant level.

6.3.3 Impacts to Wetlands

Threshold BIO-C: Would the project have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Less than Significant with Regulatory Compliance

The project study areas do not support wetlands as defined by Section 404 of the Clean Water Act. However, the project study areas do support USACE/RWQCB ephemeral non-wetland jurisdictional streambeds regulated under Sections 404/401 of the Clean Water Act (CWA) that are proposed for impacts. Drainage A and Drainage B5 are considered jurisdictional "waters of the U.S.", of which permanent impacts are proposed totaling 0.034 acre(0.023 acre on-site and 0.011 acre off-site), as shown on Figure 14. Existing and permanent impact acreages are summarized in **Table 8**, *Permanent Impacts to USACE/RWQCB Jurisdictional Features*. The permanent impacts total less than 60 percent of the total 0.058 acre of USACE/RWQCB jurisdiction on-site and off-site. Temporarily impacted areas will be restored to pre-project conditions.

TABLE 8
IMPACTS TO USACE/RWQCB JURISDICTIONAL FEATURES

Drainage	Existing (acres)		Permanent Impacts (acres)		Temporary Impacts (acres)	
	Length (ft)	Area (acres)	Length (ft)	Area (acres)	Length (ft)	Area (acres)
Drainage A	285	0.023	285	0.023	0	0.000
Drainage A (off-site)	111	0.007	111	0.007	0	0.000
Drainage B (off-site)	306	0.026	40	0.004	266	0.022
Drainage B5 (off-site)	35	0.002	10	0.001	25	0.001
Total	**737**	**0.058**	**436**	**0.034**	**366**	**0.023**

SOURCE: ESA PCR, 2016

Impacts to USACE and RWQCB jurisdictional "waters of the U.S." would be required to comply with Sections 404 and 401 of the CWA, respectively, including applying for a permit and mitigation subject to approval by USACE and/or RWQCB. A Condition of Approval (COA

BIO-2) is proposed in section *7.2.3 Measures to Mitigate Potentially Significant Impacts to Jurisdictional Features* of this BRA to comply with the compensatory mitigation requirement of these regulations, subject to approval by USACE and RWQCB. Compliance with Sections 404 and 401 of the CWA is intended to reduce impacts to a less than significant level.

6.3.4 Impacts to Wildlife Movement and Migratory Species

Threshold BIO-D: Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery areas?

Less Than Significant (Wildlife Movement)

Less than Significant with Mitigation Incorporated (Migratory Species)

6.3.4.1 Wildlife Movement

As described in section 4.5.2 above, the study area supports potential live-in and movement habitat for species on a local scale (i.e., some limited live-in and at least marginal movement habitat for reptile, bird, and mammal species), but it likely provides little to no function to facilitate wildlife movement for wildlife species on a regional scale, and is not identified as a regionally important dispersal or seasonal migration corridor. Movement on a local scale likely occurs with species adapted to urban environments due to the development and disturbances in the vicinity of the study area. Although implementation of the project would result in disturbances to local wildlife movement within the study area, those species adapted to urban areas would be expected to persist on-site following construction, particularly within the open space areas. As such, impacts would be less than significant and no mitigation measures would be required. Since the study area does not function as a regional wildlife corridor and are not known to support wildlife nursery area(s), no impacts would occur and no mitigation measures would be required.

6.3.4.2 Migratory Species

Migratory Birds and Raptors

As previously discussed in section 4.7.6, *Special-status Wildlife Species*, the site supports potential nesting and foraging habitat for migratory birds, in addition to potential foraging habitat for raptors. Based on the disturbed nature of the site from agriculture and ongoing maintenance activities, the quality of foraging habitat is considered to be low. Higher quality foraging habitat is considered to occur in less developed areas with larger expanses of open space. The loss of a relatively small acreage of low quality foraging habitat as a result of the project would not be expected to impact the foraging of these species. Therefore, impacts to foraging habitat would be considered less than significant and no mitigation measures are considered required.

The study area has the potential to support songbird and raptor nests due to the presence of shrubs, ground cover, and limited trees on-site. Nesting activity typically occurs from February 15 to August 31. Disturbing or destroying active nests is a violation of the MBTA (16 U.S.C.

703 et seq.). In addition, nests and eggs are protected under Fish and Wildlife Code Section 3503. As such direct impacts to breeding birds (e.g. through nest removal) or indirect impacts (e.g. by noise causing abandonment of the nest) is considered a potentially significant impact as defined by the thresholds of significance (Threshold BIO-D) in Section 6.0 above. Compliance with the MBTA would reduce impacts to a less than significant level, as detailed in MM BIO-3 (see section 7.2.4).

6.2.5 Consistency with Local Policies and Ordinances

Threshold BIO-E: Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

No Impacts

The project does not conflict with any local policies or ordinances protecting biological resources, such as tree preservations or ordinances.

6.2.6 Consistency with Adopted Natural Community Conservation Plan

Threshold BIO-F: Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

Less than Significant with Mitigation Incorporated

The study area is within the Western Riverside County MSHCP and requires payment of the Local Development Mitigation Fee, compliance with requirements of the MSHCP including the Burrowing Owl Survey Area guidelines (Section 6.3.2 of the MSHCP), and the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools (Section 6.1.2 of the MSHCP). The study area is not within a cell, a designated cell group, or a subunit within the Reche Canyon/Badlands Area Plan; therefore, conservation of land on the study area is not required pursuant to the MSHCP. The study area is also not within the survey overlays for Criteria Area Species, Narrow Endemic Plant Species, Amphibian Species, or Mammal Species (Section 6.3.2 of the MSHCP). Since the study area is not within or in the vicinity of any Criteria Cells, the project will not result in edge effects that will adversely and directly affect biological resources within the MSHCP Conservation Area. As such, the project will not be subject to certain requirements outlined in the Guidelines Pertaining to the Urban/Wildlands Interface (Section 6.1.3 of the MSHCP) including those for the treatment and management of edge factors including night lighting, noise, barriers for public access and predators, and grading/land development limits. However, runoff from the site has the potential to indirectly affect MSHCP Conservation Areas downstream through the quantity and quality of water discharged from the site, in addition to the transport of plant seeds. Therefore compliance with the drainage, toxics, and invasive requirements outlined in Section 6.1.3 of the MSHCP would be required. A Condition of Approval (COA BIO-3) is proposed in section *7.2.5 Measures to Mitigate Potentially Significant Impacts to the MSHCP* of this BRA, which requires the project to comply with all provisions of the MSHCP prior to issuance of a grading permit. Compliance with COA BIO-3 would reduce impacts to a less than significant level.

Project compliance with the MSHCP pertaining to Burrowing Owl, Riparian/Riverine, and Urban/Wildlands Interface requirements for drainage, toxics and invasives are summarized below:

- The study area is within the Burrowing Owl Survey Area of the MSHCP. Focused burrowing owl surveys were conducted within all portions of the study area that support potentially suitable habitat for this species. No burrowing owls were observed on the study area. However, due to the presence of potentially suitable habitat, a 30-day pre-construction survey for burrowing owl is required pursuant to the MSHCP. If burrowing owls are found within the study area during the 30-day pre-construction survey, impacts to this species would be potentially significant. The Condition of Approval (COA BIO-1) and mitigation measure (MM BIO-2) prescribed in section 7.2.1 below would reduce this impact to a less than significant level and ensure consistency with the MSHCP.

- Drainage A and Drainage Complex B on the study area meet the definition of Riverine Areas pursuant to the MSHCP. The project will result in permanent impacts to 0.078 acre of Riverine Areas, including 0.046 acre within the on-site portion of Drainage A, 0.013 acre in the off-site portion of Drainage A, and 0.018 acre within Drainage Complex B. The permanent impacts are equivalent to approximately 47 percent of the total 0.165 acre of Riverine Areas within the project study areas. The proposed Riverine Areas impacts are summarized in Table 7.

- The biological function and value of the on- and off-site Riverine Areas within Drainage A and Drainage Complex B include the transport of water, which is restricted based on the ephemeral flows of the drainage and limited watershed. The function and value of the drainages are also limited since they support only small patches of upland and/or ruderal vegetation and are primarily unvegetated. Other types of aquatic features that could provide suitable habitat for Riparian/Riverine species, such as fairy shrimp, are not present within the study area (i.e. vernal pools, swales, vernal pool-like ephemeral ponds, seasonal ponds, stock ponds, or other human-modified depressions such as tire ruts, etc.).

- Impacts to Riverine Areas would be potentially significant based on requirements of the MSHCP. According to section 6.1.2 of the MSHCP, if an avoidance alternative is not feasible a Determination of Biologically Equivalent or Superior Preservation (DBESP) shall be made by the Project applicant to ensure the replacement of any lost functions and values of habitat as it relates to MSHCP Covered Species. The condition of approval prescribed in section 7.2.3 below pertaining to jurisdictional drainages ensures consistency with the MSHCP. The DBESP would be submitted to the City and reviewed and approved by the City and the Wildlife Agencies.

- The project has the potential to affect the quantity and quality of water in downstream MSHCP Conservation Areas or Riverine areas via Drainage A and Drainage Complex B through runoff generated by the development and transport of invasive, non-native plants species from project landscaping. Since the project will be required to comply with flood and water quality standards,[12] no indirect effects from the quantity and quality of run-off will occur to downstream areas. In addition, no invasive, non-native plant species listed in Tables 6-2 of the MSHCP, *Plants That Should Be Avoided Adjacent To The MSHCP Conservation Area*, will be utilized in the landscape plans. These measures will avoid impacts to water quality and the dispersal of invasive plant seeds in the watershed and are outlined in the Condition of Approval recommended in section 7.2.5 below.

[12] The project will be required to prepare a Water Quality Management Plan and Storm Water Pollution Prevention Plan consistent with Regional Water Quality Control Board and County requirements that will outline measures such as Best Management Practices (BMPS) to address water quantity and quality, and to address any potential flooding.

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7.0 MITIGATION MEASURES AND CONDITIONS OF APPROVAL

7.1 Approach

Mitigation measures are recommended for those impacts determined to be significant to special-status biological resources (identified in italics in section 7.2 below). Mitigation measures for impacts considered to be "significant" were developed in an effort to reduce such impacts to a level of "insignificance," while at the same time allowing an opportunity to realize development goals under the proposed project. As stated in CEQA Guidelines Section 15370 mitigation includes:

1. Avoiding the impact altogether by not taking a certain action or parts of an action.
2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
3. Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment.
4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
5. Compensating for the impact by replacing or providing substitute resources or environments.

Where compliance with existing regulations and the issuance of permits by regulatory agencies would reduce impacts to a less than significant level, those measures are proposed as conditions of approval (identified in non-italics in section 7.2 below).

7.2 Mitigation Measures and Conditions of Approval for Significant Impacts

The following recommended mitigation measures (MM) and conditions of approval (COA) are intended to address potentially significant impacts from the proposed development Project.

7.2.1 Measures to Mitigate Potentially Significant Impacts to Special-Status Plant Species

MM BIO-1 Due to the presence of suitable habitat within the proposed off-site manufactured slope area located directly east of the project boundary, a spring focused plant survey to determine the presence/absence of Parry's spineflower and white-bracted spineflower is required to be conducted during the appropriate blooming periods of the two species (between April and June) prior to ground disturbance. If individuals are found, significant impacts would occur as a result of implementation of the project unless mitigation is implemented to reduce impacts to less than significant. Mitigation includes seed collection of individuals that would be significantly impacted by the project at the end of the growing season and prior to ground disturbance. Collected seeds will be planted within an appropriate on-site or off-site mitigation area, which will be conserved as open space in perpetuity. Mitigation for significant impacts to Parry's spineflower and white-bracted spineflower will be implemented in consultation with the City of Moreno Valley and CDFW.

7.2.2 Measures to Mitigate Potentially Significant Impacts to Special-Status Wildlife Species

COA BIO-1 Due to the presence of suitable habitat and in compliance with the MSHCP, a pre-construction survey for burrowing owl is required within 30 days prior to ground disturbance to determine the presence of burrowing owls and avoid potential direct take of burrowing owls if present.

MM BIO-2 If burrowing owls are determined present during the 30-day pre-construction survey, occupied burrows shall be avoided to the greatest extent feasible, following the guidelines in the Staff Report on Burrowing Owl Mitigation published by Department of Fish and Wildlife (CDFW, 2012) including, but not limited to, conducting pre-construction surveys, avoiding occupied burrows during the nesting and non-breeding seasons, implementing a worker awareness program, biological monitoring, establishing avoidance buffers, and flagging burrows for avoidance with visible markers. If occupied burrows cannot be avoided, acceptable methods may be used to exclude burrowing owl either temporarily or permanently, pursuant to a Burrowing Owl Exclusion Plan that shall be prepared and approved by the County of Riverside Environmental Programs Department (EPD), in coordination with the CDFW. The Burrowing Owl Exclusion Plan shall be prepared in accordance with the guidelines in the Staff Report on Burrowing Owl Mitigation and the MSHCP.

In accordance with the MSHCP, take of active nests will be avoided. Passive relocation (i.e., the scoping of the burrows by a burrowing owl biologist and collapsing burrows free of young) will occur when owls are present outside the nesting season. The EPD may require translocation sites for the burrowing owl to be created in the MSHCP reserve for the establishment of new colonies pursuant to MSHCP objectives for the species. Translocation sites, if required, will be identified in consultation with EPD and/or CDFW taking into consideration unoccupied habitat areas, presence of burrowing mammals, existing colonies, and effects to other MSHCP Covered Species.

7.2.3 Measures to Mitigate Potentially Significant Impacts to Jurisdictional Features

COA BIO-2 Prior to the issuance of any grading permit for permanent impacts in the areas designated as jurisdictional features, the project applicant shall obtain regulatory permits from the USACE, RWQCB, and CDFW. The following shall be incorporated into the permitting, subject to approval by the regulatory agencies:

1. On-site or off-site creation, restoration and/or enhancement of USACE/RWQCB jurisdictional "waters of the U.S." within the San Jacinto watershed at a ratio no less

than 1:1 or within an adjacent watershed at a ratio no less than 2:1 for permanent impacts, and for any temporary impacts to restore the impact area to pre-project conditions (i.e. pre-project contours). Off-site mitigation may occur on land acquired for the purpose of in-perpetuity preservation as approved by the resource agencies, or through the purchase of mitigation credits at a resource agency-approved off-site mitigation bank or in-lieu fee program.

2. On-site or off-site creation, restoration, and/or enhancement of CDFW jurisdictional streambed within the San Jacinto watershed at a ratio no less than 1:1 or within an adjacent watershed at a ratio no less than 2:1 for permanent impacts, and for any temporary impacts to restore the impact area to pre-project conditions (i.e. pre-project contours). Off-site mitigation may occur on land acquired for the purpose of in-perpetuity preservation as approved by the resource agencies, or through the purchase of mitigation credits at a resource agency-approved off-site mitigation bank or in-lieu fee program.

Purchase of any mitigation credits through an agency-approved mitigation bank or in-lieu fee program should occur prior to any impacts to jurisdictional drainages. Any mitigation proposed on land acquired for the purpose of in-perpetuity mitigation that is not part of an agency-approved mitigation bank or in-lieu fee program shall include the creation, restoration, and/or enhancement of similar streambed habitat pursuant to a resource agency-approved Habitat Mitigation and Monitoring Plan (HMMP). The HMMP shall be prepared prior to any impacts to jurisdictional features, and shall provide details as to the implementation of the mitigation, maintenance, and future monitoring of mitigation areas. The goal of the mitigation shall be to create, restore, and/or enhance similar habitat with equal or greater function and value than the impacted habitat.

7.2.4 Measures to Mitigate Potentially Significant Impacts to Migratory or Nesting Birds

MM BIO-3 Prior to the issuance of any grading permit that would remove potentially suitable nesting habitat for raptors or songbirds, the project applicant shall demonstrate to the satisfaction of the City of Moreno Valley that either of the following have been or will be accomplished:

1. Vegetation removal activities shall be scheduled outside the nesting season (September 1 to February 14 for songbirds; September 1 to January 14 for raptors) to avoid potential impacts to nesting birds.

2. Any construction activities that occur during the nesting season (February 15 to August 31 for songbirds; January 15 to August 31 for raptors) will require that all suitable habitat be thoroughly surveyed for the presence of nesting birds by a qualified biologist before commencement of clearing. If any active nests are detected a buffer of 300 feet (500 feet for raptors) around the nest adjacent to construction will be delineated, flagged, and avoided until the nesting cycle is complete. The buffer may be modified and/or other recommendations proposed as determined appropriate by the biological monitor to minimize impacts.

7.2.5 Measures to Mitigate Potentially Significant Impacts to the MSHCP

COA BIO-3 Prior to the issuance of any grading permit the project applicant shall comply with all of the provisions of the MSHCP, including payment of the MSHCP Local Development Mitigation Fee, compliance with Section 6.1.2 of the MSHCP pertaining to Riparian/Riverine Areas, implementation of drainage, toxics and non-native species guidelines pertaining to the Urban/Wildlands Interface in Section 6.1.4 of the MSHCP, and compliance with Section 6.3.2 of the MSHCP pertaining to Burrowing Owl Survey Area requirements. Compliance with Section 6.1.2 of the MSHCP will require preparation of a Determination of Biologically Equivalent or Superior Preservation (DBESP) analysis outlining the impacts and proposed compensatory mitigation for impacts to the Riparian/Riverine Areas for submittal and approval by the City of Moreno Valley and the wildlife agencies (CDFW and USFWS).

8.0 IMPACTS AFTER MITIGATION

8.1 Level of Significance after Mitigation

The proposed project, inclusive of mitigation measures and conditions of approval, would have less than significant impacts to special-status species, jurisdictional features, and migratory and/or nesting birds, in addition to providing MSHCP consistency.

8.2 Cumulative Impacts

Cumulative impacts are defined as the direct and indirect effects of a proposed project which, when considered alone, would not be deemed a substantial impact, but when considered in addition to the impacts of related projects in the area, would be considered significant. "Related projects" refers to past, present, and reasonably foreseeable probable future projects, which would have similar impacts to the proposed Project. CEQA deems a cumulative impact analysis to be adequate if a list of "related projects" is included in the EIR or the proposed project is consistent with an adopted general, specific, master, or comparable programmatic plan [Section 15130(b)(1)(B)]. CEQA also states that no further cumulative impact analysis is necessary for impacts of a proposed project consistent with an adopted general, specific, master, or comparable programmatic plan [Section 15130(d)].

The MSHCP identifies areas for long-term conservation and management. As such, cumulative impacts of proposed projects within authorized take lands are minimized through the conservation of land. Cumulative impacts to the biological resources listed below for the study area are considered to be less than significant based on compliance with the Western Riverside County MSHCP, and regulations for jurisdictional waters. This includes implementation of the mitigation measures and conditions of approval outlined above in section 6.0, *Project Related Impacts* and *7.0, Mitigation Measures and Conditions of Approval*. Since the study area was determined not to function as a regional wildlife movement corridor, this biological resource is not included below.

- Special-status plant species (Parry's spineflower and white-bracted spineflower);
- Burrowing owl;
- Migratory and/or nesting birds; and
- Drainage features (including USACE, RWQCB and CDFW jurisdictional features and MSHCP Riparian/Riverine areas).

The proposed mitigation would result in a minimum no-net-loss of the biological function and value of these resources, and the conditions of approval would ensure compliance with existing regulations (such as the Western Riverside County MSHCP) and regulations for jurisdictional drainages. Therefore, with the proposed mitigation and conditions of approval, impacts would not be considered cumulatively significant. A summary is provided below.

Special-Status Plant Species: Mitigation is proposed and includes a spring focused survey prior to ground disturbance to determine the presence/absence of Parry's spineflower and white-bracted spineflower within the off-site eastern manufactured slope area. If either or both of these species are observed, collection of seed and planting within an on-site or off-site mitigation site is required. The mitigation site is required to be preserved as open space in perpetuity. With this mitigation measure, any impacts to Parry's spineflower and white-bracted spineflower would not be considered cumulatively significant.

Special-Status Wildlife Species: Mitigation is proposed if burrowing owls are observed on the study area in the future, which would avoid direct impacts in compliance with the Western Riverside County MSHCP. Mitigation is also proposed to avoid direct impacts to raptors and migratory bird species through compliance with the MBTA. With these mitigation measures, any impacts would not be considered cumulatively significant.

Jurisdictional Drainages: Impacts to jurisdictional features would be subject to permitting with the regulatory agencies, including USACE, RWQCB and/or CDFW, including compensatory mitigation. With the proposed compliance of existing regulations through the permitting process, impacts would not be considered cumulatively significant.

Riparian/Riverine Areas: Impacts to MSHCP Riparian/Riverine areas would be subject to approval of a DBESP by the City of Moreno Valley and Wildlife Agencies, as required in Section 6.1.2 of the Western Riverside County MSHCP. With the approval and implementation of the DBESP impacts would not be considered cumulatively significant. Mitigation is proposed as compensation for impacts to jurisdictional drainages through the regulatory process as described above.

9.0 REFERENCES

American Ornithologists' Union. 1998. *The American Ornithologists' Union Checklist of North American Birds. 7th Edition*. American Ornithologists' Union, Washington, D.C. June.

Baldwin, B. G., Editor. 2012. The Jepson Manual: Vascular Plants of California, Second Edition. University of California Press, Berkeley, California

Barbour, Michael G., Keeler-Wolf, Todd, and Schoenherr, Allan A. 2007. *Terrestrial Vegetation of California* Third Edition. University of California Press.

Bennett, A. F. 1990. *Habitat Corridors and the Conservation of Small Mammals in a Fragmented Forest Environment*. Landscape Ecol. 4:109-122.

California Herps. 2015**.** *A Guide to the Amphibians and Reptiles of California*. Available online (http://www.californiaherps.com).

CDFW (California Department of Fish and Wildlife). 2015. *California Natural Diversity Database* (available by subscription) and *Rarefind*. CDFW: Sacramento, California.

CDFW. 2012. *Staff Report on Burrowing Owl Mitigation*. State of California Natural Resources Agency. March 7, 2012.

CDFW. 2010. *Natural Communities List*. The Vegetation Classification and Mapping Program. California Department of Fish and Wildlife. Sacramento, CA. September 2010.

CDFW. 2009. *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities*. State of California, California Natural Resources Agency. November 24, 2009.

CDFW. 2000a. *Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities*. State of California, The Resources Agency. December 9, 1983; revised May 8, 2000.

CDFW. 2000b. *California Wildlife Habitat Relationships System: Pocketed Free-tailed Bat*. State of California, The Resources Agency. May 2000.

CNPS (California Native Plant Society). 2015. *Inventory of Rare and Endangered Plants of California*. California Native Plant Society. Available online (http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi).

Clarke, O.F. 2007. *Flora of the Santa Ana River and Environs with References to World Botany*. Heyday Books: Berkeley, California.

County of Riverside. 2006. *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area*. March 29, 2006.

Dudek & Associates. 2003. *Western Riverside County Multiple Species Habitat Conservation Plan* (*MSHCP*). *Final MSHCP, Volumes I and II*. Prepared for County of Riverside Transportation and Lands Management Agency by Dudek & Associates, Inc. Approved June 17, 2003.

Earth Survey. 2015. PLSS in Google Earth (PLSGE). Available online at: http://www.metzgerwillard.us/ plss/plss.html

Environmental Laboratory. 1987. *U.S. Army Corps of Engineers Wetlands Delineation Manual*, Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

Fahrig, L. and G. Merriam. 1985. *Habitat Patch Connectivity and Population Survival*. Ecology. 66:1762-1768.

Harris, L. D. and P. B. Gallagher. 1989. New Initiatives for Wildlife Conservation: The Need for Movement Corridors. Pages 11-34 in G. Mackintosh, ed. *Preserving Communities and Corridors*. Defenders of Wildlife. Washington D.C. 96 pp.

Holland, R. F. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. State of California, the Resource Agency. October 1986.

Jameson, Jr., E. W., and H. J. Peeters. 1988. *California Mammals*. Berkeley: University of California Press.

MacArthur, R. M. and E. O. Wilson. 1967. *The Theory of Island Biogeography*. Princeton University Press: Princeton, New Jersey.

Munz, P. A. 1974. *A Flora of Southern California*. Berkeley: University of California Press.

Noss, R. F. 1983. *A Regional Landscape Approach to Maintain Diversity*. BioScience. 33:700-706.

NRCS (Natural Resources Conservation Service). 2015. Web Soil Survey. Available online (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx).

Riverside County TLMA (Transportation & Land Management Agency). 2015. RCIP Conservation Summary Report Generator. Available online at: http://www.rctlma.org/online /content/rcip_report_ generator.aspx.

Sawyer, John O., T. Keeler-Wolf, and J. Evens. 2009. *A Manual of California Vegetation, Second Edition*. Sacramento: California Native Plant Society.

Simberloff, D. and J. Cox. 1987. *Consequences and Costs of Conservation Corridors*. Conserv.Biol. 1:63-71.

Soulé, M. E. 1987. *Viable Populations for Conservation*. Sinaur Associates Inc., Publishers, Sunderland, Massachusetts.

South Coast Wildlands. 2008. *South Coast Missing Linkages: A Wildland Network for the South Coast Ecoregion*. South Coast Wildlands, Idyllwild, CA. www.scwildlands.org. March 2008.

Stebbins, R. C. 2003. *A Field Guide to Western Reptiles and Amphibians Third Edition.* Boston: Houghton-Mifflin.

USACE (U.S. Army Corps of Engineers). 2008a. *A Field Guide to the Identification of the Ordinary High Water Mark* (*OHWM*) *in the Arid West Region of the Unites States*. Technical Report TR-08-12, Ed. R.W. Lichvar, S.M. McColley. Hanover, New Hampshire: Cold Regions Research and Engineering Laboratory. August.

USACE. 2008b. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (*Version 2.0*). Ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERCD/EL TR-06-16. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

USFWS (U.S. Fish and Wildlife Service). 2015a. Species Occurrence Data. Provided by USFWS.

USFWS. 2015b. Critical Habitat Mapping. GIS files provided by USFWS.

USFWS. 2000. *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants.* United States Fish and Wildlife Service. January 2000.

USGS (U.S. Geological Survey). 1967. *Sunnymead, California* topographic quadrangle map. Photorevised 1980.

APPENDIX A - FLORAL AND FAUNAL COMPENDIUM

ANGIOSPERMS (DICOTYLEDONS)

SCIENTIFIC NAME	COMMON NAME
Adoxaceae	**Muskroot Family**
Sambucus nigra ssp. *caerulea*	blue elderberry
Anacardiaceae	**Sumac or Cashew Family**
Rhus ovata	sugar sumac
Asteraceae	**Sunflower Family**
Ambrosia acanthicarpa	flatspine bur ragweed
Artemisia californica	California sagebrush
Artemisia douglasiana	mugwort
Baccharis salicifolia	mule fat
Brickellia desertorum	desert brickellbush
* *Centaurea melitensis*	tocalote
Corethrogyne filaginifolia	common sandaster
Deinandra fasciculata	fascicled tarplant
Encelia farinosa	brittlebush
Ericameria pinifolia	pinebush
Erigeron canadensis	horseweed
* *Helianthus annuus*	common sunflower
Heterotheca grandiflora	telegraphweed
* *Lactuca serriola*	prickly lettuce
* *Oncosiphon piluliferum*	stinknet
Pseudognaphalium bicolor	bicolored cudweed
* *Salsola tragus*	prickly Russian thistle
Stephanomeria virgata	rod wirelettuce
Boraginaceae	**Borage Family**
Amsinckia intermedia	common fiddleneck
Phacelia cicutaria	caterpillar phacelia
Brassicaceae	**Mustard Family**
* *Hirschfeldia incana*	short pod mustard
* *Raphanus raphanistrum*	wild radish
* *Sisymbrium irio*	London rocket
Sisymbrium sp.	mustard

** non-native*

ANGIOSPERMS (DICOTYLEDONS)

SCIENTIFIC NAME		COMMON NAME
Cactaceae		**Cactus Family**
	Cylindropuntia californica var. *parkeri*	cane cholla
	Opuntia littoralis	coast prickly pear
Chenopodiaceae		**Goosefoot Family**
*	*Chenopodium murale*	nettle-leaved goosefoot
Convolvulaceae		**Morning-Glory Family**
*	*Convolvulus arvensis*	field bindweed
Cucurbitaceae		**Gourd Family**
	Cucurbita palmata	coyote gourd
	Marah macrocarpa	wild cucumber
Cuscutaceae		**Dodder Family**
	Cuscuta sp.	dodder
Euphorbiaceae		**Spurge Family**
	Croton setigerus	dove weed
	Euphorbia albomarginata	rattlesnake weed
Fabaceae		**Legume Family**
	Acmispon americanus	Spanish lotus
	Acmispon glaber var. *glaber*	deerweed
Geraniaceae		**Geranium Family**
*	*Erodium botrys*	longbeak stork's bill
*	*Erodium cicutarium*	red-stemmed filaree
Lamiaceae		**Mint Family**
*	*Marrubium vulgare*	horehound
	Salvia apiana	white sage
	Salvia columbariae	chia
	Salvia mellifera	black sage
	Trichostema lanceolatum	vinegarweed
Malvaceae		**Mallow Family**
*	*Malva parviflora*	cheeseweed
Myrtaceae		**Myrtle Family**
*	*Eucalyptus camaldulensis*	red gum
*	*Eucalyptus citriodora*	lemon scented gum
Nyctaginaceae		**Four O'Clock Family**
	Mirabilis laevis	wishbone bush

* *non-native*

ANGIOSPERMS (DICOTYLEDONS)

SCIENTIFIC NAME	COMMON NAME
Polygonaceae	**Buckwheat Family**
Eriogonum fasciculatum	California buckwheat
Salix gooddingii	black willow
Scrophulariaceae	**Figwort Family**
Antirrhinum nuttallianum	Nuttall's snapdragon
Scrophularia californica	California figwort
Solanaceae	**Nightshade Family**
Datura wrightii	jimsonweed
* *Nicotiana glauca*	tree tobacco
Solanum douglasii	Douglas' nightshade
Solanum xanti	purple nightshade
Zygophyllaceae	**Caltrop Family**
* *Tribulus terrestris*	puncturevine

ANGIOSPERMS (MONOCOTYLEDONS)

SCIENTIFIC NAME	COMMON NAME
Arecaceae	**Palm Family**
* *Washingtonia robusta*	Mexican fan palm
Liliaceae	**Lily Family**
Chlorogalum pomeridianum	soap plant
Poaceae	**Grass Family**
* *Arundo donax*	giant reed
* *Avena fatua*	wild oat
* *Bromus diandrus*	ripgut grass
* *Bromus madritensis* ssp. *rubens*	foxtail chess
* *Festuca perennis*	Italian ryegrass
* *Hordeum vulgare*	barley
* *Lamarckia aurea*	goldentop
* *Polypogon monspeliensis*	annual beard grass
* *Schismus barbatus*	Mediterranean schismus

** non-native*

REPTILES

SCIENTIFIC NAME	COMMON NAME
Colubridae	**Colubrid Snakes**
Coluber flagellum	coachwhip
Phrynosomatidae	**Zebratail, Earless, Horned, Spiny, Fringe-Toed Lizards**
Sceloporus occidentalis	western fence lizard

BIRDS

SCIENTIFIC NAME		COMMON NAME
Cathartidae		**New World Vultures**
	Cathartes aura	*turkey vulture*
Accipitridae		**Hawks**
	Accipiter cooperii	*Cooper's hawk*
	Buteo jamaicensis	*red-tailed hawk*
Falconidae		**Falcons**
	Falco sparverius	*American kestrel*
Charadriidae		**Plovers**
	Charadrius vociferus	*killdeer*
Columbidae		**Pigeons and Doves**
*	*Columba livia*	*rock pigeon*
	Zenaida macroura	*mourning dove*
Apodidae		**Swifts**
	Aeronautes saxatalis	*white-throated swift*
Trochilidae		**Hummingbirds**
	Archilochus alexandri	*black-chinned hummingbird*
	Calypte anna	*Anna's hummingbird*
Picidae		**Woodpeckers**
	Picoides nuttallii	*Nuttall's woodpecker*
Tyrannidae		**Tyrant Flycatchers**
	Sayornis nigricans	*black phoebe*
	Sayornis saya	*Say's phoebe*
	Tyrannus verticalis	*western kingbird*
	Tyrannus vociferans	*Cassin's kingbird*
Laniidae		**Shrikes**
	Lanius ludovicianus	*loggerhead shrike*

* *non-native*

BIRDS

SCIENTIFIC NAME		COMMON NAME
Corvidae		**Jays and Crows**
	Corvus brachyrhynchos	*American crow*
Alaudidae		**Larks**
	Eremophila alpestris	*horned lark*
Hirundinidae		**Swallows**
	Petrochelidon pyrrhonota	*cliff swallow*
	Hirundo rustica	*barn swallow*
	Stelgidopteryx serripennis	*northern rough-winged swallow*
Aegithalidae		**Bushtits**
	Psaltriparus minimus	*bushtit*
Polioptilidae		**Gnatcatchers**
	Polioptila californica californica	*coastal California gnatcatcher*
Sturnidae		**Starlings**
*	*Sturnus vulgaris*	*European starling*
Emberizidae		**Emberizine Sparrows and Allies**
	Melozone crissalis	*California towhee*
Icteridae		**Blackbirds**
	Agelaius phoeniceus	*red-winged blackbird*
Fringillidae		**Finches**
	Haemorhous mexicanus	*house finch*
	Spinus psaltria	*lesser goldfinch*
	Spinus tristis	*American goldfinch*
Passeridae		**Old World Sparrows**
*	*Passer domesticus*	*house sparrow*

MAMMALS

SCIENTIFIC NAME	COMMON NAME
Sylvilagus audubonii sanctidiegi	Audubon's cottontail

* *non-native*

APPENDIX B: SPECIAL-STATUS PLANT SPECIES

Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
BRYOPHYTES								
Bryaceae	**Moss Family**							
Tortula californica	California screw moss	N/A	NONE	NONE	1B.2	NONE	Sandy soil. Chenopod scrub, Valley and foothill grassland. 10-1460 meters.	**ABSENT**
ANGIOSPERMS (DICOTS)								
Asteraceae	**Sunflower Family**							
Ambrosia pumila	San Diego ambrosia	Apr.-Oct.	FE	NONE	1B.1	MSHCP(b)	Chaparral, coastal scrub, valley and foothill grassland, vernal pools; often in disturbed areas; sometimes alkaline sandy loam or clay soils. 20-415 meters.	**NONE**
Artemisia palmeri	San Diego sagewort	May-Sep.	NONE	NONE	4.2	MSHCP	Coastal scrub, chaparral, riparian forest, riparian woodland, riparian scrub; found in sandy soils within drainages and riparian areas. 15-915 meters.	**NONE**
Centromadia pungens ssp. *laevis*	smooth tarplant	Apr.-Sep.	NONE	NONE	1B.1	MSHCP(d)	Chenopod scrub, meadows and seeps, playas, riparian woodland, valley and foothill grassland; alkaline. 0-640 meters.	**ABSENT**
Deinandra paniculata	paniculate tarplant	Apr.-Nov.	NONE	NONE	4.2	NONE	Generally vernally mesic; coastal scrub; valley and foothill grassland; vernal pools 25-940 meters.	**NONE**
Helianthus nuttallii ssp. *parishii*	Los Angeles sunflower	Aug.-Oct.	NONE	NONE	1A	NONE	Freshwater marsh, salt marsh. 10-1675 meters.	**NONE**
Lasthenia glabrata ssp. *coulteri*	Coulter's goldfields	Feb.-Jun.	NONE	NONE	1B.1	MSHCP(d)	Marshes and swamps (coastal salt), playas, vernal pools. 1-1220 meters.	**NONE**

NONE = species not expected to occur on the study area due to the lack of suitable habitat, or the site's location outside of the species' range; **ABSENT** = preferred habitat was considered present based on the literature review and observed habitat on the study area, however no individuals were observed during the focused sensitive plant survey.

Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
Senecio astephanus	San Gabriel ragwort	May-Jul.	NONE	NONE	4.3	NONE	Chaparral, coastal bluff scrub; rocky slopes. 400-1500 meters.	**NONE**
Symphyotrichum defoliatum	San Bernardino aster	Jul.-Nov.	NONE	NONE	1B.2	NONE	Cismontane woodland; coastal scrub; lower montane coniferous forest; meadows and seeps; marshes and swamps; valley and foothill grassland (vernally mesic); near ditches, streams and springs. 2-2040 meters.	**ABSENT**
Trichocoronis wrightii var. *wrightii*	Wright's trichocoronis	May-Sep.	NONE	NONE	2B.1	MSHCP(b)	Meadows and seeps, marshes and swamps, riparian scrub, vernal. 5-435 meters.	**NONE**
Aspleniaceae	**Spleenwort Family**							
Asplenium vespertinum	western spleenwort	Mar.-Jun.	NONE	NONE	4.2	NONE	Sandy soils in low-gradient washes, alluvial terraces, and canyon bottoms, along gravelly wash margins, or on coarse soils on steep, generally north-facing slopes in alluvial scrub, cismontane (e.g., chamise) chaparral, coastal sage scrub, oak woodland, and/or riparian scrub or woodland. 274 - 825 meters.	**NONE**
Berberidaeeae	**Barberry Family**							
Berberis nevinii	Nevin's barberry	Mar.-Jun.	FE	SE	1B.1	MSHCP(d)	Sandy soils in low-gradient washes, alluvial terraces, and canyon bottoms, along gravelly wash margins, or on coarse soils on steep, generally north-facing slopes in alluvial scrub, cismontane (e.g., chamise) chaparral, coastal sage scrub, oak woodland, and/or riparian	**ABSENT**

NONE = species not expected to occur on the study area due to the lack of suitable habitat, or the site's location outside of the species' range; **ABSENT** = preferred habitat was considered present based on the literature review and observed habitat on the study area, however no individuals were observed during the focused sensitive plant survey.

Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
							scrub or woodland. 274 - 825 meters.	
Nasturtium gambelii	Gambel's water cress	Apr.-Oct.	FE	ST	1B.1	NONE	Marshes or swamps. 5-330 meters.	**NONE**
Boraginaceae	**Borage Family**							
Harpagonella palmeri	Palmer's grapplinghook	Mar.-May	NONE	NONE	4.2	MSHCP	Chaparral, coastal scrub, valley and foothill grassland; open grassy areas within shrubland; clay soils. 20-955 meters.	**NONE**
Brassicaceae	**Mustard Family**							
Caulanthus simulans	Payson's jewel-flower	Feb.-Jun.	NONE	NONE	4.2	MSHCP	Chaparral, coastal scrub; sandy, granitic soils. 90-2200 meters.	
Lepidium virginicum var. robinsonii	Robinson's pepper-grass	Jan.-Jul.	NONE	NONE	4.3	NONE	Chaparral, coastal scrub; shrubland; dry soils. 1-885 meters.	**NONE**
Cactaceae	**Cactus Family**							
Opuntia basilaris var. brachyclada	short-joint beavertail	Apr.-Jun.	NONE	NONE	1B.2	NONE	Chaparral, Joshua tree woodland, Mojavean desert scrub, pinyon-juniper woodland, riparian woodland; sandy or granitic soils. 425-1800 meters.	**NONE**
Caryophyllaceae	**Pink Family**							
Arenaria paludicola	marsh sandwort	May-Aug.	FE	SE	1B.1	NONE	Marshes and swamps (freshwater); grows through dense areas of *Typha*, *Juncus*, and *Scirpus*; found in sandy soils. 3-170 meters.	**NONE**
Chenopodiaceae	**Saltbush Family**							
Atriplex coronata var. *notatior*	San Jacinto Valley crownscale	Apr.-Aug.	FE	NONE	1B.1	MSHCP(d)	Alkaline flats, playas, valley and foothill grassland, vernal pools. 139-500 meters.	**NONE**
Atriplex pacifica	South Coast saltscale	Mar.-Oct.	NONE	NONE	1B.2	NONE	Coastal bluff scrub, Coastal dunes, Coastal scrub, Playas. 0-140 meters.	**NONE**

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Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
Atriplex parishii	Parish's brittlescale	Jun.-Oct.	NONE	NONE	1B.1	MSHCP(d)	Shadscale scrub, alkali sinks, freshwater wetlands, wetland-riparian; playas, vernal pools. 25-1900 meters.	**NONE**
Atriplex serenana var. *davidsonii*	Davidson's saltscale	Apr.-Oct.	NONE	NONE	1B.2	MSHCP(d)	Coastal sage scrub, wetland-riparian; coastal. 10-200 meters	**NONE**
Convolvulaceae	**Morning-glory Family**							
Convolvulus simulans	small-flowered morning-glory	Mar.-Jul.	NONE	NONE	4.2	MSHCP(e)	Clay soils, serpentinite seeps; openings in chaparral; coastal sage scrub; valley and foothill grassland. 30-700 meters.	**NONE**
Cuscuta obtusiflora var. *glandulosa*	Peruvian dodder	Jul.-Oct.	NONE	NONE	2B.2	NONE	Marshes and swamps (freshwater). 15-280 meters.	**NONE**
Fabaceae	**Pea Family**							
Astragalus hornii var. hornii	Horn's milk-vetch	May-Oct.	NONE	NONE	1B.1	MSHCP	Meadows and seeps, playas, lake margins; alkali soils. 60-850 meters.	**NONE**
Astragalus pachypus var. jaegeri	Jaeger's bush milk-vetch	Dec.-Jun.	NONE	NONE	1B.1	MSHCP	Coastal scrub, chaparral, valley and foothill grassland, cismontane woodland; dry habitats, such as ridges, valleys, and sandy slopes, typically within grasslands and oak chaparral. 365-915 meters.	**ABSENT**
Rupertia rigida	Parish's rupertia	Jun.-Aug.	NONE	NONE	4.3	NONE	Chaparral, lower montane coniferous forest, cismontane woodland, meadows and seeps, pebble plain, valley and foothill grassland. 700-2500 meters	**NONE**

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Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
Geraniaceae	**Geranium Family**							
California macrophylla	round-leaved filaree	Mar.-May	NONE	NONE	1B.1	MSHCP(d)	Cismontane woodland, valley and foothill grassland; clay. 15-1200 meters.	**ABSENT**
Grossulariaceae	**Gooseberry Family**							
Ribes divaricatum var. parishii	Parish's gooseberry	Feb.-Apr.	NONE	NONE	1A	NONE	Riparian woodland. 65-300 meters.	**NONE**
Hydrophyllaceae	**Waterleaf Family**							
Nama stenocarpa	mud nama	Jan.-Jul.	NONE	NONE	2.B2	MSHCP(d)	Marches and swamps (lake margins, riverbanks). 5-500 meters.	**NONE**
Juglandaceae	**Walnut Family**							
Juglans californica	California black walnut	Mar.-Jun.	NONE	NONE	4.2	MSHCP	Chaparral, coastal scrub, cismontane woodland, slopes, canyons, alluvial habitats. 50-900 meters.	**NONE**
Juglandaceae	**Walnut Family**							
Lepechinia cardiophylla	heart-leaved pitcher sage	Apr.-Jul.	NONE	NONE	1B.2	MSHCP(d)	Closed-cone coniferous forest, chaparral, cismontane woodland. 520-1370 meters.	**NONE**
Monardella macrantha ssp. *hallii*	Hall's monardella	Jun.-Oct.	NONE	NONE	1B.3	MSHCP	Broadleafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest, valley and foothill grassland. 730-2195 meters.	**NONE**
Monardella pringlei	Pringle's monardella	May-Jun.	NONE	NONE	1A	NONE	Coastal scrub; sandy soils. 300-400 meters.	**NONE**
Juncaceae	**Rush Family**							
Juncus duranii	Duran's rush	Jul.-Aug.	NONE	NONE	4.3	NONE	Meadows, lower and upper montane coniferous forest; wet areas. 1770-2805 meters.	**NONE**

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Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
Malvaceae	**Stick-leaf Family**							
Malacothamnus parishii	Parish's bush-mallow	Jun.-Jul.	NONE	NONE	1A	NONE	Chaparral, coastal sage scrub; in washes. 305-455 meters.	**NONE**
Sidalcea hickmanii ssp. parishii	Parish's checkerbloom	Jun.-Aug.	NONE	SR	1B.2	NONE	Chaparral, cismontane woodland, lower montane coniferous forest; typically found in burned or cleared areas on dry, rocky hillsides and along edges of fire roads. 1000-2500 meters.	**NONE**
Sidalcea neomexicana	salt spring checkerbloom	Mar.-Jun.	NONE	NONE	2B.2	NONE	Chaparral, coastal scrub, lower montane coniferous forest, Mojavean desert scrub, playas/alkaline, mesic. 15-1530 meters.	**ABSENT**
Nyctaginaceae	**Four O'Clock Family**							
Abronia villosa var. *aurita*	chaparral sand-verbena	Jan.-Sep.	NONE	NONE	1B.1	NONE	Chaparral, coastal scrub, desert dunes; sandy. 75-1600 meters.	**ABSENT**
Orobanchaceae	**Broom-rape Family**							
Chloropyron maritimum ssp. maritimum	salt marsh bird's-beak	May-Oct.	FE	SE	1B.2	NONE	Coastal salt marsh, coastal dunes; limited to the higher zones of the salt marsh habitat 0-30 meters.	**NONE**
Papaveraceae	**Poppy Family**							
Romneya coulteri	Coulter's matilija poppy	Mar.-Jul.	NONE	NONE	4.2	MSHCP(e)	Dry washes and canyons in sage scrub and chaparral. 20-1200 meters.	**NONE**
Polemoniaceae	**Phlox Family**							
Eriastrum densifolium ssp. sanctorum	Santa Ana River woollystar	Apr.-Sep.	FE	SE	1B.1	MSHCP	Chaparral, coastal scrub (alluvial fan); sandy or gravelly soils. 91-610 meters.	**NONE**

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Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
Navarretia fossalis	spreading navarretia	Apr.-Jun.	FT	NONE	1B.1	MSHCP(b)	Coastal sage scrub, wetland-riparian; occurs almost always under natural conditions in wetlands. 30-655 meters.	**NONE**
Polygonaceae	**Buckwheat Family**							
Chorizanthe leptotheca	Peninsular spineflower	May-Aug.	NONE	NONE	4.2	MSHCP(e)	Chaparral, coastal scrub, lower montane coniferous forest; granitic soils and alluvial fans. 300-1900 meters.	**NONE**
Chorizanthe parryi var. *parryi*	Parry's spineflower	Apr.-Jun.	NONE	NONE	1B.1	MSHCP(e)	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland; sandy or rocky, openings. 275-1220 meters.	**ABSENT** However, there is a potential for this species to occur within the off-site manufactured slope area east of the project boundary.
Chorizanthe polygonoides var. *longispina*	long-spined spineflower	Apr.-Jul.	NONE	NONE	1B.2	MSHCP	Chaparral, coastal scrub, meadow and seep, valley and foothill grassland, vernal pools; ultramafic, often clay. 30-1530 meters.	**ABSENT**
Chorizanthe xanti var. leucotheca	white-bracted spineflower	Apr.-June	NONE	NONE	1B.2	NONE	Coastal scrub(alluvial fans), Mojavean desert scrub, pinyon and juniper woodland; sandy or gravelly soils. 300-1200 meters.	**ABSENT** However, there is a potential for this species to occur within the off-site manufactured slope area east of the project boundary.
Dodecahema leptoceras	slender-horned spineflower	Apr.-Jun.	FE	SE	1B.1	MSHCP(b)	Chaparral, cismontane woodland, coastal scrub (alluvial fan); sandy. 200-760 meters.	**NONE**
Ranunculaceae	**Buttercup Family**							
Myosurus minimus ssp. *apus*	little mousetail	Mar.-Jun.	NONE	NONE	3.1	MSHCP(d)	Associated with vernal pools and inundated grassland habitats.	**NONE**

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Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
Rosaceae	**Rose Family**							
Horkelia cuneata var. *puberula*	mesa horkelia	Feb.-Sep.	NONE	NONE	1B.1	NONE	Chaparral (maritime), cismontane woodland, coastal scrub; sandy or gravelly soils. 70-810 meters.	**ABSENT**
Rubiaceae	**Coffee Family**							
Galium californicum ssp. *primum*	Alvin Meadow bedstraw	May-Jul.	NONE	NONE	1B.2	MSHCP(f)	Chaparral, Lower montane coniferous forest/granitic, sandy 1350-1700 meters.	**NONE**
Solanaceae	**Nightshade Family**							
Lycium parishii	Parish's desert-thorn	Mar.-Apr.	NONE	NONE	2B.3	NONE	Coastal scrub, Sonoran desert scrub. 135-1000 meters.	**NONE**
Themidaceae	**Butcher's-Broom Family**							
Brodiaea filifolia	thread-leaved brodiaea	Mar.-Jun.	FT	SE	1B.1	MSHCP(d)	Clay soils in coastal scrub, valley and foothill grassland, cismontane woodland, and vernal pools. 25-1120 meters.	**NONE**
Muilla coronate	crowned muilla	Mar.-Apr.	NONE	NONE	4.2	NONE	Joshua tree woodland, pinyon-juniper woodland, Mojavean desert scrub, chenopod scrub; found in sandy, granitic soils on barren flats and ridges. 670-1960 meters.	**NONE**
ANGIOSPERMS (MONOCOTS)								
Cyperaceae	**Sedge Family**							
Carex comosa	bristly sedge	May-Sep.	NONE	NONE	2B.1	NONE	Coastal prairie, Marshes and swamps (lake margins), Valley and foothill grassland. 0-625 meters.	**NONE**

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Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
Orchidaceae	**Orchid Family**							
Piperia leptopetala	narrow-petaled rein orchid	Mar.-Jul.	NONE	NONE	4.3	NONE	Cismontane woodland, lower and upper montane coniferous forest. 380-2225 meters.	**NONE**
Liliaceae	**Lily Family**							
Allium munzii	Munz's onion	Mar.-May	FE	ST	1B.1	MSHCP(b)	Prefers chaparral, cismontane woodland, coastal scrub, pinyon and juniper woodland, valley and foothill grassland; mesic, clay. 297-1070 meters.	**NONE**
Calochortus plummerae	Plummer's mariposa lily	May-Jul.	NONE	NONE	4.2	MSHCP(e)	Coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous forest; rocky and sandy areas, typically of granitic or alluvial material; typically common after fire. 100-1700 meters.	**NONE**
Lilium humboldtii ssp. ocellatum	ocellated Humboldt lily	Mar.-Jul.	NONE	NONE	4.2	MSHCP(e)	Chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, riparian woodland, openings. 30-1800 meters.	**NONE**
Poaceae	**Grass Family**							
Hordeum intercedens	vernal barley	Mar.-Jun.	NONE	NONE	3.2	MSHCP	Valley and foothill grassland, vernal pools, coastal dunes, coastal scrub, dry saline streambeds, alkaline flats. 5-1000 meters.	**NONE**
Imperata brevifolia	California satintail	Sep.-May	NONE	NONE	2.1	NONE	Chaparral, coastal sage scrub, Mojavean desert scrub, meadows and seeps (often alkali), riparian scrub/mesic. 0-1215 meters.	**NONE**
Sphenopholis obtusata	prairie wedge grass	Apr.-Jul.	NONE	NONE	2B.2	NONE	Cismontane woodland, meadows and seeps; mesic sites. 300-2000 meters.	**NONE**

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Scientific Name	Common Name	Flowering Period	Federal	State	CNPS	MSHCP	Preferred Habitat	Potential For Occurrence
FUNGI (ASCOMYCOTA)								
Caliciaceae	**Lichen-forming Fungi**							
Texosporium sancti-jacobi	woven-spored lichen	N/A	NONE	NONE	3	NONE	Chaparral; found in open areas with chamise, buckwheat, club moss, and sometimes on small mammal droppings. 290-660 meters.	**NONE**

Key to Species Listing Status Codes

FE	*Federally Endangered*	SE	*State Listed as Endangered*
FT	*Federally Threatened*	ST	*State Listed as Threatened*
FC	*Federal Candidate*	SCE	*State Candidate for Endangered*
FPE	*Federally Proposed as Endangered*	SCT	*State Candidate for Threatened*
FPT	*Federally Proposed as Threatened*	SFP	*State Fully Protected*
FPD	*Federally Proposed for Delisting*	SSC	*California Species of Special Concern*

MSHCP	*Western Riverside County Multiple Species Habitat Conservation Plan covered species*
MSHCP(a)	*Surveys may be required as part of wetlands mapping per MSHCP Section 6.1.2.*
MSHCP(b)	*Surveys may be required within Narrow Endemic Plant Species survey area per MSHCP Section 6.1.3.*
MSHCP(c)	*Surveys may be required per MSHCP Section 6.3.2.*
MSHCP(d)	*Surveys may be required within Criteria Area per MSHCP Section 6.3.2.*
MSHCP(e)	*These Covered Species will be considered to be Covered Species Adequately Conserved when conservation requirements identified in species-specific conservation objectives have been met per MSHCP Section 9.0 (Table 9-3).*
MSHCP(f)	*These Covered Species will be considered to be Covered Species Adequately Conserved when a Memorandum of Understanding is executed with the Forest Service that addresses management for these species on Forest Service Land per MSHCP Table 9-3.*

Source: PCR Services Corporation, 2015

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Appendix C: Special-Status Wildlife Species

Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
INVERTEBRATES						
ANOSTRACA	**Fairy Shrimp**					
Streptocephalus woottoni	Riverside fairy shrimp	FE	NONE	MSHCP(a)	Endemic to western Riverside, Orange and San Diego Counties In areas of tectonic swales and slump basins in grassland and coastal scrub. Inhabit seasonal pools filled by winter/spring rains. Hatch in warm water later in the season.	**NONE** No suitable habitat.
Diptera	**Flies**					
Rhaphiomidas terminatus abdominalis	Delhi Sands flower-loving fly	FE	NONE	MSHCP	Found in areas of the Delhi Sands formation in southwestern San Bernardino and northwestern Riverside Counties. Requires fine, sandy soils, often with wholly or partly consolidated dunes and sparse vegetation.	**NONE** No suitable habitat. Although the study area is in the species range, Delhi Sands soils were not mapped by NRCS. Additionally, the majority of the site is highly disturbed.
Lepidoptera	**Butterflies and Moths**					
Euphydryas editha quino	quino checkerspot butterfly	FE	NONE	MSHCP	Chaparral and coastal scrub with sunny clearings. Require high densities of host plants, cuhs as *Plantago erecta*, *P. insularis*, and *Orthocarpus purpurescens*.	**NONE** No host species.
FISHES						
Catostomidae	**Suckers**					
Catostomus santaanae	Santa Ana sucker	FT	NONE	MSHCP	Habitat generalists, but prefer sand-rubble-boulder bottoms,	**NONE**

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NONE (F) = Species not expected to forage due to lack of food sources, or the site's location is outside of the species' range.

NOT EXPECTED = Preferred habitat was considered potentially present based on the literature review and anticipated habitat in the study area, however no individuals were observed and/or suitable habitat was absent based on the general field survey or focused surveys.

POTENTIAL = Preferred habitat was considered potentially present based on the literature review and observed habitat in the study area.

POTENTIAL (N) = Preferred nesting or roosting habitat was considered potentially present based on the literature review and observed habitat in the study area.

POTENTIAL (F) = Preferred foraging habitat was considered potentially present based on the literature review and observed habitat in the study area.

OBSERVED = Species was observed during surveys conducted on the site.

Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
					cool, clear water, & algae.	No suitable habitat.
Cyprinidae	**Carps and Minnows**					
Gila orcutti	arroyo chub	NONE	SSC	MSHCP	Aquatic and south coast flowing waters; slow water stream sections with mud or sand bottoms; feeds heavily on aquatic vegetation and associated invertebrates.	**NONE** No suitable habitat.
Rhinichthys osculus ssp. *3*	Santa Ana speckled dace	NONE	SSC	NONE	Aquatic and south coast flowing waters. Prefer stony habitat where there are hiding spaces between stones, washed by moderate current.	**NONE** No suitable habitat.
AMPHIBIANS						
Ranidae	**True Frogs**					
Rana muscosa	southern mountain yellow-legged frog	FE, FSS	SSC	MSHCP(d)	Prefers rocky stream courses in the mountains of southern California. Inhabits mid- to upper-elevation, perennial streams, often in locations with bedrock pools. Always encountered within a few feet of water.	**NONE** No suitable habitat.
Scaphiopodidae	**North American Spadefoots**					
Spea hammondii	western spadefoot	NONE	SSC	MSHCP	Prefers burrow sites within relatively open areas in lowland grasslands, chaparral, and pine-oak woodlands, areas of sandy or gravelly soil in alluvial fans, washes, and floodplains.	**NONE** No suitable habitat.

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
					Requires temporary pools for reproduction.	
REPTILES						
Anniellidae	**Legless Lizards**					
Anniella pulchra pulchra	silvery legless lizard	NONE	SSC	NONE	Sparse vegetation in beach, chaparral, and pine-oak woodland habitats as well as sycamores, cottonwoods, and oaks growing adjacent to streams. Needs loose soil for burrowing, moisture, warmth, and plant cover. Requires moisture.	**NONE** No suitable habitat.
Colubridae	**Colubrid Snakes**					
Lampropeltis zonata parvirubra	California mountain kingsnake (San Bernardino population)	NONE	SSC	MSHCP(f)	Well-lit canyons with rocky outcrops or rocky talus.	**NONE** No suitable habitat. Although the study area supports two small areas with rock outcrops, the outcrops are interspersed with vegetation and surrounded by unsuitable habitat. The study area also lacks rocky talus and is not within a canyon, which are both habitat features preferred by this species. The only CNDDB occurrence record in the vicinity is from 1997 on near Mill Creek off of SR-38, approximately 14.25 miles to the northeast of the study area.
Thamnophis hammondii	two-striped garter snake	NONE	SSC	NONE	Riparian and freshwater marshes with perennial water.	**NONE** No suitable habitat.

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
Emydidae	**Box and Water Turtles**					
Emys marmorata	western pond turtle	NONE	SSC	MSHCP	Aquatic environments; artificial flowing waters; marsh and swamp; south coast flowing and standing waters; wetlands. Requires upland habitat up to 0.5 km from water for egg laying and sandy banks or open fields for basking.	**NONE** No suitable habitat.
Phrynosomatidae	**Zebratail, Earless, Horned, Spiny, Fringe-Toed Lizards**					
Phrynosoma blainvillii	coast horned lizard	NONE	SSC	MSHCP	Chaparral; cismontane woodland; coastal bluff scrub; coastal scrub; desert wash; pinyon and juniper woodlands; riparian scrub; riparian woodland; valley and foothill grassland. Requires opens areas for basking, bushes for cover, loose soil for burrowing, and insects for food.	**POTENTIAL [MODERATE]** The majority of potentially suitable habitat resides on the northwestern corner of study area where Riversidean sage scrub and brittlebush scrub occurs. Harvester ants, this species main food source, were also observed (although the food source was not observed in the area supporting suitable habitat). Although suitable habitat and a possible food source exists on the study area, the majority is disturbed and higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the study area. There are numerous CNDDB occurrence records for this species within the vicinity of the study area.

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
Teiidae	**Whiptail Lizards**					
Aspidoscelis hyperythra	orange-throated whiptail	NONE	SSC	MSHCP	Chaparral; cismontane woodland; coastal scrub. Typically found along washes and other sandy sites. Requires perennial plants that host termites.	**POTENTIAL [MODERATE]** The majority of potentially suitable habitat resides on the northwestern corner of the study area where Riversidean sage scrub and brittlebush scrub occurs. These areas support perennial plants that may host this species preferred food source (termites). Although suitable habitat and a possible food source exists on the study area, the majority is disturbed and higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the study area. There are numerous CNDDB occurrence records for this species within the vicinity of the study area.
Viperidae	**Vipers**					
Crotalus ruber	red diamond rattlesnake	None	SSC	MSHCP	Chaparral, woodland, and arid desert habitats in rocky areas with dense vegetation.	**POTENTIAL [MODERATE]** The majority of potentially suitable habitat resides on the northwestern corner of study area where Riversidean sage scrub and brittlebush scrub occurs. However, these areas support limited vegetation and crevices for cover required by this species and higher quality habitat is present to the northwest (Olive Hill and Reche Canyon) and northeast (the Badlands mountain range) of the

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
						study area. There are numerous CNDDB occurrence records for this species within the vicinity of the study area.
BIRDS						
Accipitridae	**Hawks**					
Aquila chrysaetos	golden eagle	NONE	SFP	MSHCP	Mountains, deserts, and open country; prefer to forage over grasslands, deserts, savannahs and early successional stages of forest and shrub habitats.	**NONE (N); POTENTIAL(F, LOW)** There are few trees are present on the site, primarily near the western boundary in the laurel sumac scrub/ ruderal community. However, this species typically prefers to nest on cliffs, which are not present. This species is not expected to nest on the study area since it is highly disturbed, preferred nesting habitat is not present, and no records of nesting occur. There were some small mammal burrows observed in the disturbed areas of the study area, which could potentially provide a food source. However, there is only 1 CNDDB occurrence record within the vicinity. This record was a breeding pair observed in fall 1979, spring 1980, and fall 1980 in San Timoteo Canyon, approximately 6.0 miles to the northeast.
Buteo swainsoni	Swainson's hawk	NONE	ST	MSHCP	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, and agricultural or ranch lands	**NONE (N); POTENTIAL (F, LOW)** There are a few trees present on the study area, primarily near the

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OBSERVED = Species was observed during surveys conducted on the site.

Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
					with groves or lines of trees. Requires suitable foraging areas adjacent to breading areas such as grasslands that support rodent populations. This species will also hunt for reptiles and occasionally insects.	western boundary in the laurel sumac scrub/ ruderal community. However, these trees are limited and directly adjacent to roads and residential homes, which could create some noise disturbance. Disturbed areas supply open space with some potentially suitable habitat for burrowing animals and insects, and therefore may provide a food source for this species. There are only 2 CNDDB occurrence records of nesting individuals within the vicinity, both from over 100 years ago.
Elanus leucurus	white-tailed kite	NONE	SFP	MSHCP	Cismontane woodland; marsh and swamp; riparian woodland; valley and foothill grassland; wetland. Requires open grasslands, meadows, or marshes for foraging near isolated full-canopied trees for nesting.	**NONE (N); NONE (F)** No suitable habitat.
Haliaeetus leucocephalus	bald eagle	NONE	SE	MSHCP	Lower montane coniferous forest; old growth.	**NONE (N); NONE (F)** No suitable habitat.
Cuculidae	**Cuckoos, Roadrunners, and Anis**					
Coccyzus americanus occidentalis	western yellow-billed cuckoo	FC	SE	MSHCP(a)	Riparian thickets and forests dominated by willows abutting slow-moving watercourses, backwaters, or seeps.	**NONE (N); NONE (F)** No suitable habitat.

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Strigidae	**True Owls**					
Athene cunicularia	burrowing owl	None	SSC	MSHCP(c)	Disturbed; low-growing vegetation within coastal prairie, coastal scrub, Great Basin scrub, Mojavean desert scrub, Sonoran desert scrub, valley and foothill grassland; bare ground, disturbed.	**Not expected** Potentially suitable habitat present. Presence/absence surveys conducted with no BUOW observed.
Asio otus	long-eared owl	None	SSC	None	Riparian bottomlands with tall willows & cottonwoods; also found in live oak patches along streams. Require adjacent open land with mice and old nests of crows, hawks, or magpies for breeding.	**None (N); None (F)** No suitable habitat.
Tyrannidae	**Tyrant Flycatchers**					
Empidonax traillii extimus	southwestern willow flycatcher	FE	SE	MSHCP(a)	Wet meadows, riparian woodlands that contain water and low growing willow thickets.	**None (N); None (F)** No suitable habitat.
Laniidae	**Shrikes**					
Lanius ludovicianus	loggerhead shrike	None	SSC	MSHCP	Broken woodlands, savannah, pinyon-juniper, Joshua tree, & riparian woodlands, desert oases, scrub & washes; open country with perches for hunting and relatively dense shrubs for nesting.	**Potential (N, Moderate); Observed (F)** This species was observed during the third BUOW survey (7/2/2015).
Vireonidae	**Vireos**					
Vireo bellii pusillus	least Bell's vireo	FE	SE	MSHCP(a)	Riparian forest; riparian scrub; riparian woodland.	**None (N); None (F)** No suitable habitat.

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Troglodytidae	**Wrens**					
Campylorhynchus brunneicapillus sandiegensis	coastal cactus wren	None	SSC	MSHCP	Coastal scrub. Requires tall, mature *Opuntia* or cholla cactus for nesting.	**None (N); None (F)** No suitable habitat. The cactus observed on-site (*Opuntia littoralis* and *Cylindropuntia californica* var. *parkeri*) are sparsely growing, immature individuals and are not suitable for nesting.
Parulidae	**Wood Warblers**					
Icteria virens	yellow-breasted chat	None	SSC	MSHCP	Nests in low, dense riparian willow thickets & other brushy tangles (e.g. blackberry, wild grape) near water. Forages and nests within 10 feet of ground.	**None (N); None (F)** No suitable habitat.
Setophaga petechia	yellow warbler	None	SSC	MSHCP	Riparian woodlands, montane chaparral, open ponderosa pine and mixed coniferous habitat with significant brush.	**None (N); None (F)** No suitable habitat.
Polioptilidae	**Gnatcatchers**					
Polioptila californica californica	coastal California gnatcatcher	FT	SSC	MSHCP	Coastal bluff scrub; coastal scrub.	**Potential (Low, N); Observed (F)** This species was observed on the study area after completing the burrowing owl survey conducted on 5/13/2015. There is potential for this species to nest on the study area based on the presence of suitable RSS habitat; however, the potential is low since the habitat is fragmented and interspersed with unsuitable habitat.

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
Icteridae	**Blackbirds**					
Agelaius tricolor	tricolored blackbird	NONE	SSC	MSHCP	Highly colonial species. Requires open water, protected nesting substrate, and foraging area with insect prey within a few kilometers of the colony.	**NONE (N); NONE (F)** No suitable habitat.
MAMMALS						
Heteromyidae	**Pocket Mice and Kangaroo Rats**					
Chaetodipus fallax fallax	northwestern San Diego pocket mouse	NONE	SSC	MSHCP	Coastal scrub, chaparral, grasslands, sagebrush; sandy, herbaceous areas, usually in association with rocks or coarse gravel.	**POTENTIAL [MODERATE]** The study area supports suitable coastal scrub and chaparral habitat within the northwestern portion (e.g. brittle bush scrub, Riversidean sage scrub). Additionally, a number of small fossorial mammal burrows were observed on the study area.
Dipodomys merriami parvus	San Bernardino kangaroo rat	FE	NONE	MSHCP	Alluvial scrub vegetation on sandy loam substrates characteristic of alluvial fans and flood plains.	**NONE** The study area does not support suitable alluvial scrub vegetation.
Dipodomys stephensi	Stephens' kangaroo rat	FE	ST	MSHCP/SKR HCP	Open grasslands or sparse shrub lands. Sandy to sandy loam soils with low clay to gravel content.	**POTENTIAL [MODERATE]** The study area supports potentially suitable shrub habitat within the northwestern portion (e.g. brittle bush scrub and Riversidean sage scrub communities). Additionally, a number of small fossorial

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
						mammal burrows were observed on the study area.
Perognathus longimembris brevinasus	Los Angeles pocket mouse	NONE	SSC	MSHCP(c)	Lower elevation grasslands and coastal sage communities. Sparsely vegetated habitat areas in patches of fine sandy soils associated with washes. May not dig burrows, rather using weeds and dead leaves.	**POTENTIAL [MODERATE]** The study area supports potentially suitable habitat within the Riversidean sage scrub in the northwestern corner.
Leporidae	**Hares and Rabbits**					
Lepus californicus bennettii	San Diego black-tailed jackrabbit	NONE	SSC	MSHCP	Arid regions with short grasses; coastal scrub.	**POTENTIAL [MODERATE]** The majority of the study area supports suitable habitat for this species, including the Riversidean sage scrub on the northwestern corner and the ruderal areas (which support some short grasses)
Muridae	**Mice, Rats, and Voles**					
Neotoma lepida intermedia	San Diego desert woodrat	NONE	SSC	MSHCP	Coastal scrub and chaparral. Prefer areas with moderate to dense canopy cover. Frequently found in areas with rock outcrops and cliffs.	**POTENTIAL [MODERATE]** The study area supports potentially suitable habitat within northwestern corner (e.g. Riversidean sage scrub, rock outcrop/Riversidean sage scrub).

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
Onychomys torridus ramona	southern grasshopper mouse	NONE	SSC	NONE	Low, open, and semi-open coastal sage scrub, mixed chaparral, low sagebrush, riparian scrub, chenopod scrub, and annual grasslands with scattered shrubs; food source is arthropods, especially scorpions and grasshoppers.	**POTENTIAL [LOW]** The study area supports potentially suitable shrub habitat within the northwestern portion (e.g. brittle bush scrub and Riversidean sage scrub). Additionally, a number of small fossorial mammal burrows were observed on the study area. The nearest CNDDB occurrence record of this species was recorded in 1938 approximately 4.3 miles to the southeast of the study area within the Badlands.
Mustelidae	**Weasels, Badgers, and Otters**					
Taxidea taxus	American badger	NONE	SSC	NONE	Open shrub, forest, and herbaceous habitats, with friable soils to dig burrows. Requires rodent populations for food source.	**POTENTIAL [LOW]** Shrub habitat is present on the study area within the Riversidean sage scrub community on the northwestern corner of the study area. A few mammal burrows were observed, suggesting the presence of small fossorial mammals that could provide a possible food source. However, the majority of the site is surrounded by development and a large portion of suitable habitat is disturbed. Nearest CNDDB occurrence record is from 1908 roughly 6.5 miles to the northwest of the study area.
Molossidae	**Free-Tailed Bats**					
Eumops perotis californicus	western mastiff bat	NONE	SSC	NONE	Chaparral; cismontane woodland; coastal scrub; valley	**NONE [N]; POTENTIAL [F, LOW]**

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
					and foothill grassland. Roosts in crevices in cliff faces, high buildings, trees, and tunnels. Feed on insects.	No suitable roosting habitat exists on the study area. Bats in this family are known to be strong fliers and can fly long distances to forage. There is a probability that individuals may travel from roosts to forage on insects on the study area, but this is considered low based on the disturbance present on the study area and presence of surrounding development. The nearest CNDDB occurrence record is from1990 approximately 3.0 miles to the southwest of the study area.
Nyctinomops femorosaccus	pocketed free-tailed bat	NONE	SSC	NONE	Joshua tree woodland; pinyon and juniper woodland; desert scrub, palm oasis, desert wash, and desert riparian; Sonoran desert scrub. Typically roost in caves and rocky outcrops; prefers cliffs in order to obtain flight speed. Feeds on insects flying, over bodies of water or arid desert habitats to capture prey.	**POTENTIAL [N, VERY LOW]; NONE [F]** Rock outcrops are present on the study area, which may provide some potentially suitable habitat for roosting. However, this potential was considered very low since this species typically prefers steeper cliffs for roosting habitat. Although little is known regarding home range for this species, the potential for roosting is also unlikely since the study area does not support adjacent foraging habitat.[1] There are only 2 CNDDB occurrence records in the vicinity. The nearest record is from 1985 approximately 6.5 miles to the

1 *CDFW. 2000.* California Wildlife Habitat Relationships System: Pocketed Free-tailed Bat. *State of California, The Resources Agency. May 2000.*

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
						southwest of the study area near March Air Force Base.
Phyllostomidae	**Leaf-Nosed Bats**					
Leptonycteris yerbabuenae	lesser long-nosed bat	FE	None	None	Found in dry areas, such as desert grasslands and shrublands. Require caves or mines for day roosting and may additionally use rock crevices, trees & shrubs, and abandoned buildings for night roosting. Feed on cactus or agave fruit, nectar, and pollen (frugivorous). There are no records of breeding individuals in California, and occurrence records may only be vagrants.	**Potential [N, Very Low]; Potential [F, Very Low]** Some potentially suitable habitat is present on the study area. Potential night roosts include a limited number of trees and rock crevices on the northwestern corner of the project and scattered cactus may provide feeding opportunities. This species can travel long distances between day roosting and foraging sites. However, the potential was considered low since this species is not typically found in California. Records in California are typically vagrant migrants. There is only 1 CNDDB occurrence record within the vicinity from 1993, approximately 9.5 miles to the northeast in a residential neighborhood of Yucaipa.
Vespertilionidae	**Evening Bats**					
Antrozous pallidus	pallid bat	None	SSC	None	Chaparral, coastal scrub, desert wash, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, riparian woodland, Sonoran desert scrub, upper montane coniferous forest, and valley and foothill grassland. Prefers rocky outcrops, cliffs, and crevices with access to open	**Potential [N, Very Low]; Potential [F, Very Low]** Some potentially suitable habitat is present on the study area. Potential roosting habitat includes the rock outcrops and Riversidean sage scrub on the northwestern corner of the study area and the

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Scientific Name	Common Name	Federal	State	MSHCP	Preferred Habitat	Potential For Occurrence
					habitats for foraging. Very sensitive to disturbance of roosting sites.	open ruderal areas may provide feeding opportunities. However, the potential was considered very low because of evidence of disturbance on the study area and the presence of surrounding development to the south, northeast, and west; this species is highly sensitive to disturbance. Additionally, this species has not been recorded on CNDDB within the vicinity since 1929.
Lasiurus xanthinus	western yellow bat	NONE	SSC	NONE	Desert wash. Known to occur in palm oases.	**NONE [N]; NONE [F]** No suitable habitat.

Key to Species Listing Status Codes

FE	*Federally Endangered*	SE	*State Listed as Endangered*
FT	*Federally Threatened*	ST	*State Listed as Threatened*
FC	*Federal Candidate*	SCE	*State Candidate for Endangered*
FPE	*Federally Proposed as Endangered*	SCT	*State Candidate for Threatened*
FPT	*Federally Proposed as Threatened*	SFP	*State Fully Protected*
FPD	*Federally Proposed for Delisting*	SSC	*California Species of Special Concern*

MSHCP	*Western Riverside County Multiple Species Habitat Conservation Plan covered species*
MSHCP(a)	*Surveys may be required as part of wetlands mapping per MSHCP Section 6.1.2.*
MSHCP(b)	*Surveys may be required within Narrow Endemic Plant Species survey area per MSHCP Section 6.1.3.*
MSHCP(C)	*Surveys may be required per MSHCP Section 6.3.2.*
MSHCP(d)	*Surveys may be required within Criteria Area per MSHCP Section 6.3.2.*
MSHCP(e)	*These Covered Species will be considered to be Covered Species Adequately Conserved when conservation requirements identified in species-specific conservation objectives have been met per MSHCP Section 9.0 (Table 9-3).*
MSHCP(f)	*These Covered Species will be considered to be Covered Species Adequately Conserved when a Memorandum of Understanding is executed with the Forest Service that addresses management for these species on Forest Service Land per MSHCP Table 9-3.*

Source: PCR Services Corporation, 2015

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Appendix D

2015 Burrowing Owl Focused Survey Report

PCR

August 3, 2015

Mr. Joseph Rivani
GLOBAL INVESTMENT & DEVELOPMENT
3470 Wilshire Boulevard, Suite 1020
Los Angeles, CA 90010

Re: RESULTS OF FOCUSED BURROWING OWL SURVEYS FOR THE IRONWOOD PROJECT, CITY OF MORENO VALLEY, RIVERSIDE COUNTY, CALIFORNIA

Dear Mr. Rivani:

This report summarizes the methodology and findings of focused burrowing owl (*Athene cunicularia*) (BUOW) surveys conducted by **PCR Services Corporation (PCR)** for the approximately 83-acre property located directly northeast of Ironwood Avenue and Nason Street (APN 473-160-004) ("project site") located in the City of Moreno Valley, Riverside County, California. The surveys encompassed the project site and a 500-foot survey buffer surrounding the perimeter of the project site where suitable habitat was present. The surveys were conducted in accordance with the County of Riverside's 2006 *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area*.[1]

PROJECT SITE DESCRIPTION

The approximately 83-acre project site is generally situated east of Interstate 10 (I-10) and north of State Route 60 (SR 60), as shown in **Figure 1**, *Regional Map*. Specifically, the project site is located northwest of the intersection of Ironwood Avenue and Nason Street. The project site is depicted on the U.S. Geological Survey (USGS) 7.5' Sunnymead topographic quadrangle map, Section 34, T. 2 S., R. 3 W., as shown in **Figure 2**, *Vicinity Map*. The topography of the project site is generally flat with gently rolling hills throughout and steep rocky hillsides along the northwestern portion of the project site. Elevations on the project site range from approximately 1,975 feet above mean sea level (MSL) along the northwestern boundary of the project site, to approximately 1,830 feet above MSL along the southern boundary of the project site. Surrounding land uses include residential development to the south, northeast, and west and undeveloped land to the north and southeast.

[1] *County of Riverside. 2006. Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area.*

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PLANT COMMUNITIES

The project site consists primarily of large ruderal areas. Plant communities found on the project site include brittlebush scrub, Riversidean sage scrub, rock outcrop/Riversidean sage scrub, brittlebush scrub/ruderal, laurel sumac scrub/ruderal, ruderal/Riversidean sage scrub, river wash, ruderal, disturbed, and developed. A brief summary of each plant community within the project site in which surveys were conducted is discussed below.

Brittlebush Scrub/Ruderal

Brittlebush scrub is a drought tolerant subtype of Riversidean Sage Scrub in which the dominate plant is brittlebush (*Encelia farinosa*). Additional native species within the brittlebush scrub community include California buckwheat (*Eriogonum fasciculatum*), California sagebrush (*Artemisia californica*), and chia (*Salvia columbariae*). Ruderal vegetation is also found within this community. Brittlebush scrub/ruderal areas occupy 0.29 acre throughout the project site.

River Wash

River wash consists of prevailingly course-textured but variable material, ranging from sand to gravel. Sparse vegetation within the river wash includes giant reed (*Arundo donax*), telegraph weed (*Heterotheca grandiflora*), doveweed, and Russian thistle (*Salsola tragus*). River wash occupies 0.03 acre throughout the project site.

Ruderal/Riversidean Sage Scrub

Ruderal/Riversidean sage scrub within the project site is heavily disturbed and is dominated by ruderal vegetation. Non-native species observed within this community include shortpod mustard (*Hirschfeldia incana*), foxtail chess (*Bromus madritensis*), and red-stemmed filaree (*Erodium cicutarium*). Native species found within this community include brittlebush (*Encelia farinosa*), California buckwheat, California sagebrush, common sunflower (*Helianthus annuus*), deerweed (*Acmispon glaber*), and pinebush (*Ericameria pinifolia*). Ruderal/Riversidean sage scrub occupies 1.31 acres throughout the project site.

Ruderal

Ruderal vegetation is found in areas heavily disturbed by human activities, such as roadsides, graded fields, and manufactured slopes. Within the project site, non-native species observed within this community include shortpod mustard, foxtail chess, red-stemmed filaree, ripgut brome (*Bromus diandrus*), and native species such as doveweed (*Croton setigerus*), common fiddleneck (*Amsinckia*

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intermedia), and cudweed aster (*Corethrogyne filaginifolia*). Ruderal areas occupy 39.08 acres throughout the project site.

Disturbed

Disturbed areas consist of areas heavily disturbed by human activities, including dirt roads with little to no vegetation. Disturbed areas occupy 31.23 acres throughout the project site.

Developed

Developed areas consist of man-made structures such as homes and buildings, and these areas comprise 1.64 acres throughout the project site.

METHODOLOGY

Step I - Habitat Assessment

The surveys were conducted in accordance with the County of Riverside's 2006 *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area*.[2] During the Step I Habitat Assessment, suitable habitat was identified on-site during the field survey, including disturbed, low-growing vegetation; bare ground; and small fossorial mammal burrows.

Step II – Locating Burrows and Burrowing Owls

Step II surveys were conducted within the project site plus an approximately 500-foot survey buffer around the project site perimeter. Surveys focused on the detection of small fossorial mammal burrows potentially suitable for BUOW, BUOW burrows, individual BUOW, and any diagnostic sign of their occurrence (e.g., molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance). Off-site areas within the 500-foot survey buffer were surveyed by foot where accessible, or with the use of binoculars in areas which were inaccessible.

Surveys were conducted on May 13, June 3, July 2, and July 27, 2015 by PCR biologists Ezekiel Cooley, Amy Lee, and Lauren Singleton. Surveys consisted of four site visits, on four separate days, and were conducted between one hour prior to and two hours after sunrise during suitable weather conditions. Transects were utilized in all accessible areas, spaced no more than 100

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[2] *County of Riverside. 2006. Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area.*

feet apart, to allow for 100 percent visibility (**Figure 3**, *Transect Map*, attached). In addition, observations were made with the use of binoculars. Weather conditions consisted of hazy to cloudy skies with winds between 0 and 5 miles per house (mph) and air temperatures ranging from 52° to 76° Fahrenheit. Survey data is presented in **Table 1**, *Survey Data*, below.

Table 1

Survey Data

Date	Time	Wind (mph) (start/end)	Temperature (F) (start-end)	Weather (start-end)	Results	Surveyor
05/13/15	0615 – 0820	1-2/2-5	52° – 61°	70% Cloud Cover – 60% Cloud Cover	No BUOW or BUOW sign	Cooley, Lee, Singleton
06/03/15	0600 – 0800	1-3/0-1	55° – 57°	100% Cloud Cover – 100% Cloud Cover	No BUOW or BUOW sign	Cooley, Lee, Singleton
07/02/15	0545 – 0730	0-1/0-1	72° – 76°	60% Cloud Cover – 80% Cloud Cover	No BUOW or BUOW sign	Cooley, Lee, Singleton
07/27/15	0600 – 0730	0-1/0-1	62°– 66°	100% Cloud Cover – 100% Cloud Cover	No BUOW or BUOW sign	Cooley, Lee, Singleton

Source: PCR Services Corporation, 2015.

RESULTS

The project site is within the Burrowing Owl Survey Area for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The following results present the findings of the Step I Habitat Assessment and Step II Locating Burrows and Burrowing Owls.

Step I - Habitat Assessment

Results of the Step I, Habitat Assessment concluded that the project site and 500-foot survey buffer exhibited suitable BUOW habitat consisting of disturbed, low-growing vegetation; bare ground; and fossorial mammal burrows.

PCR

Step II – Locating Burrows and Burrowing Owls

The Step II surveys did not identify BUOW burrows, BUOW sign or BUOW within the project site or within the 500-foot survey buffer. A complete list of all avian species observed within the project site is included in **Appendix A**, *Avian Compendium*, attached.

RECOMMENDATIONS

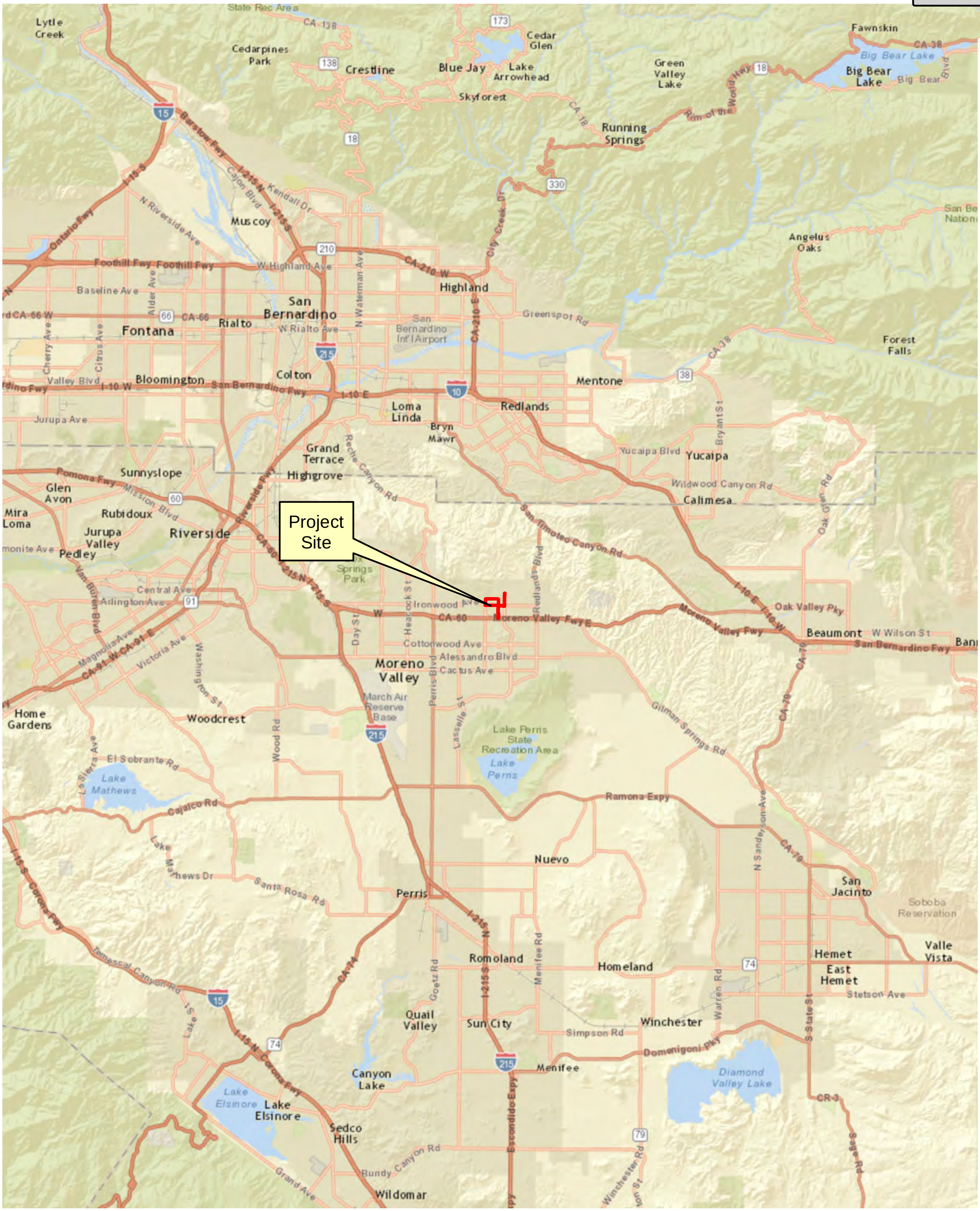
As required by the MSHCP, a pre-construction survey must be conducted 30 days prior to ground disturbance for project sites whether or not BUOW are found during the focused surveys to avoid the direct take of BUOW.

Should you have any questions concerning the methodology or findings in this report, please contact Ezekiel Cooley (E.Cooley@pcrnet.com) at (949) 753-7001.

Sincerely,
PCR SERVICES CORPORATION

Ezekiel Cooley	Amy Lee	Lauren Singleton
Senior Biologist	Biologist	Biologist

Attachments:
Figure 1: Regional Map
Figure 2: Vicinity Map
Figure 3: Transect Map
Appendix A: Avian Compendium



0 5 10 Miles

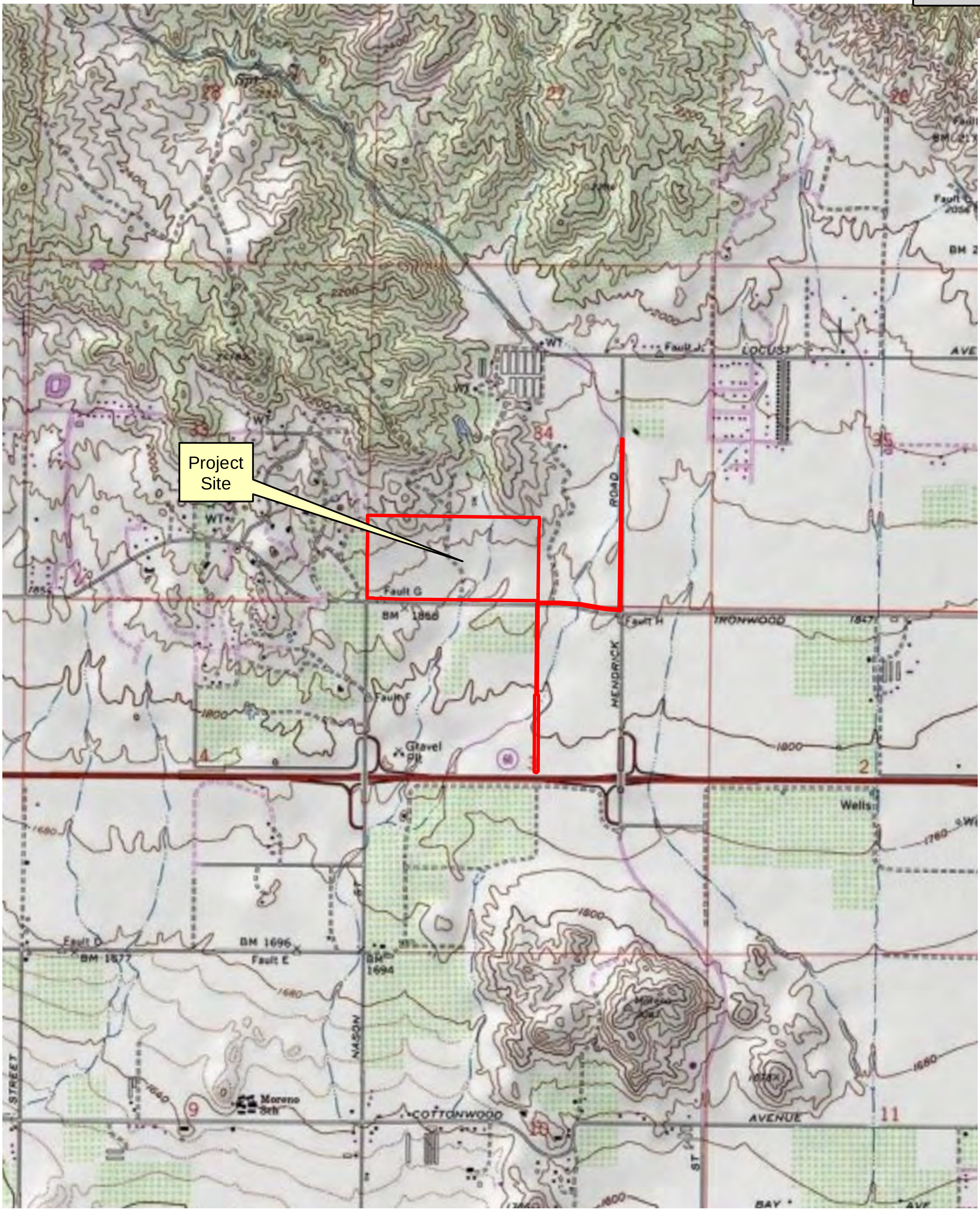
Regional Map

Ironwood Residential Project

Source: ESRI Street Map, 2009; PCR Services Corporation, 2015.

FIGURE 1

Attachment: DBESP Report (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))



0 2,000 4,000 Feet

Vicinity Map

Ironwood Residential Project

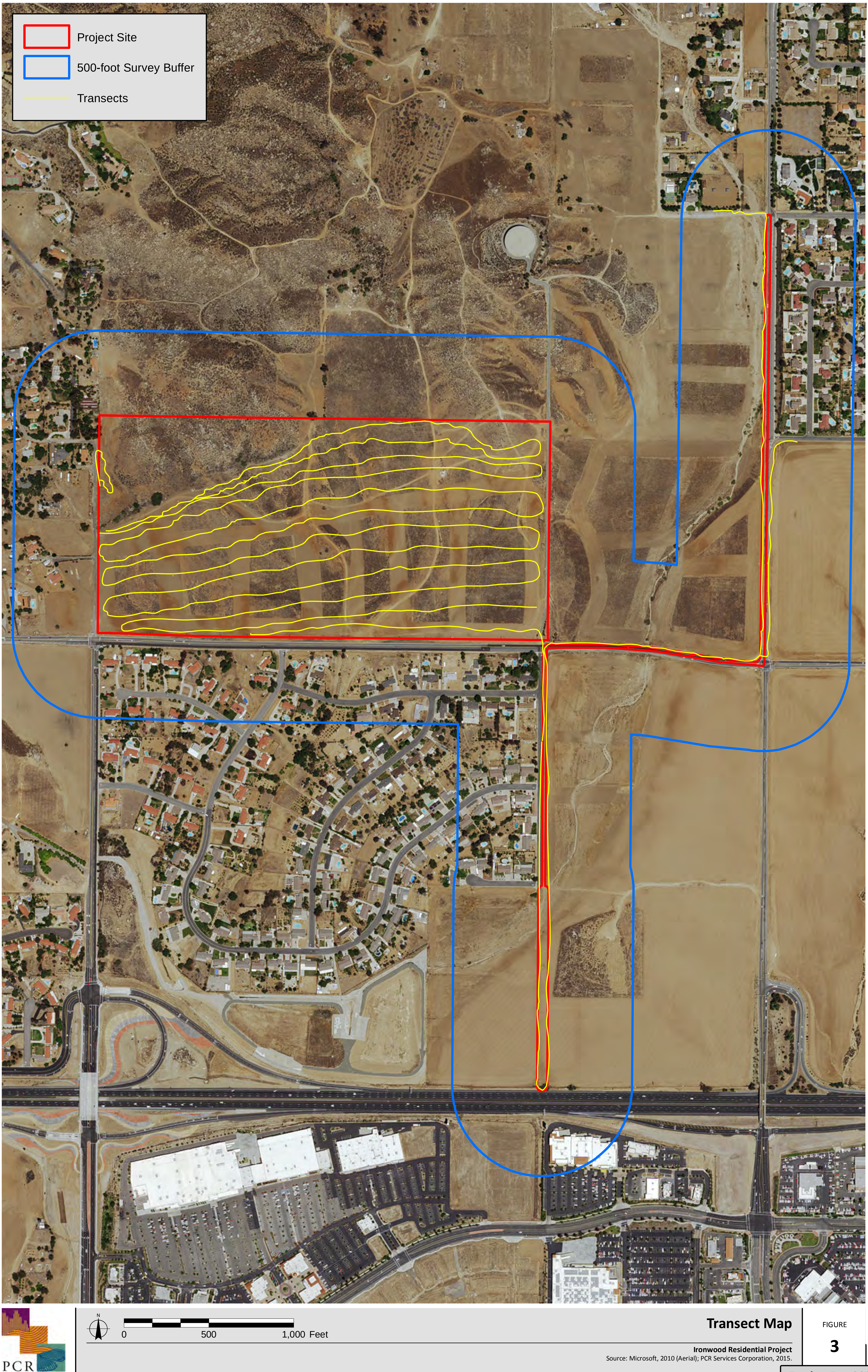
Source: USGS Topographic Series (Sunnymead, CA); PCR Services Corporation, 2015.

FIGURE

2

PCR

Attachment: DBESP Report (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))



Attachment: DBESP Report (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

PCR

Transect Map

Ironwood Residential Project

Source: Microsoft, 2010 (Aerial); PCR Services Corporation, 2015.

FIGURE

3

Appendix A: Avian Compendium

Scientific Name	Common Name
Cathartidae	**New World Vultures**
Cathartes aura	turkey vulture
Accipitridae	**Hawks**
Accipiter cooperii	Cooper's hawk
Buteo jamaicensis	red-tailed hawk
Falconidae	**Falcons**
Falco sparverius	American kestrel
Charadriidae	**Plovers**
Charadrius vociferus	killdeer
Columbidae	**Pigeons and Doves**
* *Columba livia*	rock pigeon
Zenaida macroura	mourning dove
Apodidae	**Swifts**
Aeronautes saxatalis	white-throated swift
Trochilidae	**Hummingbirds**
Archilochus alexandri	black-chinned hummingbird
Calypte anna	Anna's hummingbird
Picidae	**Woodpeckers**
Picoides nuttallii	Nuttall's woodpecker
Tyrannidae	**Tyrant Flycatchers**
Sayornis nigricans	black phoebe
Sayornis saya	Say's phoebe
Tyrannus verticalis	western kingbird
Tyrannus vociferans	Cassin's kingbird
Laniidae	**Shrikes**
Lanius ludovicianus	loggerhead shrike
Corvidae	**Jays and Crows**
Corvus brachyrhynchos	American crow
Alaudidae	**Larks**
Eremophila alpestris	horned lark
Hirundinidae	**Swallows**
Petrochelidon pyrrhonota	cliff swallow
Hirundo rustica	barn swallow
Stelgidopteryx serripennis	northern rough-winged swallow
Aegithalidae	**Bushtits**
Psaltriparus minimus	bushtit

* *Non-native species*

SCIENTIFIC NAME	COMMON NAME
Polioptilidae	**Gnatcatchers**
Polioptila californica californica	coastal California gnatcatcher
Sturnidae	**Starlings**
* *Sturnus vulgaris*	European starling
Emberizidae	**Emberizine Sparrows and Allies**
Melozone crissalis	California towhee
Icteridae	**Blackbirds**
Agelaius phoeniceus	red-winged blackbird
Fringillidae	**Finches**
Haemorhous mexicanus	house finch
Spinus psaltria	lesser goldfinch
Spinus tristis	American goldfinch
Passeridae	**Old World Sparrows**
* *Passer domesticus*	house sparrow

* *Non-native species*

Appendix E

2016 Burrowing Owl Focused Survey Report

ESA PCR

2121 Alton Parkway
Suite 100
Irvine, CA 92606
949.753.7001 phone
949.753.7002 fax

www.pcrnet.com

July 13, 2016

Mr. Joseph Rivani
Global Investment & Development
3470 Wilshire Boulevard, Suite 1020
Los Angeles, CA 90010

Subject: Results of Focused Burrowing Owl Surveys for the Alternative Off-site Waterline Area for the Ironwood Village Project, City of Moreno Valley, Riverside County, California

Dear Mr. Rivani:

This report summarizes the methodology and findings of focused burrowing owl (*Athene cunicularia*) (BUOW) surveys conducted by **ESA PCR** for the two proposed alternative off-site waterline areas associated with the approximately 78.48-acre Ironwood Village Project (APN 473-160-004) located directly northeast of Ironwood Avenue and Nason Street, City of Moreno Valley, Riverside County, California.[1] The surveys encompassed the two alternative off-site waterline areas (survey area) and a 500-foot survey buffer surrounding the survey area (survey buffer). The surveys were conducted in accordance with the County of Riverside's 2006 *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area*.[2]

Survey Area Description

The survey area is generally situated south of Interstate 10 (I-10) and north of State Route 60 (SR 60), as shown in **Figure 1**, *Regional Map*. Specifically, the survey area includes a waterline alignment that runs north-south, immediately north of the intersection of Ironwood Avenue and Oliver Street along the Eastern Municipal Water District access road, and another which runs east-west, west of the intersection of Moreno Beach Drive and Juniper Avenue. The survey area and survey buffer are depicted on the U.S. Geological Survey (USGS) 7.5' Sunnymead topographic quadrangle map, Section 34, T. 2 S., R. 3 W., as shown in **Figure 2**, *Vicinity Map*. The topography of the survey area and survey buffer is generally flat with the expectation of fairly steep east-facing slope on the western portion. Elevations in the survey area are approximately 1,858 feet above mean sea level (MSL) along the midpoint of the east-west waterline, to approximately 1,945 feet above MSL at the northern terminus of north-south waterline. Surrounding land uses include residential development to the northeast and east, and undeveloped land to the northwest, west, and south.

Plant Communities

The survey area and survey buffer consists primarily of ruderal and disturbed habitat. Ruderal habitat is dominated by non-native species including mediterranean grass (*Schismus barbatus*), Russian thistle (*Salsola tragus*), and ripgut brome (*Bromus diandrus*). Disturbed areas consist of areas heavily disturbed by human activities, including dirt roads with little to no vegetation.

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1 Step II BUOW surveys were conducted in all suitable habitat for the Ironwood Village project during the 2015 breeding season.
2 County of Riverside. 2006. Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area.

ESA PCR

Methodology

Step I - Habitat Assessment

The surveys were conducted in accordance with the County of Riverside's 2006 *Burrowing Owl Survey Instructions for the Western Riverside Multiple Species Habitat Conservation Plan Area*.[2] During the Step I Habitat Assessment, suitable habitat was identified on-site during the field survey, including disturbed, low-growing vegetation; bare ground; and small fossorial mammal burrows.

Step II – Locating Burrows and Burrowing Owls

Step II surveys were conducted within the survey area plus an approximately 500-foot survey buffer. Surveys focused on the detection of small fossorial mammal burrows potentially suitable for BUOW, BUOW burrows, individual BUOW, and any diagnostic sign of their occurrence (e.g., molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance). Off-site areas within the 500-foot survey buffer were surveyed by foot where accessible, or with the use of binoculars in areas which were inaccessible.

Surveys were conducted on April 28, May 23, June 9, and July 5, 2016 by ESA PCR biologists Amy Lee and Lauren Singleton. Surveys consisted of four site visits, on four separate days, and were conducted between one hour prior to and two hours after sunrise during suitable weather conditions. Transects were utilized in all accessible areas, spaced no more than 100 feet apart, to allow for 100 percent visibility (**Figure 3**, *Survey Area*, attached). In addition, observations were made with the use of binoculars. Weather conditions consisted of 45 to 100 percent cloud cover with winds between 0 and 4 miles per hour (mph) and air temperatures ranging from 48° to 68° Fahrenheit. Survey data is presented in **Table 1**, *Survey Data*, below.

TABLE 1
SURVEY DATA

Date	Time	Wind (mph) (start/end)	Temperature (F) (start-end)	Weather (start-end)	Results	Surveyor
04/28/16	0600 – 0800	2-4/0-1	50° – 49°	100% Cloud Cover – 100% Cloud Cover	No BUOW or BUOW sign	Singleton
05/23/16	0550 – 0750	0-1/0-1	48° – 54°	90% Cloud Cover – 75% Cloud Cover	No BUOW or BUOW sign	Lee
06/09/16	0525 – 0715	0-1/0-1	61° – 68°	45% Cloud Cover – 45% Cloud Cover	No BUOW or BUOW sign	Lee
07/05/16	0550 – 0735	0-2/0-2	63°– 63°	100% Cloud Cover – 100% Cloud Cover	No BUOW or BUOW sign	Lee

Source: ESA PCR, 2016.

ESA PCR

Results

The survey area is within the Burrowing Owl Survey Area for the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). The following results present the findings of the Step I Habitat Assessment and Step II Locating Burrows and Burrowing Owls.

Step I - Habitat Assessment

Results of the Step I, Habitat Assessment concluded that the survey area and 500-foot survey buffer exhibited suitable BUOW habitat consisting of disturbed, low-growing vegetation; bare ground; and fossorial mammal burrows.

Step II – Locating Burrows and Burrowing Owls

The Step II surveys did not identify BUOW burrows, BUOW sign or BUOW within the survey area or within the 500-foot survey buffer. A complete list of all avian species observed within the survey area and survey buffer is included in **Appendix A**, *Avian Compendium*, attached.

Recommendations

As required by the MSHCP, a pre-construction survey must be conducted 30 days prior to ground disturbance for project sites whether or not BUOW are found during the focused surveys to avoid the direct take of BUOW.

Should you have any questions concerning the methodology or findings in this report, please contact Amy Lee (A.Lee@pcrnet.com) at (949) 753-7001.

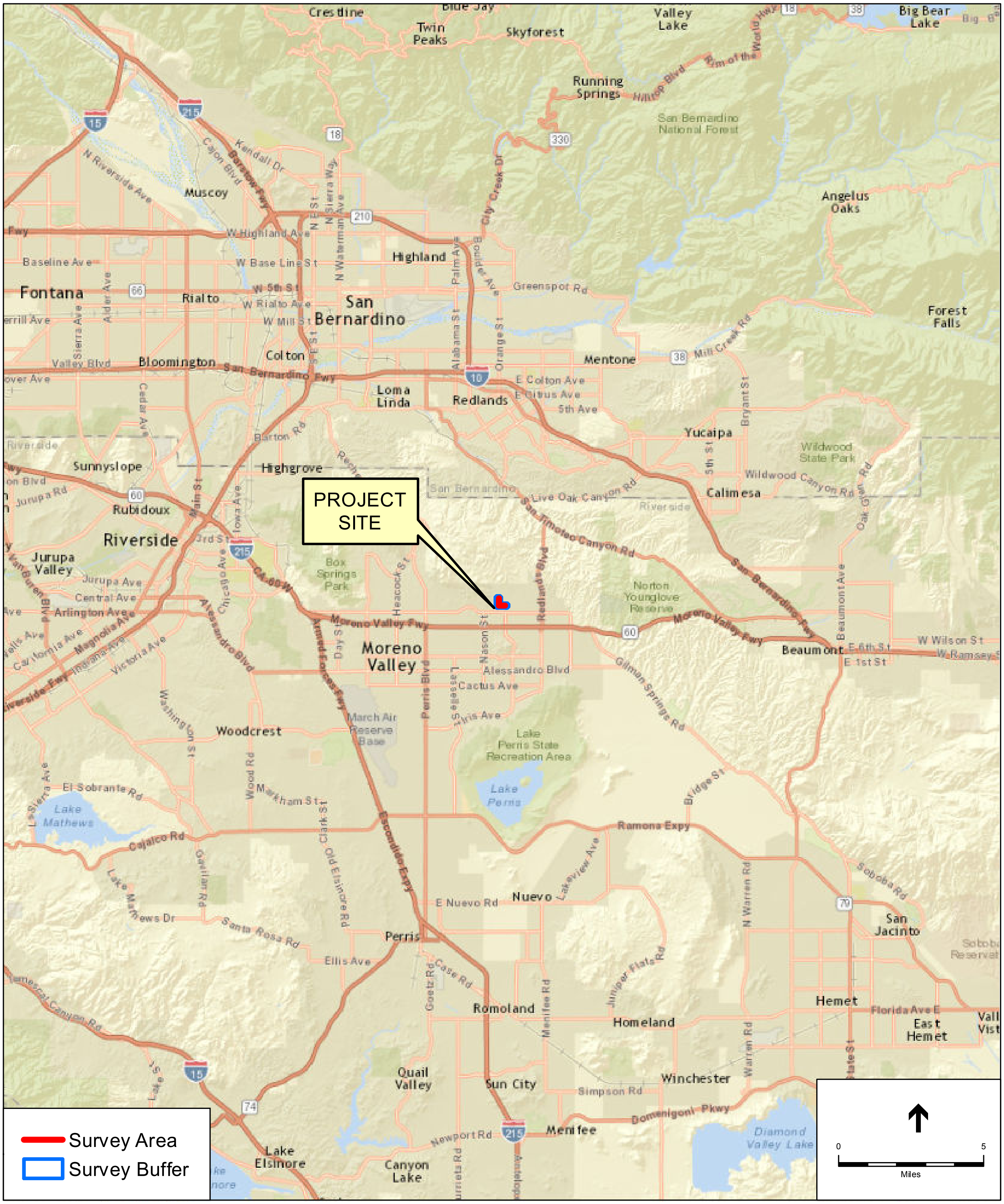
Sincerely,

Amy Lee

Amy Lee
Biologist

Attachments

Fig 1 - Regional Map
Fig 2 - Vicinity Map
Fig 3 - Survey Area
Appendix A – Avian Compendium



SOURCE: ESRI Street Map, 2009.

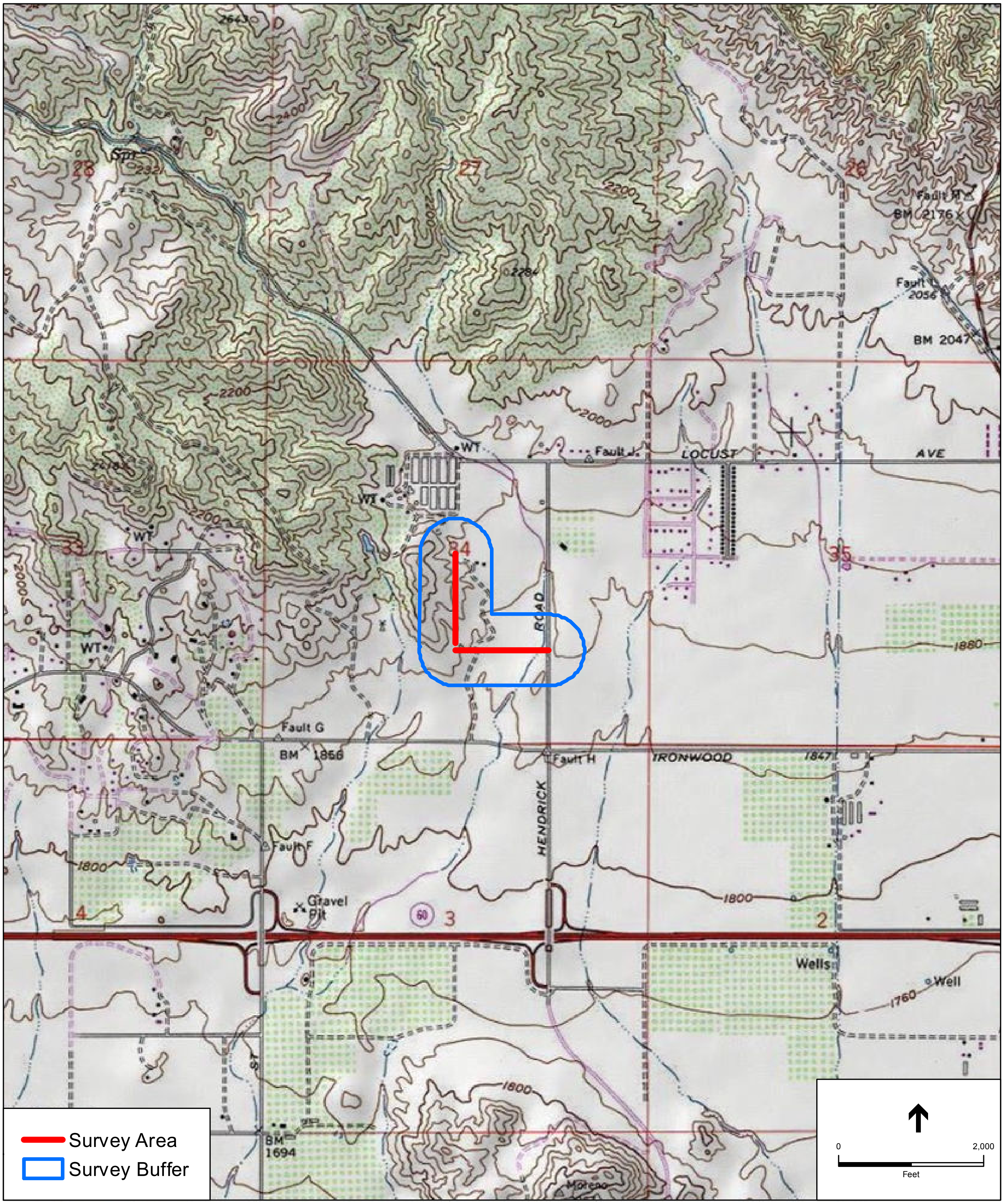
Ironwood Village Project - Alternative Off-site Waterline Area

Figure 1

Regional Map

ESA PCR

Attachment: DBESP Report (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))



SOURCE: USGS Topographic Series (Sunnymead, CA).

Ironwood Village Project - Alternative Off-site Waterline Area

Figure 2

Vicinity Map

ESA PCR

SOURCE: Google Maps, 2015 (Aerial).

Ironwood Village Project - Alternative Off-site Waterline Area

Figure 3
Survey Area

ESA PCR

Appendix A - Avian Compendium

BIRDS

Scientific Name	Common Name
Cathartidae	**New World Vultures**
Cathartes aura	turkey vulture
Falconidae	**Falcons**
Falco sparverius	American kestrel
Charadriidae	**Plovers**
Charadrius vociferus	killdeer
Columbidae	**Pigeons and Doves**
Zenaida macroura	mourning dove
Cuculidae	**Cuckoos and Roadrunners**
Geococcyx californianus	greater roadrunner
Trochilidae	**Hummingbirds**
Calypte anna	Anna's hummingbird
Tyrannidae	**Tyrant Flycatchers**
Myiarchus cinerascens	ash-throated flycatcher
Sayornis nigricans	black phoebe
Sayornis saya	Say's phoebe
Tyrannus vociferans	Cassin's kingbird
Corvidae	**Jays and Crows**
Corvus brachyrhynchos	American crow
Corvus corax	common raven
Hirundinidae	**Swallows**
Stelgidopteryx serripennis	northern rough-winged swallow
Aegithalidae	**Bushtits**
Psaltriparus minimus	bushtit
Troglodytidae	**Wrens**
Salpinctes obsoletus	rock wren
Mimidae	**Thrashers**
Mimus polyglottos	northern mockingbird
Ptilogonatidae	**Silky-flycatchers**
Phainopepla nitens	phainopepla
Parulidae	**Wood Warblers**
Setophaga coronata	yellow-rumped warbler

* non-native

BIRDS

Scientific Name	Common Name
Emberizidae	**Emberizine Sparrows and Allies**
Melozone crissalis	California towhee
Pipilo maculatus	spotted towhee
Icteridae	**Blackbirds**
Icterus bullockii	Bullock's oriole
Icterus cucullatus	hooded oriole
Sturnella neglecta	western meadowlark
Fringillidae	**Finches**
Haemorhous mexicanus	house finch
Spinus psaltria	lesser goldfinch
Spinus tristis	American goldfinch
Passeridae	**Old World Sparrows**
* *Passer domesticus*	house sparrow

* non-native

Ironwood Residential (TTM No. 37001)

GREENHOUSE GAS ANALYSIS

CITY OF MORENO VALLEY

PREPARED BY:

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AUGUST 31, 2015

09387-03 GHG Report

TABLE OF CONTENTS

APPENDICES

APPENDIX 3.1: CALEEMOD EMISSIONS MODEL OUTPUTS

LIST OF EXHIBITS

LIST OF TABLES

LIST OF ABBREVIATED TERMS

(1)	Reference
APS	Alternative Planning Organizations
ARB	California Air Resources Board
CAA	Federal Clean Air Act
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resource Board
CAT	Climate Action Team
CBSC	California Building Standards Commission
CEC	California Energy Commission
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFC	Chlorofluorocarbons
CFR	Code of Federal Regulations
CH4	Methane
CO	Carbon Monoxide
CO2	Carbon Dioxide
CO2e	Carbon Dioxide Equivalent
CPUC	California Public Utilities Commission
EPA	Environmental Protection Agency
EPS	Emission Performance Standard
GCC	Global Climate Change
GHGA	Greenhouse Gas Analysis
GWP	Global Warming Potential
HFC	Hydrofluorocarbons
LCA	Life-Cycle Analysis
MMs	Mitigation Measures
MMTCO2e	Million Metric Ton of Carbon Dioxide Equivalent
MPOs	Metropolitan Planning Organizations
MTCO2e	Metric Ton of Carbon Dioxide Equivalent
N20	Nitrogen Dioxide
NIOSH	National Institute for Occupational Safety and Health
NOx	Oxides of Nitrogen
PFC	Perfluorocarbons
PM10	Particulate Matter 10 microns in diameter or less

PM2.5	Particulate Matter 2.5 microns in diameter or less
PPM	Parts Per Million
Project	Ironwood Residential (TTM No. 37001)
RTP	Regional Transportation Plan
SB	Senate Bill
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Communities Strategies
UNFCCC	United Nations' Framework Convention on Climate Change
VOC	Volatile Organic Compounds

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EXECUTIVE SUMMARY

The City of Moreno Valley has not adopted its own thresholds of significance for GHG emissions. As such, a screening threshold of 3,000 MTCO2e per year for residential land uses is applied herein, which is a widely accepted screening threshold accepted by numerous jurisdictions in the South Coast Air Basin and is based on the South Coast Air Quality Management District (SCAQMD) staff's interim GHG screening threshold for stationary source emissions for non-industrial projects, as described in the SCAQMD's *Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans* ("SCAQMD Interim GHG Threshold").

The Project will result in approximately 2,905.71 MTCO2e per year; the proposed project would not exceed the SCAQMD threshold of 3,000 MTCO2e per year. Thus, project-related emissions would not have a significant direct or indirect impact on GHG and climate change.

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1 INTRODUCTION

This report presents the results of the greenhouse gas analysis (GHGA) prepared by Urban Crossroads, Inc., for the proposed Ironwood Residential (TTM No. 37001) (referred to as "Project"), which is located north of Ironwood Avenue, east of Nason Street, and west of Oliver Street in the City of Moreno Valley as shown on Exhibit 1-A.

The purpose of this GHGA is to evaluate Project-related construction and operational emissions and determine the level of greenhouse gas (GHG) impacts as a result of constructing and operating the proposed Project.

1.1 PROJECT OVERVIEW

The Project is proposed to consist of 181 single family, detached residential dwelling units as shown on Exhibit 1-B. For the purposes of this GHGA, it is assumed that the Project will be constructed and at full occupancy by 2020.

EXHIBIT 1-A: LOCATION MAP

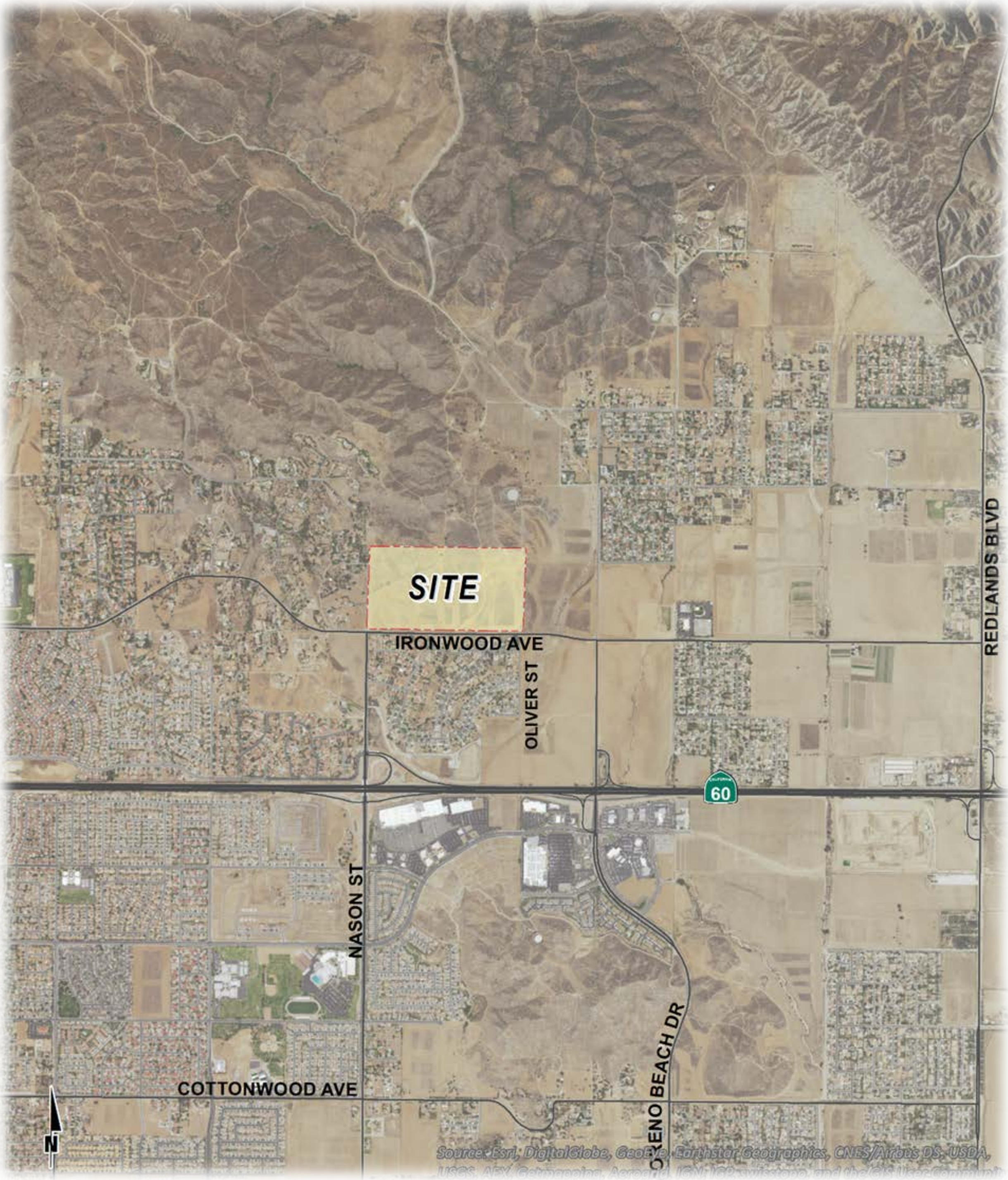
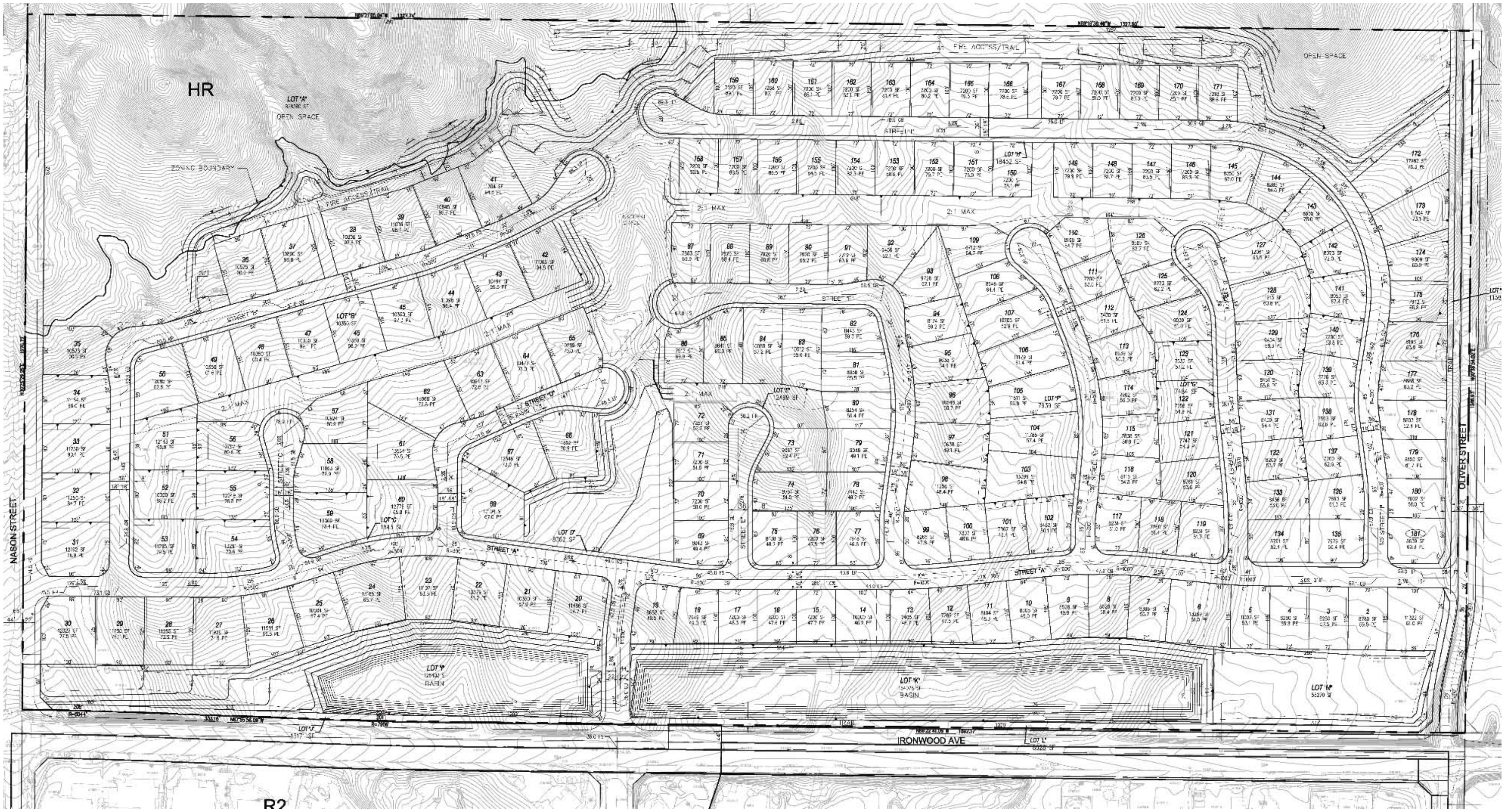


EXHIBIT 1-B: PRELIMINARY SITE PLAN



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2 CLIMATE CHANGE SETTING

2.1 INTRODUCTION TO GLOBAL CLIMATE CHANGE

Global Climate Change (GCC) is defined as the change in average meteorological conditions on the earth with respect to temperature, precipitation, and storms. GCC is currently one of the most controversial environmental issues in the United States, and much debate exists within the scientific community about whether or not GCC is occurring naturally or as a result of human activity. Some data suggests that GCC has occurred in the past over the course of thousands or millions of years. These historical changes to the Earth's climate have occurred naturally without human influence, as in the case of an ice age. However, many scientists believe that the climate shift taking place since the industrial revolution (1900) is occurring at a quicker rate and magnitude than in the past. Scientific evidence suggests that GCC is the result of increased concentrations of greenhouse gases in the earth's atmosphere, including carbon dioxide, methane, nitrous oxide, and fluorinated gases. Many scientists believe that this increased rate of climate change is the result of greenhouse gases resulting from human activity and industrialization over the past 200 years.

An individual project like the proposed Project evaluated in this GHGA cannot generate enough greenhouse gas emissions to effect a discernible change in global climate. However, the proposed Project may participate in the potential for GCC by its incremental contribution of greenhouse gasses combined with the cumulative increase of all other sources of greenhouse gases, which when taken together constitute potential influences on GCC. Because these changes may have serious environmental consequences, Section 3.0 will evaluate the potential for the proposed Project to have a significant effect upon the environment as a result of its potential contribution to the greenhouse effect.

2.2 GREENHOUSE GAS EMISSIONS INVENTORIES

Global

Worldwide anthropogenic (man-made) GHG emissions are tracked by the Intergovernmental Panel on Climate Change for industrialized nations (referred to as Annex I) and developing nations (referred to as Non-Annex I). Man-made GHG emissions data for Annex I nations are available through 2012. For the Year 2011 the sum of these emissions totaled approximately 28,865,994 Gg CO2e[1] (1) (2). The GHG emissions in more recent years may differ from the inventories presented in Table 2-1; however, the data is representative of currently available inventory data.

[1] The global emissions are the sum of Annex I and non-Annex I countries, without counting Land-Use, Land-Use Change and Forestry (LULUCF). For countries without 2005 data, the UNFCCC data for the most recent year were used. United Nations Framework Convention on Climate Change, "Annex I Parties – GHG total without LULUCF,"

United States

As noted in Table 2-1, the United States, as a single country, was the number two producer of GHG emissions in 2012. The primary greenhouse gas emitted by human activities in the United States was CO2, representing approximately 83 percent of total greenhouse gas emissions (3). Carbon dioxide from fossil fuel combustion, the largest source of US greenhouse gas emissions, accounted for approximately 78 percent of the GHG emissions.

TABLE 2-1: TOP GHG PRODUCER COUNTRIES AND THE EUROPEAN UNION[2]

Emitting Countries	GHG Emissions (Gg CO2e)
China	10,975,500
United States	6,665,700
European Union (27 member countries)	4,544,224
Russian Federation	2,322,220
India	3,013,770
Japan	1,344,580
Total	**28,865,994**

State of California

CARB compiles GHG inventories for the State of California. Based upon the 2008 GHG inventory data (i.e., the latest year for which data are available) for the 2000-2008 greenhouse gas emissions inventory, California emitted 474 MMTCO2e including emissions resulting from imported electrical power in 2008 (4). Based on the CARB inventory data and GHG inventories compiled by the World Resources Institute (5), California's total statewide GHG emissions rank second in the United States (Texas is number one) with emissions of 417 MMTCO2e excluding emissions related to imported power.

2.3 GLOBAL CLIMATE CHANGE DEFINED

Global Climate Change (GCC) refers to the change in average meteorological conditions on the earth with respect to temperature, wind patterns, precipitation and storms. Global temperatures are regulated by naturally occurring atmospheric gases such as water vapor, CO2 (Carbon Dioxide), N2O (Nitrous Oxide), CH4 (Methane), hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride. These particular gases are important due to their residence time (duration they stay) in the atmosphere, which ranges from 10 years to more than 100 years. These gases allow solar radiation into the Earth's atmosphere, but prevent radioactive heat from escaping, thus warming the Earth's atmosphere. GCC can occur naturally as it has in the past with the previous ice ages. According to the California Air Resources Board (CARB), the climate change since the industrial revolution differs from previous climate changes in both rate and magnitude (6).

[2] Used http://unfccc.int data for Annex I countries. Consulted the CAIT Climate Data Explorer http://www.eia.gov site to reference Non-Annex I countries such as China and India.

Gases that trap heat in the atmosphere are often referred to as greenhouse gases. Greenhouse gases are released into the atmosphere by both natural and anthropogenic (human) activity. Without the natural greenhouse gas effect, the Earth's average temperature would be approximately 61° Fahrenheit (F) cooler than it is currently. The cumulative accumulation of these gases in the earth's atmosphere is considered to be the cause for the observed increase in the earth's temperature.

Although California's rate of growth of greenhouse gas emissions is slowing, the state is still a substantial contributor to the U.S. emissions inventory total. In 2004, California is estimated to have produced 492 million gross metric tons of carbon dioxide equivalent (CO2e) greenhouse gas emissions. Despite a population increase of 16 percent between 1990 and 2004, California has significantly slowed the rate of growth of greenhouse gas emissions due to the implementation of energy efficiency programs as well as adoption of strict emission controls (5).

2.4 GREENHOUSE GASES

For the purposes of this analysis, emissions of carbon dioxide, methane, and nitrous oxide were evaluated (see Table 3-4 later in this report) because these gasses are the primary contributors to GCC from development projects. Although other substances such as fluorinated gases also contribute to GCC, sources of fluorinated gases are not well-defined and no accepted emissions factors or methodology exist to accurately calculate these gases.

Greenhouse gases have varying global warming potential (GWP) values; GWP values represent the potential of a gas to trap heat in the atmosphere. Carbon dioxide is utilized as the reference gas for GWP, and thus has a GWP of 1.

The atmospheric lifetime and GWP of selected greenhouse gases are summarized at Table 2-2. As shown in the table below, GWP range from 1 for carbon dioxide to 23,900 for sulfur hexafluoride.

TABLE 2-2: GLOBAL WARMING POTENTIAL AND ATMOSPHERIC LIFETIME OF SELECT GHGS

Gas	Atmospheric Lifetime (years)	Global Warming Potential (100 year time horizon)
Carbon Dioxide	50-200	1
Methane	12 ± 3	25
Nitrous Oxide	120	298
HFC-23	264	11,700
HFC-134a	14.6	1,300
HFC-152a	1.5	140
PFC: Tetrafluoromethane (CH4)	50,000	6,500
PFC: Hexafluoroethane (C2F6)	10,000	9,200
Sulfur Hexafluoride (SF6)	3,200	23,900
Source: Environmental Protection Agency (EPA) 2013 (URL: http://www.epa.gov/ghgreporting/documents/pdf/2013/documents/2013-data-elements.pdf)		

Water Vapor: Water vapor (H20) is the most abundant, important, and variable greenhouse gas in the atmosphere. Water vapor is not considered a pollutant; in the atmosphere it maintains a climate necessary for life. Changes in its concentration are primarily considered to be a result of climate feedbacks related to the warming of the atmosphere rather than a direct result of industrialization. A climate feedback is an indirect, or secondary, change, either positive or negative, that occurs within the climate system in response to a forcing mechanism. The feedback loop in which water is involved is critically important to projecting future climate change.

As the temperature of the atmosphere rises, more water is evaporated from ground storage (rivers, oceans, reservoirs, soil). Because the air is warmer, the relative humidity can be higher (in essence, the air is able to 'hold' more water when it is warmer), leading to more water vapor in the atmosphere. As a GHG, the higher concentration of water vapor is then able to absorb more thermal indirect energy radiated from the Earth, thus further warming the atmosphere. The warmer atmosphere can then hold more water vapor and so on and so on. This is referred to as a "positive feedback loop." The extent to which this positive feedback loop will continue is unknown as there are also dynamics that hold the positive feedback loop in check. As an example, when water vapor increases in the atmosphere, more of it will eventually also condense into clouds, which are more able to reflect incoming solar radiation (thus allowing less energy to reach the Earth's surface and heat it up).

There are no human health effects from water vapor itself; however, when some pollutants come in contact with water vapor, they can dissolve and the water vapor can then act as a pollutant-carrying agent. The main source of water vapor is evaporation from the oceans (approximately 85 percent). Other sources include: evaporation from other water bodies, sublimation (change from solid to gas) from sea ice and snow, and transpiration from plant leaves.

<u>Carbon Dioxide</u>: Carbon dioxide (CO2) is an odorless and colorless GHG. Outdoor levels of carbon dioxide are not high enough to result in negative health effects. Carbon dioxide is emitted from natural and manmade sources. Natural sources include: the decomposition of dead organic matter; respiration of bacteria, plants, animals and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources include: the burning of coal, oil, natural gas, and wood. Carbon dioxide is naturally removed from the air by photosynthesis, dissolution into ocean water, transfer to soils and ice caps, and chemical weathering of carbonate rocks (7).

Since the industrial revolution began in the mid-1700s, the sort of human activity that increases GHG emissions has increased dramatically in scale and distribution. Data from the past 50 years suggests a corollary increase in levels and concentrations. As an example, prior to the industrial revolution, CO2 concentrations were fairly stable at 280 parts per million (ppm). Today, they are around 370 ppm, an increase of more than 30 percent. Left unchecked, the concentration of carbon dioxide in the atmosphere is projected to increase to a minimum of 540 ppm by 2100 as a direct result of anthropogenic sources (8).

<u>Methane</u>: Methane (CH4) is an extremely effective absorber of radiation, though its atmospheric concentration is less than carbon dioxide and its lifetime in the atmosphere is brief (10-12 years), compared to other GHGs. No health effects are known to occur from exposure to methane.

Methane has both natural and anthropogenic sources. It is released as part of the biological processes in low oxygen environments, such as in swamplands or in rice production (at the roots of the plants). Over the last 50 years, human activities such as growing rice, raising cattle, using natural gas, and mining coal have added to the atmospheric concentration of methane. Other anthropocentric sources include fossil-fuel combustion and biomass burning.

<u>Nitrous Oxide</u>: Nitrous oxide (N2O), also known as laughing gas, is a colorless greenhouse gas. Nitrous oxide can cause dizziness, euphoria, and sometimes slight hallucinations. In small doses, it is considered harmless. However, in some cases, heavy and extended use can cause Olney's Lesions (brain damage) (9).

Concentrations of nitrous oxide also began to rise at the beginning of the industrial revolution. In 1998, the global concentration was 314 parts per billion (ppb). Nitrous oxide is produced by microbial processes in soil and water, including those reactions which occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load. It is used as an aerosol spray propellant, i.e., in whipped cream bottles. It is also used in potato chip bags to keep chips fresh. It is used in rocket engines and in race cars. Nitrous oxide can be transported into the stratosphere, be deposited on the Earth's surface, and be converted to other compounds by chemical reaction

Chlorofluorocarbons: Chlorofluorocarbons (CFCs) are gases formed synthetically by replacing all hydrogen atoms in methane or ethane (C2H6) with chlorine and/or fluorine atoms. CFCs are nontoxic, nonflammable, insoluble and chemically unreactive in the troposphere (the level of air at the Earth's surface). CFCs are no longer being used; therefore, it is not likely that health effects would be experienced. Nonetheless, in confined indoor locations, working with CFC-113 or other CFCs is thought to result in death by cardiac arrhythmia (heart frequency too high or too low) or asphyxiation.

CFCs have no natural source, but were first synthesized in 1928. They were used for refrigerants, aerosol propellants and cleaning solvents. Due to the discovery that they are able to destroy stratospheric ozone, a global effort to halt their production was undertaken and was extremely successful, so much so that levels of the major CFCs are now remaining steady or declining. However, their long atmospheric lifetimes mean that some of the CFCs will remain in the atmosphere for over 100 years.

Hydrofluorocarbons: Hydrofluorocarbons (HFCs) are synthetic, man-made chemicals that are used as a substitute for CFCs. Out of all the greenhouse gases, they are one of three groups with the highest global warming potential. The HFCs with the largest measured atmospheric abundances are (in order), HFC-23 (CHF3), HFC-134a (CF3CH2F), and HFC-152a (CH3CHF2). Prior to 1990, the only significant emissions were of HFC-23. HFC-134a emissions are increasing due to its use as a refrigerant. The U.S. EPA estimates that concentrations of HFC-23 and HFC-134a are now about 10 parts per trillion (ppt) each; and that concentrations of HFC-152a are about 1 ppt (10). No health effects are known to result from exposure to HFCs, which are manmade for applications such as automobile air conditioners and refrigerants.

Perfluorocarbons: Perfluorocarbons (PFCs) have stable molecular structures and do not break down through chemical processes in the lower atmosphere. High-energy ultraviolet rays, which occur about 60 kilometers above Earth's surface, are able to destroy the compounds. Because of this, PFCs have very long lifetimes, between 10,000 and 50,000 years. Two common PFCs are tetrafluoromethane (CF4) and hexafluoroethane (C2F6). The U.S. EPA estimates that concentrations of CF4 in the atmosphere are over 70 ppt.

No health effects are known to result from exposure to PFCs. The two main sources of PFCs are primary aluminum production and semiconductor manufacture.

Sulfur Hexafluoride: Sulfur hexafluoride (SF6) is an inorganic, odorless, colorless, nontoxic, nonflammable gas. It also has the highest GWP of any gas evaluated (23,900). The U.S. EPA indicates that concentrations in the 1990s were about 4 ppt. In high concentrations in confined areas, the gas presents the hazard of suffocation because it displaces the oxygen needed for breathing.

Sulfur hexafluoride is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.

2.5 EFFECTS OF CLIMATE CHANGE IN CALIFORNIA

Public Health

Higher temperatures may increase the frequency, duration, and intensity of conditions conducive to air pollution formation. For example, days with weather conducive to ozone formation could increase from 25 to 35 percent under the lower warming range to 75 to 85 percent under the medium warming range. In addition, if global background ozone levels increase as predicted in some scenarios, it may become impossible to meet local air quality standards. Air quality could be further compromised by increases in wildfires, which emit fine particulate matter that can travel long distances, depending on wind conditions. The Climate Scenarios report indicates that large wildfires could become up to 55 percent more frequent if GHG emissions are not significantly reduced.

In addition, under the higher warming range scenario, there could be up to 100 more days per year with temperatures above 90oF in Los Angeles and 95oF in Sacramento by 2100. This is a large increase over historical patterns and approximately twice the increase projected if temperatures remain within or below the lower warming range. Rising temperatures could increase the risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat.

Water Resources

A vast network of man-made reservoirs and aqueducts captures and transports water throughout the state from northern California rivers and the Colorado River. The current distribution system relies on Sierra Nevada snowpack to supply water during the dry spring and summer months. Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snowpack, increasing the risk of summer water shortages.

If temperatures continue to increase, more precipitation could fall as rain instead of snow, and the snow that does fall could melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. Under the lower warming range scenario, snowpack losses could be only half as large as those possible if temperatures were to rise to the higher warming range. How much snowpack could be lost depends in part on future precipitation patterns, the projections for which remain uncertain. However, even under the wetter climate projections, the loss of snowpack could pose challenges to water managers and hamper hydropower generation. It could also adversely affect winter tourism. Under the lower warming range, the ski season at lower elevations could be reduced by as much as a month. If temperatures reach the higher warming range and precipitation declines, there might be many years with insufficient snow for skiing and snowboarding.

The State's water supplies are also at risk from rising sea levels. An influx of saltwater could degrade California's estuaries, wetlands, and groundwater aquifers. Saltwater intrusion caused by rising sea levels is a major threat to the quality and reliability of water within the southern edge of the Sacramento/San Joaquin River Delta – a major fresh water supply.

Agriculture

Increased temperatures could cause widespread changes to the agriculture industry reducing the quantity and quality of agricultural products statewide. First, California farmers could possibly lose as much as 25 percent of the water supply they need. Although higher CO_2 levels can stimulate plant production and increase plant water-use efficiency, California's farmers could face greater water demand for crops and a less reliable water supply as temperatures rise. Crop growth and development could change, as could the intensity and frequency of pest and disease outbreaks. Rising temperatures could aggravate O_3 pollution, which makes plants more susceptible to disease and pests and interferes with plant growth.

Plant growth tends to be slow at low temperatures, increasing with rising temperatures up to a threshold. However, faster growth can result in less-than-optimal development for many crops, so rising temperatures could worsen the quantity and quality of yield for a number of California's agricultural products. Products likely to be most affected include wine grapes, fruits and nuts.

In addition, continued global climate change could shift the ranges of existing invasive plants and weeds and alter competition patterns with native plants. Range expansion could occur in many species while range contractions may be less likely in rapidly evolving species with significant populations already established. Should range contractions occur, new or different weed species could fill the emerging gaps. Continued global climate change could alter the abundance and types of many pests, lengthen pests' breeding season, and increase pathogen growth rates.

Forests and Landscapes

Global climate change has the potential to intensify the current threat to forests and landscapes by increasing the risk of wildfire and altering the distribution and character of natural vegetation. If temperatures rise into the medium warming range, the risk of large wildfires in California could increase by as much as 55 percent, which is almost twice the increase expected if temperatures stay in the lower warming range. However, since wildfire risk is determined by a combination of factors, including precipitation, winds, temperature, and landscape and vegetation conditions, future risks will not be uniform throughout the state. In contrast, wildfires in northern California could increase by up to 90 percent due to decreased precipitation.

Moreover, continued global climate change has the potential to alter natural ecosystems and biological diversity within the state. For example, alpine and subalpine ecosystems could decline by as much as 60 to 80 percent by the end of the century as a result of increasing temperatures. The productivity of the state's forests has the potential to decrease as a result of global climate change.

Rising Sea Levels

Rising sea levels, more intense coastal storms, and warmer water temperatures could increasingly threaten the state's coastal regions. Under the higher warming range scenario, sea level is anticipated to rise 22 to 35 inches by 2100. Elevations of this magnitude would inundate low-lying coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats. Under the lower warming range scenario, sea level could rise 12-14 inches.

2.6 HUMAN HEALTH EFFECTS

The potential health effects related directly to the emissions of carbon dioxide, methane, and nitrous oxide as they relate to development projects such as the proposed Project are still being debated in the scientific community. Their cumulative effects to global climate change have the potential to cause adverse effects to human health. Increases in Earth's ambient temperatures would result in more intense heat waves, causing more heat-related deaths. Scientists also purport that higher ambient temperatures would increase disease survival rates and result in more widespread disease. Climate change will likely cause shifts in weather patterns, potentially resulting in devastating droughts and food shortages in some areas (11). Exhibit 2-A presents the potential impacts of global warming.

Water Vapor: There are no known direct health effects related to water vapor at this time. It should be noted however that when some pollutants react with water vapor, the reaction forms a transport mechanism for some of these pollutants to enter the human body through water vapor.

Carbon Dioxide: According to the National Institute for Occupational Safety and Health (NIOSH) high concentrations of carbon dioxide can result in health effects such as: headaches, dizziness, restlessness, difficulty breathing, sweating, increased heart rate, increased cardiac output, increased blood pressure, coma, asphyxia, and/or convulsions. It should be noted that current concentrations of carbon dioxide in the earth's atmosphere are estimated to be approximately 370 parts per million (ppm), the actual reference exposure level (level at which adverse health effects typically occur) is at exposure levels of 5,000 ppm averaged over 10 hours in a 40-hour workweek and short-term reference exposure levels of 30,000 ppm averaged over a 15 minute period (12).

Specific health effects associated with directly emitted GHG emissions are as follows:

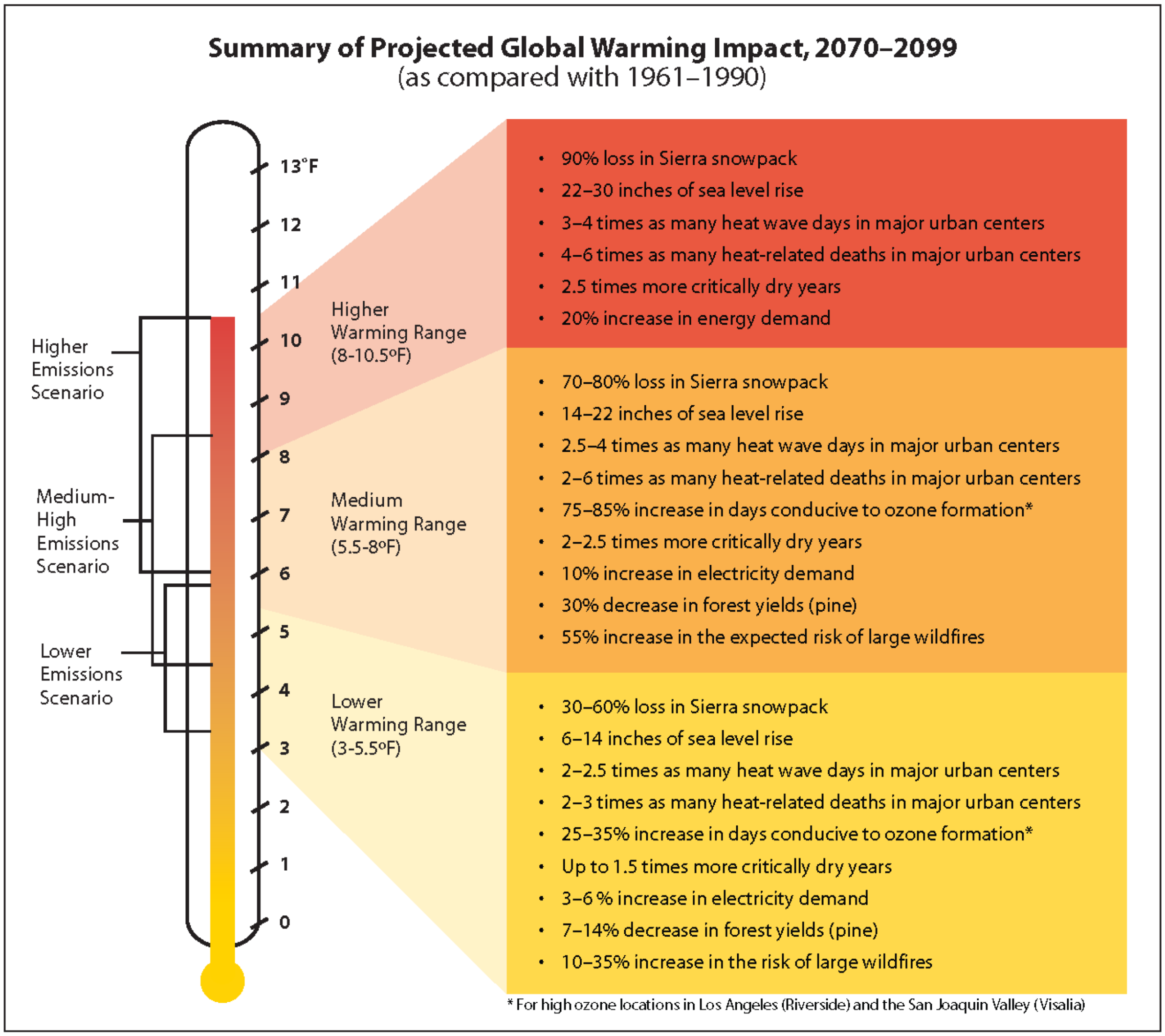
Methane: Methane is extremely reactive with oxidizers, halogens, and other halogen-containing compounds. Methane is also an asphyxiant and may displace oxygen in an enclosed space (13).

Nitrous Oxide: Nitrous Oxide is often referred to as laughing gas; it is a colorless greenhouse gas. The health effects associated with exposure to elevated concentrations of nitrous oxide include dizziness, euphoria, slight hallucinations, and in extreme cases of elevated concentrations nitrous oxide can also cause brain damage (13).

Fluorinated Gases: High concentrations of fluorinated gases can also result in adverse health effects such as asphyxiation, dizziness, headache, cardiovascular disease, cardiac disorders, and in extreme cases, increased mortality (12).

Aerosols: The health effects of aerosols are similar to that of other fine particulate matter. Thus aerosols can cause elevated respiratory and cardiovascular diseases as well as increased mortality (14).

EXHIBIT 2-A: SUMMARY OF PROJECTED GLOBAL WARMING IMPACT



2.7 REGULATORY SETTING

International Regulation and the Kyoto Protocol:

In 1988, the United Nations established the Intergovernmental Panel on Climate Change to evaluate the impacts of global warming and to develop strategies that nations could implement to curtail global climate change. In 1992, the United States joined other countries around the world in signing the United Nations' Framework Convention on Climate Change (UNFCCC) agreement with the goal of controlling greenhouse gas emissions. As a result, the Climate

Change Action Plan was developed to address the reduction of GHGs in the United States. The Plan currently consists of more than 50 voluntary programs for member nations to adopt.

The Kyoto protocol is a treaty made under the UNFCCC and was the first international agreement to regulate GHG emissions. Some have estimated that if the commitments outlined in the Kyoto protocol are met, global GHG emissions could be reduced an estimated five percent from 1990 levels during the first commitment period of 2008-2012. Notably, while the United States is a signatory to the Kyoto protocol, Congress has not ratified the Protocol and the United States is not bound by the Protocol's commitments. In December 2009, international leaders from 192 nations met in Copenhagen to address the future of international climate change commitments post-Kyoto.

Federal Regulation and the Clean Air Act:

Coinciding 2009 meeting in Copenhagen, on December 7, 2009, the U.S. Environmental Protection Agency (EPA) issued an Endangerment Finding under Section 202(a) of the Clean Air Act, opening the door to federal regulation of GHGs. The Endangerment Finding notes that GHGs threaten public health and welfare and are subject to regulation under the Clean Air Act. To date, the EPA has not promulgated regulations on GHG emissions, but it has already begun to develop them.

Previously the EPA had not regulated GHGs under the Clean Air Act (15) because it asserted that the Act did not authorize it to issue mandatory regulations to address global climate change and that such regulation would be unwise without an unequivocally established causal link between GHGs and the increase in global surface air temperatures. In Massachusetts v. Environmental Protection Agency et al. (127 S. Ct. 1438 (2007), however, the U.S. Supreme Court held that GHGs are pollutants under the Clean Air Act and directed the EPA to decide whether the gases endangered public health or welfare. The EPA had also not moved aggressively to regulate GHGs because it expected Congress to make progress on GHG legislation, primarily from the standpoint of a cap-and-trade system. However, proposals circulated in both the House of Representative and Senate have been controversial and it may be some time before the U.S. Congress adopts major climate change legislation. The EPA's Endangerment Finding paves the way for federal regulation of GHGs with or without Congress.

Although global climate change did not become an international concern until the 1980s, efforts to reduce energy consumption began in California in response to the oil crisis in the 1970s, resulting in the unintended reduction of greenhouse gas emissions. In order to manage the state's energy needs and promote energy efficiency, AB 1575 created the California Energy Commission (CEC) in 1975.

Title 24 Energy Standards:

The California Energy Commission (CEC) first adopted Energy Efficiency Standards for Residential and Nonresidential Buildings (16) in 1978 in response to a legislative mandate to reduce energy consumption in the state. Although not originally intended to reduce GHG emissions, increased energy efficiency, and reduced consumption of electricity, natural gas, and other fuels would result in fewer GHG emissions from residential and nonresidential buildings subject to the standard. The standards are updated periodically to allow for the consideration and inclusion of new energy efficiency technologies and methods. The Energy Commission's most recent standard, 2013 Building Energy Efficiency Standard, is 25 percent more efficient than previous standards for residential construction and 30 percent better for nonresidential construction. The Standards, which took effect on January 1, 2014, offer builders better windows, insulation, lighting, ventilation systems and other features that reduce energy consumption in homes and businesses. Some improved measures in the Standards include:

Residential:

- Solar-ready roofs to allow homeowners to add solar photovoltaic panels at a future date
- More efficient windows to allow increased sunlight, while decreasing heat gain
- Insulated hot water pipes, to save water and energy and reduce the time it takes to deliver hot water
- Whole house fans to cool homes and attics with evening air reducing the need for air conditioning load
- Air conditioner installation verification to insure efficient operation

Nonresidential:

- High performance windows, sensors and controls that allow buildings to use "daylighting"
- Efficient process equipment in supermarkets, computer data centers, commercial kitchens, laboratories, and parking garages
- Advanced lighting controls to synchronize light levels with daylight and building occupancy, and provide demand response capability
- Solar-ready roofs to allow businesses to add solar photovoltaic panels at a future date
- Cool roof technologies

<u>CALGreen</u>

Part 11 of the Title 24 Building Standards Code is referred to as the California Green Building Standards Code (CALGreen Code) (17). The purpose of the CALGreen Code is to “improve public health, safety and general welfare by enhancing the design and construction of buildings through the use of building concepts having a positive environmental impact and encouraging sustainable construction practices in the following categories: (1) Planning and design; (2) Energy efficiency; (3) Water efficiency and conservation; (4) Material conservation and resource efficiency; and (5) Environmental air quality.” The CALGreen Code is not intended to substitute or be identified as meeting the certification requirements of any green building program that is not established and adopted by the California Building Standards Commission (CBSC). The CBSC has released the 2010 California Green Building Standards Code on its Web site. Unless otherwise noted in the regulation, all newly constructed buildings in California are subject of the requirements of the CALGreen Code.

CALGreen contains both mandatory and voluntary measures, for Non-Residential land uses there are 39 mandatory measures including, but not limited to: exterior light pollution reduction, wastewater reduction by 20%, and commissioning of projects over 10,000 sf. There are two tiers of voluntary measures for Non-Residential land uses for a total of 36 additional elective measures.

The 2013 CALGreen includes additions and amendments to the water efficiency standards for non residential buildings in order to comply with the reduced flow rate table. The 2013 CALGreen has also been rewritten to clarify and definitively identify the requirements and applicability for residential and nonresidential buildings.

California Assembly Bill No. 1493 (AB 1493):

AB 1493 requires CARB to develop and adopt the nation's first greenhouse gas emission standards for automobiles. The Legislature declared in AB 1493 that global warming was a matter of increasing concern for public health and environment in California (18). Further, the legislature stated that technological solutions to reduce greenhouse gas emissions would stimulate the California economy and provide jobs.

To meet the requirements of AB 1493, ARB approved amendments to the California Code of Regulations (CCR) adding GHG emission standards to California's existing motor vehicle emission standards in 2004. Amendments to CCR Title 13 Sections 1900 (CCR 13 1900) and 1961 (CCR 13 1961) and adoption of Section 1961.1 (CCR 13 1961.1) require automobile manufacturers to meet fleet average GHG emission limits for all passenger cars, light-duty trucks within various weight criteria, and medium-duty passenger vehicle weight classes beginning with the 2009 model year. Emission limits are further reduced each model year through 2016.

In December 2004 a group of car dealerships, automobile manufacturers, and trade groups representing automobile manufacturers filed suit against ARB to prevent enforcement of CCR 13 1900 and CCR 13 1961 as amended by AB 1493 and CCR 13 1961.1 (Central Valley Chrysler-Jeep et al. v. Catherine E. Witherspoon, in her official capacity as Executive Director of the California Air Resources Board, et al.). The suit, heard in the U.S. District Court for the Eastern District of California, contended that California's implementation of regulations that in effect regulate vehicle fuel economy violates various federal laws, regulations, and policies. In January 2007, the judge hearing the case accepted a request from the State Attorney General's office that the trial be postponed until a decision is reached by the U.S. Supreme Court on a separate case addressing GHGs. In the Supreme Court Case, Massachusetts vs. EPA, the primary issue in question is whether the federal CAA provides authority for USEPA to regulate CO2 emissions. In April 2007, the U.S. Supreme Court ruled in Massachusetts' favor, holding that GHGs are air pollutants under the CAA. On December 11, 2007, the judge in the Central Valley Chrysler-Jeep case rejected each plaintiff's arguments and ruled in California's favor. On December 19, 2007, the USEPA denied California's waiver request. California filed a petition with the Ninth Circuit Court of Appeals challenging USEPA's denial on January 2, 2008.

The Obama administration subsequently directed the USEPA to re-examine their decision. On May 19, 2009, challenging parties, automakers, the State of California, and the federal government reached an agreement on a series of actions that would resolve these current and potential future disputes over the standards through model year 2016. In summary, the USEPA and the U.S. Department of Transportation agreed to adopt a federal program to reduce GHGs and improve fuel economy, respectively, from passenger vehicles in order to achieve equivalent or greater greenhouse gas benefits as the AB 1493 regulations for the 2012–2016 model years. Manufacturers agreed to ultimately drop current and forego similar future legal challenges, including challenging a waiver grant, which occurred on June 30, 2009. The State of California committed to (1) revise its standards to allow manufacturers to demonstrate compliance with the fleet-average GHG emission standard by "pooling" California and specified State vehicle sales; (2) revise its standards for 2012–2016 model year vehicles so that compliance with USEPA-adopted GHG standards would also comply with California's standards; and (3) revise its standards, as necessary, to allow manufacturers to use emissions data from the federal CAFE program to demonstrate compliance with the AB 1493 regulations (CARB 2009, http://www.arb.ca.gov/regact/2009/ghgpv09/ghgpvisor.pdf) both of these programs are aimed at light-duty auto and light-duty trucks.

<u>Executive Order S-3-05:</u>

Executive Order S-3-05, which was signed by Governor Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change (19). It declares that increased temperatures could reduce the Sierra's snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the Executive Order established total greenhouse gas emission targets. Specifically, emissions are to be reduced to the 1990 level by 2020, and to 80% below the 1990 level by 2050. The Executive Order directed the Secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce greenhouse gas emissions to the target levels. The Secretary also is required to submit biannual reports to the Governor and state Legislature describing: (1) progress made toward reaching the emission targets; (2) impacts of global warming on California's resources; and (3) mitigation and adaptation plans to combat these impacts. To comply with the Executive Order, the Secretary of the CalEPA created a Climate Action Team (CAT) made up of members from various state agencies and commission. CAT released its first report in March 2006. The report proposed to achieve the targets by building on voluntary actions of California businesses, local government and community actions, as well as through state incentive and regulatory programs.

<u>California Assembly Bill 32 (AB 32):</u>

In September 2006, Governor Arnold Schwarzenegger signed AB 32, the California Climate Solutions Act of 2006. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by the year 2020 (20). This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs CARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then CARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires that CARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the state achieves reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

In November 2007, CARB completed its estimates of 1990 GHG levels. Net emission 1990 levels were estimated at 427 MMTs (emission sources by sector were: transportation – 35 percent; electricity generation – 26 percent; industrial – 24 percent; residential – 7 percent; agriculture – 5 percent; and commercial – 3 percent). Accordingly, 427 MMTs of CO2 equivalent was established as the emissions limit for 2020. For comparison, CARB's estimate for baseline GHG emissions was 473 MMT for 2000 and 532 MMT for 2010. "Business as usual" conditions (without the 28.4 percent reduction to be implemented by CARB regulations) for 2020 were projected to be 596 MMTs.

In December 2007, CARB approved a regulation for mandatory reporting and verification of GHG emissions for major sources. This regulation covered major stationary sources such as cement plants, oil refineries, electric generating facilities/providers, and co-generation facilities, which comprise 94 percent of the point source CO2 emissions in the State.

On December 11, 2008, CARB adopted a scoping plan to reduce GHG emissions to 1990 levels. The Scoping Plan's recommendations for reducing GHG emissions to 1990 levels by 2020 include emission reduction measures, including a cap-and-trade program linked to Western Climate Initiative partner jurisdictions, green building strategies, recycling and waste-related measures, as well as Voluntary Early Actions and Reductions. Implementation of individual measures must begin no later than January 1, 2012, so that the emissions reduction target can be fully achieved by 2020.

Table 2-3 shows the proposed reductions from regulations and programs outlined in the Scoping Plan. While local government operations were not accounted for in achieving the 2020 emissions reduction, local land use changes are estimated to result in a reduction of 5 MMTons of CO2e, which is approximately 3 percent of the 2020 GHG emissions reduction goal. In recognition of the critical role local governments will play in successful implementation of AB 32, CARB is recommending GHG reduction goals of 15 percent of 2006 levels by 2020 to ensure that municipal and community-wide emissions match the state's reduction target. According to the Measure Documentation Supplement to the Scoping Plan, local government actions and targets are anticipated to reduce vehicle miles by approximately 2 percent through land use planning, resulting in a potential GHG reduction of 2 MMTons tons of CO2e (or approximately 1.2 percent of the GHG reduction target).

Overall, CARB determined that achieving the 1990 emission level in 2020 would require a reduction in GHG emissions of approximately 28.5 percent in the absence of new laws and regulations (referred to as "Business-As-Usual" [BAU]). The Scoping Plan evaluates opportunities for sector-specific reductions, integrates all CARB and California Climate Action

TABLE 2-3: SCOPING PLAN GHG REDUCTION MEASURES TOWARDS 2020 TARGET

Recommended Reduction Measures	Reductions Counted toward 2020 Target of 169 MMT CO2e	Percentage of Statewide 2020 Target
Cap and Trade Program and Associated Measures		
California Light-Duty Vehicle GHG Standards	31.7	19%
Energy Efficiency	26.3	16%
Renewable Portfolio Standard (33 percent by 2020)	21.3	13%
Low Carbon Fuel Standard	15	9%
Regional Transportation-Related GHG Targets[1]	5	3%
Vehicle Efficiency Measures	4.5	3%
Goods Movement	3.7	2%
Million Solar Roofs	2.1	1%
Medium/Heavy Duty Vehicles	1.4	1%
High Speed Rail	1.0	1%
Industrial Measures	0.3	0%
Additional Reduction Necessary to Achieve Cap	34.4	20%
Total Cap and Trade Program Reductions	146.7	87%
Uncapped Sources/Sectors Measures		
High Global Warming Potential Gas Measures	20.2	12%
Sustainable Forests	5	3%
Industrial Measures (for sources not covered under cap and trade program)	1.1	1%
Recycling and Waste (landfill methane capture)	1	1%
Total Uncapped Sources/Sectors Reductions	27.3	16%
Total Reductions Counted toward 2020 Target	174	100%
Other Recommended Measures – Not Counted toward 2020 Target		
State Government Operations	1.0 to 2.0	1%
Local Government Operations	To Be Determined[2]	NA
Green Buildings	26	15%
Recycling and Waste	9	5%
Water Sector Measures	4.8	3%
Methane Capture at Large Dairies	1	1%
Total Other Recommended Measures – Not Counted toward 2020 Target	42.8	NA

Source: CARB. 2008, MMTons CO2e: million metric tons of CO2e

[1]Reductions represent an estimate of what may be achieved from local land use changes. It is not the SB 375 regional target.

[2]According to the Measure Documentation Supplement to the Scoping Plan, local government actions and targets are anticipated to reduce vehicle miles by approximately 2 percent through land use planning, resulting in a potential GHG reduction of 2 million metric tons of CO2e (or approximately 1.2 percent of the GHG reduction target). However, these reductions were not included in the Scoping Plan reductions to achieve the 2020 Target

Team early actions and additional GHG reduction measures, identifies additional measures to be pursued as regulations, and outlines the role of the cap-and-trade program.

In connection with its preparation of the August 2011 Final Supplement to the Scoping Plan's Functional Equivalent Document, CARB released revised estimates of the 2020 emissions level projection in light of the economic recession and the availability of updated information from development of measure-specific regulations. Based on the new economic data, CARB determined the 2020 emissions level projection in the BAU condition would be reduced from 596 metric tons of CO2 equivalent (MTCO2e) to 545 MTCO2e. (21) Under this scenario, achieving the 1990 emissions level in 2020 would require a reduction of GHG emissions of 118 MTCO2e, or 21.7 percent (down from 28.5 percent), from the BAU condition.

When the 2020 emissions level projection also was updated to account for implemented regulatory measures, including Pavley (vehicle model-years 2009 - 2016) and the renewable portfolio standard (12% - 20%), the 2020 projection in the BAU condition was reduced further to 507 MTCO2e. As a result, based on the updated economic and regulatory data, CARB determined that achieving the 1990 emissions level in 2020 would now only require a reduction of GHG emissions of 80 MTCO2e, or approximately 16 percent (down from 28.5 percent), from the BAU condition. (21) (22)

On February 10, 2014, CARB released a Draft Proposed First Update of the Scoping Plan. The draft recalculates 1990 GHG emissions using new global warming potentials identified in the IPCC Fourth Assessment Report released in 2007. Using those GWPs, the 427 MTCO2e 1990 emissions level and 2020 GHG emissions limit identified in the 2008 Scoping Plan would be slightly higher, at 431 MTCO2e. (23) Based on the revised 2020 emissions level projection identified in the 2011 Final Supplement and the updated 1990 emissions levels identified in the discussion draft of the First Update, achieving the 1990 emissions level in 2020 would require a reduction of 78 MTCO2e (down from 509 MTCO2e), or approximately 15.3 percent (down from 28.5 percent), from the BAU condition. (21) (22) (23)

Although CARB has released an update to the Scoping Plan and reduction targets from BAU, it is still appropriate to utilize the previous 28.5% reduction from BAU since the modeling tools available are not able to easily segregate the inclusion of the renewable portfolio standards, and Pavley requirements that are now included in the revised BAU scenario.

<u>California Senate Bill No. 1368 (SB 1368):</u>

In 2006, the State Legislature adopted Senate Bill 1368 ("SB 1368"), which was subsequently signed into law by the Governor (24). SB 1368 directs the California Public Utilities Commission ("CPUC") to adopt a greenhouse gas emission performance standard ("EPS") for the future power purchases of California utilities. SB 1368 seeks to limit carbon emissions associated with electrical energy consumed in California by forbidding procurement arrangements for energy longer than five years from resources that exceed the emissions of a relatively clean, combined cycle natural gas power plant. Due to the carbon content of its fuel source, a coal-fired plant cannot meet this standard because such plants emit roughly twice as much carbon as natural gas, combined cycle plants.

Accordingly, the new law will effectively prevent California's utilities from investing in, otherwise financially supporting, or purchasing power from new coal plants located in or out of the State. Thus, SB 1368 will lead to dramatically lower greenhouse gas emissions associated with California energy demand, as SB 1368 will effectively prohibit California utilities from purchasing power from out of state producers that cannot satisfy the EPS standard required by SB 1368.

<u>Senate Bill 97 (SB 97):</u>

Pursuant to the direction of SB 97, OPR released preliminary draft CEQA Guideline amendments for greenhouse gas emissions on January 8, 2009, and submitted its final proposed guidelines to the Secretary for Natural Resources on April 13, 2009 (25). The Natural Resources Agency adopted the Guideline amendments and they became effective on March 18, 2010.

Of note, the new guidelines state that a lead agency shall have discretion to determine whether to use a quantitative model or methodology, or in the alternative, rely on a qualitative analysis or performance based standards. CEQA Guideline § 15064.4(a)"A lead agency shall have discretion to determine, in the context of a particular project, whether to: (1) Use a model or methodology to quantify greenhouse gas emissions resulting from a project, and which model or methodology to use . . .; or (2) Rely on a qualitative analysis or performance based standards."

Also amended were CEQA Guidelines Sections 15126.4 and 15130, which address mitigation measures and cumulative impacts respectively. Greenhouse gas mitigation measures are referenced in general terms, but no specific measures are championed. The revision to the cumulative impact discussion requirement (Section 15130) simply directs agencies to analyze greenhouse gas emissions in an EIR when a Project's incremental contribution of emissions may be cumulatively considerable, however it does not answer the question of when emission are cumulatively considerable.

Section 15183.5 permits programmatic greenhouse gas analysis and later project-specific tiering, as well as the preparation of Greenhouse Gas Reduction Plans. Compliance with such plans can support determination that a Project's cumulative effect is not cumulatively considerable, according to proposed Section 15183.5(b).

CEQA emphasizes that the effects of greenhouse gas emissions are cumulative, and should be analyzed in the context of CEQA's requirements for cumulative impacts analysis. (See CEQA Guidelines Section 15130(f)).

Section 15064.4(b) of the CEQA Guidelines provides direction for lead agencies for assessing the significance of impacts of greenhouse gas emissions:

1. The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;
2. Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project; or

3. The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such regulations or requirements must be adopted by the relevant public agency through a public review process and must include specific requirements that reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

The CEQA Guideline amendments do not identify a threshold of significance for greenhouse gas emissions, nor do they prescribe assessment methodologies or specific mitigation measures. Instead, they call for a "good-faith effort, based on available information, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project." The amendments encourage lead agencies to consider many factors in performing a CEQA analysis and preserve lead agencies' discretion to make their own determinations based upon substantial evidence. The amendments also encourage public agencies to make use of programmatic mitigation plans and programs from which to tier when they perform individual project analyses. Specific GHG language incorporated in the Guidelines' suggested Environmental Checklist (Guidelines Appendix G) is as follows:

VII. GREENHOUSE GAS EMISSIONS

Would the project:

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

<u>Executive Order S-01-07:</u>

On January 18, 2007 California Governor Arnold Schwarzenegger, through Executive Order S-01-07, mandated a statewide goal to reduce the carbon intensity of California's transportation fuel by at least ten percent by 2020 (26). The order also requires that a California specific Low Carbon Fuel Standard be established for transportation fuels.

<u>Executive Order B-30-15:</u>

On April 29, 2015 California Governor Jerry Brown, through Executive Order B-30-15 ("BEO") states a new statewide policy goal to reduce GHG emissions 40 percent below their 1990 levels by 2030. It should be noted that the BEO was issued after the notice of preparation date for the Project of April 1, 2015.

The BEO sets an ambitious new Statewide GHG emissions reduction target of 40% below 1990 levels by 2030 as a "mid-term" benchmark needed to achieve the 80% below 1990 levels by 2050. It should be noted however that this target has not been formally enacted by the Legislature or even CARB. As such, the BEO does not appear to constitute a new regulation or requirement adopted to implement a statewide, regional or local plan for the reduction of GHG emissions within the context of CEQA.

The Project reduces its GHG emissions to the maximum extent feasible as discussed in this document. At this time, no further analysis is necessary or required by CEQA as it pertains to Executive Order B-30-15.

Senate Bills 1078 and 107 and Executive Order S-14-08:

SB 1078 (Chapter 516, Statutes of 2002) requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20% of their supply from renewable sources by 2017 (27). SB 107 (Chapter 464, Statutes of 2006) changed the target date to 2010 (26). In November 2008 Governor Schwarzenegger signed Executive Order S-14-08, which expands the state's Renewable Energy Standard to 33% renewable power by 2020 (28).

Senate Bill 375:

SB 375, signed in September 2008 (Chapter 728, Statutes of 2008), aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation (29). SB 375 requires metropolitan planning organizations (MPOs) to adopt a sustainable communities strategy (SCS) or alternative planning strategy (APS) that will prescribe land use allocation in that MPO's regional transportation plan. ARB, in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035.

These reduction targets will be updated every 8 years but can be updated every 4 years if advancements in emissions technologies affect the reduction strategies to achieve the targets. ARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, transportation projects will not be eligible for funding programmed after January 1, 2012.

This law also extends the minimum time period for the regional housing needs allocation cycle from 5 years to 8 years for local governments located within an MPO that meets certain requirements. City or county land use policies (including general plans) are not required to be consistent with the regional transportation plan (and associated SCS or APS). However, new provisions of CEQA would incentivize (through streamlining and other provisions) qualified projects that are consistent with an approved SCS or APS, categorized as "transit priority projects."

The Southern California Association of Governments (SCAG) is required by law to update the Southern California Regional Transportation Plan (RTP) every four years. The 2012 draft plan has been released, this draft plan differs from past plans because it includes development of a SCS. The RTP/SCS incorporates land use and housing policies to meet the greenhouse gas emissions targets established by the California Air Resource Board (CARB) for 2020 (8% reduction) and 2035 (13% reduction). On April 4, 2012, the Regional Council of the Southern

California Association of Governments (SCAG) adopted the 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS): Towards a Sustainable Future.

<u>CARB's Preliminary Draft Staff Proposal for Interim Significance Thresholds:</u>

Separate from its Scoping Plan approved in December of 2008 (30), CARB issued a Staff Proposal in October 2008, as its first step toward developing recommended statewide interim thresholds of significance for GHGs that may be adopted by local agencies for their own use. CARB staff's objective in this proposal is to develop a threshold of significance that will result in the vast majority (approximately 90 percent statewide) of GHG emissions from new industrial projects being subject to CEQA's requirement to impose feasible mitigation. The proposal does not attempt to address every type of project that may be subject to CEQA, but instead focuses on common project types that, collectively, are responsible for substantial GHG emissions – specifically, industrial, residential, and commercial projects. CARB is developing these thresholds in these sectors to advance climate objectives, streamline project review, and encourage consistency and uniformity in the CEQA analysis of GHG emissions throughout the state. These draft thresholds are under revision in response to comments. There is currently no timetable for finalized thresholds at this time.

As currently proposed by CARB, a quantitative threshold of 7,000 metric tons (MT) of CO2e per year for operational emissions (excluding transportation), and performance standards yet to be defined for construction and transportation emissions are under consideration. However, CARB's proposal is not yet final, and thus cannot be applied to the Project.

<u>South Coast Air Quality Management District Recommendations for Significance Thresholds:</u>

In April 2008, the South Coast Air Quality Management District (SCAQMD), in order to provide guidance to local lead agencies on determining the significance of GHG emissions identified in CEQA documents, convened a "GHG CEQA Significance Threshold Working Group." The goal of the working group is to develop and reach consensus on an acceptable CEQA significance threshold for GHG emissions that would be utilized on an interim basis until CARB (or some other state agency) develops statewide guidance on assessing the significance of GHG emissions under CEQA.

Initially, SCAQMD staff presented the working group with a significance threshold that could be applied to various types of projects—residential; non-residential; industrial; etc (31). However, the threshold is still under development. In December 2008, staff presented the SCAQMD Governing Board with a significance threshold for stationary source projects where it is the lead agency. This threshold uses a tiered approach to determine a project's significance, with 10,000 metric tons of carbon dioxide equivalent (MTCO2e) as a screening numerical threshold for stationary sources. More importantly it should be noted that when setting the 10,000 MTCO2e threshold, the SCAQMD did not consider mobile sources (vehicular travel), rather the threshold is based mainly on stationary source generators such as boilers, refineries, power plants, etc. Therefore it would be misleading to apply a threshold that was developed without consideration for mobile sources to a Project where the majority of emissions are related to mobile sources. Thus there is no SCAQMD threshold that can be applied to this Project.

In September 2010 (32), the Working Group released additional revisions that consist of the following recommended tiered approach:

- Tier 1 consists of evaluating whether or not the Project qualifies for applicable CEQA exemptions.
- Tier 2 consists of determining whether or not a Project is consistent with a greenhouse gas reduction plan. If a Project is consistent with a greenhouse gas reduction plan, it would not have a significant impact.
- Tier 3 consists of screening values at the discretion of the lead agency; however they should be consistent for all projects within its jurisdiction. Project-related construction emissions should be amortized over 30 years and should be added back the Project's operational emissions. The following thresholds are proposed for consideration:
    - 3,000 MTCO2e per year for all land use types

      or
    - 3,500 MTCO2e per year for residential; 1,400 MTCO2e per year for commercial; or 3,000 MTCO2e per year for mixed-use projects
- Tier 4 has the following options:
    - Option 1: Reduce emissions from business as usual by a certain percentage (currently undefined)
    - Option 2: Early implementation of applicable AB 32 Scoping Plan measures
    - Option 3: A project-level efficiency target of 4.8 MTCO2e per service population as a 2020 target and 3.0 MTCO2e per service population as a 2035 target. The recommended plan-level target for 2020 is 6.6 MTCO2e and the plan level target for 2035 is 4.1 MTCO2e
- Tier 5 involves mitigation offsets to achieve target significance thresholds

The SCAQMD has also adopted Rules 2700, 2701, and 2702 that address GHG reductions. However, these rules address boilers and process heater, forestry, and manure management projects, none of which are required by the Project

2.8 DISCUSSION ON ESTABLISHMENT OF SIGNIFICANCE THRESHOLDS

The City of Moreno Valley has not adopted a threshold of significance for GHG emissions. As such, a screening threshold of 3,000 MTCO2e per year for residential land uses is applied herein, which is a widely accepted screening threshold used by the County of Riverside and numerous jurisdictions in the South Coast Air Basin and is based on the South Coast Air Quality Management District (SCAQMD) staff's proposed GHG screening threshold for stationary source emissions for non-industrial projects, as described in the SCAQMD's *Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans* ("SCAQMD Interim GHG Threshold"). The SCAQMD Interim GHG Threshold identifies a screening threshold to determine whether additional analysis is required (33). As noted by the SCAQMD:

> "…the…screening level for stationary sources is based on an emission capture rate of 90 percent for all new or modified projects...the policy objective of [SCAQMD's]

recommended interim GHG significance threshold proposal is to achieve an emission capture rate of 90 percent of all new or modified stationary source projects. A GHG significance threshold based on a 90 percent emission capture rate may be more appropriate to address the long-term adverse impacts associated with global climate change because most projects will be required to implement GHG reduction measures. Further, a 90 percent emission capture rate sets the emission threshold low enough to capture a substantial fraction of future stationary source projects that will be constructed to accommodate future statewide population and economic growth, while setting the emission threshold high enough to exclude small projects that will in aggregate contribute a relatively small fraction of the cumulative statewide GHG emissions. This assertion is based on the fact that [SCAQMD] staff estimates that these GHG emissions would account for slightly less than one percent of future 2050 statewide GHG emissions target (85 [MMTCO2e/yr]). In addition, these small projects may be subject to future applicable GHG control regulations that would further reduce their overall future contribution to the statewide GHG inventory. Finally, these small sources are already subject to [Best Available Control Technology] (BACT) for criteria pollutants and are more likely to be single-permit facilities, so they are more likely to have few opportunities readily available to reduce GHG emissions from other parts of their facility." (33)

Thus, and based on guidance from the SCAQMD, if a residential project would emit GHGs less than 3,000 $MTCO_2e$ per year, the project is not considered a substantial GHG emitter and the GHG impact is less than significant, requiring no additional analysis and no mitigation. On the other hand, if a residential project would emit GHGs in excess of 3,000 MTCO2e per year, then the project could be considered a substantial GHG emitter, requiring additional analysis and potential mitigation.

2.9 CITY OF MORENO VALLEY GENERAL PLAN MEASURES

Although the City of Moreno Valley General Plan does not identify specific GHG or climate change policies or goal, a number of the measures identified in the General Plan's Air Quality Element act to reduce or control criteria pollutant emissions and peripherally reduce GHG emissions. The proposed Project has been evaluated for consistency with the City's General Plan Air Quality Element, as shown on Table 2-4.

TABLE 2-4: CITY OF MORENO VALLEY GENERAL PLAN CONSISTENCY

Objective 6.6: Promote land use patterns that reduce daily automotive trips and reduce trip distance for work, shopping, school, and recreation.	**Consistent.** *The Project site is developed approximately 0.50 miles north of a regional shopping center (Stoneridge Towne Centre)*
Objective 6.7: Reduce mobile and stationary source air pollutant emissions.	**Consistent.** *The Project site is located proximate to existing and proposed major roadways, acting to generally reduce vehicle trip lengths, thereby reducing mobile source emissions.*
Policy 6.7.5: Require grading activities to comply with South Coast Air Quality Management District's Rule 403 regarding the control of fugitive dust.	**Consistent.** *The Project will be required to implement fugitive dust control measures consistent with SCAQMD Rule 403.*

Policy 6.7.6: Require building construction to comply with the energy conservation requirements of Title 24 of the California Administrative Code [California Code of Regulations].	**Consistent.** *Pursuant to City and State Building Code requirements, the Project will meet or surpass applicable CCR Title 24 energy conservation requirements.*

Source: City of Moreno Valley General Plan, Safety Element

2.10 CITY OF MORENO VALLEY ENERGY EFFICIENCY AND CLIMATE ACTION STRATEGY

The City of Moreno Valley released an Energy Efficiency and Climate Action Strategy (CAS) as well as a Greenhouse Gas Analysis for public review on May 8, 2012. The documents were approved on October 9, 2012. The CAS identifies ways that the City can reduce energy and water consumption and greenhouse gas emissions as an organization (its employees and the operation of its facilities) and outlines the actions that the City can encourage and community members can employ to reduce their own energy and water consumption and greenhouse gas emissions. The policies in the document are to reduce greenhouse gas emissions in 2010 by 15 percent by 2020. The following consists of an analysis of project consistency with the policies in the CAS.

- R2-T1: Land Use Based Trips and VMT Reduction Policies. Encourage the development of Transit Priority Projects along High Quality Transit Corridors identified in the SCAG Sustainable Communities Plan, to allow a reduction in vehicle miles traveled.

  Project consistency: Not applicable.
- R2-T3: Employment-Based Trip Reductions. Require a Transportation Demand Management (TDM) program for new development to reduce automobile travel by encouraging ride-sharing, carpooling, and alternative modes of transportation.

  Project consistency: Not applicable.
- R2-E1: New Construction Residential Energy Efficiency Requirements. Require energy efficient design for all new residential buildings to be 10 percent beyond the current Title 24 standards. (Reach Code)

  Project consistency: Consistent; the Project will comply with this measure if adopted by the City.
- R2-E2: New Construction Residential Renewable Energy. Facilitate the use of renewable energy (such as solar (photovoltaic) panels or small wind turbines) for new residential developments. Alternative approach would be the purchase of renewable energy resources offsite.

  Project consistency: Consistent; the Project will comply with this measure if adopted by the city.
- R2-E5: New Construction Commercial Energy Efficiency Requirements. Require energy efficient design for all new commercial buildings to be 10% beyond the current Title 24 standards. (Reach Code)

  Project consistency: Not applicable.
- R3-E1: Energy Efficient Development, and Renewable Energy Deployment Facilitation and Streamlining. Updating of codes and zoning requirements and guidelines to further implement green building practices. This could include incentives for energy efficient projects.
- Project consistency: Not applicable.

- R3-L2: Heat Island Plan. Develop measures that address "heat islands." Potential measures include using strategically placed shade trees, using paving materials with a Solar Reflective Index of at least 29, an open grid pavement system, or covered parking.

  Project consistency: Consistent; the Project will comply with the City of Moreno Valley's landscaping requirements.

- R2-W1: Water Use Reduction Initiative. Consider adopting a per capita water use reduction goal, which mandates the reduction of water use of 20 percent per capita with requirements applicable to new development and with cooperative support of the water agencies.

  Project consistency: Consistent. California Green Building Standards Code, Chapter 5, Division 5.3, Section 5.303.2 requires that indoor water use be reduced by 20 percent. The Project will be consistent with this measure.

- R3-W1: Water Efficiency Training and Education. Work with EMWD and local water companies to implement a public information and education program that promotes water conservation.

  Project consistency: Not applicable.

- R2-S1: City Diversion Program. For Solid Waste, consider a target of increasing the waste diverted from the landfill to a total of 75 percent by 2020.

  Project consistency: Consistent; the Project will comply with the City of Moreno Valley's citywide goal of solid waste reduction. Additionally the Project will be compliant with the City of Moreno Valley's Municipal Code 8.80.030 by implementing a Waste Management Plan.

As shown above, Project Consistency with Moreno Valley Energy Efficiency and Climate Action Strategy, of this report, many of the measures are not applicable to the project. The project is consistent with the applicable measures in the Strategy. Therefore, the project is consistent with the CAS.

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3 PROJECT GREENHOUSE GAS IMPACT

3.1 INTRODUCTION

The Project has been evaluated to determine if it will result in a significant greenhouse gas impact. The significance of these potential impacts is described in the following section.

3.2 PROJECT RELATED GREENHOUSE GAS EMISSIONS

CEQA Guidelines 15064.4 (b) (1) states that a lead agency may use a model or methodology to quantify greenhouse gas emissions associated with a project (34).

On October 2, 2013, the SCAQMD in conjunction with the California Air Pollution Control Officers Association (CAPCOA) released the latest version of the California Emissions Estimator Model™ (CalEEMod™) v2013.2.2. The purpose of this model is to more accurately calculate construction-source and operational-source criteria pollutant (NO_x, VOC, PM_{10}, $PM_{2.5}$, SO_x, and CO) and greenhouse gas (GHG) emissions from direct and indirect sources; and quantify applicable air quality and GHG reductions achieved from mitigation measures (35). Accordingly, the latest version of CalEEMod™ has been used for this Project to determine construction and operational air quality impacts. Output from the model runs for both construction and operational activity are provided in Appendix 3.1

3.3 CONSTRUCTION AND OPERATIONAL LIFE-CYCLE ANALYSIS

A full life-cycle analysis (LCA) for construction and operational activity is not included in this analysis due to the lack of consensus guidance on LCA methodology at this time. Life-cycle analysis (i.e., assessing economy-wide GHG emissions from the processes in manufacturing and transporting all raw materials used in the project development, infrastructure and on-going operations) depends on emission factors or econometric factors that are not well established for all processes. At this time a LCA would be extremely speculative and thus has not been prepared.

3.4 CONSTRUCTION EMISSIONS

Construction activities associated with the proposed Project will result in emissions of CO2 and CH4 from construction activities.

The report Ironwood Residential Air Quality Impact Analysis, Urban Crossroads, Inc. (2015) contains detailed information regarding construction activity (36).

For construction phase Project emissions, GHGs are quantified and amortized over the life of the Project. To amortize the emissions over the life of the Project, the SCAQMD recommends calculating the total greenhouse gas emissions for the construction activities, dividing it by the a 30 year project life then adding that number to the annual operational phase GHG emissions (37). As such, construction emissions were amortized over a 30 year period and added to the annual operational phase GHG emissions.

3.5 OPERATIONAL EMISSIONS

Operational activities associated with the proposed Project will result in emissions of CO2, CH4, and N2O from the following primary sources:

- Area Source Emissions
- Energy Source Emissions
- Mobile Source Emissions
- Solid Waste
- Water Supply, Treatment and Distribution

3.5.1 AREA SOURCE EMISSIONS

Hearths/Fireplaces

GHG emissions would result from the combustion of wood or biomass and are considered biogenic emissions of CO2. The emissions associated with use of hearths/fireplaces were calculated based on assumptions provided in the CalEEMod model. The Project is required to comply with SCAQMD Rule 445, which prohibits the use of wood burning stoves and fireplaces in new development. In order to account for the requirements of this Rule, the unmitigated CalEEMod model estimates were adjusted to remove wood burning stoves and fireplaces. As the project is required to comply with SCAQMD Rule 445, the removal of wood burning stoves and fireplaces is not considered "mitigation" although it must be identified as such in CalEEMod in order to treat the case appropriately.

Landscape Maintenance Equipment

Landscape maintenance equipment would generate emissions from fuel combustion and evaporation of unburned fuel. Equipment in this category would include lawnmowers, shedders/grinders, blowers, trimmers, chain saws, and hedge trimmers used to maintain the landscaping of the Project. The emissions associated with landscape maintenance equipment were calculated based on assumptions provided in the CalEEMod model.

3.5.2 ENERGY SOURCE EMISSIONS

Combustion Emissions Associated with Natural Gas and Electricity

GHGs are emitted from buildings as a result of activities for which electricity and natural gas are typically used as energy sources. Combustion of any type of fuel emits CO2 and other GHGs directly into the atmosphere; these emissions are considered direct emissions associated with a building. GHGs are also emitted during the generation of electricity from fossil fuels; these emissions are considered to be indirect emissions. Unless otherwise noted, CalEEMod™ default parameters were used.

3.5.3 Mobile Source Emissions

Vehicles

GHG emissions will also result from mobile sources associated with the Project. These mobile source emissions will result from the typical daily operation of motor vehicles by visitors, employees, and residents.

Project mobile source emissions are dependent on both overall daily vehicle trip generation. Trip characteristics available from the report, Ironwood Residential Traffic Impact Analysis (Urban Crossroads) 2015 were utilized in this analysis (38). A vehicle fleet mix consistent with the Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol was used as shown in Table 3-1 (39). This fleet mix was utilized as it is more appropriate than the CalEEMod default fleet mix for residential land uses.

TABLE 3-1: PROJECT FLEET MIX

Vehicle Type	Fleet Mix %
Light Duty Autos	69 %
Light Duty Trucks	19.4 %
Medium Duty Trucks	6.4 %
Heavy Duty Trucks	4.7 %
Motorcycles	0.5 %

3.5.4 Solid Waste

Residential land uses will result in the generation and disposal of solid waste. A large percentage of this waste will be diverted from landfills by a variety of means, such as reducing the amount of waste generated, recycling, and/or composting. The remainder of the waste not diverted will be disposed of at a landfill. GHG emissions from landfills are associated with the anaerobic breakdown of material. GHG emissions associated with the disposal of solid waste associated with the proposed Project were calculated by the CalEEMod™ model using default parameters.

3.5.5 Water Supply, Treatment and Distribution

Indirect GHG emissions result from the production of electricity used to convey, treat and distribute water and wastewater. The amount of electricity required to convey, treat and distribute water depends on the volume of water as well as the sources of the water. Unless otherwise noted, CalEEMod™ default parameters were used.

3.6 Emissions Summary

The annual GHG emissions associated with the operation of the proposed Project are estimated to be 2,905.71 MTCO2e per year as summarized in Table 3-2. Direct and indirect operational emissions associated with the Project are compared with the SCAQMD threshold of significance for residential use projects, which is 3,000 MTCO2e per year (33). As shown, the proposed Project would result in a less than significant impact with respect to GHG emissions.

TABLE 3-2: TOTAL PROJECT GREENHOUSE GAS EMISSIONS (ANNUAL)

Emission Source	Emissions (metric tons per year)			
	CO_2	CH_4	N_2O	Total CO_2E
Annual construction-related emissions amortized over 30 years	40.79	4.06E-03	--	41.01
Area	46.51	3.81E-03	8.00E-04	46.84
Energy	589.38	2.00E-02	9.27E-03	592.75
Mobile Sources	2,197.25	0.07	--	2,063.59
Waste	43.11	2.55	--	96.62
Water Usage	53.76	0.39	9.70E-03	64.9
Total CO_2E (All Sources)	**2,905.71**			
SCAQMD Threshold	**3,000**			
Significant?	**NO**			

Source: CalEEMod™ model output, See Appendix 3.1 for detailed model outputs.
Note: Totals obtained from CalEEMod™ and may not total 100% due to rounding.
Table results include scientific notation. *e* is used to represent *times ten raised to the power of* (which would be written as x 10^{b}") and is followed by the value of the exponent
[a] Includes emissions of landscape maintenance equipment and architectural coatings emissions
[b] Includes emissions of natural gas consumption
[c] Includes emissions of vehicle emissions and fugitive dust related to vehicular travel

4 FINDINGS & CONCLUSIONS

The City of Moreno Valley has not adopted its own thresholds of significance for GHG emissions. As such, a screening threshold of 3,000 MTCO2e per year for residential land uses is applied herein, which is a widely accepted screening threshold accepted by the County of Riverside and numerous jurisdictions in the South Coast Air Basin and is based on the South Coast Air Quality Management District (SCAQMD) staff's proposed GHG screening threshold for stationary source emissions for non-industrial projects, as described in the SCAQMD's *Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans* ("SCAQMD Interim GHG Threshold"). The SCAQMD Interim GHG Threshold identifies a screening threshold to determine whether additional analysis is required. (SCAQMD, 2008)

The Project will result in approximately 2,905.71 MTCO2e per year; the proposed project would not exceed the SCAQMD threshold of 3,000 MTCO2e per year. Thus, project-related emissions would not have a significant direct or indirect impact on GHG and climate change.

4.1 CONSTRUCTION AND OPERATIONAL-SOURCE MITIGATION MEASURES

No significant impacts occur, as such no mitigation is required.

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5 REFERENCES

1. **United Nations.** Flexible GHG Data Queries. [Online] [Cited: September 17, 2014.] http://unfccc.int/ghg_data/ghg_data_unfccc/time_series_annex_i/items/3841.php.
2. **U.S. Energy Information Administration.** [Online] http://www.eia.gov/.
3. **Environmental Protection Agency.** Inventory of U.S. Greenhouse Gas Emissions and Sinks. [Online] April 12, 2013. http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2013-Main-Text.pdf.
4. **Air Resources Board.** Greenhouse Gas Inventory Data - 2000 to 2011. [Online] [Cited: September 17, 2014.] http://www.arb.ca.gov/cc/inventory/data/data.htm.
5. **World Resources Institute.** Climate Analysis Indicator Tool (CAIT). [Online] [Cited: September 2014, 2014.] http://cait.wri.org.
6. **Air Resources Board.** Reducing Climate Change Emissions From Motor Vehicles. [Online] [Cited: September 17, 2014.] http://www.arb.ca.gov/cc/factsheets/ccfactsheet.pdf.
7. *The Carbon Cycle and Climate Change.* **Bennington, Bret J.** 1, s.l. : Brooks/Cole. ISBN 1 3: 978-0-495-73855-8.
8. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report.* **International Panel on Climate Change.** 4, 2007.
9. *Occupational Safety and Health Guideline for Nitrous Oxide.* **U.S. Department of Labor.**
10. **Environmental Protection Agency.** Overview of Greenhouse Gases. [Online] [Cited: September 17, 2014.] http://www.epa.gov/highgwp/scientific.html.
11. **American Lung Association.** Climate Change. [Online] 2013. [Cited: September 17, 2014.] http://www.lung.org/associations/states/california/advocacy/climate-change/.
12. **The National Institute for Occupational Safety and Health.** [Online] [Cited: September 17, 2014.] http://www.cdc.gov/niosh/.
13. **Occupational Health and Safety Administration.** [Online] [Cited: September 17, 2014.] https://www.osha.gov/.
14. **Hardin, Mary and Kahn, Ralph.** Aerosols & Climate Change. *Earth Observatory.* [Online] http://earthobservatory.nasa.gov/Features/Aerosols/.
15. **Environmental Protection Agency.** Air Pollution and the Clean Air Act. [Online] [Cited: September 17, 2014.] http://www.epa.gov/air/caa/.
16. **Building Standards Commission.** California Building Standards Code (Title 24, California Code of Regulations). [Online] [Cited: 17 2014, September.] http://www.bsc.ca.gov/codes.aspx.
17. —. CALGreen. [Online] 2010. [Cited: September 17, 2014.] http://www.bsc.ca.gov/home/calgreen.aspx.
18. **Air Resources Board.** Clean Car Standards - Pavley, Assembly Bill 1493. [Online] September 24, 2009. [Cited: September 17, 2014.] http://www.arb.ca.gov/cc/ccms/ccms.htm.
19. **Environmental Protection Agency.** State and Local Climate and Energy Program. [Online] [Cited: September 17, 2014.] http://www.epa.gov/statelocalclimate/state/tracking/individual/ca.html.
20. **Air Resources Board.** Assembly Bill 32: Global Warming Solutions Act. [Online] 2006. [Cited: September 17, 2014.] http://www.arb.ca.gov/cc/ab32/ab32.htm.
21. —. Status of Scoping Plan Recommended Measures. [Online] July 25, 2011. [Cited: September 23, 2014.] http://www.arb.ca.gov/cc/scopingplan/status_of_scoping_plan_measures.pdf.

22. —. Final Supplement to the AB 32 Scoping Plan Functional Equivalent Document. [Online] August 19, 2011. [Cited: September 23, 2014.] http://www.arb.ca.gov/cc/scopingplan/document/final_supplement_to_sp_fed.pdf.
23. —. Climate Change Scoping Plan First Update, Discussion Draft for Public Review and Comment. [Online] May 22, 2014. [Cited: September 23, 2014.] http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf.
24. **California Energy Commission.** SB 1368 Emission Performance Standards. [Online] September 29, 2006. [Cited: September 17, 2014.] http://www.energy.ca.gov/emission_standards/.
25. **State of California.** Senate Bill No. 97. [Online] [Cited: September 17, 2014.] http://opr.ca.gov/docs/SB_97_bill_20070824_chaptered.pdf.
26. —. California Climate Change Executive Orders. [Online] http://www.climatechange.ca.gov/state/executive_orders.html.
27. —. Senate Bill No. 1078. [Online] http://www.energy.ca.gov/portfolio/documents/documents/SB1078.PDF.
28. —. EXECUTIVE ORDER S-14-08. [Online] [Cited: September 17, 2014.] http://gov.ca.gov/news.php?id=11072.
29. **Air Resources Board.** Sustainable Communities. [Online] 2008. [Cited: September 17, 2014.] http://www.arb.ca.gov/cc/sb375/sb375.htm.
30. **California Air Resources Board .** Preliminary Draft Staff Proposal. [Online] October 24, 2008. [Cited: November 13, 2013.] http://www.arb.ca.gov/cc/localgov/ceqa/meetings/102708/prelimdraftproposal102408.pdf.
31. **South Coast Air Quality Management District.** Greenhouse Gases (GHG) CEQA Significance Thresholds. [Online] [Cited: September 17, 2014.] http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/ghg-significance-thresholds.
32. *Greenhouse Gas CEQA Significance Threshold Stakeholder Working Group Meeting #15.* **South Coast Air Quality Management District.** Diamond Bar : s.n., 2010.
33. **South Coast Air Quality Management District.** Interim CEQA GHG Significance Threshold for Stationary Sources, Rules and Plans. [Online] http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/year-2008-2009/ghg-meeting-8/ghg-meeting-8-minutes.pdf?sfvrsn=2.
34. **California Environmental Quality Act.** Addressing Analysis and Mitigation of Greenhouse Gas . [Online] [Cited: Noveber 13, 2013.] http://ceres.ca.gov/ceqa/docs/Final_Statement_of_Reasons.pdf.
35. **South Coast Air Quality Management District.** California Emissions Estimator Model. [Online] 2013. [Cited: September 17, 2014.] http://www.caleemod.com/.
36. **Urban Crossroads, Inc.** *Ironwood Residential Air Quality Impact Analysis.* Irvine : s.n., 2015.
37. **South Coast Air Quality Management District.** *Greenhouse Gas CEQA Significance Threshold Stakeholder Working Group #13.* [Powerpoint] Diamond Bar : s.n., 2009.
38. **Urban Crossroads, Inc.** *Ironwood Residential Traffic Impact Analysis.* Irvine : s.n., 2015.
39. **California Department of Transportation.** *Transportation Project-Level Carbon Monoxed Protocol.* 1997. UCD-ITS-RR-92-21.

6 CERTIFICATION

The contents of this greenhouse gas study report represent an accurate depiction of the greenhouse gas impacts associated with the proposed Ironwood Residential (TTM No. 37001). The information contained in this greenhouse gas report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 660-1994 ext. 217.

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EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May, 2010

Bachelor of Arts in Environmental Analysis and Design
University of California, Irvine • June, 2006

PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Planned Communities and Urban Infill – Urban Land Institute • June, 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April, 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August, 2007
AB2588 Regulatory Standards – Trinity Consultants • November, 2006
Air Dispersion Modeling – Lakes Environmental • June, 2006

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APPENDIX 3.1:

CALEEMOD EMISSIONS MODEL OUTPUTS

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Ironwood Residential- Construction

Riverside-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	181.00	Dwelling Unit	58.77	325,800.00	518

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.4 **Precipitation Freq (Days)** 28

Climate Zone 10 **Operational Year** 2020

Utility Company Southern California Edison

CO2 Intensity (lb/MWhr) 466.91 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44.

Land Use - Project unit count is based on information provided by the applicant

Construction Phase - Based on consultation with the applicant

Off-road Equipment - 8 hour work days

Off-road Equipment - 8 hour work days

Off-road Equipment - Water truck added

Off-road Equipment -

Grading -

Vehicle Trips - Construction run only

Woodstoves - Construction run only

Energy Use - Construction run only

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	75.00	675.00
tblConstructionPhase	NumDays	1,110.00	55.00
tblConstructionPhase	NumDays	110.00	75.00
tblConstructionPhase	NumDays	75.00	675.00
tblConstructionPhase	PhaseEndDate	11/1/2022	7/2/2020
tblConstructionPhase	PhaseStartDate	4/1/2020	12/1/2017
tblEnergyUse	LightingElect	1,608.84	0.00
tblEnergyUse	NT24E	5,089.81	0.00
tblEnergyUse	NT24NG	5,950.14	0.00
tblEnergyUse	T24E	980.99	0.00
tblEnergyUse	T24NG	27,816.78	0.00
tblFireplaces	NumberGas	153.85	0.00
tblFireplaces	NumberNoFireplace	18.10	0.00
tblFireplaces	NumberWood	9.05	0.00
tblOffRoadEquipment	HorsePower	400.00	189.00
tblOffRoadEquipment	LoadFactor	0.38	0.50
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblProjectCharacteristics	CO2IntensityFactor	630.89	466.91
tblProjectCharacteristics	OperationalYear	2014	2020
tblVehicleTrips	ST_TR	10.08	0.00
tblVehicleTrips	SU_TR	8.77	0.00
tblVehicleTrips	WD_TR	9.57	0.00
tblWoodstoves	NumberCatalytic	9.05	0.00
tblWoodstoves	NumberNoncatalytic	9.05	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.4882	4.6474	3.2785	4.9600e-003	0.3664	0.2422	0.6086	0.1459	0.2240	0.3698	0.0000	448.7622	448.7622	0.1218	0.0000	451.3197
2018	0.7650	2.6036	2.3635	3.8800e-003	0.0402	0.1489	0.1891	0.0107	0.1391	0.1498	0.0000	341.7137	341.7137	0.0883	0.0000	343.5683
2019	0.7343	2.2820	2.3315	3.8800e-003	0.0402	0.1283	0.1684	0.0107	0.1198	0.1305	0.0000	336.2409	336.2409	0.0878	0.0000	338.0837
2020	0.3169	0.6008	0.6742	1.1500e-003	0.0148	0.0339	0.0487	3.9300e-003	0.0319	0.0359	0.0000	96.8754	96.8754	0.0228	0.0000	97.3537
Total	**2.3044**	**10.1338**	**8.6476**	**0.0139**	**0.4615**	**0.5533**	**1.0148**	**0.1711**	**0.5149**	**0.6860**	**0.0000**	**1,223.5921**	**1,223.5921**	**0.3206**	**0.0000**	**1,230.3254**

2.1 Overall Construction

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.4882	4.6474	3.2785	4.9600e-003	0.1680	0.2422	0.4102	0.0636	0.2240	0.2876	0.0000	448.7617	448.7617	0.1218	0.0000	451.3192
2018	0.7650	2.6036	2.3635	3.8800e-003	0.0402	0.1489	0.1891	0.0107	0.1391	0.1498	0.0000	341.7133	341.7133	0.0883	0.0000	343.5680
2019	0.7343	2.2820	2.3315	3.8800e-003	0.0402	0.1283	0.1684	0.0107	0.1198	0.1305	0.0000	336.2406	336.2406	0.0878	0.0000	338.0833
2020	0.3169	0.6008	0.6742	1.1500e-003	0.0148	0.0339	0.0487	3.9300e-003	0.0319	0.0359	0.0000	96.8753	96.8753	0.0228	0.0000	97.3536
Total	**2.3044**	**10.1338**	**8.6476**	**0.0139**	**0.2631**	**0.5533**	**0.8164**	**0.0888**	**0.5149**	**0.6037**	**0.0000**	**1,223.5908**	**1,223.5908**	**0.3206**	**0.0000**	**1,230.3240**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**42.99**	**0.00**	**19.55**	**48.08**	**0.00**	**11.99**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.3617	0.0217	1.8728	1.0000e-004		0.0103	0.0103		0.0103	0.0103	0.0000	3.0490	3.0490	2.9700e-003	0.0000	3.1115
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	43.1112	0.0000	43.1112	2.5478	0.0000	96.6150
Water						0.0000	0.0000		0.0000	0.0000	3.7413	50.0143	53.7556	0.3874	9.7200e-003	64.9026
Total	**1.3617**	**0.0217**	**1.8728**	**1.0000e-004**	**0.0000**	**0.0103**	**0.0103**	**0.0000**	**0.0103**	**0.0103**	**46.8526**	**53.0633**	**99.9159**	**2.9382**	**9.7200e-003**	**164.6291**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.3617	0.0217	1.8728	1.0000e-004		0.0103	0.0103		0.0103	0.0103	0.0000	3.0490	3.0490	2.9700e-003	0.0000	3.1115
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	43.1112	0.0000	43.1112	2.5478	0.0000	96.6150
Water						0.0000	0.0000		0.0000	0.0000	3.7413	50.0143	53.7556	0.3873	9.7000e-003	64.8966
Total	**1.3617**	**0.0217**	**1.8728**	**1.0000e-004**	**0.0000**	**0.0103**	**0.0103**	**0.0000**	**0.0103**	**0.0103**	**46.8526**	**53.0633**	**99.9159**	**2.9381**	**9.7000e-003**	**164.6231**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	3/1/2017	6/13/2017	5	75	
2	Building Construction	Building Construction	6/14/2017	8/29/2017	5	55	
3	Paving	Paving	8/30/2017	3/31/2020	5	675	
4	Architectural Coating	Architectural Coating	12/1/2017	7/2/2020	5	675	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 187.5

Acres of Paving: 0

Residential Indoor: 659,745; Residential Outdoor: 219,915; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Excavators	2	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Off-Highway Trucks	1	8.00	189	0.50
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Scrapers	2	8.00	361	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Cranes	1	8.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	125	0.42
Paving	Paving Equipment	2	8.00	130	0.36
Paving	Rollers	2	8.00	80	0.38
Architectural Coating	Air Compressors	1	8.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	9	23.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	65.00	19.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	13.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3253	0.0000	0.3253	0.1349	0.0000	0.1349	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2548	2.8827	1.8647	2.6200e-003		0.1362	0.1362		0.1253	0.1253	0.0000	242.8320	242.8320	0.0744	0.0000	244.3945
Total	**0.2548**	**2.8827**	**1.8647**	**2.6200e-003**	**0.3253**	**0.1362**	**0.4614**	**0.1349**	**0.1253**	**0.2602**	**0.0000**	**242.8320**	**242.8320**	**0.0744**	**0.0000**	**244.3945**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.6400e-003	3.8900e-003	0.0391	1.1000e-004	9.4800e-003	6.0000e-005	9.5400e-003	2.5200e-003	5.0000e-005	2.5700e-003	0.0000	7.7230	7.7230	3.4000e-004	0.0000	7.7302
Total	**2.6400e-003**	**3.8900e-003**	**0.0391**	**1.1000e-004**	**9.4800e-003**	**6.0000e-005**	**9.5400e-003**	**2.5200e-003**	**5.0000e-005**	**2.5700e-003**	**0.0000**	**7.7230**	**7.7230**	**3.4000e-004**	**0.0000**	**7.7302**

3.2 Grading - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1269	0.0000	0.1269	0.0526	0.0000	0.0526	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2548	2.8827	1.8647	2.6200e-003		0.1362	0.1362		0.1253	0.1253	0.0000	242.8317	242.8317	0.0744	0.0000	244.3942
Total	**0.2548**	**2.8827**	**1.8647**	**2.6200e-003**	**0.1269**	**0.1362**	**0.2630**	**0.0526**	**0.1253**	**0.1779**	**0.0000**	**242.8317**	**242.8317**	**0.0744**	**0.0000**	**244.3942**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.6400e-003	3.8900e-003	0.0391	1.1000e-004	9.4800e-003	6.0000e-005	9.5400e-003	2.5200e-003	5.0000e-005	2.5700e-003	0.0000	7.7230	7.7230	3.4000e-004	0.0000	7.7302
Total	**2.6400e-003**	**3.8900e-003**	**0.0391**	**1.1000e-004**	**9.4800e-003**	**6.0000e-005**	**9.5400e-003**	**2.5200e-003**	**5.0000e-005**	**2.5700e-003**	**0.0000**	**7.7230**	**7.7230**	**3.4000e-004**	**0.0000**	**7.7302**

3.3 Building Construction - 2017

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Off-Road	0.0908	0.7840	0.5327	7.9000e-004		0.0525	0.0525		0.0493	0.0493	0.0000	70.6343	70.6343	0.0177	0.0000	71.0054
Total	**0.0908**	**0.7840**	**0.5327**	**7.9000e-004**		**0.0525**	**0.0525**		**0.0493**	**0.0493**	**0.0000**	**70.6343**	**70.6343**	**0.0177**	**0.0000**	**71.0054**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.8600e-003	0.0415	0.0506	1.1000e-004	3.2400e-003	7.7000e-004	4.0100e-003	9.3000e-004	7.0000e-004	1.6300e-003	0.0000	9.8098	9.8098	6.0000e-005	0.0000	9.8111
Worker	5.4800e-003	8.0500e-003	0.0810	2.2000e-004	0.0197	1.2000e-004	0.0198	5.2200e-003	1.1000e-004	5.3300e-003	0.0000	16.0055	16.0055	7.1000e-004	0.0000	16.0205
Total	**9.3400e-003**	**0.0496**	**0.1317**	**3.3000e-004**	**0.0229**	**8.9000e-004**	**0.0238**	**6.1500e-003**	**8.1000e-004**	**6.9600e-003**	**0.0000**	**25.8153**	**25.8153**	**7.7000e-004**	**0.0000**	**25.8316**

Attachment: Greenhouse Gas Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

3.3 Building Construction - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0908	0.7840	0.5327	7.9000e-004		0.0525	0.0525		0.0493	0.0493	0.0000	70.6342	70.6342	0.0177	0.0000	71.0054
Total	**0.0908**	**0.7840**	**0.5327**	**7.9000e-004**		**0.0525**	**0.0525**		**0.0493**	**0.0493**	**0.0000**	**70.6342**	**70.6342**	**0.0177**	**0.0000**	**71.0054**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.8600e-003	0.0415	0.0506	1.1000e-004	3.2400e-003	7.7000e-004	4.0100e-003	9.3000e-004	7.0000e-004	1.6300e-003	0.0000	9.8098	9.8098	6.0000e-005	0.0000	9.8111
Worker	5.4800e-003	8.0500e-003	0.0810	2.2000e-004	0.0197	1.2000e-004	0.0198	5.2200e-003	1.1000e-004	5.3300e-003	0.0000	16.0055	16.0055	7.1000e-004	0.0000	16.0205
Total	**9.3400e-003**	**0.0496**	**0.1317**	**3.3000e-004**	**0.0229**	**8.9000e-004**	**0.0238**	**6.1500e-003**	**8.1000e-004**	**6.9600e-003**	**0.0000**	**25.8153**	**25.8153**	**7.7000e-004**	**0.0000**	**25.8316**

3.4 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0839	0.8930	0.6480	9.8000e-004		0.0501	0.0501		0.0461	0.0461	0.0000	91.0510	91.0510	0.0279	0.0000	91.6369
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0839**	**0.8930**	**0.6480**	**9.8000e-004**		**0.0501**	**0.0501**		**0.0461**	**0.0461**	**0.0000**	**91.0510**	**91.0510**	**0.0279**	**0.0000**	**91.6369**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0200e-003	2.9700e-003	0.0299	8.0000e-005	7.2500e-003	4.0000e-005	7.3000e-003	1.9300e-003	4.0000e-005	1.9700e-003	0.0000	5.9097	5.9097	2.6000e-004	0.0000	5.9153
Total	**2.0200e-003**	**2.9700e-003**	**0.0299**	**8.0000e-005**	**7.2500e-003**	**4.0000e-005**	**7.3000e-003**	**1.9300e-003**	**4.0000e-005**	**1.9700e-003**	**0.0000**	**5.9097**	**5.9097**	**2.6000e-004**	**0.0000**	**5.9153**

3.4 Paving - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0839	0.8930	0.6480	9.8000e-004		0.0501	0.0501		0.0461	0.0461	0.0000	91.0509	91.0509	0.0279	0.0000	91.6368
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0839**	**0.8930**	**0.6480**	**9.8000e-004**		**0.0501**	**0.0501**		**0.0461**	**0.0461**	**0.0000**	**91.0509**	**91.0509**	**0.0279**	**0.0000**	**91.6368**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0200e-003	2.9700e-003	0.0299	8.0000e-005	7.2500e-003	4.0000e-005	7.3000e-003	1.9300e-003	4.0000e-005	1.9700e-003	0.0000	5.9097	5.9097	2.6000e-004	0.0000	5.9153
Total	**2.0200e-003**	**2.9700e-003**	**0.0299**	**8.0000e-005**	**7.2500e-003**	**4.0000e-005**	**7.3000e-003**	**1.9300e-003**	**4.0000e-005**	**1.9700e-003**	**0.0000**	**5.9097**	**5.9097**	**2.6000e-004**	**0.0000**	**5.9153**

3.4 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2103	2.2397	1.8915	2.9100e-003		0.1225	0.1225		0.1127	0.1127	0.0000	265.8121	265.8121	0.0828	0.0000	267.5499
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.2103**	**2.2397**	**1.8915**	**2.9100e-003**		**0.1225**	**0.1225**		**0.1127**	**0.1127**	**0.0000**	**265.8121**	**265.8121**	**0.0828**	**0.0000**	**267.5499**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.3800e-003	7.9700e-003	0.0800	2.4000e-004	0.0215	1.3000e-004	0.0217	5.7100e-003	1.2000e-004	5.8300e-003	0.0000	16.8615	16.8615	7.2000e-004	0.0000	16.8767
Total	**5.3800e-003**	**7.9700e-003**	**0.0800**	**2.4000e-004**	**0.0215**	**1.3000e-004**	**0.0217**	**5.7100e-003**	**1.2000e-004**	**5.8300e-003**	**0.0000**	**16.8615**	**16.8615**	**7.2000e-004**	**0.0000**	**16.8767**

3.4 Paving - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2103	2.2397	1.8915	2.9100e-003		0.1225	0.1225		0.1127	0.1127	0.0000	265.8118	265.8118	0.0828	0.0000	267.5495
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.2103**	**2.2397**	**1.8915**	**2.9100e-003**		**0.1225**	**0.1225**		**0.1127**	**0.1127**	**0.0000**	**265.8118**	**265.8118**	**0.0828**	**0.0000**	**267.5495**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.3800e-003	7.9700e-003	0.0800	2.4000e-004	0.0215	1.3000e-004	0.0217	5.7100e-003	1.2000e-004	5.8300e-003	0.0000	16.8615	16.8615	7.2000e-004	0.0000	16.8767
Total	**5.3800e-003**	**7.9700e-003**	**0.0800**	**2.4000e-004**	**0.0215**	**1.3000e-004**	**0.0217**	**5.7100e-003**	**1.2000e-004**	**5.8300e-003**	**0.0000**	**16.8615**	**16.8615**	**7.2000e-004**	**0.0000**	**16.8767**

3.4 Paving - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1861	1.9491	1.8747	2.9100e-003		0.1056	0.1056		0.0972	0.0972	0.0000	261.5151	261.5151	0.0827	0.0000	263.2526
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.1861**	**1.9491**	**1.8747**	**2.9100e-003**		**0.1056**	**0.1056**		**0.0972**	**0.0972**	**0.0000**	**261.5151**	**261.5151**	**0.0827**	**0.0000**	**263.2526**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.9300e-003	7.2700e-003	0.0731	2.4000e-004	0.0215	1.3000e-004	0.0217	5.7100e-003	1.2000e-004	5.8300e-003	0.0000	16.2318	16.2318	6.7000e-004	0.0000	16.2459
Total	**4.9300e-003**	**7.2700e-003**	**0.0731**	**2.4000e-004**	**0.0215**	**1.3000e-004**	**0.0217**	**5.7100e-003**	**1.2000e-004**	**5.8300e-003**	**0.0000**	**16.2318**	**16.2318**	**6.7000e-004**	**0.0000**	**16.2459**

3.4 Paving - 2019

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Off-Road	0.1861	1.9491	1.8747	2.9100e-003		0.1056	0.1056		0.0972	0.0972	0.0000	261.5147	261.5147	0.0827	0.0000	263.2523
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.1861**	**1.9491**	**1.8747**	**2.9100e-003**		**0.1056**	**0.1056**		**0.0972**	**0.0972**	**0.0000**	**261.5147**	**261.5147**	**0.0827**	**0.0000**	**263.2523**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.9300e-003	7.2700e-003	0.0731	2.4000e-004	0.0215	1.3000e-004	0.0217	5.7100e-003	1.2000e-004	5.8300e-003	0.0000	16.2318	16.2318	6.7000e-004	0.0000	16.2459
Total	**4.9300e-003**	**7.2700e-003**	**0.0731**	**2.4000e-004**	**0.0215**	**1.3000e-004**	**0.0217**	**5.7100e-003**	**1.2000e-004**	**5.8300e-003**	**0.0000**	**16.2318**	**16.2318**	**6.7000e-004**	**0.0000**	**16.2459**

3.4 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0432	0.4480	0.4665	7.3000e-004		0.0240	0.0240		0.0221	0.0221	0.0000	63.7067	63.7067	0.0206	0.0000	64.1394
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0432**	**0.4480**	**0.4665**	**7.3000e-004**		**0.0240**	**0.0240**		**0.0221**	**0.0221**	**0.0000**	**63.7067**	**63.7067**	**0.0206**	**0.0000**	**64.1394**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1400e-003	1.6700e-003	0.0169	6.0000e-005	5.3600e-003	3.0000e-005	5.3900e-003	1.4200e-003	3.0000e-005	1.4500e-003	0.0000	3.8768	3.8768	1.6000e-004	0.0000	3.8801
Total	**1.1400e-003**	**1.6700e-003**	**0.0169**	**6.0000e-005**	**5.3600e-003**	**3.0000e-005**	**5.3900e-003**	**1.4200e-003**	**3.0000e-005**	**1.4500e-003**	**0.0000**	**3.8768**	**3.8768**	**1.6000e-004**	**0.0000**	**3.8801**

3.4 Paving - 2020

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0432	0.4480	0.4665	7.3000e-004		0.0240	0.0240		0.0221	0.0221	0.0000	63.7066	63.7066	0.0206	0.0000	64.1393
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0432**	**0.4480**	**0.4665**	**7.3000e-004**		**0.0240**	**0.0240**		**0.0221**	**0.0221**	**0.0000**	**63.7066**	**63.7066**	**0.0206**	**0.0000**	**64.1393**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1400e-003	1.6700e-003	0.0169	6.0000e-005	5.3600e-003	3.0000e-005	5.3900e-003	1.4200e-003	3.0000e-005	1.4500e-003	0.0000	3.8768	3.8768	1.6000e-004	0.0000	3.8801
Total	**1.1400e-003**	**1.6700e-003**	**0.0169**	**6.0000e-005**	**5.3600e-003**	**3.0000e-005**	**5.3900e-003**	**1.4200e-003**	**3.0000e-005**	**1.4500e-003**	**0.0000**	**3.8768**	**3.8768**	**1.6000e-004**	**0.0000**	**3.8801**

3.5 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0396					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.6500e-003	0.0306	0.0262	4.0000e-005		2.4300e-003	2.4300e-003		2.4300e-003	2.4300e-003	0.0000	3.5746	3.5746	3.8000e-004	0.0000	3.5825
Total	**0.0443**	**0.0306**	**0.0262**	**4.0000e-005**		**2.4300e-003**	**2.4300e-003**		**2.4300e-003**	**2.4300e-003**	**0.0000**	**3.5746**	**3.5746**	**3.8000e-004**	**0.0000**	**3.5825**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.2000e-004	6.1000e-004	6.1900e-003	2.0000e-005	1.5000e-003	1.0000e-005	1.5100e-003	4.0000e-004	1.0000e-005	4.1000e-004	0.0000	1.2222	1.2222	5.0000e-005	0.0000	1.2234
Total	**4.2000e-004**	**6.1000e-004**	**6.1900e-003**	**2.0000e-005**	**1.5000e-003**	**1.0000e-005**	**1.5100e-003**	**4.0000e-004**	**1.0000e-005**	**4.1000e-004**	**0.0000**	**1.2222**	**1.2222**	**5.0000e-005**	**0.0000**	**1.2234**

3.5 Architectural Coating - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0396					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.6500e-003	0.0306	0.0262	4.0000e-005		2.4300e-003	2.4300e-003		2.4300e-003	2.4300e-003	0.0000	3.5746	3.5746	3.8000e-004	0.0000	3.5825
Total	**0.0443**	**0.0306**	**0.0262**	**4.0000e-005**		**2.4300e-003**	**2.4300e-003**		**2.4300e-003**	**2.4300e-003**	**0.0000**	**3.5746**	**3.5746**	**3.8000e-004**	**0.0000**	**3.5825**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.2000e-004	6.1000e-004	6.1900e-003	2.0000e-005	1.5000e-003	1.0000e-005	1.5100e-003	4.0000e-004	1.0000e-005	4.1000e-004	0.0000	1.2222	1.2222	5.0000e-005	0.0000	1.2234
Total	**4.2000e-004**	**6.1000e-004**	**6.1900e-003**	**2.0000e-005**	**1.5000e-003**	**1.0000e-005**	**1.5100e-003**	**4.0000e-004**	**1.0000e-005**	**4.1000e-004**	**0.0000**	**1.2222**	**1.2222**	**5.0000e-005**	**0.0000**	**1.2234**

Attachment: Greenhouse Gas Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

3.5 Architectural Coating - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.4927					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0520	0.3490	0.3226	5.2000e-004		0.0262	0.0262		0.0262	0.0262	0.0000	44.4267	44.4267	4.2200e-003	0.0000	44.5153
Total	**0.5446**	**0.3490**	**0.3226**	**5.2000e-004**		**0.0262**	**0.0262**		**0.0262**	**0.0262**	**0.0000**	**44.4267**	**44.4267**	**4.2200e-003**	**0.0000**	**44.5153**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6700e-003	6.9000e-003	0.0693	2.1000e-004	0.0187	1.1000e-004	0.0188	4.9500e-003	1.1000e-004	5.0600e-003	0.0000	14.6133	14.6133	6.2000e-004	0.0000	14.6265
Total	**4.6700e-003**	**6.9000e-003**	**0.0693**	**2.1000e-004**	**0.0187**	**1.1000e-004**	**0.0188**	**4.9500e-003**	**1.1000e-004**	**5.0600e-003**	**0.0000**	**14.6133**	**14.6133**	**6.2000e-004**	**0.0000**	**14.6265**

3.5 Architectural Coating - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.4927					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0520	0.3490	0.3226	5.2000e-004		0.0262	0.0262		0.0262	0.0262	0.0000	44.4266	44.4266	4.2200e-003	0.0000	44.5153
Total	**0.5446**	**0.3490**	**0.3226**	**5.2000e-004**		**0.0262**	**0.0262**		**0.0262**	**0.0262**	**0.0000**	**44.4266**	**44.4266**	**4.2200e-003**	**0.0000**	**44.5153**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6700e-003	6.9000e-003	0.0693	2.1000e-004	0.0187	1.1000e-004	0.0188	4.9500e-003	1.1000e-004	5.0600e-003	0.0000	14.6133	14.6133	6.2000e-004	0.0000	14.6265
Total	**4.6700e-003**	**6.9000e-003**	**0.0693**	**2.1000e-004**	**0.0187**	**1.1000e-004**	**0.0188**	**4.9500e-003**	**1.1000e-004**	**5.0600e-003**	**0.0000**	**14.6133**	**14.6133**	**6.2000e-004**	**0.0000**	**14.6265**

3.5 Architectural Coating - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.4927					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0464	0.3194	0.3204	5.2000e-004		0.0224	0.0224		0.0224	0.0224	0.0000	44.4266	44.4266	3.7500e-003	0.0000	44.5054
Total	**0.5390**	**0.3194**	**0.3204**	**5.2000e-004**		**0.0224**	**0.0224**		**0.0224**	**0.0224**	**0.0000**	**44.4266**	**44.4266**	**3.7500e-003**	**0.0000**	**44.5054**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.2700e-003	6.3000e-003	0.0633	2.1000e-004	0.0187	1.1000e-004	0.0188	4.9500e-003	1.0000e-004	5.0600e-003	0.0000	14.0675	14.0675	5.8000e-004	0.0000	14.0798
Total	**4.2700e-003**	**6.3000e-003**	**0.0633**	**2.1000e-004**	**0.0187**	**1.1000e-004**	**0.0188**	**4.9500e-003**	**1.0000e-004**	**5.0600e-003**	**0.0000**	**14.0675**	**14.0675**	**5.8000e-004**	**0.0000**	**14.0798**

3.5 Architectural Coating - 2019

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Archit. Coating	0.4927					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0464	0.3194	0.3204	5.2000e-004		0.0224	0.0224		0.0224	0.0224	0.0000	44.4266	44.4266	3.7500e-003	0.0000	44.5054
Total	**0.5390**	**0.3194**	**0.3204**	**5.2000e-004**		**0.0224**	**0.0224**		**0.0224**	**0.0224**	**0.0000**	**44.4266**	**44.4266**	**3.7500e-003**	**0.0000**	**44.5054**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.2700e-003	6.3000e-003	0.0633	2.1000e-004	0.0187	1.1000e-004	0.0188	4.9500e-003	1.0000e-004	5.0600e-003	0.0000	14.0675	14.0675	5.8000e-004	0.0000	14.0798
Total	**4.2700e-003**	**6.3000e-003**	**0.0633**	**2.1000e-004**	**0.0187**	**1.1000e-004**	**0.0188**	**4.9500e-003**	**1.0000e-004**	**5.0600e-003**	**0.0000**	**14.0675**	**14.0675**	**5.8000e-004**	**0.0000**	**14.0798**

3.5 Architectural Coating - 2020

Unmitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Archit. Coating	0.2492					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0213	0.1482	0.1612	2.6000e-004		9.7600e-003	9.7600e-003		9.7600e-003	9.7600e-003	0.0000	22.4686	22.4686	1.7400e-003	0.0000	22.5052
Total	**0.2705**	**0.1482**	**0.1612**	**2.6000e-004**		**9.7600e-003**	**9.7600e-003**		**9.7600e-003**	**9.7600e-003**	**0.0000**	**22.4686**	**22.4686**	**1.7400e-003**	**0.0000**	**22.5052**

Unmitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0100e-003	2.9400e-003	0.0297	1.1000e-004	9.4300e-003	6.0000e-005	9.4900e-003	2.5000e-003	5.0000e-005	2.5600e-003	0.0000	6.8232	6.8232	2.8000e-004	0.0000	6.8291
Total	**2.0100e-003**	**2.9400e-003**	**0.0297**	**1.1000e-004**	**9.4300e-003**	**6.0000e-005**	**9.4900e-003**	**2.5000e-003**	**5.0000e-005**	**2.5600e-003**	**0.0000**	**6.8232**	**6.8232**	**2.8000e-004**	**0.0000**	**6.8291**

3.5 Architectural Coating - 2020

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Archit. Coating	0.2492					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0213	0.1482	0.1612	2.6000e-004		9.7600e-003	9.7600e-003		9.7600e-003	9.7600e-003	0.0000	22.4686	22.4686	1.7400e-003	0.0000	22.5051
Total	**0.2705**	**0.1482**	**0.1612**	**2.6000e-004**		**9.7600e-003**	**9.7600e-003**		**9.7600e-003**	**9.7600e-003**	**0.0000**	**22.4686**	**22.4686**	**1.7400e-003**	**0.0000**	**22.5051**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0100e-003	2.9400e-003	0.0297	1.1000e-004	9.4300e-003	6.0000e-005	9.4900e-003	2.5000e-003	5.0000e-005	2.5600e-003	0.0000	6.8232	6.8232	2.8000e-004	0.0000	6.8291
Total	**2.0100e-003**	**2.9400e-003**	**0.0297**	**1.1000e-004**	**9.4300e-003**	**6.0000e-005**	**9.4900e-003**	**2.5000e-003**	**5.0000e-005**	**2.5600e-003**	**0.0000**	**6.8232**	**6.8232**	**2.8000e-004**	**0.0000**	**6.8291**

4.0 Operational Detail - Mobile

Attachment: Greenhouse Gas Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.457065	0.068684	0.178597	0.172280	0.046891	0.007460	0.012475	0.043976	0.000902	0.001056	0.006515	0.000828	0.003272

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.3617	0.0217	1.8728	1.0000e-004		0.0103	0.0103		0.0103	0.0103	0.0000	3.0490	3.0490	2.9700e-003	0.0000	3.1115
Unmitigated	1.3617	0.0217	1.8728	1.0000e-004		0.0103	0.0103		0.0103	0.0103	0.0000	3.0490	3.0490	2.9700e-003	0.0000	3.1115

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1274					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.1773					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0570	0.0217	1.8728	1.0000e-004		0.0103	0.0103		0.0103	0.0103	0.0000	3.0490	3.0490	2.9700e-003	0.0000	3.1115
Total	**1.3617**	**0.0217**	**1.8728**	**1.0000e-004**		**0.0103**	**0.0103**		**0.0103**	**0.0103**	**0.0000**	**3.0490**	**3.0490**	**2.9700e-003**	**0.0000**	**3.1115**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Consumer Products	1.1773					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0570	0.0217	1.8728	1.0000e-004		0.0103	0.0103		0.0103	0.0103	0.0000	3.0490	3.0490	2.9700e-003	0.0000	3.1115
Architectural Coating	0.1274					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.3617**	**0.0217**	**1.8728**	**1.0000e-004**		**0.0103**	**0.0103**		**0.0103**	**0.0103**	**0.0000**	**3.0490**	**3.0490**	**2.9700e-003**	**0.0000**	**3.1115**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	53.7556	0.3873	9.7000e-003	64.8966
Unmitigated	53.7556	0.3874	9.7200e-003	64.9026

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	11.7929 / 7.43464	53.7556	0.3874	9.7200e-003	64.9026
Total		**53.7556**	**0.3874**	**9.7200e-003**	**64.9026**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	11.7929 / 7.43464	53.7556	0.3873	9.7000e-003	64.8966
Total		**53.7556**	**0.3873**	**9.7000e-003**	**64.8966**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	43.1112	2.5478	0.0000	96.6150
Unmitigated	43.1112	2.5478	0.0000	96.6150

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	212.38	43.1112	2.5478	0.0000	96.6150
Total		**43.1112**	**2.5478**	**0.0000**	**96.6150**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	212.38	43.1112	2.5478	0.0000	96.6150
Total		**43.1112**	**2.5478**	**0.0000**	**96.6150**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Ironwood Residential- Operation

Riverside-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	181.00	Dwelling Unit	58.77	325,800.00	518

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.4	**Precipitation Freq (Days)**	28
Climate Zone	10			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	466.91	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44.

Land Use - Project unit count is based on information provided by the applicant

Construction Phase - Operation run only

Off-road Equipment - 8 hour work days

Off-road Equipment - Operation run only

Grading -

Vehicle Trips - Weekday TR based on the Ironwood Residential TIA. Weekend TR based on the ITE Trip Generation Manual (code 210)

Woodstoves - No wood stoves, all natural gas fireplaces

Energy Use - Title-24 Electricity Energy Intensity and Title-24 Natural Gas Energy Intensity were adjusted by 36.4% and 6.5% respectively, to reflect 2013 Title 24 requirements. Source: Impact Analysis California's 2013 Building Energy Efficiency Standards (CEC 2013)

Construction Off-road Equipment Mitigation -

Vechicle Emission Factors - Based on Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol

Vechicle Emission Factors - Based on Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol

Vechicle Emission Factors - Based on Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	110.00	1.00
tblEnergyUse	T24E	980.99	623.91
tblEnergyUse	T24NG	27,816.78	26,008.69
tblFireplaces	NumberGas	153.85	181.00
tblFireplaces	NumberNoFireplace	18.10	0.00
tblFireplaces	NumberWood	9.05	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	630.89	466.91
tblProjectCharacteristics	OperationalYear	2014	2020

tblVehicleEF	HHD	0.04	0.05
tblVehicleEF	HHD	0.04	0.05
tblVehicleEF	HHD	0.04	0.05
tblVehicleEF	LDA	0.46	0.69
tblVehicleEF	LDA	0.46	0.69
tblVehicleEF	LDA	0.46	0.69
tblVehicleEF	LDT1	0.07	0.10
tblVehicleEF	LDT1	0.07	0.10
tblVehicleEF	LDT1	0.07	0.10
tblVehicleEF	LDT2	0.18	0.10
tblVehicleEF	LDT2	0.18	0.10
tblVehicleEF	LDT2	0.18	0.10
tblVehicleEF	LHD1	0.05	0.00
tblVehicleEF	LHD1	0.05	0.00
tblVehicleEF	LHD1	0.05	0.00
tblVehicleEF	LHD2	7.4600e-003	0.00
tblVehicleEF	LHD2	7.4600e-003	0.00
tblVehicleEF	LHD2	7.4600e-003	0.00
tblVehicleEF	MCY	6.5150e-003	5.0000e-003
tblVehicleEF	MCY	6.5150e-003	5.0000e-003
tblVehicleEF	MCY	6.5150e-003	5.0000e-003
tblVehicleEF	MDV	0.17	0.00
tblVehicleEF	MDV	0.17	0.00
tblVehicleEF	MDV	0.17	0.00
tblVehicleEF	MH	3.2720e-003	0.00
tblVehicleEF	MH	3.2720e-003	0.00
tblVehicleEF	MH	3.2720e-003	0.00
tblVehicleEF	MHD	0.01	0.06

tblVehicleEF	MHD	0.01	0.06
tblVehicleEF	MHD	0.01	0.06
tblVehicleEF	OBUS	9.0200e-004	0.00
tblVehicleEF	OBUS	9.0200e-004	0.00
tblVehicleEF	OBUS	9.0200e-004	0.00
tblVehicleEF	SBUS	8.2800e-004	0.00
tblVehicleEF	SBUS	8.2800e-004	0.00
tblVehicleEF	SBUS	8.2800e-004	0.00
tblVehicleEF	UBUS	1.0560e-003	0.00
tblVehicleEF	UBUS	1.0560e-003	0.00
tblVehicleEF	UBUS	1.0560e-003	0.00
tblVehicleTrips	ST_TR	10.08	9.91
tblVehicleTrips	SU_TR	8.77	8.62
tblVehicleTrips	WD_TR	9.57	9.52
tblWoodstoves	NumberCatalytic	9.05	0.00
tblWoodstoves	NumberNoncatalytic	9.05	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Attachment: Greenhouse Gas Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.3661	0.0217	1.8730	1.0000e-004		0.0133	0.0133		0.0133	0.0133	0.0000	46.5139	46.5139	3.8100e-003	8.0000e-004	46.8408
Energy	0.0312	0.2665	0.1134	1.7000e-003		0.0216	0.0216		0.0216	0.0216	0.0000	589.3842	589.3842	0.0234	9.2700e-003	592.7472
Mobile	0.7691	2.9039	9.0501	0.0296	2.2323	0.0640	2.2963	0.5989	0.0590	0.6579	0.0000	2,062.4540	2,062.4540	0.0539	0.0000	2,063.5865
Waste						0.0000	0.0000		0.0000	0.0000	43.1112	0.0000	43.1112	2.5478	0.0000	96.6150
Water						0.0000	0.0000		0.0000	0.0000	3.7413	50.0143	53.7556	0.3874	9.7200e-003	64.9026
Total	**2.1664**	**3.1921**	**11.0365**	**0.0314**	**2.2323**	**0.0989**	**2.3312**	**0.5989**	**0.0938**	**0.6927**	**46.8526**	**2,748.3664**	**2,795.2190**	**3.0163**	**0.0198**	**2,864.6921**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.3661	0.0217	1.8730	1.0000e-004		0.0133	0.0133		0.0133	0.0133	0.0000	46.5139	46.5139	3.8100e-003	8.0000e-004	46.8408
Energy	0.0312	0.2665	0.1134	1.7000e-003		0.0216	0.0216		0.0216	0.0216	0.0000	589.3842	589.3842	0.0234	9.2700e-003	592.7472
Mobile	0.7691	2.9039	9.0501	0.0296	2.2323	0.0640	2.2963	0.5989	0.0590	0.6579	0.0000	2,062.4540	2,062.4540	0.0539	0.0000	2,063.5865
Waste						0.0000	0.0000		0.0000	0.0000	43.1112	0.0000	43.1112	2.5478	0.0000	96.6150
Water						0.0000	0.0000		0.0000	0.0000	3.7413	50.0143	53.7556	0.3873	9.7000e-003	64.8966
Total	**2.1664**	**3.1921**	**11.0365**	**0.0314**	**2.2323**	**0.0989**	**2.3312**	**0.5989**	**0.0938**	**0.6927**	**46.8526**	**2,748.3664**	**2,795.2190**	**3.0162**	**0.0198**	**2,864.6861**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Grading	1/1/2016	1/1/2016	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Excavators	0	8.00	162	0.38
Grading	Graders	0	8.00	174	0.41
Grading	Rubber Tired Dozers	0	8.00	255	0.40
Grading	Scrapers	0	8.00	361	0.48
Grading	Tractors/Loaders/Backhoes	0	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Grading - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Grading - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.7691	2.9039	9.0501	0.0296	2.2323	0.0640	2.2963	0.5989	0.0590	0.6579	0.0000	2,062.454 0	2,062.454 0	0.0539	0.0000	2,063.586 5
Unmitigated	0.7691	2.9039	9.0501	0.0296	2.2323	0.0640	2.2963	0.5989	0.0590	0.6579	0.0000	2,062.454 0	2,062.454 0	0.0539	0.0000	2,063.586 5

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	1,723.12	1,793.71	1560.22	5,843,100	5,843,100
Total	1,723.12	1,793.71	1,560.22	5,843,100	5,843,100

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.690000	0.097000	0.097000	0.000000	0.000000	0.000000	0.064000	0.047000	0.000000	0.000000	0.005000	0.000000	0.000000

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	280.6987	280.6987	0.0174	3.6100e-003	282.1830
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	280.6987	280.6987	0.0174	3.6100e-003	282.1830
NaturalGas Mitigated	0.0312	0.2665	0.1134	1.7000e-003		0.0216	0.0216		0.0216	0.0216	0.0000	308.6855	308.6855	5.9200e-003	5.6600e-003	310.5641
NaturalGas Unmitigated	0.0312	0.2665	0.1134	1.7000e-003		0.0216	0.0216		0.0216	0.0216	0.0000	308.6855	308.6855	5.9200e-003	5.6600e-003	310.5641

5.2 Energy by Land Use - NaturalGas

Unmitigated

Land Use	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	5.78455e+006	0.0312	0.2665	0.1134	1.7000e-003		0.0216	0.0216		0.0216	0.0216	0.0000	308.6855	308.6855	5.9200e-003	5.6600e-003	310.5641
Total		**0.0312**	**0.2665**	**0.1134**	**1.7000e-003**		**0.0216**	**0.0216**		**0.0216**	**0.0216**	**0.0000**	**308.6855**	**308.6855**	**5.9200e-003**	**5.6600e-003**	**310.5641**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	5.78455e+006	0.0312	0.2665	0.1134	1.7000e-003		0.0216	0.0216		0.0216	0.0216	0.0000	308.6855	308.6855	5.9200e-003	5.6600e-003	310.5641
Total		**0.0312**	**0.2665**	**0.1134**	**1.7000e-003**		**0.0216**	**0.0216**		**0.0216**	**0.0216**	**0.0000**	**308.6855**	**308.6855**	**5.9200e-003**	**5.6600e-003**	**310.5641**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	1.32538e+006	280.6987	0.0174	3.6100e-003	282.1830
Total		**280.6987**	**0.0174**	**3.6100e-003**	**282.1830**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	1.32538e +006	280.6987	0.0174	3.6100e-003	282.1830
Total		**280.6987**	**0.0174**	**3.6100e-003**	**282.1830**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.3661	0.0217	1.8730	1.0000e-004		0.0133	0.0133		0.0133	0.0133	0.0000	46.5139	46.5139	3.8100e-003	8.0000e-004	46.8408
Unmitigated	1.3661	0.0217	1.8730	1.0000e-004		0.0133	0.0133		0.0133	0.0133	0.0000	46.5139	46.5139	3.8100e-003	8.0000e-004	46.8408

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1274					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.1773					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	4.3900e-003	0.0000	2.4000e-004	0.0000		3.0300e-003	3.0300e-003		3.0000e-003	3.0000e-003	0.0000	43.4648	43.4648	8.3000e-004	8.0000e-004	43.7293
Landscaping	0.0570	0.0217	1.8728	1.0000e-004		0.0103	0.0103		0.0103	0.0103	0.0000	3.0490	3.0490	2.9700e-003	0.0000	3.1115
Total	**1.3661**	**0.0217**	**1.8730**	**1.0000e-004**		**0.0133**	**0.0133**		**0.0133**	**0.0133**	**0.0000**	**46.5139**	**46.5139**	**3.8000e-003**	**8.0000e-004**	**46.8408**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.1274					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.1773					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	4.3900e-003	0.0000	2.4000e-004	0.0000		3.0300e-003	3.0300e-003		3.0000e-003	3.0000e-003	0.0000	43.4648	43.4648	8.3000e-004	8.0000e-004	43.7293
Landscaping	0.0570	0.0217	1.8728	1.0000e-004		0.0103	0.0103		0.0103	0.0103	0.0000	3.0490	3.0490	2.9700e-003	0.0000	3.1115
Total	**1.3661**	**0.0217**	**1.8730**	**1.0000e-004**		**0.0133**	**0.0133**		**0.0133**	**0.0133**	**0.0000**	**46.5139**	**46.5139**	**3.8000e-003**	**8.0000e-004**	**46.8408**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	53.7556	0.3873	9.7000e-003	64.8966
Unmitigated	53.7556	0.3874	9.7200e-003	64.9026

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	11.7929 / 7.43464	53.7556	0.3874	9.7200e-003	64.9026
Total		**53.7556**	**0.3874**	**9.7200e-003**	**64.9026**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	11.7929 / 7.43464	53.7556	0.3873	9.7000e-003	64.8966
Total		**53.7556**	**0.3873**	**9.7000e-003**	**64.8966**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	43.1112	2.5478	0.0000	96.6150
Unmitigated	43.1112	2.5478	0.0000	96.6150

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	212.38	43.1112	2.5478	0.0000	96.6150
Total		**43.1112**	**2.5478**	**0.0000**	**96.6150**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	212.38	43.1112	2.5478	0.0000	96.6150
Total		**43.1112**	**2.5478**	**0.0000**	**96.6150**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Moreno Valley Ironwood Rockfall Investigation

City of Moreno Valley
Riverside County, California

March 15, 2016

Project No. KGT 16-05

KANE GeoTech, Inc.
Geoengineering Consultants

KANE GeoTech, Inc.
Geoengineering Consultants

Moreno Valley Ironwood Rockfall Investigation

Riverside County, California

March 15, 2016

Project No. KGT 16-05

Prepared for:

Global Investment and Development, LLC
Administrative and Project Assistant
3470 Wilshire Blvd. Ste. 1020
Los Angeles, CA 90010

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Moreno Valley Ironwood Rockfall Investigation

Riverside County, California

Project No. KGT 16-05

1. INTRODUCTION

1.1 General

KANE GeoTech, Inc. (KANE GeoTech) was retained by Global Investment and Development, LLC to investigate any potential rockfall hazard affecting the location of a planned residences in the City of Moreno Valley on Ironwood Avenue, located in Riverside County, California. This report was prepared by KANE GeoTech to provide detailed information on the assessment of potential rockfall hazards at the Project site. The Project location, Tentative Tract No. 37001, is shown in Figure 1 with an aerial overview of the site in Figure 2. A lot map of the planned development is included as Appendix A.

1.2 Purpose

The purpose of this report is to present the results of the field investigation and rockfall analyses performed to assess the potential rockfall hazards at the Project site.

2. SCOPE OF WORK

2.1 Scope

The scope of services provided by KANE GeoTech included the following:

1. *Literature Review*. KANE GeoTech reviewed existing geotechnical information, reports, and maps pertinent to the project area.

2. *Site Investigation.* KANE GeoTech visited the site to evaluate the site conditions and gather data necessary to perform a rockfall analyses.

3. *Engineering Analysis.* KANE GeoTech performed a rockfall analyses using the Colorado Rockfall Simulation Program to assess the potential rockfall hazard present at the site.

Figure 1. Project location.

Figure 2. Aerial overview of project site.

4. *Report of Findings.* KANE GeoTech provides this Report of Findings stamped by a Licensed California Civil Engineer experienced in rockfall. This Report contains a summary of the site investigation and engineering analysis.

3. SITE DESCRIPTION

3.1 Overview

The Project site, Tentative Tract No. 37001, is a planned residential area located at approximately latitude 33°56'56'' N and longitude 117°11'16'' W, in Moreno Valley, Riverside County, California. Several of the planned residences are on a flat area at the base of a rocky outcrop. This slope is the source of any potential rockfall. At the time of our visit, most of the area was covered by short grass.

3.2 Regional Geology

The project site is generally located south of the San Gregorio Mountains in Southern California, northeast of the Santa Ana Mountains, and southeast of Box Springs Mountain. This area is a part of the Perris Block which is bounded by the Elsinore Fault, located to the southwest and the Jacinto Fault to the northeast (City, 2006). The area is a part of the Southern California batholith that is composed of felsic rich, intrusive igneous bedrock.

3.3 Site Geology

The site is located at the southeastern base of the Kalmia Hills in the northern section of the Perris Block. The bedrock present at the site is mainly biotite-hornblende tonalite not associated with an specific pluton (USGS, 1967). The tonalite is grey, medium-grained and in some areas contains mafic inclusions.

The slope adjacent to the planned resident locations contains spheroidally weathered, large, rounded boulders. These boulders are composed of the tonalite described above. The boulders are heavily weathered and when broken down, form the sandy soil present at the site. The majority of these boulders are embedded in the sediment or are actually exposed bedrock. There are some areas of exposed bedrock indicating the depth to bedrock, although varies, is shallow.

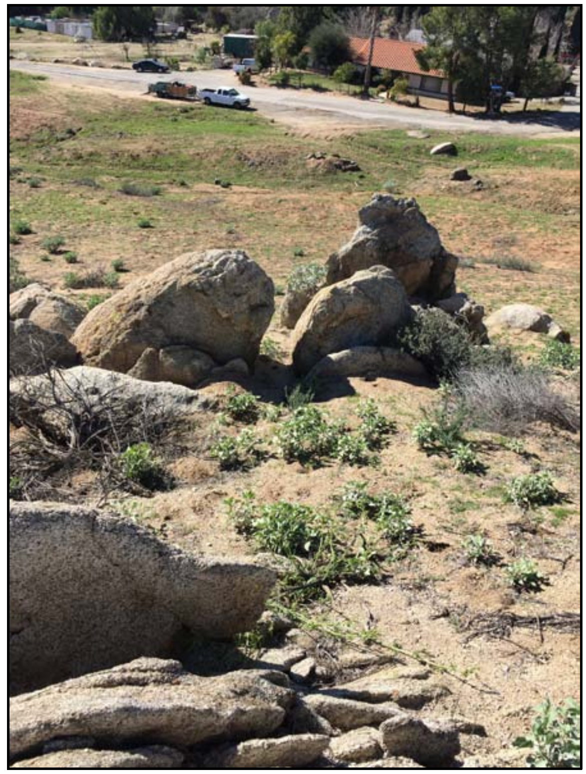

Figure 3. Large embedded boulders and exposed bedrock outcrops.

4. SITE EVALUATION

4.1 Background

KANE GeoTech visited the project site on February 2, 2016. The purpose of the visit and field investigation was to collect data required for analyses to determine the nature and extent of any rockfall hazards. Details and data were recorded with photos and in a field notebook. Rock type, boulder size, and probable paths of rockfall, and soil cover were noted.

4.2 Observations

The areas of concern consist of embedded rounded boulders. Approximately 95% of them are embedded in a soft sediment, Figure 3. These boulders weather into smaller spheroidal boulders with a maximum diameter of 1-ft, Figure 4. These 1-ft boulders were observed sporadically throughout the project site. There is minimal vegetation present at the site and consists of shrubs and grasses. Six different slopes have been observed and are presented in Appendix B.

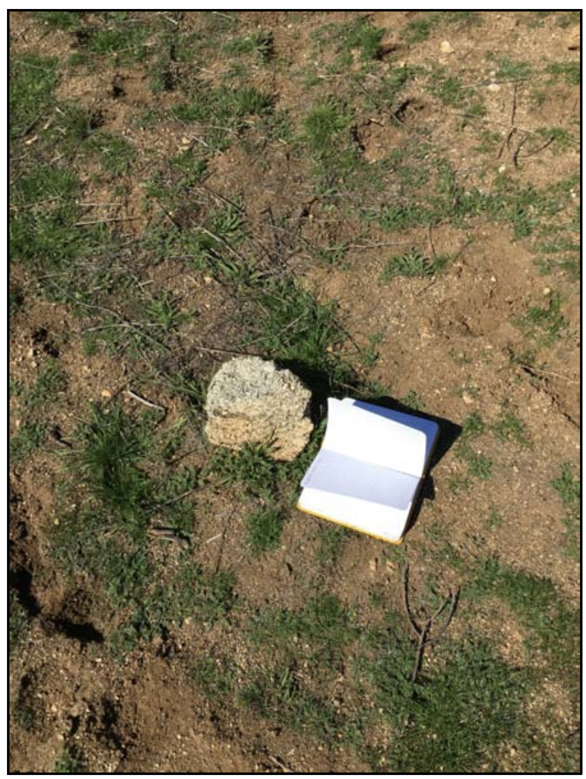

Figure 4. Typical rockfall observed at the site.

Lots 36 through 42 mostly consisted of large embedded boulders. Also present at this location were blocky, rounded boulders that could potentially mobilize during a seismic event. These boulders may detach during such events, but are very unlikely to impact the planned residence locations. There were no indications of rockfall exceeding the 1-ft diameter boulders at any of the planned lot locations.

A large, feldspar vein was observed at the site near Lots 41 and 42. This vein maybe be continuous throughout the site, but was only exposed in this area. The vein is hard, and resistant to erosion. The thickness is unknown, Figure 5.

Figure 5. Exposed feldspar vein .

Lot 171, located on the east end of the project site was an additional area of concern. Lot 171 is composed of the same rounded, embedded boulders as the west end of the site. No boulders exceeding 1-ft in diameter was found at the location of planned residence construction.

5. ROCKFALL ANALYSES

5.1 Method of Analyses

Rockfall analyses of the slope utilized computer modeling. The Colorado Rockfall Simulation Program (CRSP) was used to simulate and analyze rockfall events.

5.2 Colorado Rockfall Simulation Program (CRSP)

Common practice in the analyses of slope rockfall is to use CRSP (Jones, et al., 2000). It is also possible to estimate how far a rock will travel along a slope by conducting actual rock rolling tests. While these tests may be useful in verifying criteria, they are expensive and are limited by the small number of rocks that can be rolled. In contrast, thousands of simulated rolls can be made using CRSP.

CRSP uses a computer algorithm based on actual rockfall tests to predict the distance a rock will stop from the toe of a slope, the velocity of the rock, how high the rock is likely to bounce, and the kinetic energy of the rock at any point. CRSP requires a slope profile, and an estimate of parameters such as rock unit weight, size, and slope roughness in addition to normal and tangential coefficients of restitution along the slope. CRSP provides an image of the slope profile with simulated rockfall, Figure 6, and can then compute the dynamic parameters of rockfall events, that is, the velocity, kinetic energy, and bounce height.

By modeling a slope using CRSP, it is possible to make some reasoned judgements on the need for, or the design of, a rockfall fence or impact wall. The CRSP algorithm has been validated by field data. It is routinely used as a design tool by the California Department of Transportation (Caltrans) and many other state highway departments.

After evaluating the site, it was determined that certain areas were most susceptible to rockfall and were chosen for the analyses. Rockfall parameters used in the analyses were based on field data and topographic maps. The collected field data included determination of surface conditions, boulder sizes, and soil properties.

Six slope profiles were analyzed with surface characteristics based on observed site conditions. Figure 6 shows a typical profile. Each profile was analyzed with surface characteristics based on observed slope conditions and boulder size. CRSP rockfall analyses were performed for the slope using 1,000 simulated rock rolls with rock shape and size applicable to the most hazardous boulders located in that zone. For these analyses, vegetation was not considered a factor in energy dissipation.

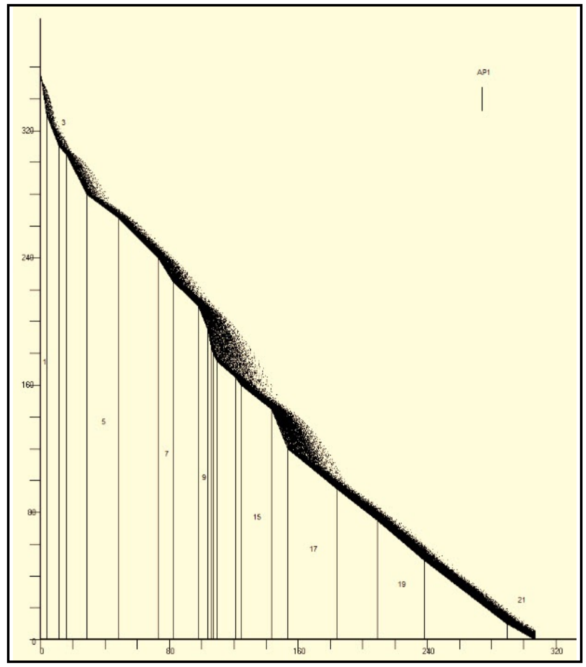

Figure 6. Typical CRSP profile..

The model boulders were assumed to have a unit weight of 165-pcf, typical of a intrusive, felsic, igneous rock (Hunt,1984), and maximum dimensions of 2-ft by 3-ft. Velocity, bounce heights, and kinetic energies were determined along each profile.

The profiles were assigned Analyses Points (AP) that were placed at the planned residence locations (AP1) to determine the probable rockfall hazard. Velocity, bounce heights, and kinetic energies were determined at the AP for each profile.

6. RESULTS AND DISCUSSION

6.1 Overview

Field investigations and rockfall analyses were performed and conclusions were made using generally accepted geotechnical engineering principles and incorporating currently available information, equipment and methods.

6.2 CRSP Results and Discussion

CRSP was utilized to model six profiles, chosen due to slope geometry and boulder locations. After the completion of the analyses, it was determined that the planned residences after not expected to be impacted by rockfall. The full results from CRSP, including all inputs and slope geometry, can be found in the Appendix A.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

Based on the results of the field studies and rockfall analyses, the following conclusions and recommendations are reported below. It is our opinion that:

1. **Some minor rockfall onto the slope may occur.** The rockfall source will continue to weather and erode and is likely to produce rockfall onto the slope. Based on the our observations and CRSP modeling, the proposed locations of the residences should not be affected.

2. **Rockfall mitigation is not necessary.** After rockfall simulation analyses, it is our opinion that rockfall mitigation is not necessary for the proposed location of the residences. It will, however, be beneficial to construct reinforced concrete or block privacy walls at Lots 36, 37, 38, 39, and 40 to provide supplementary protection and prevent any small, nuisance rockfall from accumulating in residential areas.

8. REFERENCES

City of Moreno Valley. (2006). “Moreno Valley General Plan. Final Program EIR. 2.6 Geology and Soils”. July 2006.

Hunt, R. E. (1984). *Geotechnical Engineering Investigation Manual*. McGraw-Hill Book Company, New York, 195 p.

Jennings, C.W., Strand, R.G., and Rogers, T.H., 1977, Geologic map of California: California Division of Mines and Geology, scale 1:750,000.

Jennings, C.W., 1985, An explanatory text to accompany the 1:750,000 scale fault and geologic maps of California: California Division of Mines and Geology, Bulletin 201, 197 p.

Jones, C. L., Higgins, J. D., Andrew, R. D. (2000). “Colorado Rockfall Simulation Program Version 4.0.” Colorado Department of Transportation, Denver, CO, 127 p.

USGS., (1967). PR1980 Sunnymead Quadrangle, 7.5 Minute Series, Scale 1"= 2000'.

9. LIMITATIONS

The analyses, conclusions and recommendations contained in this report are based on the site conditions observed by us and derived from the information provided to us. If there is a substantial lapse of time between the submission of our report and the start of any work at the site, or if conditions have changed due to natural causes, mining or construction operations at or adjacent to the site, we urge that our report be reviewed to determine the applicability of the conclusions and recommendations considering the changed conditions and time lapse. This report is applicable only for the project and sites studied. This report should not be used after three years.

Our professional services were performed, our findings obtained, and our recommendations proposed in accordance with generally accepted engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied. Findings and statements of professional opinion do not constitute a guarantee or warranty, expressed or implied.

***KANE* GeoTech, Inc.**

William F. Kane

William F. Kane, PhD, PG, PE
California Licensed Civil Engineer No. 55714

REGISTERED PROFESSIONAL ENGINEER
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Exp. 12-31-16
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STATE OF CALIFORNIA

Appendix A
Project Lot Map

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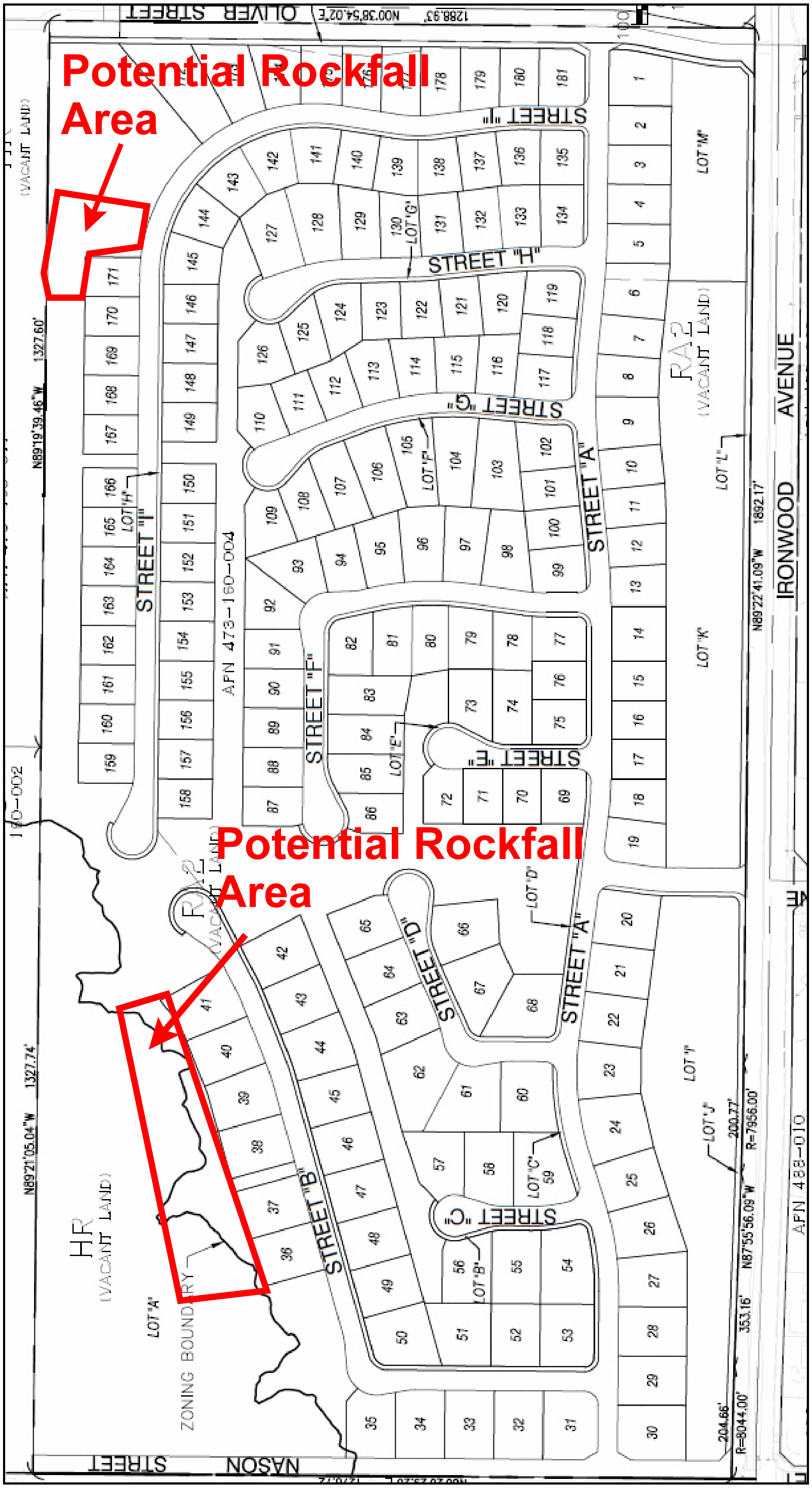

PLATE A-1. Project Lot Map

Attachment: Rockfall Investigation Report (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

***KANE* GeoTech, Inc.**

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Appendix B
CRSP Analyses

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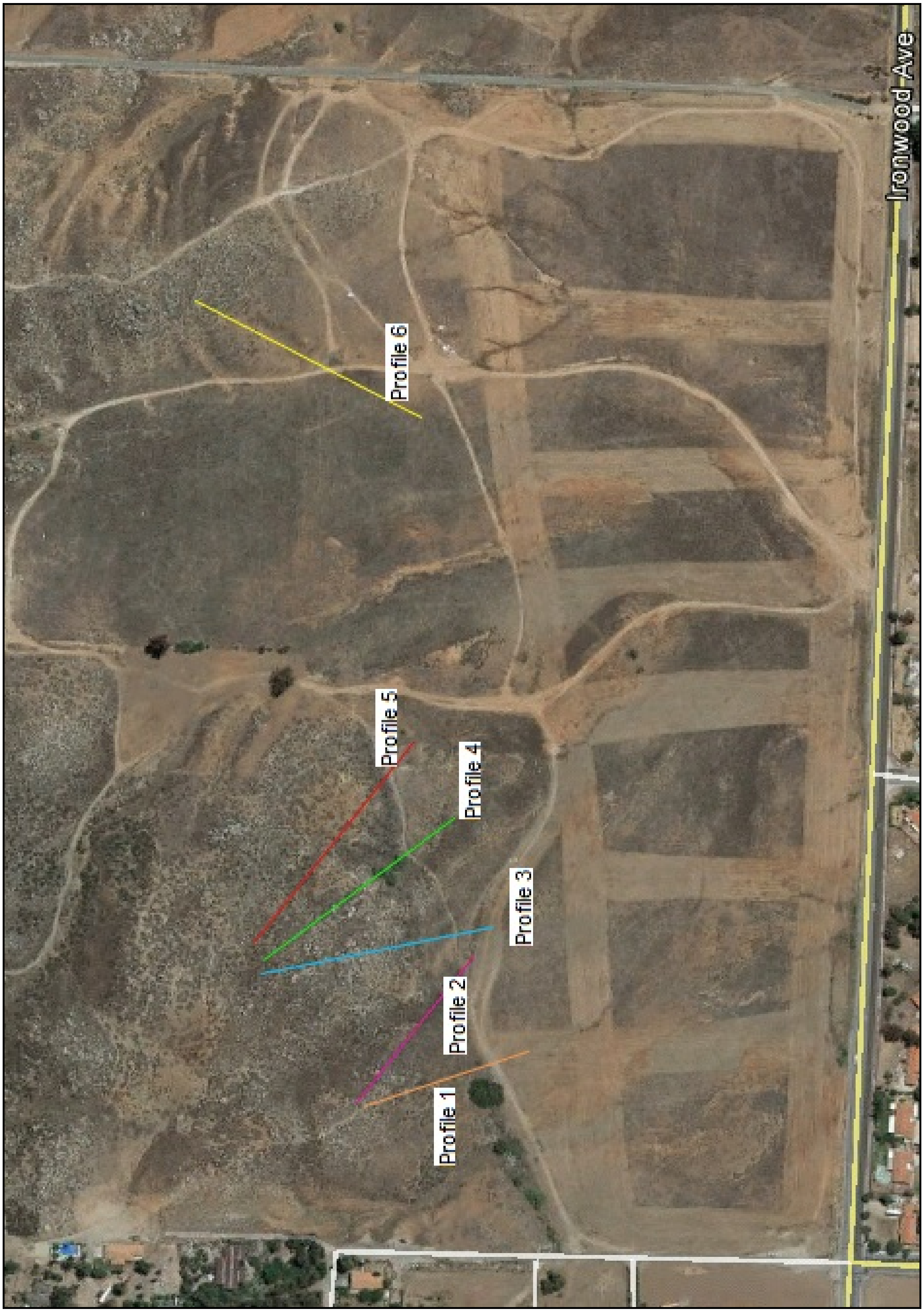

PLATE B-1. CRSP Profile Locations

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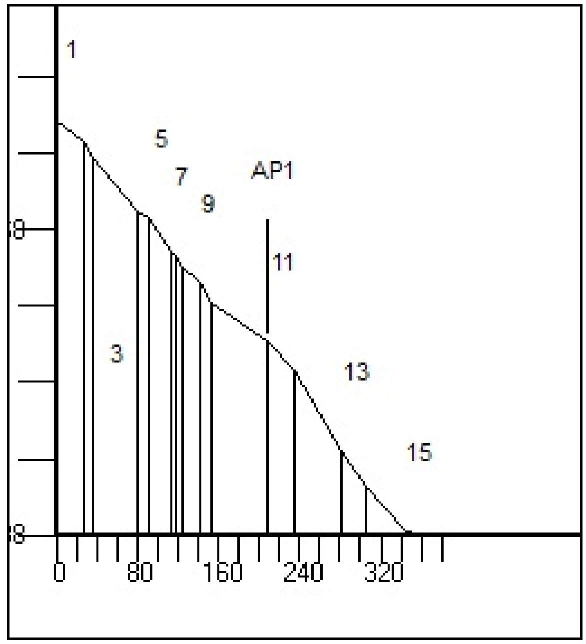
CRSP Analysis Profile 1



CRSP Input File -\\KANESERVER\Kane GeoTech Folder\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 1\Profile 1.dat

Input File Specifications

Units of Measure: U.S.
Total Number of Cells: 15
Analysis Point 1 X-Coordinate: 208.75
Analysis Point 2 X-Coordinate: 0
Analysis Point 3 X-Coordinate: 0
Initial Y-Top Starting Zone Coordinate:
1996
Initial Y-Base Starting Zone Coordinate: 1991

Remarks:

Cell Data

Cell No.	S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	3	.75	.15	0	1996	26.083	1991
2	3	.75	.15	26.083	1991	35.917	1987
3	3	.75	.15	35.917	1987	80.667	1973
4	3	.75	.15	80.667	1973	91.75	1971
5	3	.75	.15	91.75	1971	112.75	1962
6	3	.75	.15	112.75	1962	117.167	1961
7	3	.75	.15	117.167	1961	125.25	1958
8	3	.75	.15	125.25	1958	141.667	1954
9	3	.75	.15	141.667	1954	153.5	1949
10	3	.75	.15	153.5	1949	208.75	1939
11	3	.75	.15	208.75	1939	234.416	1931
12	3	.75	.15	234.416	1931	281.083	1910
13	3	.75	.15	281.083	1910	306.333	1901
14	3	.75	.15	306.333	1901	345.917	1889
15	3	.75	.15	345.917	1889	365.917	1888

CRSP Simulation Specifications: Used with \\KANESERVER\Kane GeoTech Folder\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 1\Profile 1.dat

Total Number of Rocks Simulated: 1000

Starting Velocity in X-Direction: 1 ft/sec
Starting Velocity in Y-Direction: -1 ft/sec
Starting Cell Number: 1
Ending Cell Number: 15
Rock Density: 165 lb/ft^3
Rock Shape: Spherical
Diameter: 1 ft
CRSP Analysis Point 1 Data - \\KANESERVER\Kane GeoTech Folder\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 1\Profile 1.dat

Analysis Point 1: X = 208.75, Y = 1939

NO ROCKS PAST ANALYSIS POINT 1

CRSP Data Collected at End of Each Cell - \\KANESERVER\Kane GeoTech Folder\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 1\Profile 1.dat

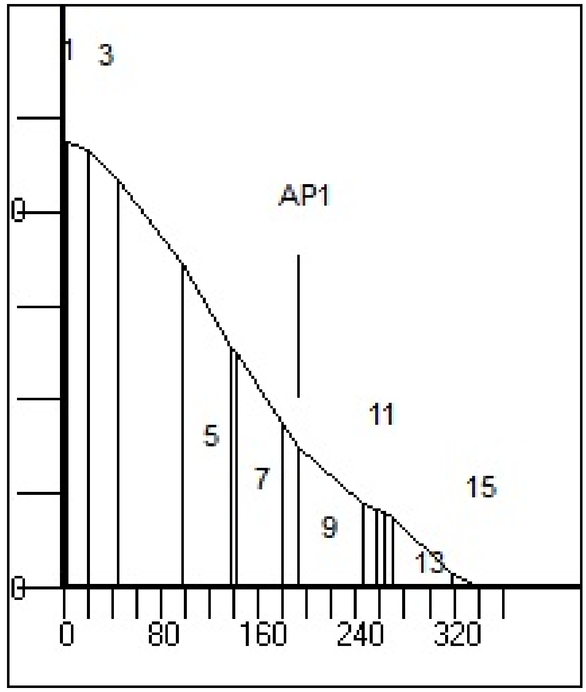
Velocity Units: ft/sec Bounce Height Units: ft

Cell #	Max. Vel.	Avg. Vel.	S.D. Vel.	Max. Bounce Ht.	Avg. Bounce Ht.
1	No rocks	past end of cell			
2	No rocks	past end of cell			
3	No rocks	past end of cell			
4	No rocks	past end of cell			
5	No rocks	past end of cell			
6	No rocks	past end of cell			
7	No rocks	past end of cell			
8	No rocks	past end of cell			
9	No rocks	past end of cell			
10	No rocks	past end of cell			
11	No rocks	past end of cell			
12	No rocks	past end of cell			
13	No rocks	past end of cell			
14	No rocks	past end of cell			
15	No rocks	past end of cell			

CRSP Rocks Stopped Data - \\KANESERVER\Kane GeoTech Folder\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 1\Profile 1.dat

X Interval	Rocks Stopped
0 To 10 ft	1000
10 To 20 ft	0
20 To 30 ft	0
30 To 40 ft	0
40 To 50 ft	0
50 To 60 ft	0
60 To 70 ft	0
70 To 80 ft	0
80 To 90 ft	0
90 To 100 ft	0
100 To 110 ft	0
110 To 120 ft	0
120 To 130 ft	0
130 To 140 ft	0
140 To 150 ft	0
150 To 160 ft	0
160 To 170 ft	0
170 To 180 ft	0
180 To 190 ft	0
190 To 200 ft	0
200 To 210 ft	0
210 To 220 ft	0
220 To 230 ft	0
230 To 240 ft	0
240 To 250 ft	0
250 To 260 ft	0
260 To 270 ft	0
270 To 280 ft	0
280 To 290 ft	0
290 To 300 ft	0
300 To 310 ft	0
310 To 320 ft	0
320 To 330 ft	0
330 To 340 ft	0
340 To 350 ft	0
350 To 360 ft	0
360 To 365.917 ft	0

CRSP Analysis
Profile 2



CRSP Input File -X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 2\Profile 2.dat

Input File Specifications

Units of Measure: U.S.
Total Number of Cells: 15
Analysis Point 1 X-Coordinate: 192
Analysis Point 2 X-Coordinate: 0
Analysis Point 3 X-Coordinate: 0
Initial Y-Top Starting Zone Coordinate: 1996
Initial Y-Base Starting Zone Coordinate: 1995

Remarks:

Cell Data

Cell No.	S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	3	.75	.15	0	1996	3.583	1995
2	3	.75	.15	3.583	1995	19.667	1993
3	3	.75	.15	19.667	1993	44	1987
4	3	.75	.15	44	1987	97.75	1969
5	3	.75	.15	97.75	1969	138.5	1951
6	3	.75	.15	138.5	1951	141.416	1950
7	3	.75	.15	141.416	1950	180.416	1935
8	3	.75	.15	180.416	1935	192	1930
9	3	.75	.15	192	1930	246.416	1918
10	3	.75	.15	246.416	1918	256	1917
11	3	.75	.15	256	1917	264.167	1916
12	3	.75	.15	264.167	1916	269.583	1915
13	3	.75	.15	269.583	1915	319.667	1903
14	3	.75	.15	319.667	1903	331.667	1901
15	3	.75	.15	331.667	1901	346.5	1900

CRSP Simulation Specifications: Used with X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 2\Profile 2.dat

Total Number of Rocks Simulated: 100
Starting Velocity in X-Direction: 1 ft/sec
Starting Velocity in Y-Direction: -1 ft/sec
Starting Cell Number: 1
Ending Cell Number: 15
Rock Density: 165 lb/ft^3
Rock Shape: Spherical
Diameter: 1 ft

CRSP Analysis Point 1 Data - X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 2\Profile 2.dat

Analysis Point 1: X = 192, Y = 1930

NO ROCKS PAST ANALYSIS POINT 1

CRSP Data Collected at End of Each Cell - X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 2\Profile 2.dat

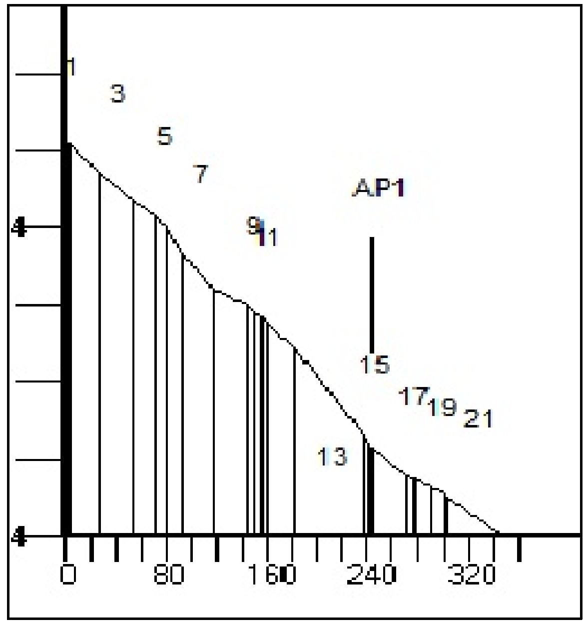
Velocity Units: ft/sec   Bounce Height Units: ft

Cell #	Max. Vel.	Avg. Vel.	S.D. Vel.	Max. Bounce Ht.	Avg. Bounce Ht.
1	No rocks	past end of cell			
2	No rocks	past end of cell			
3	No rocks	past end of cell			
4	No rocks	past end of cell			
5	No rocks	past end of cell			
6	No rocks	past end of cell			
7	No rocks	past end of cell			
8	No rocks	past end of cell			
9	No rocks	past end of cell			
10	No rocks	past end of cell			
11	No rocks	past end of cell			
12	No rocks	past end of cell			
13	No rocks	past end of cell			
14	No rocks	past end of cell			
15	No rocks	past end of cell			

CRSP Rocks Stopped Data - X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 2\Profile 2.dat

X Interval	Rocks Stopped
0 To 10 ft	100
10 To 20 ft	0
20 To 30 ft	0
30 To 40 ft	0
40 To 50 ft	0
50 To 60 ft	0
60 To 70 ft	0
70 To 80 ft	0
80 To 90 ft	0
90 To 100 ft	0
100 To 110 ft	0
110 To 120 ft	0
120 To 130 ft	0
130 To 140 ft	0
140 To 150 ft	0
150 To 160 ft	0
160 To 170 ft	0
170 To 180 ft	0
180 To 190 ft	0
190 To 200 ft	0
200 To 210 ft	0
210 To 220 ft	0
220 To 230 ft	0
230 To 240 ft	0
240 To 250 ft	0
250 To 260 ft	0
260 To 270 ft	0
270 To 280 ft	0
280 To 290 ft	0
290 To 300 ft	0
300 To 310 ft	0
310 To 320 ft	0
320 To 330 ft	0
330 To 340 ft	0
340 To 346.5 ft	0

CRSP Analysis
Profile 3



CRSP Input File -X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 3\Profile 3.dat

Input File Specifications

Units of Measure: U.S.
Total Number of Cells: 21
Analysis Point 1 X-Coordinate: 243.833
Analysis Point 2 X-Coordinate: 0
Analysis Point 3 X-Coordinate: 0
Initial Y-Top Starting Zone Coordinate: 1997
Initial Y-Base Starting Zone Coordinate: 1996

Remarks:

Cell Data

Cell No.	S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	3	.75	.15	0	1997	3.667	1996
2	3	.75	.15	3.667	1996	26.25	1988
3	3	.75	.15	26.25	1988	54.083	1981
4	3	.75	.15	54.083	1981	72.416	1977
5	3	.75	.15	72.416	1977	80.667	1974
6	3	.75	.15	80.667	1974	93.75	1967
7	3	.75	.15	93.75	1967	118.833	1958
8	3	.75	.15	118.833	1958	145.083	1954
9	3	.75	.15	145.083	1954	150.416	1952
10	3	.75	.15	150.416	1952	155	1951
11	3	.75	.15	155	1951	159.583	1949
12	3	.75	.15	159.583	1949	181.583	1943
13	3	.75	.15	181.583	1943	237.167	1920
14	3	.75	.15	237.167	1920	241.333	1918
15	3	.75	.15	241.333	1918	243.883	1917
16	3	.75	.15	243.883	1917	269.25	1910
17	3	.75	.15	269.25	1910	277.583	1909
18	3	.75	.15	277.583	1909	290.75	1907
19	3	.75	.15	290.75	1907	300.667	1905
20	3	.75	.15	300.667	1905	303.5	1904
21	3	.75	.15	303.5	1904	347.416	1894

CRSP Simulation Specifications: Used with X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 3\Profile 3.dat

```
Total Number of Rocks Simulated:  100
Starting Velocity in X-Direction:  1 ft/sec
Starting Velocity in Y-Direction:  -1 ft/sec
Starting Cell Number:  1
Ending Cell Number:  21
Rock Density:  165 lb/ft^3
Rock Shape:  Spherical
Diameter:  1 ft

CRSP Analysis Point 1 Data - X:\KANE GeoTech Projects\2016\KGT16-05 Moreno
Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 3\Profile 3.dat

Analysis Point 1: X =  243.833, Y =  1917

                            NO ROCKS PAST ANALYSIS POINT 1

CRSP Data Collected at End of Each Cell - X:\KANE GeoTech
Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP
Profiles\Profile 3\Profile 3.dat

Velocity Units: ft/sec      Bounce Height Units: ft

Cell #   Max. Vel.   Avg. Vel.   S.D. Vel.   Max. Bounce Ht.   Avg. Bounce Ht.

 1           No rocks      past end of cell

 2           No rocks      past end of cell

 3           No rocks      past end of cell

 4           No rocks      past end of cell

 5           No rocks      past end of cell

 6           No rocks      past end of cell

 7           No rocks      past end of cell

 8           No rocks      past end of cell

 9           No rocks      past end of cell

 10          No rocks      past end of cell

 11          No rocks      past end of cell

 12          No rocks      past end of cell

 13          No rocks      past end of cell

 14          No rocks      past end of cell

 15          No rocks      past end of cell

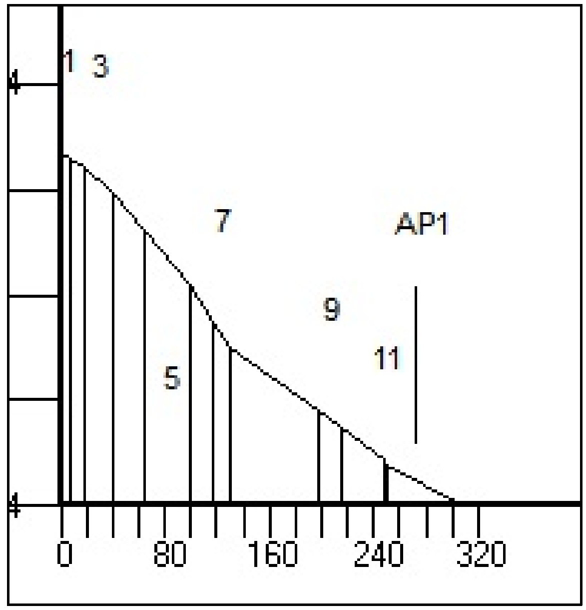
 16          No rocks      past end of cell
```

17	No rocks	past end of cell
18	No rocks	past end of cell
19	No rocks	past end of cell
20	No rocks	past end of cell
21	No rocks	past end of cell

CRSP Rocks Stopped Data - X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 3\Profile 3.dat

X Interval	Rocks Stopped
0 To 10 ft	100
10 To 20 ft	0
20 To 30 ft	0
30 To 40 ft	0
40 To 50 ft	0
50 To 60 ft	0
60 To 70 ft	0
70 To 80 ft	0
80 To 90 ft	0
90 To 100 ft	0
100 To 110 ft	0
110 To 120 ft	0
120 To 130 ft	0
130 To 140 ft	0
140 To 150 ft	0
150 To 160 ft	0
160 To 170 ft	0
170 To 180 ft	0
180 To 190 ft	0
190 To 200 ft	0
200 To 210 ft	0
210 To 220 ft	0
220 To 230 ft	0
230 To 240 ft	0
240 To 250 ft	0
250 To 260 ft	0
260 To 270 ft	0
270 To 280 ft	0
280 To 290 ft	0
290 To 300 ft	0
300 To 310 ft	0
310 To 320 ft	0
320 To 330 ft	0
330 To 340 ft	0
340 To 347.416 ft	0

CRSP Analysis Profile 4



CRSP Input File -X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 4\Profile 4.dat

Input File Specifications

Units of Measure: U.S.
Total Number of Cells: 12
Analysis Point 1 X-Coordinate: 272.416
Analysis Point 2 X-Coordinate:
Analysis Point 3 X-Coordinate:
Initial Y-Top Starting Zone Coordinate: 1981
Initial Y-Base Starting Zone Coordinate: 1980

Remarks:

Cell Data

Cell No.	S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	3	.75	.15	0	1981	7.583	1980
2	3	.75	.15	7.583	1980	18.25	1978
3	3	.75	.15	18.25	1978	39.583	1973
4	3	.75	.15	39.583	1973	65.25	1966
5	3	.75	.15	65.25	1966	100	1956
6	3	.75	.15	100	1956	116	1949
7	3	.75	.15	116	1949	130.333	1944
8	3	.75	.15	130.333	1944	197.167	1932
9	3	.75	.15	197.167	1932	215.583	1929
10	3	.75	.15	215.583	1929	247.167	1923
11	3	.75	.15	247.167	1923	250.333	1922
12	3	.75	.15	250.333	1922	306.667	1914

CRSP Simulation Specifications: Used with X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 4\Profile 4.dat

Total Number of Rocks Simulated: 100
Starting Velocity in X-Direction: 1 ft/sec
Starting Velocity in Y-Direction: -1 ft/sec
Starting Cell Number: 1
Ending Cell Number: 12
Rock Density: 165 lb/ft^3
Rock Shape: Spherical
Diameter: 1 ft

CRSP Analysis Point 1 Data - X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 4\Profile 4.dat

Analysis Point 1: X = 272.416, Y = 1919

NO ROCKS PAST ANALYSIS POINT 1

CRSP Data Collected at End of Each Cell - X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 4\Profile 4.dat

Velocity Units: ft/sec Bounce Height Units: ft

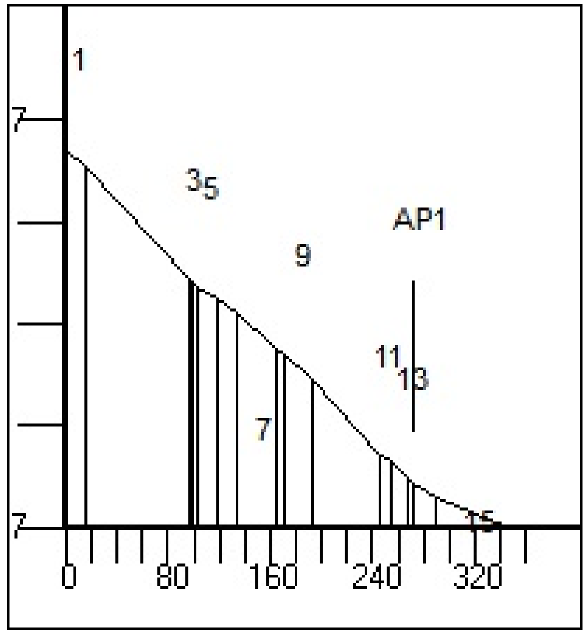
Cell #	Max. Vel.	Avg. Vel.	S.D. Vel.	Max. Bounce Ht.	Avg. Bounce Ht.
1	No rocks	past end of cell			
2	No rocks	past end of cell			
3	No rocks	past end of cell			
4	No rocks	past end of cell			
5	No rocks	past end of cell			
6	No rocks	past end of cell			
7	No rocks	past end of cell			
8	No rocks	past end of cell			
9	No rocks	past end of cell			
10	No rocks	past end of cell			
11	No rocks	past end of cell			
12	No rocks	past end of cell			

CRSP Rocks Stopped Data - X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 4\Profile 4.dat

X Interval	Rocks Stopped
0 To 10 ft	100
10 To 20 ft	0
20 To 30 ft	0
30 To 40 ft	0
40 To 50 ft	0
50 To 60 ft	0
60 To 70 ft	0
70 To 80 ft	0
80 To 90 ft	0
90 To 100 ft	0
100 To 110 ft	0
110 To 120 ft	0
120 To 130 ft	0

130 To 140 ft	0
140 To 150 ft	0
150 To 160 ft	0
160 To 170 ft	0
170 To 180 ft	0
180 To 190 ft	0
190 To 200 ft	0
200 To 210 ft	0
210 To 220 ft	0
220 To 230 ft	0
230 To 240 ft	0
240 To 250 ft	0
250 To 260 ft	0
260 To 270 ft	0
270 To 280 ft	0
280 To 290 ft	0
290 To 300 ft	0
300 To 306.667 ft	0

CRSP Analysis
Profile 5



CRSP Input File -X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 5\Profile 5.dat

Input File Specifications

Units of Measure: U.S.
Total Number of Cells: 15
Analysis Point 1 X-Coordinate: 271
Analysis Point 2 X-Coordinate:
Analysis Point 3 X-Coordinate:
Initial Y-Top Starting Zone Coordinate: 1981
Initial Y-Base Starting Zone Coordinate: 1978

Remarks:

Cell Data

Cell No.	S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	3	.75	.15	0	1981	16	1978
2	3	.75	.15	16	1978	96.25	1956
3	3	.75	.15	96.25	1956	99.5	1955
4	3	.75	.15	99.5	1955	103.583	1954
5	3	.75	.15	103.583	1954	118.416	1952
6	3	.75	.15	118.416	1952	135	1949
7	3	.75	.15	135	1949	164.667	1942
8	3	.75	.15	164.667	1942	171.25	1941
9	3	.75	.15	171.25	1941	193	1936
10	3	.75	.15	193	1936	246.083	1921
11	3	.75	.15	246.083	1921	253.5	1920
12	3	.75	.15	253.5	1920	268.083	1917
13	3	.75	.15	268.083	1917	271	1916
14	3	.75	.15	271	1916	288.833	1913
15	3	.75	.15	288.833	1913	348.583	1907

CRSP Simulation Specifications: Used with X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 5\Profile 5.dat
Total Number of Rocks Simulated: 100
Starting Velocity in X-Direction: 1 ft/sec
Starting Velocity in Y-Direction: -1 ft/sec
Starting Cell Number: 1
Ending Cell Number: 15
Rock Density: 165 lb/ft^3
Rock Shape: Spherical
Diameter: 1 ft

CRSP Analysis Point 1 Data - X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 5\Profile 5.dat

Analysis Point 1: X = 271, Y = 1916

NO ROCKS PAST ANALYSIS POINT 1

CRSP Data Collected at End of Each Cell - X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 5\Profile 5.dat

Velocity Units: ft/sec   Bounce Height Units: ft

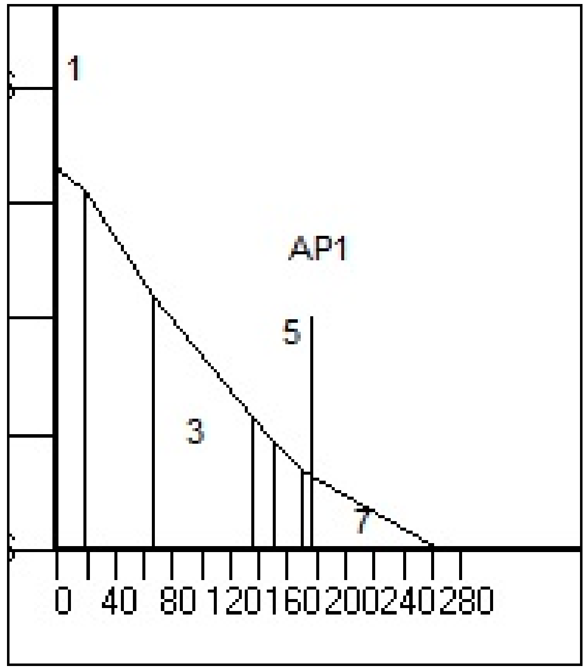
Cell #	Max. Vel.	Avg. Vel.	S.D. Vel.	Max. Bounce Ht.	Avg. Bounce Ht.
1	No rocks	past end of cell			
2	No rocks	past end of cell			
3	No rocks	past end of cell			
4	No rocks	past end of cell			
5	No rocks	past end of cell			
6	No rocks	past end of cell			
7	No rocks	past end of cell			
8	No rocks	past end of cell			
9	No rocks	past end of cell			
10	No rocks	past end of cell			
11	No rocks	past end of cell			
12	No rocks	past end of cell			
13	No rocks	past end of cell			
14	No rocks	past end of cell			
15	No rocks	past end of cell			

CRSP Rocks Stopped Data - X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 5\Profile 5.dat

X Interval	Rocks Stopped
0 To 10 ft	100
10 To 20 ft	0
20 To 30 ft	0
30 To 40 ft	0
40 To 50 ft	0
50 To 60 ft	0
60 To 70 ft	0
70 To 80 ft	0
80 To 90 ft	0

90 To 100 ft	0
100 To 110 ft	0
110 To 120 ft	0
120 To 130 ft	0
130 To 140 ft	0
140 To 150 ft	0
150 To 160 ft	0
160 To 170 ft	0
170 To 180 ft	0
180 To 190 ft	0
190 To 200 ft	0
200 To 210 ft	0
210 To 220 ft	0
220 To 230 ft	0
230 To 240 ft	0
240 To 250 ft	0
250 To 260 ft	0
260 To 270 ft	0
270 To 280 ft	0
280 To 290 ft	0
290 To 300 ft	0
300 To 310 ft	0
310 To 320 ft	0
320 To 330 ft	0
330 To 340 ft	0
340 To 348.583 ft	0

CRSP Analysis
Profile 6



CRSP Input File -X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 6\Profile 6.dat

Input File Specifications

Units of Measure: U.S.
Total Number of Cells: 7
Analysis Point 1 X-Coordinate: 176.75
Analysis Point 2 X-Coordinate:
Analysis Point 3 X-Coordinate:
Initial Y-Top Starting Zone Coordinate: 1962
Initial Y-Base Starting Zone Coordinate: 1958

Remarks:

Cell Data

Cell No.	S.R.	Tang. C.	Norm. C.	Begin X	Begin Y	End X	End Y
1	3	.75	.15	0	1962	18.25	1958
2	3	.75	.15	18.25	1958	65.75	1940
3	3	.75	.15	65.75	1940	135.416	1919
4	3	.75	.15	135.416	1919	151.25	1915
5	3	.75	.15	151.25	1915	169.667	1910
6	3	.75	.15	169.667	1910	176.75	1909
7	3	.75	.15	176.75	1909	266.833	1896

CRSP Simulation Specifications: Used with X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 6\Profile 6.dat

Total Number of Rocks Simulated: 100
Starting Velocity in X-Direction: 1 ft/sec
Starting Velocity in Y-Direction: -1 ft/sec
Starting Cell Number: 1
Ending Cell Number: 7
Rock Density: 165 lb/ft^3
Rock Shape: Spherical
Diameter: 1 ft

CRSP Analysis Point 1 Data - X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 6\Profile 6.dat

Analysis Point 1: X = 176.75, Y = 1909

NO ROCKS PAST ANALYSIS POINT 1

CRSP Data Collected at End of Each Cell - X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 6\Profile 6.dat

Velocity Units: ft/sec   Bounce Height Units: ft

Cell #	Max. Vel.	Avg. Vel.	S.D. Vel.	Max. Bounce Ht.	Avg. Bounce Ht.
1	No rocks	past end of cell			
2	No rocks	past end of cell			
3	No rocks	past end of cell			
4	No rocks	past end of cell			
5	No rocks	past end of cell			
6	No rocks	past end of cell			
7	No rocks	past end of cell			

CRSP Rocks Stopped Data - X:\KANE GeoTech Projects\2016\KGT16-05 Moreno Valley Ironwood Rockfall\CRSP\CRSP Profiles\Profile 6\Profile 6.dat

X Interval	Rocks Stopped
0 To 10 ft	100
10 To 20 ft	0
20 To 30 ft	0
30 To 40 ft	0
40 To 50 ft	0
50 To 60 ft	0
60 To 70 ft	0
70 To 80 ft	0
80 To 90 ft	0
90 To 100 ft	0
100 To 110 ft	0
110 To 120 ft	0
120 To 130 ft	0
130 To 140 ft	0
140 To 150 ft	0
150 To 160 ft	0
160 To 170 ft	0
170 To 180 ft	0
180 To 190 ft	0
190 To 200 ft	0
200 To 210 ft	0
210 To 220 ft	0
220 To 230 ft	0
230 To 240 ft	0
240 To 250 ft	0
250 To 260 ft	0
260 To 266.833 ft	0

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Ironwood Residential (TTM No. 37001)

Noise Impact Analysis

City of Moreno Valley

PREPARED BY:

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AUGUST 31, 2015

TABLE OF CONTENTS

APPENDICES

LIST OF EXHIBITS

LIST OF TABLES

LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
INCE	Institute of Noise Control Engineering
Leq	Equivalent continuous (average) sound level
Lmax	Maximum level measured over the time interval
Lmin	Minimum level measured over the time interval
mph	Miles per hour
NR	Noise Reduction
PPV	Peak particle velocity
Project	Ironwood Residential (TTM No. 37001)
RCNM	Roadway Construction Noise Model
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
SR-60	State Route 60
STC	Sound Transmission Class
VdB	Vibration Decibels

EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this noise study to determine the noise exposure and the necessary noise mitigation measures for the proposed Ironwood Residential (TTM No. 37001) development ("Project"). The Project site is located north of Ironwood Avenue and between Nason Street and Oliver Street in the City of Moreno Valley. The Project is proposed to include the development of up to 181 single-family detached residential dwelling units. The purpose of this noise analysis is to ensure that the proposed development is compatible with the existing and future noise environment. This study has been prepared to satisfy the City of Moreno Valley noise standards for residential land uses.

OFF-SITE TRAFFIC NOISE ANALYSIS

Traffic generated by the proposed Project will influence the traffic noise levels in surrounding off-site areas. To quantify the off-site traffic noise increases on the surrounding off-site areas, the changes in traffic noise levels on nine roadway segments surrounding the Project site were estimated based on the change in the average daily traffic (ADT) volumes. The traffic noise levels provided in this analysis are based on the traffic forecasts found in the *Ironwood Residential (TTM No. 37001) Traffic Impact Analysis* prepared by Urban Crossroads, Inc. (1) To assess the off-site noise level impacts associated with the proposed Project, noise contour boundaries were developed for Existing, Year 2020, and Year 2035 traffic conditions. The off-site traffic noise analysis indicates that the Project's contributions to roadway noise levels at adjacent sensitive land uses will be *less than significant* for Existing, Year 2020, and Year 2035 conditions.

ON-SITE NOISE ANALYSIS

The results of this analysis indicate that future vehicle noise from Ironwood Avenue is the principal source of community noise that will impact the Project site. The Project will also experience some background traffic noise impacts from Nason Street, Oliver Street, and the Project's internal roads, however due to the distance, topography and low traffic volume/speeds, traffic noise from these roads will not make a significant contribution to the noise environment. The following on-site noise mitigation measures recommended in this noise analysis have been designed to reduce the exterior and interior noise levels to satisfy the City of Moreno Valley transportation related CNEL noise criteria for residential development. With the recommended noise mitigation measures shown on Exhibit ES-A, the on-site noise impacts will be *less than significant*.

EXTERIOR NOISE MITIGATION

To satisfy the City of Moreno Valley 65 dBA CNEL exterior noise level standards for residential land use, the construction of 4-foot high noise barriers for the outdoor living areas (backyards) of lots 26 to 30 is required. With the recommended noise barriers shown on Exhibit ES-A, the mitigated future exterior noise levels will range from 61.5 to 63.3 dBA CNEL. This noise analysis shows that the recommended noise barriers will satisfy the City of Moreno Valley 65 dBA CNEL exterior noise level standards. The recommendations identify the minimum required noise barrier height to satisfy the City of Moreno Valley exterior noise level standards.

The recommended noise control barriers shall be constructed so that the top of each wall extends to the recommended height above the pad elevation of the lot it is shielding. When the road is elevated above the pad elevation, the barrier shall extend to the recommended height above the highest point between the residential home and the road. The barriers shall provide a weight of at least 4 pounds per square foot of face area with no decorative cutouts or line-of-sight openings between shielded areas and the roadways. The noise barrier shall be constructed using one of the following materials:

- Masonry block
- Stucco veneer over wood framing (or foam core), or 1 inch thick tongue and groove wood of sufficient weight per square foot
- Glass (1/4 inch thick), or other transparent material with sufficient weight per square foot
- Earthen berm
- Any combination of these construction materials

The barrier must present a solid face from top to bottom. Unnecessary openings or decorative cutouts shall not be made. All gaps (except for weep holes) should be filled with grout or caulking.

Interior Noise Mitigation

To satisfy the City of Moreno Valley 45 dBA CNEL interior noise level criteria, a Noise Reduction (NR) of up to 21.4 dBA and a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning) are required for lots adjacent to Ironwood Avenue. In order to meet the City of Moreno Valley 45 dBA CNEL interior noise standards the Project shall provide the following or equivalent noise mitigation measures:

- <u>Windows</u>: All windows and sliding glass doors shall be well fitted, well weather-stripped assemblies and shall have a minimum STC rating of 27.
- <u>Doors</u>: All exterior doors shall be well weather-stripped solid core assemblies at least one and three-fourths-inch thick.
- <u>Roof:</u> Roof sheathing of wood construction shall be well fitted or caulked plywood of at least one-half inch thick. Ceilings shall be well fitted, well-sealed gypsum board of at least one-half inch thick.
- <u>Attic:</u> Attic vents should be oriented away from Ironwood Avenue. If such an orientation cannot be avoided, then an acoustical baffle shall be placed in the attic space behind the vents. Insulation with at least a rating of R-19 shall be used in the attic space.
- <u>Ventilation:</u> When any habitable room is in use, arrangements shall be such that circulated air is received when any exterior door(s) or window(s) are closed. A forced air circulation system (e.g. air conditioning) or active ventilation system (e.g. fresh air supply) shall be provided which satisfies the requirements of the Uniform Building Code.

With the interior noise mitigation measures provided in this study, the proposed Ironwood Residential (TTM No. 37001) Project is expected to meet the City of Moreno Valley 45 dBA CNEL interior noise level standards.

Construction Noise and Vibration Analysis

Construction noise represents a short-term impact on the ambient noise levels. Based on the four phases of Project construction, the construction-related noise impacts are expected to create temporary and intermittent high-level noise conditions at receivers surrounding the Project site when certain activities occur at the center of construction activity.

The peak construction noise levels are expected to range from 46.2 to 56.6 dBA Leq with the attenuation provided by the recommended temporary construction noise barriers and noise mitigation measures provided below. With the temporary noise control barriers providing a minimum attenuation of 10 dBA, the construction noise levels will satisfy the 60 dBA Leq construction noise level threshold at the nearby sensitive receivers. Therefore, the construction of the Project will result in a *less than significant* noise impact.

Construction activity can result in varying degrees of ground-borne vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. This analysis shows the construction vibration levels are expected to approach 64.6 VdB at the nine receiver locations. Based on the FTA vibration standard of 80 VdB, the proposed Project site will not include or require equipment, facilities, or activities that would result in a barely perceptible human response (annoyance), and therefore, impacts due to vibration are considered *less than significant*.

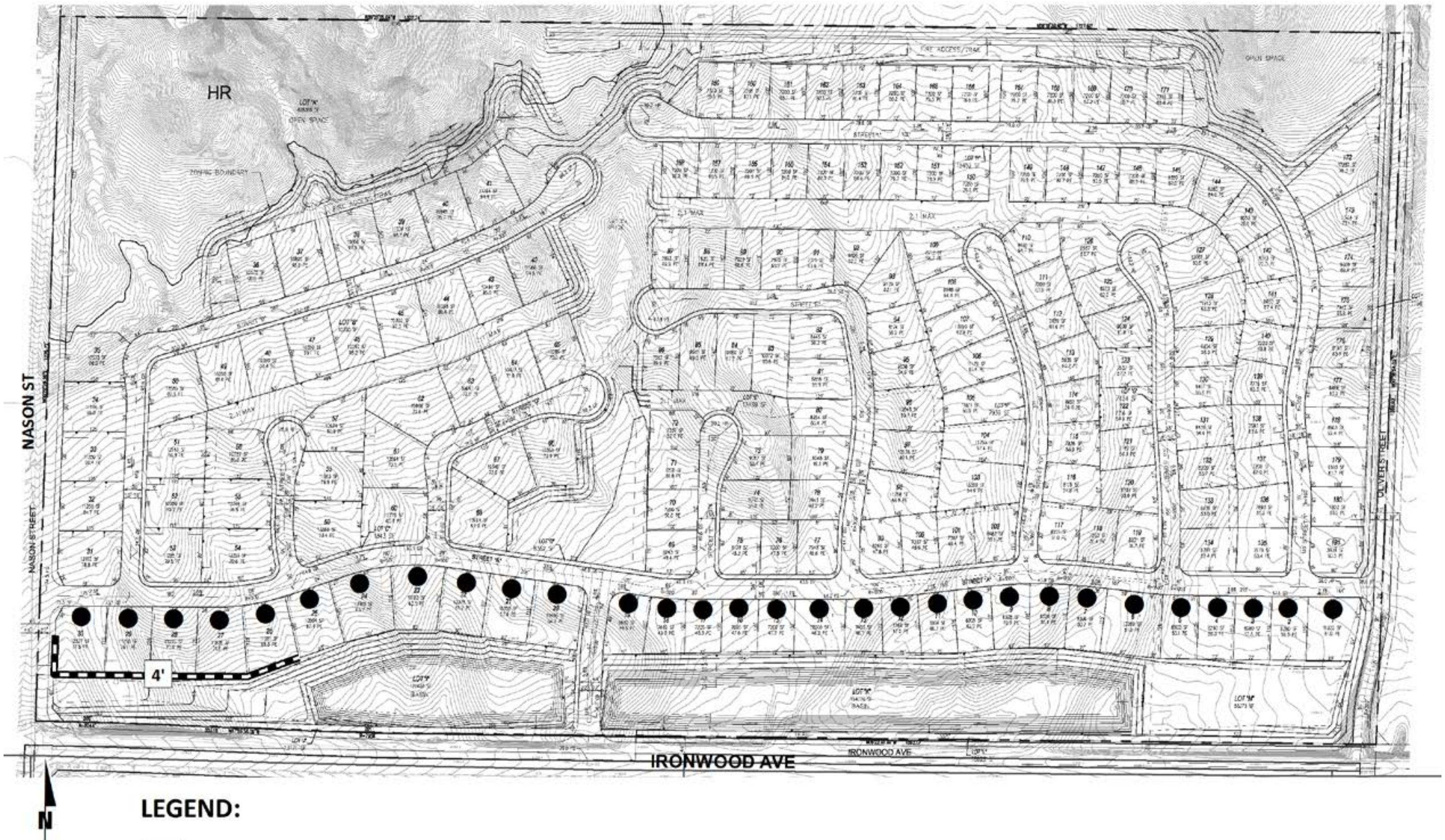
Construction Noise and Vibration Abatement Measures

Though construction noise is temporary, intermittent and of short duration, and will not present any long-term impacts, the following practices would reduce any noise level increases produced by the construction equipment to the nearby noise-sensitive residential land uses:

- Prior to approval of grading plans and/or issuance of building permits, plans shall include a note indicating that noise-generating Project construction activities shall only occur between the hours of 7:00 a.m. and 8:00 p.m. on any day. The Project construction supervisor shall ensure compliance with the note and the City shall conduct periodic inspection at its discretion.
- Install temporary noise control barriers that provide a minimum noise level attenuation of 10 dBA when Project construction occurs near existing noise-sensitive structures. The noise control barrier must present a solid face from top to bottom. The noise control barrier must be high enough and long enough to block the view of the noise source. Unnecessary openings shall not be made.
    - The noise barrier may be constructed using an acoustical blanket (e.g. vinyl acoustic curtains or quilted blankets) attached to the construction site perimeter fence or equivalent temporary fence posts.

  - The noise barriers must be maintained and any damage promptly repaired. Gaps, holes, or weaknesses in the barrier or openings between the barrier and the ground shall be promptly repaired.
  - The noise control barriers and associated elements shall be completely removed and the site appropriately restored upon the conclusion of the construction activity.
- During all Project site construction, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise sensitive receptors nearest the Project site.
- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receivers nearest the Project site (i.e., to the north) during all Project construction.
- The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment (between the hours of 7:00 a.m. and 8:00 p.m. on any day). The contractor shall design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.

EXHIBIT ES-A: SUMMARY OF RECOMMENDATIONS



LEGEND:

6' Recommended Noise Barrier Height (in feet)

Recommended Noise Barrier Location

● Lots requiring standard windows with a minimum STC rating of 27 and a means of mechanical ventilation (e.g. air conditioning).

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1 INTRODUCTION

This noise analysis has been completed to determine the noise impacts associated with the development of the proposed Ironwood Residential (TTM No. 37001) ("Project"). This noise study briefly describes the proposed Project, provides information regarding noise fundamentals, describes the local regulatory setting, provides the study methods and procedures for traffic noise analysis, and evaluates the future exterior noise environment. In addition, this study includes an analysis of the potential Project-related short-term construction noise impacts.

1.1 SITE LOCATION

The proposed Ironwood Residential (TTM No. 37001) site is located north of Ironwood Avenue and between Nason Street and Oliver Street in the City of Moreno Valley, as shown on Exhibit 1-A. The Project site is currently vacant. Existing single-family residential homes are located to the west, east, and south of the Project site. The State Route 60 (SR-60) Freeway is located approximately one half mile south of the Project site.

1.2 PROJECT DESCRIPTION

The Project is proposed to include the development of up to 181 single-family detached residential dwelling units, as shown on Exhibit 1-B.

Exhibit 1-A: Location Map

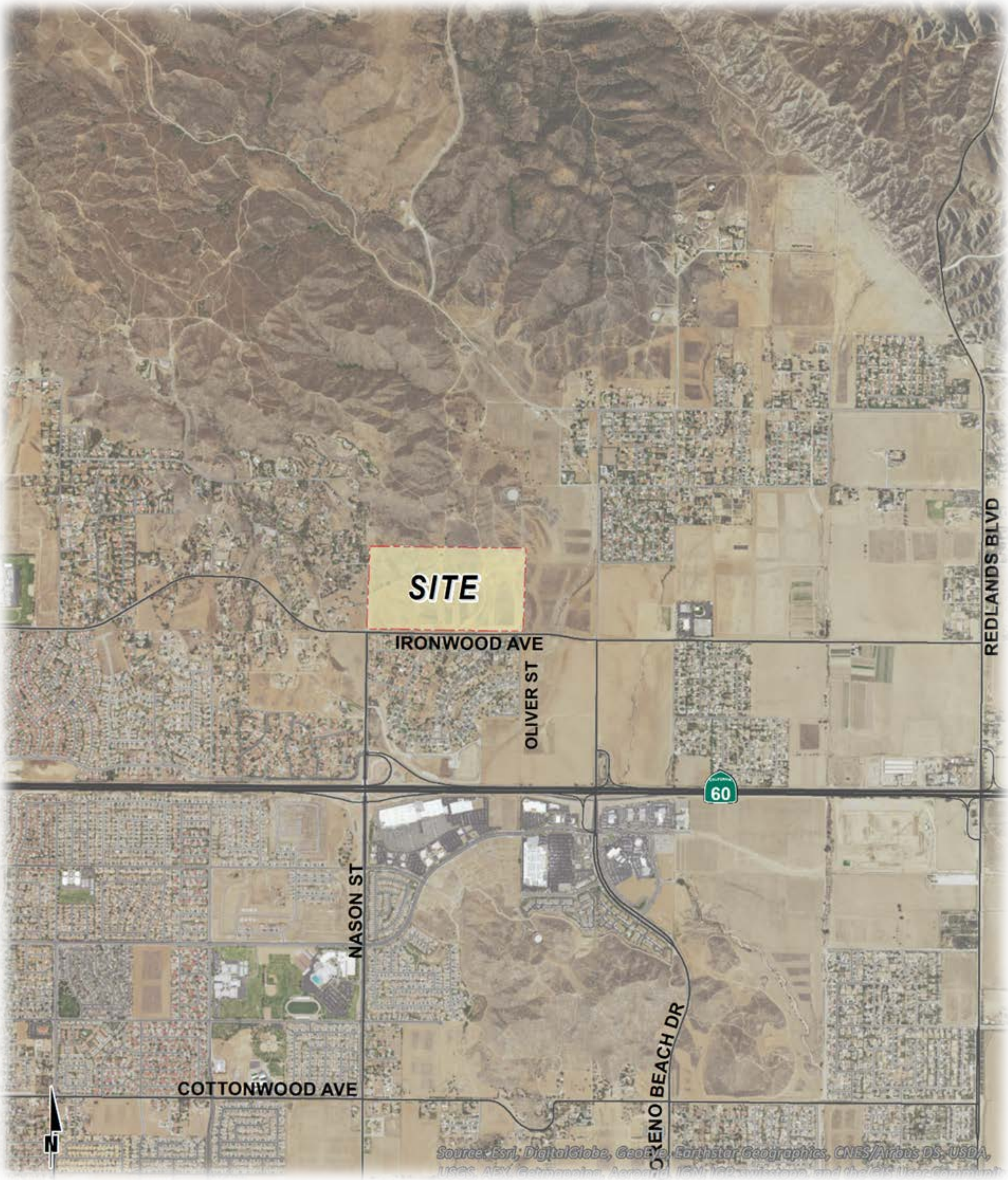
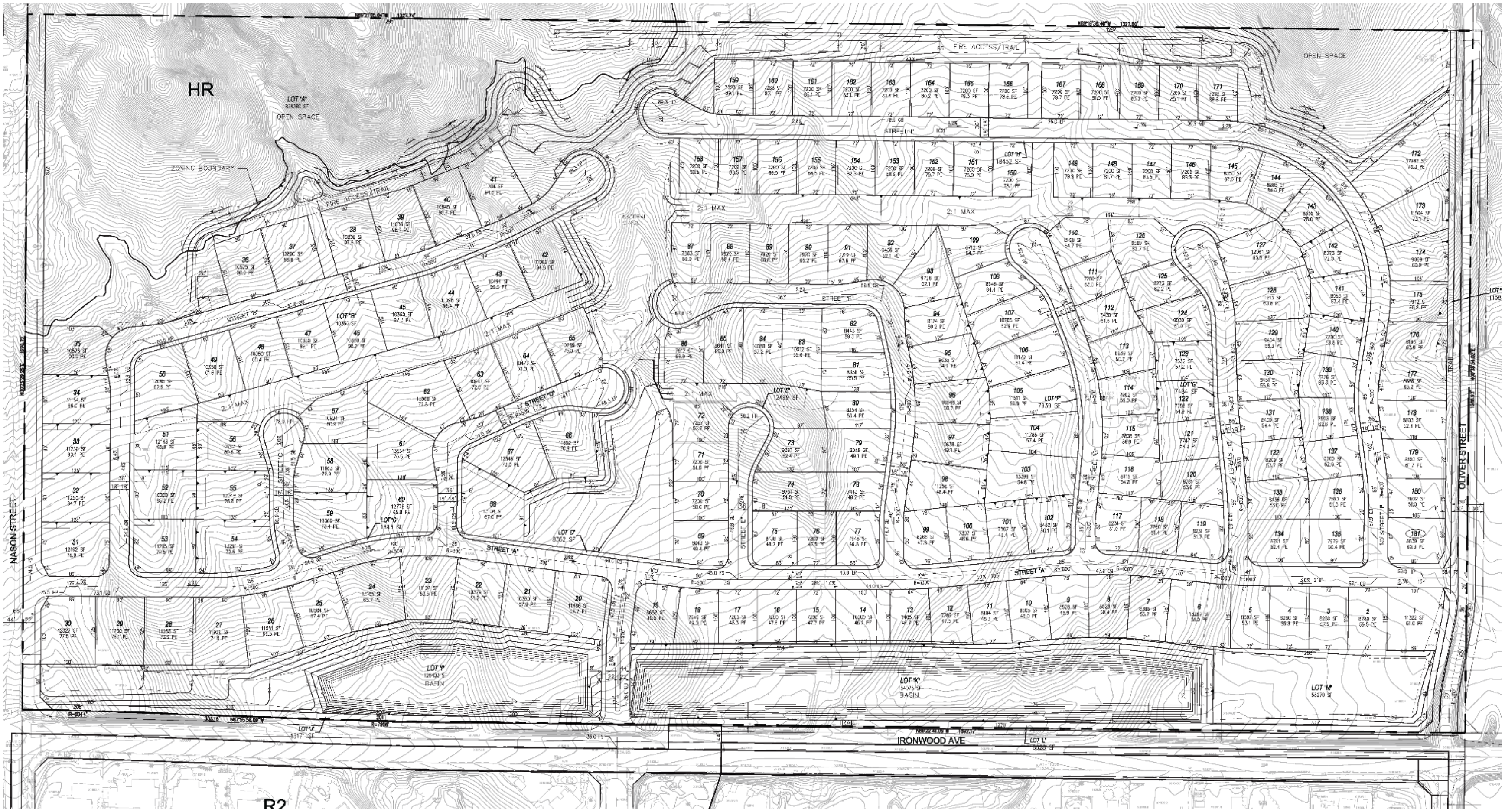


EXHIBIT 1-B: SITE PLAN



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2 FUNDAMENTALS

Noise has been simply defined as "unwanted sound." Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. Exhibit 2-A presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

EXHIBIT 2-A: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	COMMON INDOOR ACTIVITIES	A - WEIGHTED SOUND LEVEL dBA	SUBJECTIVE LOUDNESS	EFFECTS OF NOISE
THRESHOLD OF PAIN		140		
NEAR JET ENGINE		130	INTOLERABLE OR DEAFENING	
		120		HEARING LOSS
JET FLY-OVER AT 300m (1000 ft)	ROCK BAND	110		
LOUD AUTO HORN		100		
GAS LAWN MOWER AT 1m (3 ft)		90	VERY NOISY	
DIESEL TRUCK AT 15m (50 ft), at 80 km/hr (50 mph)	FOOD BLENDER AT 1m (3 ft)	80		
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70	LOUD	SPEECH INTERFERENCE
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60		
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50	MODERATE	
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		SLEEP DISTURBANCE
QUIET SUBURBAN NIGHTTIME	LIBRARY	30	FAINT	
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20		NO EFFECT
	BROADCAST/RECORDING STUDIO	10	VERY FAINT	
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

Source: Environmental Protection Agency Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA/ONAC 550/9-74-004) March 1974.

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (2) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA at approximately 100 feet, which can cause serious discomfort. (3) Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 Noise Descriptors

Environmental noise descriptors are generally based on averages, rather than instantaneous, noise levels. The most commonly used figure is the equivalent level (Leq). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (Leq) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period.

Peak hour or average noise levels, while useful, do not completely describe a given noise environment. Noise levels lower than the peak hour may be disturbing if they occur during times when quiet is most desirable, namely evening and nighttime (sleeping) hours. To account for this, the Community Noise Equivalent Level (CNEL), representing a composite twenty-four hour noise level is utilized. The CNEL is the weighted average of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The time of day corrections require the addition of 5 decibels to dBA Leq sound levels in the evening from 7:00 p.m. to 10:00 p.m., and the addition of 10 decibels to dBA Leq sound levels at night between 10:00 p.m. and 7:00 a.m. These additions are made to account for the noise-sensitive time periods during the evening and night hours when sound appears louder. CNEL does not represent the actual sound level heard at any particular time, but rather represents the total sound exposure. The City of Moreno Valley relies on the 24-hour CNEL level to assess land use compatibility with transportation related noise sources.

2.3 Sound Propagation

When sound propagates over a distance, it changes in level and frequency content. The manner in which noise reduces with distance depends on the following factors.

2.3.1 Geometric Spreading

Sound from a localized source (i.e., a stationary point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source.

2.3.2 Ground Absorption

The propagation path of noise from a highway to a receptor is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 ft. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receptor, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receptor such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance from a line source.

2.3.3 ATMOSPHERIC EFFECTS

Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects.

2.3.4 SHIELDING

A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels at the receptor. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Shielding by trees and other such vegetation typically only has an “out of sight, out of mind” effect. That is, the perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby resident. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide and dense enough to completely obstruct the line-of sight between the source and the receiver. This size of vegetation may provide up to 5 dBA of noise reduction. The FHWA does not consider the planting of vegetation to be a noise abatement measure.

2.4 TRAFFIC NOISE PREDICTION

Vehicle noise is a combination of the noise produced by the engine, exhaust, and tires on the roadway. According to the *Highway Traffic Noise Analysis and Abatement Policy and Guidance,* provided by the Federal Highway Administration (FHWA), the level of traffic noise depends on three primary factors: the volume of the traffic, the speed of the traffic, and the vehicle mix within the flow of traffic. Generally, the loudness of traffic noise is increased by heavier traffic volumes, higher speeds, and a greater number of trucks. (4) A doubling of the traffic volume, assuming that the speed and vehicle mix do not change, results in a noise level increase of 3 dBA. The vehicle mix on a given roadway may also have an effect on community noise levels. As the number of medium and heavy trucks increases and becomes a larger percentage of the vehicle mix, adjacent noise level impacts will increase.

2.5 NOISE CONTROL

Noise control is the process of obtaining an acceptable noise environment for a particular observation point or receptor by controlling the noise source, transmission path, receptor, or all three. This concept is known as the source-path-receptor concept. In general, noise control measures can be applied to any and all of these three elements.

2.6 NOISE BARRIER ATTENUATION

Effective noise barriers can reduce noise levels by 10 to 15 dBA, cutting the loudness of traffic noise in half. A noise barrier is most effective when placed close to the noise source or receptor. Noise barriers, however, do have limitations. For a noise barrier to work, it must be high enough and long enough to block the path of the noise source. (4)

2.7 LAND USE COMPATIBILITY WITH NOISE

Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches and residences are more sensitive to noise intrusion than are commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process. The FHWA encourages State and Local government to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized. (5)

2.8 COMMUNITY RESPONSE TO NOISE

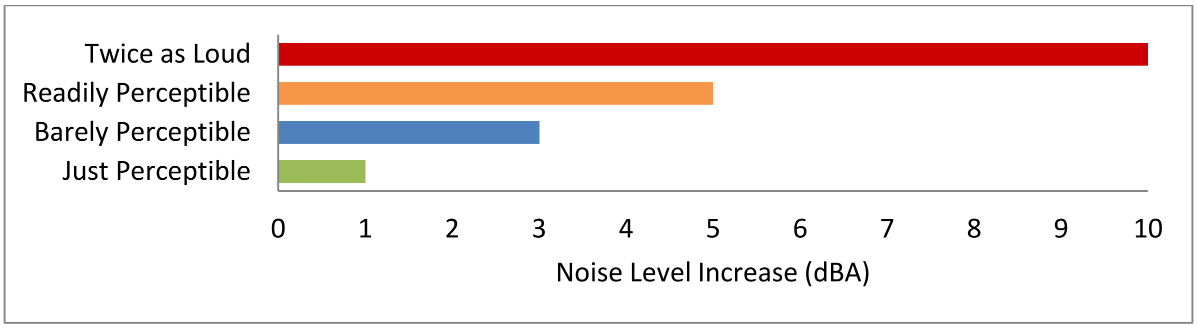
Community responses to noise may range from registering a complaint by telephone or letter, to initiating court action, depending upon each individual's susceptibility to noise and personal attitudes about noise. Several factors are related to the level of community annoyance including:

- Fear associated with noise producing activities;
- Socio-economic status and educational level;
- Perception that those affected are being unfairly treated;
- Attitudes regarding the usefulness of the noise-producing activity;
- Belief that the noise source can be controlled.

Approximately ten percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints will occur. Another twenty-five percent of the population will not complain even in very severe noise environments. Thus, a variety of reactions can be expected from people exposed to any given noise environment. (6) Surveys have shown that about ten percent of the people exposed to traffic noise of 60 dBA will report being highly annoyed with the noise, and each increase of one dBA is associated with approximately two percent more people being highly annoyed. When traffic noise exceeds 60 dBA or aircraft noise exceeds 55 dBA, people may begin to complain. (6)

Despite this variability in behavior on an individual level, the population as a whole can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. An increase or decrease of 1 dBA cannot be perceived except in carefully controlled laboratory experiments, a change of 3 dBA are considered *barely perceptible*, and changes of 5 dBA are considered *readily perceptible*. (4)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION



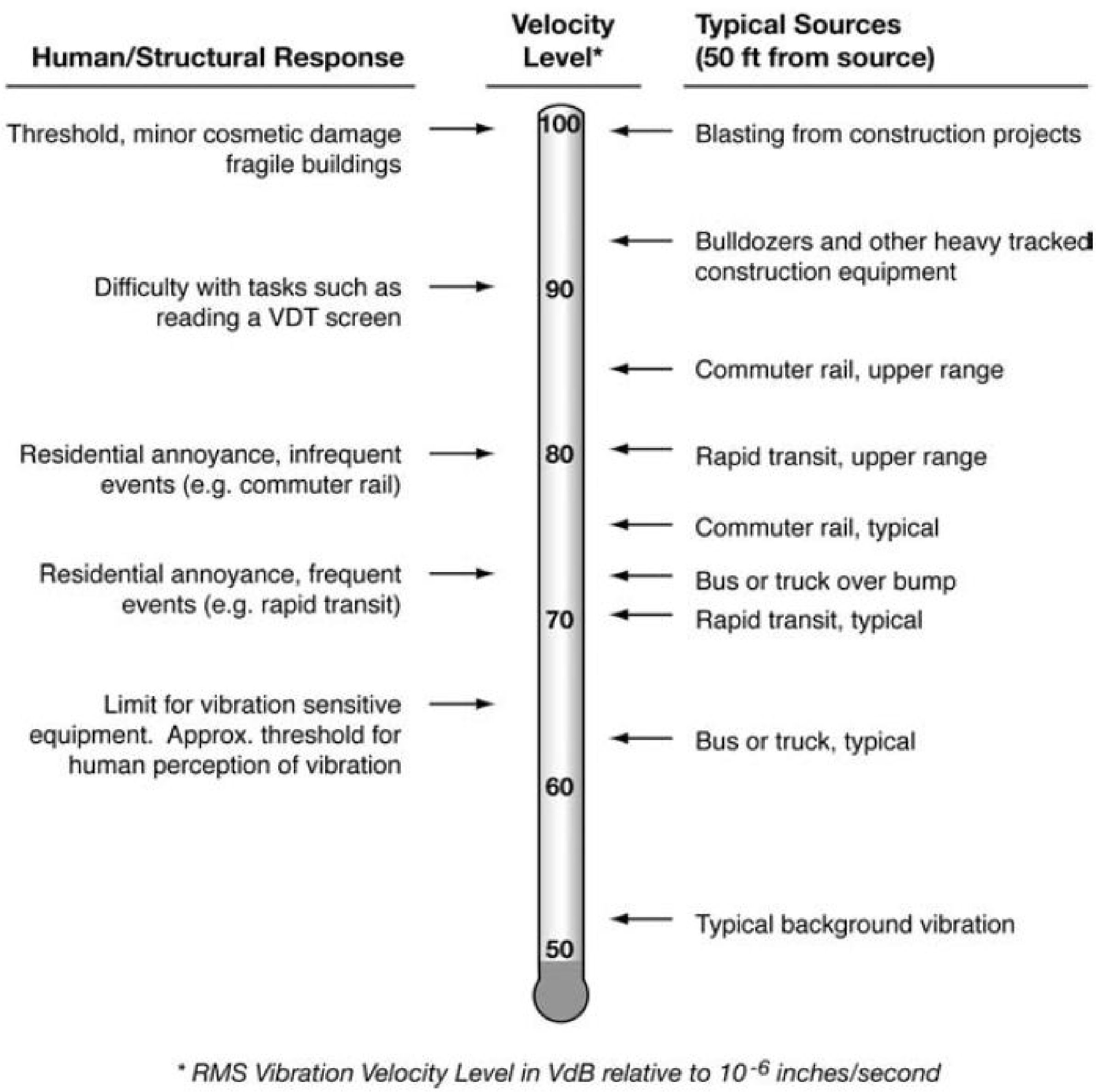
2.9 VIBRATION

According to the Federal Transit Administration (FTA) *Transit Noise Impact and Vibration Assessment* (7), vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, ground-borne vibrations may be described by amplitude and frequency.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings, but is not always suitable for evaluating human response (annoyance) because it takes some time for the human body to respond to vibration signals. Instead, the human body responds to average vibration amplitude often described as the root mean square (RMS). The RMS amplitude is defined as the average of the squared amplitude of the signal, and is most frequently used to describe the effect of vibration on the human body. Decibel notation (VdB) is commonly used to measure RMS. Decibel notation (VdB) serves to reduce the range of numbers used to describe human response to vibration. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receivers for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration-sensitive equipment.

The background vibration-velocity level in residential areas is generally 50 VdB. Ground-borne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Exhibit 2-C illustrates common vibration sources and the human and structural response to ground-borne vibration.

EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION



Source: Federal Transit Administration (FTA) Transit Noise Impact and Vibration Assessment.

3 REGULATORY SETTING

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. In most areas, automobile and truck traffic is the major source of environmental noise. Traffic activity generally produces an average sound level that remains fairly constant with time. Air and rail traffic, and commercial and industrial activities are also major sources of noise in some areas. Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies.

3.1 STATE OF CALIFORNIA NOISE REQUIREMENTS

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared according to guidelines adopted by the Governor's Office of Planning and Research. (8) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including environmental noise impacts.

3.2 STATE OF CALIFORNIA BUILDING CODE

The State of California's noise insulation standards are codified in the California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2, and the California Building Code. These noise standards are applied to new construction in California for the purpose of controlling interior noise levels resulting from exterior noise sources. The regulations specify that acoustical studies must be prepared when noise-sensitive structures, such as residential buildings, schools, or hospitals, are developed near major transportation noise sources, and where such noise sources create an exterior noise level of 60 dBA CNEL or higher. Acoustical studies that accompany building plans for noise-sensitive land uses must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. For new residential buildings, schools, and hospitals, the acceptable interior noise limit for new construction is 45 dBA CNEL.

3.3 CITY OF MORENO VALLEY GENERAL PLAN SAFETY ELEMENT

The City of Moreno Valley General Plan does not include a noise element or specific transportation-related noise standards. Rather, noise is considered in Section 6.4 of the Environmental Safety section of the General Plan Safety Element. (9) While the General Plan provides background and noise fundamentals, it does not identify criteria to assess the impacts associated with off-site transportation-related noise impacts. Instead, the General Plan includes policies associated with each element in Chapter 9, *Goals and Objectives*. The objectives identified in Chapter 9 of the City of Moreno Valley General Plan to address potential noise impacts are listed below:

Objective 6.3 *Provide noise compatible land use relationships by establishing noise standards utilized for design and siting purposes.*

Objective 6.4 *Review noise issues during the planning process and require noise attenuation measures to minimize acoustic impacts to existing and future surrounding land uses.*

Objective 6.5 *Minimize noise impacts from significant noise generators such as, but not limited to, motor vehicles, trains, aircraft, commercial, industrial, construction, and other activities.*

The City of Moreno Valley General Policies (pg. 9-31, 9-32) act to ensure that when exterior noise levels exceed 65 dBA CNEL at sensitive land uses (Policy 6.3.1), mitigation is provided to ensure that interior noise levels of 45 dBA CNEL are maintained. General Plan Policies in this regard are consistent with, and support, the California Building Code interior noise standards previously discussed in Section 3.2.

3.4 CITY OF MORENO VALLEY MUNICIPAL CODE NOISE STANDARDS

The most effective method to control community noise impacts from non-transportation noise sources (such as playgrounds, trash compactors, air-conditioning units, etc.) is through the application of a noise control ordinance. For the purpose of this analysis, the potential non-transportation noise impacts include Project-related short-term construction activities during the permitted hours of construction established in the Municipal Code. The City of Moreno Valley Municipal Code is included in Appendix 3.1.

As a subset of its stationary-source noise regulations, the City of Moreno Valley Municipal Code establishes restrictions on construction-source noise. More specifically, Municipal Code Section 11.80.030(D)(7), *Construction and Demolition*, provides the following:

> *No person shall operate or cause operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of eight p.m. and seven a.m. the following day such that the sound there from creates a noise disturbance, except for emergency work by public service utilities or for other work approved by the city manager or designee.*

The City of Moreno Valley defines a *noise disturbance* as any sound which:

> *Disturbs a reasonable person of normal sensitivities; exceeds the sound level limits set forth in this chapter* [Section 11.80.030(C)]*; or is plainly audible as defined in this section. Where no specific distance is set forth for the determination of audibility, references to noise disturbance shall be deemed to mean plainly audible at a distance of two (200) feet from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right of way, public space or other publicly owned property.*

Therefore, Project construction shall be limited to the hours of 7:00 a.m. to 8:00 p.m. on any day and may not generate a noise level at 200 feet from the property line which exceeds the noise standards provided in the Noise Ordinance, Section 11.80.030(C), *Non-impulsive Sound Decibel Limits*, which states the following:

> *No person shall maintain, create, operate or cause to be operated on private property any source of sound in such a manner as to create any non-impulsive sound which exceeds the limits set forth for the source land use category in Table 11.80.030-2 when measured at a distance of two hundred (200) feet or more from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right-of-way, public space or other publicly owned property. Any source of sound in violation of this subsection shall be deemed prima facie to be a noise disturbance*. (10)

Even though the City of Moreno Valley Municipal Code does not identify specific construction noise limits; it does provide noise level limits for the source land use category when measured at a distance of 200 feet. For the purpose of this analysis, the Ironwood Residential (TTM No. 37001) Project is considered *Residential* land use since it is *land primarily for dwelling units*, as defined by the City of Moreno Valley Municipal Code. For residential land uses, the City of Moreno Valley 60 dBA Leq noise level standard at a distance of 200 feet is used as the limit for this analysis to assess the construction noise level impacts at sensitive receivers in the Project study area. Therefore, to conform to the applicable provisions of the Municipal Code, the maximum allowable noise generated by on-site construction activities when measured at 200 feet from any property line, shall not exceed 60 dBA Leq. The City of Moreno Valley construction noise standards are shown on Table 3-1 and included in Appendix 3.1.

TABLE 3-1: CONSTRUCTION NOISE STANDARDS

Jurisdiction	Permitted Hours of Construction Activity	Construction Noise Level Standard
City of Moreno Valley[1]	Between 7:00 a.m. and 8:00 p.m. on any day	60 dBA Leq @ 200'

[1] Source: City of Moreno Valley Municipal Code, Section 11.80.030(D)(7) (Appendix 3.1).

3.5 CONSTRUCTION VIBRATION STANDARDS

To analyze the vibration impacts originating from the construction of the Project, vibration from construction activities are typically evaluated against standards established under a City's Municipal Code. The City of Moreno Valley Municipal Code, however, does not identify specific vibration standards for construction. Therefore, the construction-related vibration standards provided by the United States Department of Transportation Federal Transit Administration (FTA) are used in this analysis to assess the potential vibration impacts due to Project construction.

3.6.1 FTA VIBRATION STANDARDS

The FTA identifies guidelines for maximum-acceptable vibration criteria for different types of land uses. (7) These guidelines allow 80 VdB for residential uses and buildings where people normally sleep. Construction activity can result in varying degrees of ground-borne vibration, depending on the equipment and methods used, distance to the affected structures and soil type. Construction vibration is generally associated with pile driving and rock blasting. Other construction equipment such as air compressors, light trucks, hydraulic loaders, etc., generates little or no ground vibration. Occasionally large bulldozers and loaded trucks can cause perceptible vibration levels at close proximity. While not enforceable regulations within the City of Moreno Valley, the FTA guidelines of 80 VdB for sensitive land uses provide the basis for determining the relative significance of potential Project-related vibration impacts.

3.6.2 HUMAN PERCEPTION OF VIBRATION

Typically, the human response at the perception threshold for vibration includes annoyance in residential areas when vibration levels, expressed in vibration decibels (VdB), approach 75 VdB as previously shown on Exhibit 2-C. As discussed in Section 2.9, ground-borne vibration is normally perceptible to humans at approximately 65 VdB and, for most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. For this analysis, the FTA-provided 80 VdB vibration standard represents residential annoyance as perceived by the nearby sensitive receivers in the Project study area.

4 SIGNIFICANCE CRITERIA

The following significance criteria are based on guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. For the purposes of this report, impacts would be potentially significant if the Project is determined to result in or cause:

A. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

B. Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.

C. A substantial permanent increase in ambient noise levels in the Project vicinity above existing levels without the proposed Project; or

D. A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above noise levels existing without the proposed Project.

While the CEQA Guidelines and the City of Moreno Valley General Plan Guidelines provide direction on noise compatibility and establish noise standards by land use type that are sufficient to assess the significance of noise impacts under the first threshold, they do not define the levels at which increases are considered substantial for use under the second, third and fourth threshold. Under CEQA, consideration must be given to the magnitude of the increase, the existing ambient noise levels and the location of noise-sensitive receivers in order to determine if a noise increase represents a significant adverse environmental impact. This approach recognizes *that there is no single noise increase that renders the noise impact significant.* (11)

Unfortunately, there is no completely satisfactory way to measure the subjective effects of noise or of the corresponding human reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted—the so-called *ambient* environment.

In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will typically be judged. With this in mind, the Federal Interagency Committee on Noise (FICON) developed guidance to be used for the assessment of project-generated increases in noise levels that take into account the ambient noise level. (12) The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (i.e., CNEL).

For example, if the ambient noise environment is quiet (<60 dBA) and the new noise source greatly increases the noise levels, an impact may occur even though the noise criteria might not be exceeded. Therefore, for the purpose of this analysis, FICON identifies a *readily perceptible* 5 dBA or greater project related noise level increase is considered a significant impact when nearby noise-sensitive receivers are affected. According to the FICON, in areas where the without project noise levels range from 60 to 65 dBA, a 3 dBA *barely perceptible* noise level increase appears to be appropriate for most people. When the without project noise levels already exceed 65 dBA, any increase in community noise louder than 1.5 dBA or greater is considered a significant impact if noise-sensitive receivers are affected, since it likely contributes to an existing noise exposure exceedance. Table 4-1 below provides a summary of the potential noise impact significance criteria, based on guidance from FICON.

TABLE 4-1: SIGNIFICANCE OF NOISE IMPACTS

Without Project Noise Level	Potential Significant Impact
< 60 dBA	5 dBA or more
60 - 65 dBA	3 dBA or more
> 65 dBA	1.5 dBA or more

Federal Interagency Committee on Noise (FICON), 1992.

Based on the significance of noise impacts outlined below on Table 4-2, noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development:

Off-Site Traffic Noise

- If the off-site traffic noise levels at nearby noise-sensitive land uses adjacent to roadways conveying Project traffic:
  - are less than 60 dBA CNEL and the Project creates a *readily perceptible* 5 dBA CNEL or greater Project related noise level increase; or
  - range from 60 to 65 dBA CNEL and the Project creates a *barely perceptible* 3 dBA CNEL or greater Project noise level increase; or
  - already exceed 65 dBA CNEL, and the Project creates a community noise level impact of greater than 1.5 dBA CNEL (FICON, 1992.).

On-Site Traffic Noise

- If the on-site exterior noise levels exceed 65 dBA CNEL at the residential land uses within the Project site. Interior noise levels shall not exceed 45 dBA CNEL for residential land uses (City of Moreno Valley General Noise Element, Policy 6.3.1).

Construction Noise and Vibration

- If Project-related construction activities:
  - occur anytime other than between the permitted hours of 7:00 a.m. to 8:00 p.m. on any day (City of Moreno Valley Municipal Code Section 11.80.030(D)(7)); or
  - create noise levels at sensitive residential receivers in the City of Moreno Valley which exceed the short-term construction noise level limit of 60 dBA Leq at 200 feet from the Project site (City of Moreno Valley Municipal Code, Section 11.80.030(D)(7)).

- If short-term Project generated construction vibration levels exceed the FTA maximum acceptable vibration standard of 80 VdB at sensitive receiver locations (FTA Transit Noise and Vibration Impact Assessment, May 2006).

TABLE 4-2: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Condition(s)	Significance Criteria	
		Daytime	Nighttime
Off-Site[1]	if ambient is < 60 dBA CNEL	≥ 5 dBA CNEL Project increase	
	if ambient is 60 - 65 dBA CNEL	≥ 3 dBA CNEL Project increase	
	if ambient is > 65 dBA CNEL	≥ 1.5 dBA CNEL Project increase	
On-Site[2]	Exterior residential land use	65 dBA CNEL	
	Interior residential land use	45 dBA CNEL	
Construction[3]	Permitted hours of 7:00 a.m. to 8:00 p.m. on any day.		
	Noise Level Threshold	60 dBA Leq @ 200'	n/a
	Vibration Level Threshold[4]	80 VdB	n/a

[1] Source: FICON, 1992.
[2] Source: City of Moreno Valley General Noise Element, Policy 6.3.1.
[3] Source: City of Moreno Valley Municipal Code Section 11.80.030(D)(7) (Appendix 3.1).
[4] Source: FTA Transit Noise and Vibration Impact Assessment, May 2006.
"Daytime" = 8:00 a.m. to 10:00 p.m.; "Nighttime" = 10:01 p.m. to 7:59 a.m.; "n/a" = No nighttime construction activity is permitted and therefore, no nighttime construction noise and vibration thresholds are identified.

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5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, five 24-hour noise level measurements were taken at sensitive receiver locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Wednesday, January 28th, 2015. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the daytime and nighttime hourly noise levels and calculate the 24-hour CNEL. The long-term noise readings were recorded using Piccolo Type 2 integrating sound level meter and dataloggers. The Piccolo sound level meters were calibrated using a Larson-Davis calibrator, Model CAL 150. All noise meters were programmed in "slow" mode to record noise levels in "A" weighted form. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (13)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned at the nearest sensitive receiver locations to assess the existing ambient hourly noise levels surrounding the Project site. To describe the existing noise environment, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustical equivalence. In other words, the area represented by the receiver shares similar shielding, terrain, and geometric relationship to the reference noise source. Receivers represent a location of noise sensitive areas and are used to estimate the future noise level impacts. Collecting reference ambient noise level measurements at the nearby sensitive receiver locations allows for a comparison of the before and after Project noise levels and is necessary to assess potential cumulative noise impacts.

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the average or equivalent sound levels (Leq). The equivalent sound level (Leq) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. Table 5-1 identifies the hourly daytime (8:00 a.m. to 10:00 p.m.) and nighttime (10:01 p.m. to 7:59 a.m.) noise levels at each noise level measurement location. Appendix 5.2 provides a summary of the existing hourly ambient noise levels described below:

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS

- Location L1 represents the noise levels at the northeastern corner of Ironwood Avenue and Nason Street near existing residential homes across Ironwood Avenue. The noise level measurements collected show an overall 24-hour exterior noise level of 63.6 dBA CNEL. The hourly noise levels measured at location L1 ranged from 55.5 to 61.9 dBA Leq during the daytime hours and from 45.3 to 62.8 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 60.1 dBA Leq with an average nighttime noise level of 57.1 dBA Leq.
- Location L2 represents the noise levels in the northwestern portion of the Project site, east of existing residential homes across Nason Street. The noise level measurements collected show an overall 24-hour exterior noise level of 55.4 dBA CNEL. The hourly noise levels measured at location L2 ranged from 45.4 to 50.2 dBA Leq during the daytime hours and from 44.2 to 52.8 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 48.7 dBA Leq with an average nighttime noise level of 49.0 dBA Leq.
- Location L3 represents the noise levels at the southwestern corner of Ironwood Avenue and Oliver Street adjacent to an existing residential home. The 24-hour CNEL indicates that the overall exterior noise level is 63.0 dBA CNEL. At location L3 the background ambient noise levels ranged from 56.2 to 61.9 dBA Leq during the daytime hours to levels of 46.8 to 61.0 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 59.7 dBA Leq with an average nighttime noise level of 56.1 dBA Leq.
- Located on the eastern Project site boundary, location L4 represents the noise levels north of Ironwood Avenue at the Project site. The noise level measurements collected show an overall 24-hour exterior noise level of 55.5 dBA CNEL. The hourly noise levels measured at location L4 ranged from 46.7 to 51.2 dBA Leq during the daytime hours and from 43.6 to 53.2 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 49.7 dBA Leq with an average nighttime noise level of 49.1 dBA Leq.
- Location L5 represents the noise levels south of the Project site across Ironwood Avenue adjacent to existing residential homes. The 24-hour CNEL indicates that the overall exterior noise level is 73.2 dBA CNEL. At location L5 the background ambient noise levels ranged from 66.7 to 71.6 dBA Leq during the daytime hours to levels of 58.2 to 72.2 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 69.9 dBA Leq with an average nighttime noise level of 66.8 dBA Leq.

Table 5-1 provides the (energy average) noise levels used to describe the daytime and nighttime ambient conditions. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. Appendix 5.2 provides a summary of the noise levels for each hour as well as the minimum, maximum, L_1, L_2, L_5, L_8, L_{25}, L_{50}, L_{90}, L_{95}, and L_{99} percentile noise levels observed during the daytime and nighttime periods.

The background ambient noise levels in the Project study area are dominated by the transportation related noise associated with the arterial roadway network. This includes the auto and heavy truck activities near the noise level measurement locations. The 24-hour existing noise level measurements shown on Table 5-1 present the worst-case existing unmitigated ambient noise conditions.

TABLE 5-1: 24-HOUR AMBIENT NOISE LEVEL MEASUREMENTS

Location[1]	Distance from Project Site (Feet)	Description	Hourly Noise Level (dBA Leq)[2]		CNEL
			Daytime	Nighttime	
L1	0'	Located at the northeastern corner of Ironwood Avenue and Nason Street near existing residential homes across Ironwood Avenue.	60.1	57.1	63.6
L2	0'	Located in the northwestern portion of the Project site, east of existing residential homes across Nason Street.	48.7	49.0	55.4
L3	96'	Located at the southwestern corner of Ironwood Avenue and Oliver Street adjacent to an existing residential home.	59.7	56.1	63.0
L4	0'	Located north of Ironwood Avenue on the eastern Project site boundary.	49.7	49.1	55.5
L5	81'	Located south of the Project site across Ironwood Avenue adjacent to existing residential homes.	69.9	66.8	73.2

[1] See Exhibit 5-A for the location of the noise level measurement locations.
[2] Energy (logarithmic) average hourly levels. The long-term 24-hour measurement printouts are included in Appendix 5.2.
"Daytime" = 8:00 a.m. to 10:00 p.m.; "Nighttime" = 10:01 p.m. to 7:59 a.m.

6 METHODS AND PROCEDURES

The following section outlines the methods and procedures used to model and analyze the future traffic noise environment.

6.1 FHWA Traffic Noise Prediction Model

The estimated roadway noise impacts from vehicular traffic were calculated using a computer program that replicates the Federal Highway Administration (FHWA) Traffic Noise Prediction Model- FHWA-RD-77-108. (14) The FHWA Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). In California the national REMELs are substituted with the California Vehicle Noise (Calveno) Emission Levels. (15) Adjustments are then made to the REMEL to account for: the roadway classification (e.g., collector, secondary, major or arterial), the roadway active width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), the total average daily traffic (ADT), the travel speed, the percentages of automobiles, medium trucks, and heavy trucks in the traffic volume, the roadway grade, the angle of view (e.g., whether the roadway view is blocked), the site conditions ("hard" or "soft" relates to the absorption of the ground, pavement, or landscaping), and the percentage of total ADT which flows each hour throughout a 24-hour period.

6.2 Off-Site Traffic Noise Prediction Model Inputs

Table 6-1 presents the roadway parameters used to assess the Project's off-site transportation noise impacts. Table 6-1 identifies the nine study area roadway segments, the distance from the centerline to adjacent land use based on the functional roadway classifications according to the City of Moreno Valley General Plan Environmental Impact Report (EIR) Traffic/Circulation section, and the vehicle speeds. The ADT volumes used for this study, presented in Table 6-2, were obtained from the *Ironwood Residential (TTM No. 37001) Traffic Impact Analysis,* prepared by Urban Crossroads, Inc. (1) Table 6-3 presents the time of day vehicle splits and Table 6-4 presents the traffic flow distributions (vehicle mix) used for this analysis. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks and heavy trucks for input into the FHWA noise prediction model.

TABLE 6-1: OFF-SITE ROADWAY PARAMETERS

ID	Roadway	Segment	Adjacent Planned Land Use[1]	Distance from Centerline to Nearest Adjacent Land Use (feet)[2]	Vehicle Speed (mph)
1	Nason St.	s/o Ironwood Av.	Residential	44'	45
2	Nason St.	n/o SR-60 WB Ramps	Residential	44'	45
3	Nason St.	n/o SR-60 WB Fwy	Open Space	44'	45
4	Nason St.	s/o SR-60 EB Ramps	Commercial	44'	45
5	Ironwood Av.	w/o Nason St.	Residential	44'	45
6	Ironwood Av.	e/o Nason St.	Residential	44'	55
7	Ironwood Av.	e/o Lantz Ln.	Residential	44'	55
8	Ironwood Av.	e/o Oliver St.	Residential	44'	55

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] Distance to adjacent land use is based upon the right-of-way distances for each functional roadway classification provided in the City of Moreno Valley General Plan Environmental Impact Report (EIR) Traffic/Circulation section.

TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES

ID	Roadway	Segment	Average Daily Traffic (1,000's)[1]					
			Existing		Year 2020		Year 2035	
			Without Project	With Project	Without Project	With Project	Without Project	With Project
1	Nason St.	s/o Ironwood Av.	4.3	5.3	9.0	9.9	9.9	10.8
2	Nason St.	n/o SR-60 WB Ramps	4.8	5.7	9.5	10.4	10.4	11.4
3	Nason St.	n/o SR-60 WB Fwy	12.7	13.3	18.7	19.4	20.6	21.3
4	Nason St.	s/o SR-60 EB Ramps	17.8	18.2	24.9	25.2	27.4	27.7
5	Ironwood Av.	w/o Nason St.	6.8	7.1	12.2	12.5	13.4	13.7
6	Ironwood Av.	e/o Nason St.	4.6	5.3	7.8	8.6	8.6	9.4
7	Ironwood Av.	e/o Lantz Ln.	4.3	4.5	7.4	7.7	8.1	8.4
8	Ironwood Av.	e/o Oliver St.	4.3	4.8	7.4	7.8	8.1	8.5

[1] Source: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis, Urban Crossroads, Inc. August 2015.

TABLE 6-3: TIME OF DAY VEHICLE SPLITS

Time Period	Vehicle Type		
	Autos	Medium Trucks	Heavy Trucks
Daytime (7:00 a.m. - 7:00 p.m.)	77.5%	84.8%	86.5%
Evening (7:00 p.m. - 10:00 p.m.)	12.9%	4.9%	2.7%
Nighttime (10:00 p.m. - 7:00 a.m.)	9.6%	10.3%	10.8%
Total:	100.0%	100.0%	100.0%

Source: County of Riverside Office of Industrial Hygiene.

TABLE 6-4: DISTRIBUTION OF TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX)

Roadway	Total % Traffic Flow			Total
	Autos	Medium Trucks	Heavy Trucks	
All Segments[1]	97.42%	1.84%	0.74%	100.00%

[1] Source: County of Riverside Office of Industrial Hygiene.

6.3 ON-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

The on-site roadway parameters including the ADT volumes used for this analysis are presented on Table 6-5. Based on the City of Moreno Valley General Plan EIR Traffic/Circulation section, Figure 5.2-1, Ironwood Avenue is classified as a 4-lane Minor Arterial. (16) To predict the future on-site noise environment at the Project site, the City of Moreno Valley General Plan EIR Traffic/Circulation section, Table 5.2-5, future design capacity traffic volumes were used. The traffic volumes shown on Table 6-5 reflect future long-range traffic conditions needed to assess the future on-site traffic noise environment and to identify potential mitigation measures (if any) that address the worst-case future conditions. For the purposes of this analysis, soft site conditions were used to analyze the on-site traffic noise impacts for the Project study area. Soft site conditions account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation.

TABLE 6-5: ON-SITE ROADWAY PARAMETERS

Roadway	Lanes	Classification[1]	Design Capacity Volume[2]	Posted Speed Limit (mph)[3]	Site Conditions
Ironwood Av.	4	Minor Arterial	30,000	55	Soft

[1] Road classifications based upon the City of Moreno Valley General Plan Environmental Impact Report (EIR), Figure 5.2-1.
[2] Source: City of Moreno Valley General Plan EIR, Table 5.2-5.
[3] Source: Ironwood Residential (TTM No. 37001) Traffic Impact Analysis, Urban Crossroads, Inc., August 2015.

Table 6-3 presents the time of day vehicle splits by vehicle type, and Table 6-4 presents the total traffic flow distributions (vehicle mixes) used for this analysis. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks and heavy trucks for input into the FHWA model based on roadway types. To predict the future noise environment at lots within the Project site, coordinate information was collected to identify the noise transmission path between the noise source and receiver. The coordinate information is based on the Project site plan showing the plotting of each lot in relationship to Ironwood Avenue, as shown in Appendix 6.1.

The site plan is used to identify the relationship between the roadway centerline elevation, the pad elevation and the centerline distance to the noise barrier, and the building façade. The exterior noise level impacts at the outdoor living area receivers (backyards) were placed five feet above the pad elevation and ten feet from the proposed barrier location or at the proposed building façade, whichever is greater. First floor receivers were located five feet above the proposed finished floor elevation and second floor receivers were located fourteen feet above the proposed finished floor elevation.

6.4 VIBRATION ASSESSMENT

This analysis focuses on the potential ground-borne vibration associated with vehicular traffic and construction activities. Ground-borne vibration levels from automobile traffic are generally overshadowed by vibration generated by heavy trucks that roll over the same uneven roadway surfaces. However, due to the rapid drop-off rate of ground-borne vibration and the short duration of the associated events, vehicular traffic-induced ground-borne vibration is rarely perceptible beyond the roadway right-of-way, and rarely results in vibration levels that cause damage to buildings in the vicinity.

However, while vehicular traffic is rarely perceptible, construction has the potential to result in varying degrees of temporary ground vibration, depending on the specific construction activities and equipment used. Ground vibration levels associated with various types of construction equipment are summarized on Table 6-6. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the human response (annoyance) using the following vibration assessment methods defined by the FTA. To describe the human response (annoyance) associated with vibration impacts the FTA provides the following equation (7): $L_{VdB}(D) = L_{VdB}(25\text{ ft}) - 30\log(D/25)$

TABLE 6-6: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	Vibration Decibels (VdB) at 25 feet
Small bulldozer	58
Jackhammer	79
Loaded Trucks	86
Large bulldozer	87

Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006.

7 OFF-SITE TRAFFIC NOISE IMPACTS

To assess the off-site transportation CNEL noise level impacts associated with development of the proposed Project, noise contours were developed based on the *Ironwood Residential (TTM No. 37001) Traffic Impact Analysis*. (1) Noise contour boundaries represent the equal levels of noise exposure and are measured in CNEL from the center of the roadway. Noise contours were developed for the following traffic scenarios:

- <u>Existing Without / With Project</u>: This scenario refers to the existing present-day noise conditions, without the Project, and with the construction of the Project.
- <u>Year 2020 Without / With Project</u>: This scenario refers to the background noise conditions at future Year 2020 with and without the proposed Project. The with Project scenario corresponds to Year 2020 conditions and includes all cumulative projects identified in the Traffic Impact Analysis.
- <u>Year 2035 Without / With Project</u>: This scenario refers to the background noise conditions at future Year 2035 with and without the proposed Project. The with Project scenario corresponds to Year 2035 conditions and includes all cumulative projects identified in the Traffic Impact Analysis.

7.1 TRAFFIC NOISE CONTOURS

To quantify the Project's traffic noise impacts on the surrounding areas, the changes in traffic noise levels on nine roadway segments surrounding the Project were calculated based on the changes in the average daily traffic volumes. The noise contours were used to assess the Project's incremental traffic-related noise impacts at land uses adjacent to roadways conveying Project traffic. Based on the noise impact significance criteria described in Section 4, a significant off-site traffic noise level impact occurs if the without Project noise levels at nearby noise-sensitive receivers:

- are less than 60 dBA and the Project creates a *readily perceptible* 5 dBA or greater Project related noise level increase, or:
- range from 60 to 65 dBA and the Project creates a *barely perceptible* 3 dBA or greater Project noise level increase, or;
- already exceed 65 dBA, and the Project creates a community noise level impact of greater than 1.5 dBA.

Noise contours represent the distance to noise levels of a constant value and are measured from the center of the roadway for the 70, 65, and 60 dBA noise levels. The noise contours do not take into account the effect of any existing noise barriers or topography that may affect ambient noise levels. In addition, since the noise contours reflect modeling of vehicular noise on area roadways, they appropriately do not reflect noise contributions from any nearby stationary noise sources within the Project study area. Tables 7-1 to 7-6 present a summary of the unmitigated exterior traffic noise levels for the nine study area roadway segments analyzed from the without Project to the with Project conditions in each of the three timeframes: Existing, Year 2020, and

Year 2035 conditions. Appendix 7.1 includes a summary of the traffic noise level contours for each of the six traffic scenarios.

TABLE 7-1: EXISTING WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	64.9	RW	RW	93
2	Nason St.	n/o SR-60 WB Ramps	Residential	65.3	RW	46	100
3	Nason St.	n/o SR-60 WB Fwy	Open Space	69.6	RW	89	191
4	Nason St.	s/o SR-60 EB Ramps	Commercial	71.0	52	111	239
5	Ironwood Av.	w/o Nason St.	Residential	66.8	RW	58	126
6	Ironwood Av.	e/o Nason St.	Residential	67.4	RW	63	136
7	Ironwood Av.	e/o Lantz Ln.	Residential	67.1	RW	60	130
8	Ironwood Av.	e/o Oliver St.	Residential	67.1	RW	60	130

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-2: EXISTING WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	65.8	RW	49	107
2	Nason St.	n/o SR-60 WB Ramps	Residential	66.1	RW	52	112
3	Nason St.	n/o SR-60 WB Fwy	Open Space	69.8	RW	91	197
4	Nason St.	s/o SR-60 EB Ramps	Commercial	71.1	52	113	243
5	Ironwood Av.	w/o Nason St.	Residential	67.0	RW	60	130
6	Ironwood Av.	e/o Nason St.	Residential	68.0	RW	69	149
7	Ironwood Av.	e/o Lantz Ln.	Residential	67.3	RW	62	134
8	Ironwood Av.	e/o Oliver St.	Residential	67.5	RW	65	140

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-3: YEAR 2020 WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	68.1	RW	70	152
2	Nason St.	n/o SR-60 WB Ramps	Residential	68.3	RW	73	157
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.2	53	115	247
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.5	64	139	299
5	Ironwood Av.	w/o Nason St.	Residential	69.4	RW	86	186
6	Ironwood Av.	e/o Nason St.	Residential	69.6	RW	90	193
7	Ironwood Av.	e/o Lantz Ln.	Residential	69.4	RW	87	187
8	Ironwood Av.	e/o Oliver St.	Residential	69.4	RW	87	187

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-4: YEAR 2020 WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	68.5	RW	75	162
2	Nason St.	n/o SR-60 WB Ramps	Residential	68.7	RW	78	167
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.4	55	118	253
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.5	65	140	302
5	Ironwood Av.	w/o Nason St.	Residential	69.5	RW	88	189
6	Ironwood Av.	e/o Nason St.	Residential	70.1	44	96	206
7	Ironwood Av.	e/o Lantz Ln.	Residential	69.6	RW	89	192
8	Ironwood Av.	e/o Oliver St.	Residential	69.6	RW	90	193

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-5: YEAR 2035 WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	68.5	RW	75	162
2	Nason St.	n/o SR-60 WB Ramps	Residential	68.7	RW	78	167
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.7	57	122	264
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.9	69	148	319
5	Ironwood Av.	w/o Nason St.	Residential	69.8	RW	92	198
6	Ironwood Av.	e/o Nason St.	Residential	70.1	44	96	206
7	Ironwood Av.	e/o Lantz Ln.	Residential	69.8	RW	92	198
8	Ironwood Av.	e/o Oliver St.	Residential	69.8	RW	92	198

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-6: YEAR 2035 WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	Nason St.	s/o Ironwood Av.	Residential	68.9	RW	80	171
2	Nason St.	n/o SR-60 WB Ramps	Residential	69.1	RW	82	178
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.8	58	125	270
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.9	69	149	321
5	Ironwood Av.	w/o Nason St.	Residential	69.9	RW	93	201
6	Ironwood Av.	e/o Nason St.	Residential	70.5	47	102	219
7	Ironwood Av.	e/o Lantz Ln.	Residential	70.0	44	94	203
8	Ironwood Av.	e/o Oliver St.	Residential	70.0	44	95	205

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

7.2 EXISTING CONDITION PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 7-7 presents a comparison of the Existing without and with Project conditions CNEL noise levels. Table 7-1 shows that the exterior noise levels are expected to range from 64.9 to 71.0 dBA CNEL for Existing without Project conditions. Table 7-2 presents the Existing with Project conditions noise level contours that are expected to range from 65.8 to 71.1 dBA CNEL. As shown on Table 7-7 the Project is expected to generate an exterior noise level increase of up to 0.9 dBA CNEL. Based on the significance criteria in Section 4, the Project-related off-site traffic noise level increases are considered *less than significant* impacts for all roadway segments under Existing conditions.

TABLE 7-7: EXISTING PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Potential Significant Impact?[2]
				Without Project	With Project	Project Addition	
1	Nason St.	s/o Ironwood Av.	Residential	64.9	65.8	0.9	No
2	Nason St.	n/o SR-60 WB Ramps	Residential	65.3	66.1	0.8	No
3	Nason St.	n/o SR-60 WB Fwy	Open Space	69.6	69.8	0.2	No
4	Nason St.	s/o SR-60 EB Ramps	Commercial	71.0	71.1	0.1	No
5	Ironwood Av.	w/o Nason St.	Residential	66.8	67.0	0.2	No
6	Ironwood Av.	e/o Nason St.	Residential	67.4	68.0	0.6	No
7	Ironwood Av.	e/o Lantz Ln.	Residential	67.1	67.3	0.2	No
8	Ironwood Av.	e/o Oliver St.	Residential	67.1	67.5	0.4	No

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] Significance Criteria (Section 4, Table 4-1).

7.3 YEAR 2020 PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 7-8 presents a comparison of the Year 2020 without and with Project conditions CNEL noise levels. Table 7-3 shows that the exterior noise levels are expected to range from 68.1 to 72.5 dBA CNEL for Year 2020 without Project conditions. Table 7-4 presents the Year 2020 with Project conditions noise level contours that are expected to range from 68.5 to 72.5 dBA CNEL. As shown on Table 7-8 the Project is expected to generate an exterior noise level increase of up to 0.5 dBA CNEL. Based on the significance criteria in Section 4, the Project-related off-site traffic noise level increases are considered *less than significant* impacts for all roadway segments under Year 2020 conditions.

TABLE 7-8: YEAR 2020 PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Potential Significant Impact?[2]
				Without Project	With Project	Project Addition	
1	Nason St.	s/o Ironwood Av.	Residential	68.1	68.5	0.4	No
2	Nason St.	n/o SR-60 WB Ramps	Residential	68.3	68.7	0.4	No
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.2	71.4	0.2	No
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.5	72.5	0.0	No
5	Ironwood Av.	w/o Nason St.	Residential	69.4	69.5	0.1	No
6	Ironwood Av.	e/o Nason St.	Residential	69.6	70.1	0.5	No
7	Ironwood Av.	e/o Lantz Ln.	Residential	69.4	69.6	0.2	No
8	Ironwood Av.	e/o Oliver St.	Residential	69.4	69.6	0.2	No

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] Significance Criteria (Section 4, Table 4-1).

7.4 YEAR 2035 PROJECT TRAFFIC NOISE LEVELS

Table 7-9 presents a comparison of the Year 2035 without and with Project conditions CNEL noise levels. Table 7-5 shows that the exterior noise levels are expected to range from 68.5 to 72.9 dBA CNEL for Year 2035 without Project conditions. Table 7-6 presents the Year 2035 with Project conditions noise level contours that are expected to range from 68.9 to 72.9 dBA CNEL. As shown on Table 7-9 the Project is expected to generate an exterior noise level increase of up to 0.4 dBA CNEL. Based on the significance criteria in Section 4, the Project-related off-site traffic noise level increases are considered *less than significant* impacts for all roadway segments under Year 2035 conditions.

TABLE 7-9: YEAR 2035 PROJECT-RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Potential Significant Impact?[2]
				Without Project	With Project	Project Addition	
1	Nason St.	s/o Ironwood Av.	Residential	68.5	68.9	0.4	No
2	Nason St.	n/o SR-60 WB Ramps	Residential	68.7	69.1	0.4	No
3	Nason St.	n/o SR-60 WB Fwy	Open Space	71.7	71.8	0.1	No
4	Nason St.	s/o SR-60 EB Ramps	Commercial	72.9	72.9	0.0	No
5	Ironwood Av.	w/o Nason St.	Residential	69.8	69.9	0.1	No
6	Ironwood Av.	e/o Nason St.	Residential	70.1	70.5	0.4	No
7	Ironwood Av.	e/o Lantz Ln.	Residential	69.8	70.0	0.2	No
8	Ironwood Av.	e/o Oliver St.	Residential	69.8	70.0	0.2	No

[1] Source: City of Moreno Valley General Plan Land Use Map, Figure 2-2.
[2] Significance Criteria (Section 4, Table 4-1).

7.5 PROJECT TRAFFIC NOISE CONTRIBUTIONS

The off-site traffic noise analysis shows that the greatest Project-related noise level contribution of 0.9 dBA CNEL under Existing conditions will decrease to 0.4 dBA CNEL under Year 2035 conditions. This shows that the Project's incremental traffic-related noise level increases at land uses adjacent to roadways conveying Project traffic will diminish over time. This occurs as the background traffic on the study area roadway segments increases and the Project represents a smaller percentage of the overall traffic volume. The off-site traffic noise analysis indicates that the Project’s contributions to roadway noise levels will be *less than significant*.

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8 ON-SITE TRAFFIC NOISE IMPACTS

An on-site exterior noise impact analysis has been completed to determine the traffic noise exposure and to identify potential necessary noise abatement measures for the proposed Ironwood Residential (TTM No. 37001) Project. It is expected that the primary source of noise impacts to the Project site will be traffic noise from Ironwood Avenue. The Project will also experience some background traffic noise impacts from Nason Street, Oliver Street, and the Project's internal streets, however, due to the distance, topography and low traffic volume/speed, traffic noise from these roads will not make a significant contribution to the noise environment.

8.1 ON-SITE EXTERIOR NOISE ANALYSIS

Using the FHWA traffic noise prediction model and the parameters outlined in Tables 6-3 to 6-5, the expected future exterior noise levels for individual lots were calculated. Table 8-1 presents a summary of future exterior noise level impacts in the outdoor living areas (backyards) for the lots within the Project site. The on-site traffic noise level impacts indicate that the lots adjacent to Ironwood Avenue will experience unmitigated exterior noise levels ranging from 63.3 to 67.0 dBA CNEL. The on-site traffic noise analysis calculations are provided in Appendix 8.1.

To satisfy the City of Moreno Valley 65 dBA CNEL exterior noise level standards for residential land use, the construction of 4-foot high noise barriers for the outdoor living areas (backyards) of lots 26 to 30 is required. With the recommended noise barriers shown on Exhibit ES-A, the mitigated future exterior noise levels will range from 61.5 to 63.3 dBA CNEL. This noise analysis shows that the recommended noise barriers will satisfy the City of Moreno Valley 65 dBA CNEL exterior noise level standards. The recommendations identify the minimum required noise barrier height to satisfy the City of Moreno Valley exterior noise level standards.

TABLE 8-1: EXTERIOR NOISE LEVELS (CNEL)

Lot Number	Roadway	Unmitigated Noise Level (dBA CNEL)	Mitigated Noise Level (dBA CNEL)	Recommended Barrier Height (Feet)	Top of Barrier Elevation (Feet)
1	Ironwood Av.	64.5	–[1]	–[1]	–[1]
5	Ironwood Av.	64.4	–[1]	–[1]	–[1]
12	Ironwood Av.	64.4	–[1]	–[1]	–[1]
19	Ironwood Av.	64.4	–[1]	–[1]	–[1]
20	Ironwood Av.	64.3	–[1]	–[1]	–[1]
23	Ironwood Av.	63.3	–[1]	–[1]	–[1]
25	Ironwood Av.	64.6	–[1]	–[1]	–[1]
27	Ironwood Av.	66.6	61.5	4'	1876'
30	Ironwood Av.	67.0	61.6	4'	1882'

[1] No exterior noise mitigation required to meet the City of Moreno Valley exterior noise standards.

8.2 On-Site Interior Noise Analysis

To ensure that the interior noise levels comply with the City of Moreno Valley 45 dBA CNEL interior noise standards, future noise levels were calculated at the first and second floor building façades.

8.2.1 Noise Reduction Methodology

The interior noise level is the difference between the predicted exterior noise level at the building façade and the noise reduction of the structure. Typical building construction will provide a Noise Reduction (NR) of approximately 12 dBA with "windows open" and a minimum 25 dBA NR with "windows closed." However, sound leaks, cracks and openings within the window assembly can greatly diminish its effectiveness in reducing noise. Several methods are used to improve interior NR, including: (1) weather-stripped solid core exterior doors; (2) upgraded dual glazed windows; (3) mechanical ventilation/air conditioning; and (4) exterior wall/roof assembles free of cut outs or openings.

8.2.2 Interior Noise Level Assessment

To satisfy the City of Moreno Valley 45 dBA CNEL interior noise level criteria, a Noise Reduction (NR) of up to 21.4 dBA and a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning) are required for lots adjacent to Ironwood Avenue. Table 8-2 shows that the future unmitigated noise levels at the first floor building façade are expected to range from 60.1 to 64.3 dBA CNEL. The first floor interior noise level analysis shows that the City of Moreno Valley 45 dBA CNEL interior noise level standards for residential land use can be satisfied using standard windows with a minimum STC rating of 27 for all lots adjacent to Ironwood Avenue. Table 8-3 shows that the future unmitigated noise levels at the second floor building façade are expected to range from 63.0 to 66.4 dBA CNEL. The second floor interior noise level analysis shows that the City of Moreno Valley 45 dBA CNEL interior noise level standards for residential land use can be satisfied using standard windows with a minimum STC rating of 27 for all lots adjacent to Ironwood Avenue. The interior noise analysis shows that with the recommended interior noise mitigation measures described in the Executive Summary, the Project will satisfy the City of Moreno Valley 45 dBA CNEL interior noise level standards for residential development.

TABLE 8-2: FIRST FLOOR INTERIOR NOISE IMPACTS (CNEL)

Lot Number	Noise Level at Façade[1]	Required Interior Noise Reduction[2]	Estimated Interior Noise Reduction[3]	Upgraded Windows[4]	Interior Noise Level[5]
1	64.1	19.1	25.0	No	39.1
5	64.1	19.1	25.0	No	39.1
12	64.1	19.1	25.0	No	39.1
19	64.1	19.1	25.0	No	39.1
20	64.0	19.0	25.0	No	39.0
23	63.0	18.0	25.0	No	38.0
25	64.3	19.3	25.0	No	39.3
27	60.2	15.2	25.0	No	35.2
30	60.1	15.1	25.0	No	35.1

[1] Exterior noise level at the facade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
[2] Noise reduction required to satisfy the 45 dBA CNEL interior noise standards.
[3] A minimum 25 dBA noise reduction is assumed with standard building construction.
[4] Does the required interior noise reduction trigger upgraded with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.

TABLE 8-3: SECOND FLOOR INTERIOR NOISE IMPACTS (CNEL)

Lot Number	Noise Level at Façade[1]	Required Interior Noise Reduction[2]	Estimated Interior Noise Reduction[3]	Upgraded Windows[4]	Interior Noise Level[5]
1	64.1	19.1	25.0	No	39.1
5	64.1	19.1	25.0	No	39.1
12	64.1	19.1	25.0	No	39.1
19	64.1	19.1	25.0	No	39.1
20	64.0	19.0	25.0	No	39.0
23	63.0	18.0	25.0	No	38.0
25	64.3	19.3	25.0	No	39.3
27	66.2	21.2	25.0	No	41.2
30	66.4	21.4	25.0	No	41.4

[1] Exterior noise level at the facade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
[2] Noise reduction required to satisfy the 45 dBA CNEL interior noise standards.
[3] A minimum 25 dBA noise reduction is assumed with standard building construction.
[4] Does the required interior noise reduction trigger upgraded with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.

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9 RECEIVER LOCATIONS

To assess the potential for short-term construction noise impacts, the following nine receiver locations, as shown on Exhibit 9-A, were identified as representative locations for analysis. Sensitive receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land. Noise-sensitive land uses are generally considered to include: schools, hospitals, single-family dwellings, mobile home parks, churches, libraries, and recreation areas. Moderately noise-sensitive land uses typically include: multi-family dwellings, hotels, motels, dormitories, out-patient clinics, cemeteries, golf courses, country clubs, athletic/tennis clubs, and equestrian clubs. Land uses that are considered relatively insensitive to noise include business, commercial, and professional developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, natural open space, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

Representative sensitive receivers in the vicinity of the Project site include existing residential homes represented by receiver locations R1 to R9. The closest sensitive receiver is represented by location R1 where an existing residential home is located approximately 40 feet west of the Project site.

R1: Located approximately 40 feet west of the Project site, R1 represents existing residential homes at the northwest corner of Nason Street and Sandi Lane.

R2: Location R2 represents the existing single-family residential home located approximately 86 feet west of the Project site across Nason Street.

R3: Location R3 represents the existing residential homes situated west of the Project site across Nason Street at a distance of roughly 208 feet.

R4: Location R4 represents the existing residential home situated approximately 168 feet south of the Project site across Ironwood Avenue.

R5: At a distance of approximately 141 feet, location R5 represents single-family residential homes south of the Project site across Ironwood Avenue.

R6: At a distance of 145 feet south of the Project site, R6 describes the residential homes located at the southwest corner of Ironwood Avenue and Lantz Lane.

R7: Location R7 represents existing single-family residential homes located south of the Project site at a distance of approximately 227 feet on Walfred Way.

R8: Location R8 represents the existing residential home situated approximately 216 feet south of the Project site at the northwest corner of Walfred Way and Oliver Street.

R9: Location R9 represents the existing residential community located approximately 1,369 feet east of the Project site.

EXHIBIT 9-A: RECEIVER LOCATIONS

10 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project.

10.1 CONSTRUCTION NOISE STANDARDS

Project construction shall be limited to the hours of 7:00 a.m. to 8:00 p.m. on any day and may not generate a noise level at 200 feet from the property line which exceeds the noise standards provided in the Noise Ordinance, Section 11.80.030(C), *Non-impulsive Sound Decibel Limits*, which states the following:

> *No person shall maintain, create, operate or cause to be operated on private property any source of sound in such a manner as to create any non-impulsive sound which exceeds the limits set forth for the source land use category in Table 11.80.030-2 when measured at a distance of two hundred (200) feet or more from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right-of-way, public space or other publicly owned property. Any source of sound in violation of this subsection shall be deemed prima facie to be a noise disturbance*. (10)

Even though the City of Moreno Valley Municipal Code does not identify specific construction noise limits; it does provide noise level limits for the source land use category when measured at a distance of 200 feet. For the purpose of this analysis, the Ironwood Residential (TTM No. 37001) Project is considered *Residential* land use since it is *land primarily for dwelling units*, as defined by the City of Moreno Valley Municipal Code. For residential land uses, the City of Moreno Valley 60 dBA Leq noise level standard at a distance of 200 feet is used as the limit for this analysis to assess the construction noise level impacts at sensitive receivers in the Project study area. Therefore, to conform to the applicable provisions of the Municipal Code, the maximum allowable noise generated by on-site construction activities when measured at 200 feet from any property line, shall not exceed 60 dBA Leq.

10.2 CONSTRUCTION NOISE LEVELS

Noise generated by the Project construction equipment will include a combination of trucks, power tools, concrete mixers and portable generators that when combined can reach high levels. The number and mix of construction equipment is expected to occur in the following four stages:

- Grading
- Paving
- Building Construction
- Architectural Coating

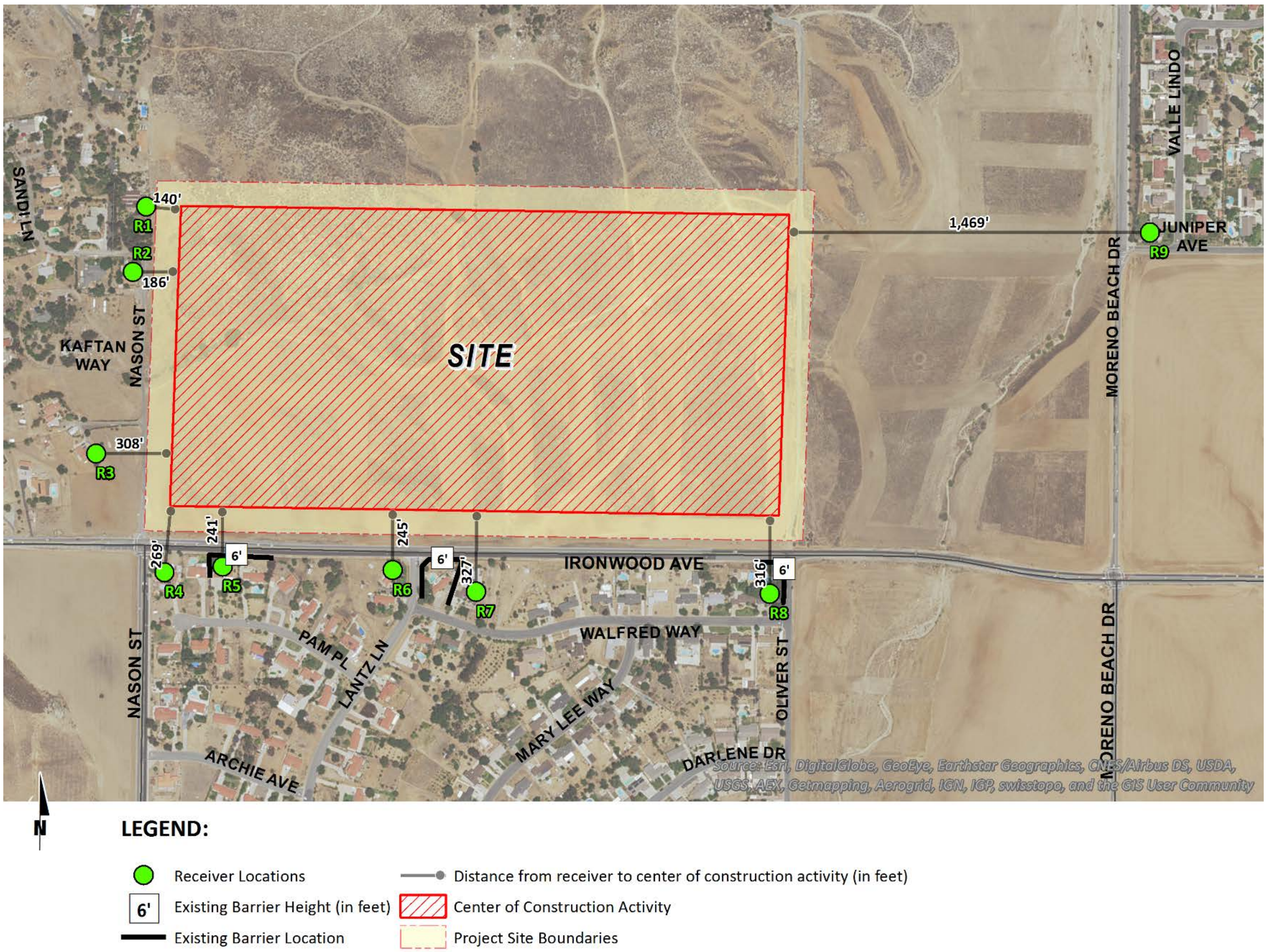
This construction noise analysis was prepared using the Federal Highway Administration (FHWA) published Roadway Construction Noise Model (RCNM) that includes a national database of construction equipment reference noise emission levels. (17) The RCNM equipment database, as shown in Appendix 10.1, provides a comprehensive list of the noise generating characteristics for specific types of construction equipment. In addition, the database provides an acoustical usage factor to estimate the fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation.

Noise levels generated by heavy construction equipment can range from approximately 62 dBA to 76 dBA when measured at 200 feet. However, these noise levels diminish with distance from the construction site at a rate of 6 dBA per doubling of distance. For example, a noise level of 76 dBA measured at 200 feet from the noise source to the receiver would be reduced to 70 dBA at 400 feet from the source to the receiver, and would be further reduced to 64 dBA at 800 feet from the source to the receiver. The construction noise levels including the number and mix of construction equipment by construction phase are consistent with the data used to support the construction emissions in the *Ironwood Residential (TTM No. 37001) Air Quality Impact Analysis* prepared by Urban Crossroads Inc. (18)

10.3 Construction Noise Analysis

Using the stationary-source RCNM noise prediction model, calculations of the Project construction noise level impacts at the nine sensitive receiver locations were completed. Tables 10-1 to 10-4 present the short-term construction noise levels at a distance of 200 feet from the center of construction activity for each stage of construction. Table 10-5 provides a summary of the construction noise levels by phase at the nine noise receiver locations. Based on the four stages of construction, the noise impacts associated with the proposed Project are expected to create temporary high noise levels at the nearby receiver locations. To assess the construction noise levels at each receiver location, this analysis shows the construction noise levels by phase when all heavy equipment is operating simultaneously at a distance of roughly 100 feet from the Project site boundary. Exhibit 10-A shows the receiver locations and construction activity location used in this analysis.

EXHIBIT 10-A: CONSTRUCTION ACTIVITY AND RECEIVER LOCATIONS



URBAN CROSSROADS

TABLE 10-1: GRADING EQUIPMENT NOISE LEVELS

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (dBA Lmax)	Combined Level @ 200 Feet (dBA Leq)
Excavators	2	40%	3.2	81.0	68.0
Graders	1	40%	3.2	85.0	69.0
Water Trucks	1	40%	3.2	76.0	60.0
Rubber Tired Dozers	1	40%	3.2	82.0	66.0
Scrapers	2	40%	3.2	84.0	71.0
Tractor/Loader/Backhoes	2	40%	3.2	79.0	66.0
Combined Hourly Noise Levels 200 Feet (dBA Leq)					75.5
Distance to 65 dBA Leq Contour (Feet)					672'

Construction Noise Reference Distance	Distance To Construction Activity (Feet)[4]	Distance Attenuation (dBA Leq)[5]	Estimated Existing Barrier Attenuation (dBA Leq)[6]	Construction Noise Level (dBA Leq)
R1	140'	-8.9	0.0	66.6
R2	186'	-11.4	0.0	64.1
R3	308'	-15.8	0.0	59.7
R4	269'	-14.6	0.0	60.9
R5	241'	-13.7	-5.0	56.9
R6	245'	-13.8	0.0	61.7
R7	327'	-16.3	0.0	59.2
R8	316'	-16.0	-5.0	54.5
R9	1,469'	-29.4	0.0	46.2

[1] Source: FHWA's Roadway Construction Noise Model, January 2006.
[2] Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.
[3] Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.
[4] Distance from the nearest point of construction activity to the nearest receiver.
[5] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[6] Estimated barrier attenuation provided by the existing barriers in the Project study area.

TABLE 10-2: PAVING EQUIPMENT NOISE LEVELS

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (dBA Lmax)	Combined Level @ 200 Feet (dBA Leq)
Pavers	2	50%	4.0	77.0	65.0
Paving Equipment	2	40%	3.2	76.0	63.0
Rollers	2	20%	1.6	80.0	64.0
Combined Hourly Noise Levels 200 Feet (dBA Leq)					68.8
Distance to 65 dBA Leq Contour (Feet)					311'

Construction Noise Reference Distance	Distance To Construction Activity (Feet)[4]	Distance Attenuation (dBA Leq)[5]	Estimated Existing Barrier Attenuation (dBA Leq)[6]	Construction Noise Level (dBA Leq)
R1	140'	-8.9	0.0	59.9
R2	186'	-11.4	0.0	57.4
R3	308'	-15.8	0.0	53.0
R4	269'	-14.6	0.0	54.2
R5	241'	-13.7	-5.0	50.2
R6	245'	-13.8	0.0	55.0
R7	327'	-16.3	0.0	52.5
R8	316'	-16.0	-5.0	47.8
R9	1,469'	-29.4	0.0	39.5

[1] Source: FHWA's Roadway Construction Noise Model, January 2006.
[2] Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.
[3] Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.
[4] Distance from the nearest point of construction activity to the nearest receiver.
[5] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[6] Estimated barrier attenuation provided by the existing barriers in the Project study area.

TABLE 10-3: BUILDING CONSTRUCTION EQUIPMENT NOISE LEVELS

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (dBA Lmax)	Combined Level @ 200 Feet (dBA Leq)
Cranes	1	16%	1.3	81.0	61.0
Forklifts	3	20%	1.6	75.0	60.7
Generator Sets	1	50%	4.0	81.0	65.9
Tractor/Loader/Backhoes	3	40%	3.2	79.0	67.8
Welders	1	40%	3.2	74.0	58.0
Combined Hourly Noise Levels 200 Feet (dBA Leq)					71.1
Distance to 65 dBA Leq Contour (Feet)					405'

Construction Noise Reference Distance	Distance To Construction Activity (Feet)[4]	Distance Attenuation (dBA Leq)[5]	Estimated Existing Barrier Attenuation (dBA Leq)[6]	Construction Noise Level (dBA Leq)
R1	140'	-8.9	0.0	62.2
R2	186'	-11.4	0.0	59.7
R3	308'	-15.8	0.0	55.3
R4	269'	-14.6	0.0	56.5
R5	241'	-13.7	-5.0	52.5
R6	245'	-13.8	0.0	57.3
R7	327'	-16.3	0.0	54.8
R8	316'	-16.0	-5.0	50.1
R9	1,469'	-29.4	0.0	41.8

[1] Source: FHWA's Roadway Construction Noise Model, January 2006.
[2] Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.
[3] Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.
[4] Distance from the nearest point of construction activity to the nearest receiver.
[5] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[6] Estimated barrier attenuation provided by the existing barriers in the Project study area.

TABLE 10-4: ARCHITECTURAL COATING EQUIPMENT NOISE LEVELS

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (dBA Lmax)	Combined Level @ 200 Feet (dBA Leq)
Air Compressors	1	40%	3.2	78.0	62.0
Combined Hourly Noise Levels 200 Feet (dBA Leq)					62.0
Distance to 65 dBA Leq Contour (Feet)					141'

Construction Noise Reference Distance	Distance To Construction Activity (Feet)[4]	Distance Attenuation (dBA Leq)[5]	Estimated Existing Barrier Attenuation (dBA Leq)[6]	Construction Noise Level (dBA Leq)
R1	140'	-8.9	0.0	53.0
R2	186'	-11.4	0.0	50.6
R3	308'	-15.8	0.0	46.2
R4	269'	-14.6	0.0	47.4
R5	241'	-13.7	-5.0	43.3
R6	245'	-13.8	0.0	48.2
R7	327'	-16.3	0.0	45.7
R8	316'	-16.0	-5.0	41.0
R9	1,469'	-29.4	0.0	32.6

[1] Source: FHWA's Roadway Construction Noise Model, January 2006.
[2] Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.
[3] Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.
[4] Distance from the nearest point of construction activity to the nearest receiver.
[5] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[6] Estimated barrier attenuation provided by the existing barriers in the Project study area.

10.4 CONSTRUCTION NOISE THRESHOLDS OF SIGNIFICANCE

The construction noise analysis shows that the highest construction noise levels will occur during grading activities within the Project site. As shown on Table 10-5, the unmitigated peak construction noise levels are expected to range from 46.2 to 66.6 dBA Leq. Construction activities are estimated to occur during the permitted hours of 7:00 a.m. to 8:00 p.m. on any day, based on the City of Moreno Valley Municipal Code. (10)

TABLE 10-5: UNMITIGATED CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Noise Receiver[1]	Distance To Construction Activity (Feet)	Construction Phase Hourly Noise Level (dBA Leq)					Potential Significant Impact?[3]
		Grading	Paving	Building Const.	Arch. Coating	Peak[2]	
R1	140'	66.6	59.9	62.2	53.0	66.6	Yes
R2	186'	64.1	57.4	59.7	50.6	64.1	Yes
R3	308'	59.7	53.0	55.3	46.2	59.7	No
R4	269'	60.9	54.2	56.5	47.4	60.9	Yes
R5	241'	56.9	50.2	52.5	43.3	56.9	No
R6	245'	61.7	55.0	57.3	48.2	61.7	Yes
R7	327'	59.2	52.5	54.8	45.7	59.2	No
R8	316'	54.5	47.8	50.1	41.0	54.5	No
R9	1,469'	46.2	39.5	41.8	32.6	46.2	No

[1] Noise receiver locations are shown on Exhibit 10-A.
[2] Estimated construction noise levels during peak operating conditions.
[3] Do the peak construction noise levels exceed the City of Moreno Valley 60 dBA Leq threshold?

Based on the construction noise standards described in Section 3.4, the potential short-term unmitigated construction noise level impacts are expected to exceed the acceptable construction noise level threshold of 60 dBA Leq at nearby sensitive receiver locations R1, R2, R4, and R6 during the permitted hours of construction activity. Therefore, temporary noise abatement would be needed to reduce the potential construction noise impacts. With the installation of temporary exterior noise control barriers providing a minimum attenuation of 10 dBA, construction noise levels at the nearby residential receivers would be reduced, but not eliminated.

This analysis does not evaluate the feasibility of temporary noise barrier installation. If it is not feasible to install temporary barriers, construction noise levels would not be reduced, because no other measures exist to reasonably reduce construction noise levels. The noise attenuation provided through temporary noise barriers depends on many factors including cost, wind loading, the location of the receiver, and the ability to place barriers such that the line-of-sight of the receiver is blocked to the noise source, among others. This analysis assumes a temporary noise barrier capable of 10 dBA of attenuation and constructed using frame-mounted materials such as vinyl acoustic curtains or quilted blankets.

While noise attenuation of greater than 10 dBA may be possible to achieve with the use of temporary barriers, the noise barrier costs are expected to increase exponentially in relation to additional attenuation provided above 10 dBA. This suggests a point of diminishing return of noise attenuation for temporary noise barriers beyond 10 dBA. While a 10 dBA reduction in sound level is considered *attainable*, a reduction of 15 dBA is *very difficult* and a 20 dBA reduction is *nearly impossible*. (4) Further noise attenuation strategies include the installation of temporary barriers or window inserts and treatments at each receiver location to reduce the noise levels and block the line of sight to the source. However, the ability to install such measures at the approval of nearby homeowners may not be feasible and will vary depending on each homeowner's willingness to allow for installation. Further, noise abatement at the receiver is usually only cost-effective if fewer residences are involved as each home may require different materials based on each home's specifications. (19) Therefore, an *attainable* attenuation of 10 dBA through the use of temporary construction noise barriers is recommended to reduce construction noise levels at the nearby residential receivers.

Table 10-6 shows the peak construction noise levels are expected to range from 46.2 to 56.6 dBA Leq with the attenuation provided by the temporary construction noise barriers. With the temporary noise control barrier providing a minimum attenuation of 10 dBA, the construction noise levels will satisfy the 60 dBA Leq construction noise level threshold. Therefore, the construction of the Project will result in a *less than significant* noise impact with mitigation at nearby receiver locations during peak construction activity.

TABLE 10-6: MITIGATED CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Noise Receiver[1]	Distance To Const. Activity (Feet)	Without Temporary Noise Barriers			With Temporary Noise Barriers		
		Const. Noise Level (dBA Leq)[2]	Threshold (dBA Leq)[3]	Compliance[4]	Attenuation	Const. Noise Levels With Attenuation[5]	Compliance With Attenuation[4]
R1	140'	66.6	60	No	-10.0	56.6	Yes
R2	186'	64.1	60	No	-10.0	54.1	Yes
R3	308'	59.7	60	Yes	n/a	n/a	n/a
R4	269'	60.9	60	No	-10.0	50.9	Yes
R5	241'	56.9	60	Yes	-10.0	46.9	Yes
R6	245'	61.7	60	No	-10.0	51.7	Yes
R7	327'	59.2	60	Yes	n/a	n/a	n/a
R8	316'	54.5	60	Yes	n/a	n/a	n/a
R9	1,469'	46.2	60	Yes	n/a	n/a	n/a

[1] Noise receiver locations are shown on Exhibit 10-A.
[2] Estimated construction noise levels during peak operating conditions, as shown on Table 10-5.
[3] Source: City of Moreno Valley Municipal Code, Section 11.80.030 (D) (7) (Appendix 3.1)
[4] Do the estimated Project construction noise levels meet the threshold of 60 dBA Leq?
[5] Peak construction noise levels with the recommended minimum temporary noise barrier attenuation of 10 dBA when operating near sensitive receiver locations.

10.5 CONSTRUCTION NOISE MITIGATION MEASURES

Though construction noise is temporary, intermittent and of short duration, and will not present any long-term impacts, the following practices would reduce any noise level increases produced by the construction equipment to the nearby noise-sensitive residential land uses:

- Prior to approval of grading plans and/or issuance of building permits, plans shall include a note indicating that noise-generating Project construction activities shall only occur between the hours of 7:00 a.m. and 8:00 p.m. on any day. The Project construction supervisor shall ensure compliance with the note and the City shall conduct periodic inspection at its discretion.

- Install temporary noise control barriers that provide a minimum noise level attenuation of 10 dBA when Project construction occurs near existing noise-sensitive structures. The noise control barrier must present a solid face from top to bottom. The noise control barrier must be high enough and long enough to block the view of the noise source. Unnecessary openings shall not be made.
  - The noise barrier may be constructed using an acoustical blanket (e.g. vinyl acoustic curtains or quilted blankets) attached to the construction site perimeter fence or equivalent temporary fence posts.
  - The noise barriers must be maintained and any damage promptly repaired. Gaps, holes, or weaknesses in the barrier or openings between the barrier and the ground shall be promptly repaired.
  - The noise control barriers and associated elements shall be completely removed and the site appropriately restored upon the conclusion of the construction activity.
- During all Project site construction, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise sensitive receptors nearest the Project site.
- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receivers nearest the Project site (i.e., to the northern center) during all Project construction.
- The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment (between the hours of 7:00 a.m. and 8:00 p.m. on any day). The contractor shall design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.

10.6 Construction Vibration Impacts

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. The proposed Project's construction activities most likely to cause vibration impacts are:

- Heavy Construction Equipment: Although all heavy mobile construction equipment has the potential of causing at least some perceptible vibration while operating close to building, the vibration is usually short-term and is not of sufficient magnitude to cause building damage. It is not expected that heavy equipment such as large bulldozers would operate close enough to any residences to cause a vibration impact.
- Trucks: Trucks hauling building materials to construction sites can be sources of vibration intrusion if the haul routes pass through residential neighborhoods on streets with bumps or potholes. Repairing the bumps and potholes generally eliminates the problem.

Ground-borne vibration levels resulting from construction activities occurring within the Project site were estimated by data published by the Federal Transit Administration. Construction activities that would have the potential to generate low levels of ground-borne vibration within the Project site include grading. Using the vibration source level of construction equipment provided on Table 6-6 and the construction vibration assessment methodology published by the FTA, it is possible to estimate the Project vibration impacts. Table 10-7 presents the expected Project related vibration levels at each of the nine sensitive receiver locations.

TABLE 10-7: CONSTRUCTION EQUIPMENT VIBRATION LEVELS

Noise Receiver[1]	Distance To Construction Activity (Feet)	Receiver Vibration Levels (VdB)[2]					Potential Significant Impact?[3]
		Small Bulldozer	Jackhammer	Loaded Trucks	Large Bulldozer	Peak Vibration	
R1	140'	35.6	56.6	63.6	64.6	64.6	No
R2	186'	31.9	52.9	59.9	60.9	60.9	No
R3	308'	25.3	46.3	53.3	54.3	54.3	No
R4	269'	27.0	48.0	55.0	56.0	56.0	No
R5	241'	28.5	49.5	56.5	57.5	57.5	No
R6	245'	28.3	49.3	56.3	57.3	57.3	No
R7	327'	24.5	45.5	52.5	53.5	53.5	No
R8	316'	24.9	45.9	52.9	53.9	53.9	No
R9	1,469'	4.9	25.9	32.9	33.9	33.9	No

[1] Noise receiver locations are shown on Exhibit 10-A.
[2] Based on the Vibration Source Levels of Construction Equipment included on Table 6-6.
[3] Does the Peak Vibration exceed the FTA maximum acceptable vibration standard of 80 (VdB)?

Based on the reference vibration levels provided by the FTA, a large bulldozer represents the peak source of vibration with a reference velocity of 87 VdB at a distance of 25 feet. At distances ranging from 140 to 1,469 feet from the Project site, construction vibration velocity levels are expected to approach 64.6 VdB, as shown on Table 10-7. Based on the FTA vibration standards, the proposed Project site will not include or require equipment, facilities, or activities that would result in a *barely perceptible* human response (annoyance) for infrequent events.

Further, vibration levels at the site of the closest sensitive receiver are unlikely to be sustained during the entire construction period, but will occur rather only during the times that heavy construction equipment is operating simultaneously at a distance of 100 feet from the Project site perimeter. Moreover, construction at the Project site will be restricted to daytime hours consistent with City requirements thereby eliminating potential vibration impacts during the sensitive nighttime hours. The results of this analysis indicate that the vibration impacts due to Project construction will be *less than significant*.

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11 REFERENCES

1. **Urban Crossroads, Inc.** *Ironwood Residential (TTM No. 37001) Traffic Impact Analysis.* August 2015.
2. **California Department of Transportation Environmental Program.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA : s.n., September 2013.
3. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requiste to Protect Public Health and Welfare with an Adequate Margin of Safety.* March, 1974. EPA/ONAC 550/9/74-004.
4. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* June, 1995.
5. **U.S. Department of Transportation, Federal Highway Administration.** *Highway Traffic Noise in the United States, Problem and Response.* April 2000. p. 3.
6. **U.S. Environmental Protection Agency Office of Noise Abatement and Control.** *Noise Effects Handbook-A Desk Reference to Health and Welfare Effects of Noise.* October 1979 (revised July 1981). EPA 550/9/82/106.
7. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment.* May 2006. FTA-VA-90-1003-06.
8. **Office of Planning and Research.** *State of California General Plan Guidlines 2003.* October 2003.
9. **City of Moreno Valley.** *General Plan Safety Element (Noise).* July 2006.
10. —. *Municipal Code, Chapter 11.80 Noise Regulation.*
11. **California Court of Appeal.** *Gray v. County of Madera, F053661.* 167 Cal.App.4th 1099; - Cal.Rptr.3d, October 2008.
12. **Federal Interagency Committee on Noise.** *Federal Agency Review of Selected Airport Noise Analysis Issues.* August 1992.
13. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*
14. **U.S. Department of Transportation, Federal Highway Administration.** *FHWA Highway Traffic Noise Prediction Model.* December 1978. FHWA-RD-77-108.
15. **California Department of Transportation Environmental Program, Office of Environmental Engineering.** *Use of California Vehicle Noise Reference Energy Mean Emission Levels (Calveno REMELs) in FHWA Highway Traffic Noise Prediction.* September 1995. TAN 95-03.
16. **City of Moreno Valley.** *General Plan Environmental Impact Report, Traffic/Circulation.* July 2006.
17. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning.** *FHWA Roadway Construction Noise Model.* January 2006.
18. **Urban Crossroads, Inc.** *Ironwood Residential (TTM No. 37001) Air Quality Impact Analysis.* September 2015.
19. **California Department of Transportation.** *Transportation and Construction Vibration Guidance Manual.* September 2013.

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12 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Ironwood Residential (TTM No. 37001) Project. The information contained in this noise study report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 660-1994 ext. 203.

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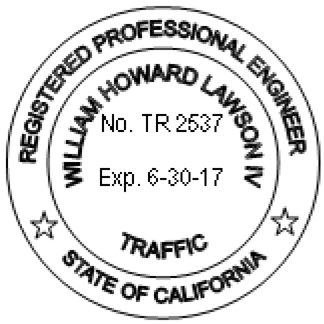

EDUCATION

Master of Science in Civil and Environmental Engineering
California Polytechnic State University, San Luis Obispo • December, 1993

Bachelor of Science in City and Regional Planning
California Polytechnic State University, San Luis Obispo • June, 1992

PROFESSIONAL REGISTRATIONS

PE – Registered Professional Traffic Engineer – TR 2537 • January, 2009
AICP – American Institute of Certified Planners – 013011 • June, 1997–January 1, 2012
PTP – Professional Transportation Planner • May, 2007 – May, 2013
INCE – Institute of Noise Control Engineering • March, 2004

PROFESSIONAL AFFILIATIONS

ASA – Acoustical Society of America
ITE – Institute of Transportation Engineers

PROFESSIONAL CERTIFICATIONS

Certified Acoustical Consultant – County of Orange • February, 2011
FHWA-NHI-142051 Highway Traffic Noise Certificate of Training • February, 2013

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APPENDIX 3.1:

CITY OF MORENO VALLEY MUNICIPAL CODE

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Chapter 11.80 NOISE REGULATION

11.80.010 Legislative findings.

It is found and declared that:

A. Excessive sound within the limits of the city is a condition which has existed for some time, and the amount and intensity of such sound is increasing.

B. Such excessive sound is a detriment to the public health, safety, and welfare and quality of life of the residents of the city.

C. The necessity in the public interest for the provisions and prohibitions hereinafter contained and enacted is declared as a matter of legislative determination and public policy, and it is further declared that the provisions and prohibitions hereinafter contained and enacted are in pursuance of and for the purpose of securing and promoting the public health, safety, welfare and quality of life of the city and its inhabitants. (Ord. 740 § 1.2, 2007)

11.80.020 Definitions.

For purposes of this chapter, certain words and phrases used herein are defined as follows:

"A-weighted sound level" means the sound pressure level in decibels as measured with a sound level meter using the A-weighting network. The unit of measurement is the dB(A).

"Commercial" means all uses of land not otherwise classified as residential, as defined in this section.

"Construction" means any site preparation, and/or any assembly, erection, repair, or alteration, excluding demolition, of any structure, or improvements to real property.

"Continuous airborne sound" means sound that is measured by the slow-response setting of a meter manufactured to the specifications of ANSI Section 1.4-1983 (R2006) "Specification for Sound Level Meters," or its successor.

"Daytime" means eight a.m. to ten p.m. the same day.

"Decibel" (dB) means a unit for measuring the amplitude of sound, equal to twenty (20) times the logarithm to the base ten (10) of the ratio of the pressure of the sound measured to the reference pressure, which is twenty (20) microPascals (twenty (20) microNewtons per square meter.)

"Demolition" means any dismantling, intentional destruction or removal of structures or other improvements to real property.

"Disturb" means to interrupt, interfere with, or hinder the enjoyment of peace or quiet or the normal listening activities or the sleep, rest or mental concentration of the hearer.

"Emergency" means any occurrence or set of circumstances involving actual or imminent physical trauma or significant property damage which necessitates immediate action. Economic loss alone shall not constitute an emergency. It shall be the burden of an alleged violator to prove an "emergency."

"Emergency work" means any work made necessary to restore property to a safe condition following an emergency, or to protect persons or property threatened by an imminent emergency, to the extent such work is, in fact, necessary to protect persons or property from exposure to imminent danger or damage.

"Frequency" means the number of complete oscillation cycles per unit of time.

"Impulsive sound" means sound of short duration, usually less than one second, with an abrupt onset and rapid decay. Examples of sources of impulsive sound include explosions, drop forge impacts, and discharge of firearms.

"Nighttime" means 10:01 p.m. to 7:59 a.m. the following day.

"Noise disturbance" means any sound which:

1. Disturbs a reasonable person of normal sensitivities;

2. Exceeds the sound level limits set forth in this chapter; or

3. Is plainly audible as defined in this section. Where no specific distance is set forth for the determination of audibility, references to noise disturbance shall be deemed to mean plainly audible at a distance of two hundred (200) feet from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right of way, public space or other publicly owned property.

"Person" means any person, person's firm, association, copartnership, joint venture, corporation, or any entity public or private in nature.

"Plainly audible" means that the sound or noise produced or reproduced by any particular source, can be clearly distinguished from ambient noise by a person using his/her normal hearing faculties.

"Public right-of-way" means any street, avenue, boulevard, sidewalk, bike path or alley, or similar place normally accessible to the public which is owned or controlled by a governmental entity.

"Public space" means any park, recreational or community facility, or lot which contains at least one building that is open to the general public during its hours of operation.

"Residential" means all uses of land primarily for dwelling units, as well as hospitals, schools, colleges and universities, and places of religious assembly.

"Sound" means an oscillation in pressure, particle displacement, particle velocity or other physical parameter, in a medium with internal forces that causes compression and rarefaction of that medium capable of producing an auditory impression. The description of sound may include any characteristic of such sound, including duration, intensity and frequency.

"Sound level" means the weighted sound pressure level as measured in dB(A) by a sound level meter and as specified in American National Standards Institute (ANSI) specifications for sound-level meters (ANSI Section 1.4-1971 (R1976)). If the frequency weighting employed is not indicated, the A-weighting shall apply.

"Sound level meter" means an instrument, demonstrably capable of accurately measuring sound levels as defined above.

All technical definitions not defined above shall be in accordance with applicable publications and standards of the American National Standards Institute (ANSI). (Ord. 740 § 1.2, 2007)

11.80.030 Prohibited acts.

A. General Prohibition. It is unlawful and a violation of this chapter to maintain, make, cause, or allow the making of any sound that causes a noise disturbance, as defined in Section 11.80.020.

B. Sound causing permanent hearing loss.

1. Sound level limits. Based on statistics from the Center for Disease Control and Prevention and the National Institute for Occupational Safety and Health, Table 1 and Table 1-A specify sound level limits which, if exceeded, will have a high probability of producing permanent hearing loss in anyone in the area where the sound levels are being exceeded. No sound shall be permitted within the city which exceeds the parameters set forth in Tables 11.80.030-1 and 11.80.030-1-A of this chapter:

Table 11.80.030-1

MAXIMUM CONTINUOUS SOUND LEVELS*

Duration per Day Continuous Hours	Sound level [db(A)]
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25	115

* When the daily sound exposure is composed of two or more periods of sound exposure at different levels, the combined effect of all such periods shall constitute a violation of this section if the sum of the percent of allowed period of sound exposure at each level exceeds 100 percent

Table 11.80.030-1A

MAXIMUM IMPULSIVE SOUND LEVELS

Number of Repetitions per 24-Hour Period	Sound level [dB(A)]
1	145
10	135
100	125

2. Exemptions. No violation shall exist if the only persons exposed to sound levels in excess of those listed in Tables 11.80.030-1 and 11.80.030-1A are exposed as a result of:

a. Trespass;

b. Invitation upon private property by the person causing or permitting the sound; or

c. Employment by the person or a contractor of the person causing or permitting the sound.

C. Nonimpulsive Sound Decibel Limits. No person shall maintain, create, operate or cause to be operated on private property any source of sound in such a manner as to create any nonimplusive sound which exceeds the limits set forth for the source land use category (as defined in Section 11.80.020) in Table 11.80.030-2 when measured at a distance of two hundred (200) feet or more from the real property line of the source of the sound, if the sound occurs on privately owned property, or from the source of the sound, if the sound occurs on public right-of-way, public space or other publicly owned property. Any source of sound in violation of this subsection shall be deemed prima facie to be a noise disturbance.

Table 11.80.030-2

MAXIMUM SOUND LEVELS (IN dB(A)) FOR SOURCE LAND USES

Residential		Commercial	
Daytime	Nighttime	Daytime	Nighttime
60	55	65	60

D. Specific Prohibitions. In addition to the general prohibitions set out in subsection A of this section, and unless otherwise exempted by this chapter, the following specific acts, or the causing or permitting thereof, are regulated as follows:

1. Motor Vehicles. No person shall operate or cause to be operated a public or private motor vehicle, or combination of vehicles towed by a motor vehicle, that creates a sound exceeding the sound level limits in Table 11.80.030-2 when the vehicle(s) are not otherwise subject to noise regulations provided for by the California Vehicle Code.

2. Radios, Televisions, Electronic Audio Equipment, Musical Instruments or Similar Devices from a Stationary Source. No person shall operate, play or permit the operation or playing of any radio, tape player, television, electronic audio equipment, musical instrument, sound amplifier or other mechanical or electronic sound making device that produces, reproduces or amplifies sound in such a manner as to create a noise disturbance. However, this subsection shall not apply to any use or activity exempted in subsection E of this section and any use or activity for which a special permit has been issued pursuant to Section 11.80.040.

3. Radios, Electronic Audio Equipment, or Similar Devices from a Mobile Source Such as a Motor Vehicle. Sound amplification or reproduction equipment on or in a motor vehicle is subject to regulation in accordance with the California Vehicle Code when upon the public right-of-way. When upon public space or publicly owned property other than the public right-of-way or upon private property open to the public, sound amplification or reproduction equipment shall not be operated in such a manner that it is plainly audible at a distance of fifty (50) feet in any direction from the vehicle.

4. Portable, Hand-Held Music or Sound Amplification or Reproduction Equipment. Such equipment shall not be operated on a public right-of-way, public space or other publicly owned property in such a manner as to be plainly audible at a distance of fifty (50) feet in any direction from the operator.

5. Loudspeakers and Public Address Systems.

a. Except as permitted by Section 11.80.040, no person shall operate, or permit the operation of, any loudspeaker, public address system or similar device, for any commercial purpose:

1. Which produces, reproduces or amplifies sound in such a manner as to create a noise disturbance; or

2. During nighttime hours on a public right-of-way, public space or other publicly owned property.

b. No person shall operate, or permit the operation of, any loudspeaker, public address system or similar device, for any noncommercial purpose, during nighttime hours in such a manner as to create a noise disturbance.

6. Animals. No person shall own, possess or harbor an animal or bird that howls, barks, meows, squawks, or makes other sounds that:

a. Create a noise disturbance;

b. Are of frequent or continued duration for ten (10) or more consecutive minutes and are plainly audible at a distance of fifty (50) feet from the real property line of the source of the sound; or

c. Are intermittent for a period of thirty (30) or more minutes and are plainly audible at a distance of fifty (50) feet from the real property line of the source of the sound.

7. Construction and Demolition. No person shall operate or cause the operation of any tools or equipment used in construction, drilling, repair, alteration or demolition work between the hours of eight p.m. and seven a.m. the following day such that the sound there from creates a noise disturbance, except for emergency work by

public service utilities or for other work approved by the city manager or designee. This section shall not apply to the use of power tools as provided in subsection (D)(9) of this section.

8. Emergency Signaling Devices. No person shall intentionally sound or permit the sounding outdoors of any fire, burglar or civil defense alarm, siren or whistle, or similar stationary emergency signaling device, except for emergency purposes or for testing as follows:

a. Testing of a stationary emergency signaling device shall not occur between seven p.m. and seven a.m. the following day;

b. Testing of a stationary emergency signaling device shall use only the minimum cycle test time, in no case to exceed sixty (60) seconds;

c. Testing of a complete emergency signaling system, including the functioning of the signaling device and the personnel response to the signaling device, shall not occur more than once in each calendar month. Such testing shall only occur only on weekdays between seven a.m. and seven p.m. and shall be exempt from the time limit specified in subsection (D)(8)(2) of this section.

9. Power Tools. No person shall operate or permit the operation of any mechanically, electrically or gasoline motor-driven tool during nighttime hours so as to cause a noise disturbance across a residential real property boundary.

10. Pumps, Air Conditioners, Air-Handling Equipment and Other Continuously Operating Equipment. Notwithstanding the general prohibitions of subsection a of this section, no person shall operate or permit the operation of any pump, air conditioning, air-handling or other continuously operating motorized equipment in a state of disrepair or in a manner which otherwise creates a noise disturbance distinguishable from normal operating sounds.

E. Exemptions. The following uses and activities shall be exempt from the sound level regulations except the maximum sound levels provided in Tables 11.80.030-1 and 11.80.030-1A:

1. Sounds resulting from any authorized emergency vehicle when responding to an emergency call or acting in time of an emergency.

2. Sounds resulting from emergency work as defined in Section 11.80.020

3. Any aircraft operated in conformity with, or pursuant to, federal law, federal air regulations and air traffic control instruction used pursuant to and within the duly adopted federal air regulations; and any aircraft operating under technical difficulties in any kind of distress, under emergency orders of air traffic control, or being operated pursuant to and subsequent to the declaration of an emergency under federal air regulations.

4. All sounds coming from the normal operations of interstate motor and rail carriers, to the extent that local regulation of sound levels of such vehicles has been preempted by the Noise Control Act of 1972 (42 U.S.C. § 4901 et seq.) or other applicable federal laws or regulations

5. Sounds from the operation of motor vehicles, to the extent they are regulated by the California Vehicle Code.

6. Any constitutionally protected noncommercial speech or expression conducted within or upon a any public right-of-way, public space or other publicly owned property constituting an open or a designated public forum in compliance with any applicable reasonable time, place and manner restrictions on such speech or expression or otherwise pursuant to legal authority.

7. Sounds produced at otherwise lawful and permitted city-sponsored events, organized sporting events, school assemblies, school playground activities, by permitted fireworks, and by permitted parades on public right-of-way, public space or other publicly owned property.

8. An event for which a temporary use permit or special event permit has been issued under other provisions of this code, where the provisions of Section 11.80.040 are met, the permit granted expressly grants an exemption from specific standards contained in this chapter, and the permittee and all persons under the permittee's reasonable control actually comply with all conditions of such permit. Violation of any condition of

such a permit related to sound or sound equipment shall be a violation of this chapter and punishable as such.

F. Nothing in this chapter shall be construed to limit, modify or repeal any other regulation elsewhere in this code relating to the regulation of noise sources, nor shall any such other regulation be read to permit the emission of noise in violation of any provision of this chapter. (Ord. 740 § 1.2, 2007)

11.80.040 Special provisions for temporary use and special event permits.

The exemption by permit set forth in Section 11.80.030(E)(8) shall be subject to the following requirements and conditions:

A. The permit application shall include the name, address and telephone number of the permit applicant; the date, hours and location for which the permit is requested; and the nature of the event or activity. It shall also specify the types of sounds and/or sound equipment to be permitted, the proposed duration of such sound, the specific standards from which the sound is to be exempted, and the reasons for each requested exemption.

B. The permit shall be issued provided the proposed activity meets the requirements of this section and the issuing official determines that the sound to be emitted at the event as proposed would not be detrimental to the public health, safety or welfare, that the event cannot reasonably achieve its legitimate aims and purposes without the exemption and that the sound levels proposed will not unreasonably damage the peace and quiet enjoyment of the lawful users of surrounding properties, nor constitute a public nuisance.

C. The official issuing the permit may prescribe any reasonable conditions or requirements he/she deems necessary to minimize noise disturbances upon the community or the surrounding neighborhood, and/or to protect the health, safety or welfare of the public, including participants in the permitted event, including use of mufflers, screens or other sound-attenuating devices.

D. Any permit granted must be in writing and shall contain all conditions upon which the permit shall be effective.

E. No more than six events requiring a sound limit exemption may be held at any particular location upon privately owned or controlled property per calendar year, provided further that the number of events shall not exceed the number permitted under the regulations for the type of permit issued. For purposes of this subsection, "location" means a legal parcel of real property or a complete shopping or commercial center or mall sharing common parking and access even if comprised of multiple legal parcels.

F. The exemption from sound limits under such permit shall not exceed maximum period of four hours in one twenty-four (24) hour day.

G. The permit will only be granted for hours between nine a.m. and ten p.m. on all days other than Friday and Saturday; and, on Friday and Saturday, between the hours of nine a.m. and one a.m. of the following day, except in the following circumstances:

1. A permit may be granted for hours between nine a.m. on New Year's Eve and one a.m. the following day (New Year's Day).

2. A permit may be granted for hours between nine a.m. and two a.m. the following day if there are no residences, hospitals, or nursing homes within a 0.5 mile radius of the property where the function is taking place.

H. Functions for which the permits are issued shall be limited to a continuous airborne sound level not to exceed seventy (70) dB(A), as measured two hundred (200) feet from the real property boundary of the source property if on private property, or from the source if on public right of way, public space or other publicly owned property. (Ord. 740 § 1.2, 2007)

11.80.050 Measurement or assessment of sound.

A. Measurement With Sound Meter.

1. The measurement of sound shall be made with a sound level meter meeting the standards prescribed by ANSI Section 1.4-1983 (R2006). The instruments shall be maintained in calibration and good working order. A calibration check shall be made of the system at the time of any sound level measurement. Measurements recorded shall be taken so as to provide a proper representation of the source of the sound. The microphone during measurement shall be positioned so as not to create any unnatural enhancement or diminution of the measured sound. A windscreen for the microphone shall be used at all times. However, a violation of this chapter may occur without the occasion of the measurements being made as otherwise provided.

2. The slow meter response of the sound level meter shall be used in order to best determine the average amplitude.

3. The measurement shall be made at any point on the property into which the sound is being transmitted and shall be made at least three feet away from any ground, wall, floor, ceiling, roof and other plane surface.

4. In case of multiple occupancy of a property, the measurement may be made at any point inside the premises to which any complainant has right of legal private occupancy; provided that the measurement shall not be made within three feet of any ground, wall, floor, ceiling, roof or other plane surface.

5. All measurements of sound provided for in this chapter will be made by qualified officials of the city who are designated by the city manger or designee to operate the apparatus used to make the measurements.

B. Assessment Without Sound Level Meter. Any police officer, code enforcement officer, or other official designated by the city manager or designee who hears a noise or sound that is plainly audible, as defined in Section 11.80.020, in violation of this chapter, may enforce this chapter and shall assess the noise or sound according to the following standards:

1. The primary means of detection shall be by means of the official's normal hearing faculties, not artificially enhanced.

2. The official shall first attempt to have a direct line of sight and hearing to the vehicle or real property from which the sound or noise emanates so that the official can readily identify the offending source of the sound or noise and the distance involved. If the official is unable to have a direct line of sight and hearing to the vehicle or real property from which the sound or noise emanates, then the official shall confirm the source of the sound or noise by approaching the suspected vehicle or real property until the official is able to obtain a direct line of sight and hearing, and confirm the source of the sound or noise that was heard at the place of the original assessment of the sound or noise.

3. The official need not be required to identify song titles, artists, or lyrics in order to establish a violation. (Ord. 740 § 1.2, 2007)

11.80.060 Violation.

A. Violation of Sound Level Limits. Any person violating any of the provisions of this chapter shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punishable by a fine not to exceed one thousand dollars ($1,000.00) and/or six months in the county jail, or both. Notwithstanding the foregoing, any violation of the provisions of this chapter may, in the discretion of the citing officer or the city attorney, be cited and/or prosecuted as an infraction or be subject to civil citation pursuant to Chapter 1.10.

B. Joint and Several Responsibility. In addition to the person causing the offending sound, the owner, tenant or lessee of property, or a manager, overseer or agent, or any other person lawfully entitled to possess the property from which the offending sound is emitted at the time the offending sound is emitted, shall be responsible for compliance with this chapter if the additionally responsible party knows or should have known of the offending noise disturbance. It shall not be a lawful defense to assert that some other person caused the sound. The lawful possessor or operator of the premises shall be responsible for operating or maintaining the premises in compliance with this chapter and may be cited regardless of whether or not the person actually causing the sound is also cited.

C. Violation May be Declared a Public Nuisance. The operation or maintenance of any device, equipment, instrument, vehicle or machinery in violation of any provisions of this chapter which endangers the public health, safety and quality of life of residents in the area is declared to be a public nuisance, and may be subject to abatement summarily or by a restraining order or injunction issued by a court of competent jurisdiction. (Ord. 824 § 1.2, 2011; Ord. 740 § 1.2, 2007)

APPENDIX 5.1:

STUDY AREA PHOTOS

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JN:09385 Ironwood Residential

L1
33, 56' 48.508300", 117, 11' 28.760300"

L1_E
33, 56' 48.508300", 117, 11' 28.760300"

L1_N
33, 56' 48.508300", 117, 11' 28.760300"

L1_NE
33, 56' 48.508300", 117, 11' 28.760300"

L1_S
33, 56' 48.508300", 117, 11' 28.760300"

L1_SW
33, 56' 48.508300", 117, 11' 28.760300"

JN:09385 Ironwood Residential

L1_W
33, 56' 48.508300", 117, 11' 28.760300"

L2
33, 56' 58.821700", 117, 11' 29.062500"

L2_E
33, 56' 58.821700", 117, 11' 29.062500"

L2_N
33, 56' 58.821700", 117, 11' 29.062500"

L2_NE
33, 56' 58.821700", 117, 11' 29.062500"

L2_NW
33, 56' 58.821700", 117, 11' 29.062500"

JN:09385 Ironwood Residential

L2_S
33, 56' 58.821700", 117, 11' 29.062500"

L2_SE
33, 56' 58.821700", 117, 11' 29.062500"

L3
33, 56' 47.189900", 117, 10' 58.547900"

L3_N
33, 56' 47.189900", 117, 10' 58.547900"

L3_NE
33, 56' 47.189900", 117, 10' 58.547900"

L3_NW
33, 56' 47.189900", 117, 10' 58.547900"

JN:09385 Ironwood Residential

L4
33, 56' 52.078800", 117, 10' 58.108500"

L4_E
33, 56' 49.854100", 117, 10' 58.108500"

L4_E-2
33, 56' 52.078800", 117, 10' 58.108500"

L4_N
33, 56' 49.854100", 117, 10' 58.108500"

L4_N-2
33, 56' 52.078800", 117, 10' 58.108500"

L4_NE
33, 56' 49.854100", 117, 10' 58.108500"

JN:09385 Ironwood Residential

L4_NE-2
33, 56' 49.854100", 117, 10' 58.108500"

L4_NW
33, 56' 49.854100", 117, 10' 58.108500"

L4_S
33, 56' 52.078800", 117, 10' 58.108500"

L4_SE
33, 56' 52.078800", 117, 10' 58.108500"

L4_W
33, 56' 49.854100", 117, 10' 58.108500"

L4_W-2
33, 56' 52.078800", 117, 10' 58.108500"

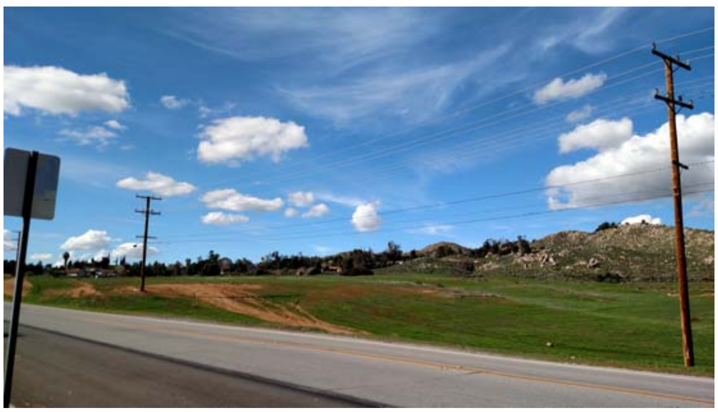
JN:09385 Ironwood Residential

L5
33, 56' 47.546900", 117, 11' 13.242100"

L5_E
33, 56' 47.546900", 117, 11' 13.242100"

L5_N
33, 56' 47.546900", 117, 11' 13.242100"

L5_NE
33, 56' 47.546900", 117, 11' 13.242100"



L5_NW
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L5_S
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JN:09385 Ironwood Residential

L5_W
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S_Site_E
33, 56' 45.761700", 117, 11' 28.403300"

S_Site_E-2
33, 56' 48.659300", 117, 11' 27.112400"

S_Site_N
33, 56' 45.761700", 117, 11' 28.403300"

S_Site_NE
33, 56' 45.761700", 117, 11' 28.403300"

S_Site_NE-2
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JN:09385 Ironwood Residential

S_Site_S
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S_Site_SE
33, 56' 45.761700", 117, 11' 28.403300"

S_Site_SW
33, 56' 45.761700", 117, 11' 28.403300"

SE_Site_E
33, 56' 48.164900", 117, 10' 58.300700"

SE_Site_N
33, 56' 48.164900", 117, 10' 58.300700"

SE_Site_N-2
33, 56' 48.164900", 117, 10' 58.300700"

JN:09385 Ironwood Residential

SE_Site_S
33, 56' 48.164900", 117, 10' 58.300700"

SE_Site_SW
33, 56' 48.164900", 117, 10' 58.300700"

SE_Site_W
33, 56' 48.164900", 117, 10' 58.300700"

SW_Site_E
33, 56' 49.497000", 117, 11' 29.282200"

SW_Site_Ironwood Av_E
33, 56' 48.576900", 117, 11' 29.199800"

SW_Site_Ironwood Av_Nason St_S
33, 56' 48.576900", 117, 11' 29.199800"

JN:09385 Ironwood Residential

SW_Site_Ironwood Av_W
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SW_Site_N
33, 56' 49.497000", 117, 11' 29.282200"

SW_Site_NE
33, 56' 49.497000", 117, 11' 29.282200"

SW_Site_S
33, 56' 49.497000", 117, 11' 29.282200"

SW_Site_SE
33, 56' 49.497000", 117, 11' 29.282200"

SW_Site_SW
33, 56' 49.497000", 117, 11' 29.282200"

JN:09385 Ironwood Residential

SW_Site_W
33, 56' 49.497000", 117, 11' 29.282200"

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APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

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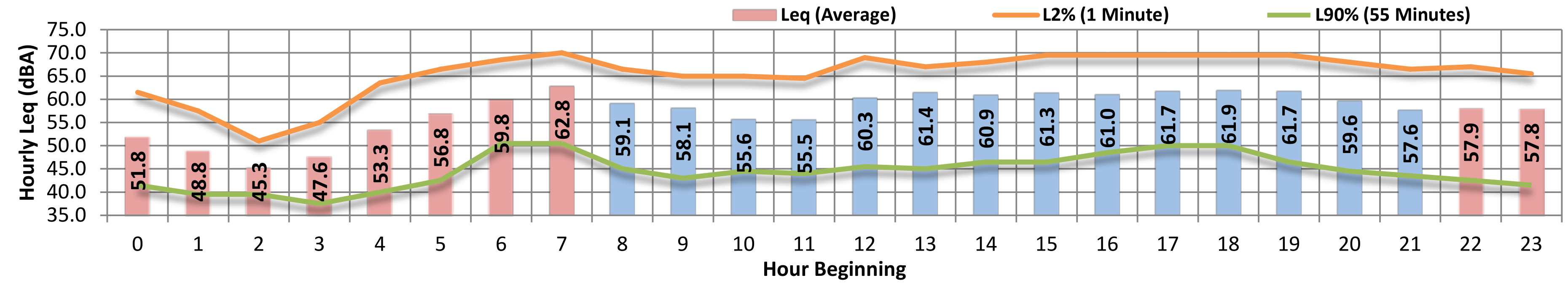
24-Hour Noise Level Measurement Summary

Project Name: Ironwood Residential	*JN:* 9385	*Energy Average Leq*		*24-Hour*
Location: L1 - Located at the northeastern corner of Ironwood Avenue and Nason Street near existing residential homes across Ironwood Avenue.	*Analyst:* A. Wolfe	*Day*	*Night*	*CNEL*
	Date: 1/28/2015	60.1	57.1	63.6

Hourly Leq dBA Readings (unadjusted)



Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	55.5	70.9	40.5	66.0	64.5	62.0	60.5	53.0	47.0	43.0	42.5	41.5
	Max	61.9	87.8	46.2	72.5	69.5	67.5	66.0	61.0	56.0	50.0	48.5	47.0
Energy Average		60.1	83.5	42.6	70.4	68.0	65.3	63.6	57.7	52.2	46.5	45.3	43.8
Night	Min	45.3	69.7	37.6	53.0	51.0	48.0	45.0	41.5	40.5	37.5	37.5	37.5
	Max	62.8	89.6	46.8	72.5	70.0	67.0	65.5	60.5	55.5	50.5	49.5	48.5
Energy Average		57.1	81.8	41.6	68.1	65.4	61.5	59.3	53.5	49.5	45.1	44.1	43.0

Hourly Summary

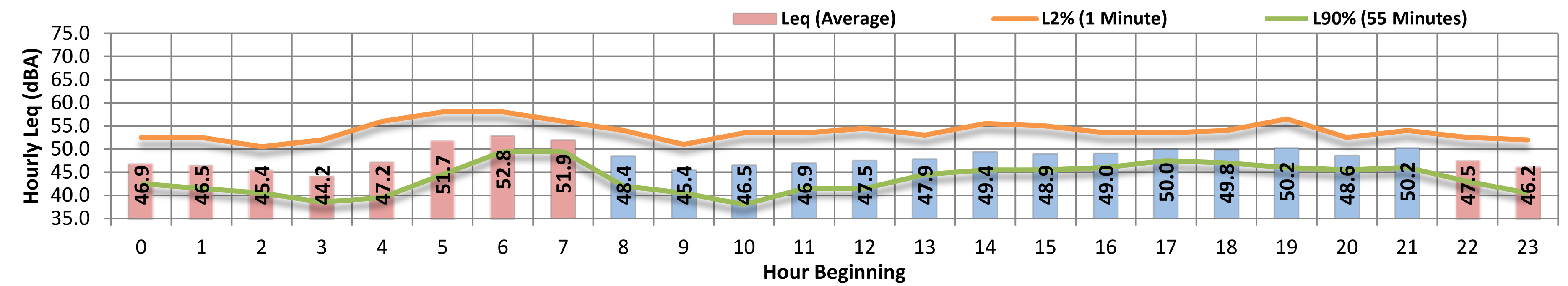
Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Night	0	51.8	72.1	39.4	64.5	61.5	55.5	53.0	47.0	44.5	41.5	41.0	40.0
	1	48.8	70.2	37.6	62.5	57.5	50.0	47.5	44.0	41.5	39.5	39.0	37.5
	2	45.3	69.7	37.6	53.0	51.0	48.0	47.0	44.0	42.0	39.5	39.0	38.0
	3	47.6	71.3	37.6	60.5	55.0	48.0	45.0	41.5	40.5	37.5	37.5	37.5
	4	53.3	78.8	37.7	67.0	63.5	56.0	52.5	45.0	42.0	40.0	39.5	39.0
	5	56.8	78.5	39.0	68.5	66.5	61.5	59.0	54.0	51.0	42.5	41.0	39.5
	6	59.8	79.4	46.8	71.0	68.5	66.0	63.5	56.5	53.5	50.5	49.5	48.5
	7	62.8	89.6	46.4	72.5	70.0	67.0	65.5	60.5	55.5	50.5	49.5	48.0
Day	8	59.1	83.9	43.0	68.5	66.5	64.5	63.0	56.5	51.0	45.0	44.5	43.5
	9	58.1	84.5	41.6	67.5	65.0	62.5	60.5	53.0	47.0	43.0	42.5	41.5
	10	55.6	70.9	42.4	66.0	65.0	62.5	60.5	53.5	48.5	44.5	43.5	43.0
	11	55.5	72.9	41.5	66.0	64.5	62.0	60.5	53.5	48.0	44.0	43.0	42.0
	12	60.3	84.4	42.3	71.5	69.0	65.5	63.5	58.5	53.0	45.5	44.5	43.0
	13	61.4	87.1	41.6	70.0	67.0	64.5	63.0	57.0	50.5	45.0	44.0	43.0
	14	60.9	81.6	42.5	71.5	68.0	65.5	64.0	58.0	52.5	46.5	45.0	43.5
	15	61.3	85.4	42.4	72.5	69.5	66.0	64.5	58.5	52.5	46.5	45.5	44.0
	16	61.0	83.7	42.9	72.0	69.5	66.5	65.0	59.5	54.0	48.5	47.0	45.0
	17	61.7	82.6	44.0	71.0	69.5	67.0	66.0	61.0	56.0	50.0	48.5	46.0
	18	61.9	80.0	46.2	71.5	69.5	67.5	66.0	61.0	56.0	50.0	48.5	47.0
	19	61.7	87.8	41.7	71.5	69.5	66.5	64.5	57.5	52.0	46.5	45.5	43.5
	20	59.6	80.4	40.5	70.5	68.0	65.0	63.0	56.0	50.0	44.5	43.5	42.0
	21	57.6	79.4	40.6	69.0	66.5	64.0	61.6	53.5	48.0	43.5	42.5	41.5
Night	22	57.9	81.9	39.3	69.5	67.0	62.5	60.0	51.5	47.0	42.5	41.5	40.5
	23	57.8	82.0	37.7	69.0	65.5	60.5	56.5	50.5	47.0	41.5	40.5	39.5

URBAN

24-Hour Noise Level Measurement Summary

			Energy Average Leq		24-Hour
Project Name: Ironwood Residential		*JN:* 9385	*Day*	*Night*	*CNEL*
Location: L2 - Located in the northwestern portion of the Project site, east of existing residential homes across Nason Street.		*Analyst:* A. Wolfe *Date:* 1/28/2015	48.7	49.0	55.4

Hourly Leq dBA Readings (unadjusted)



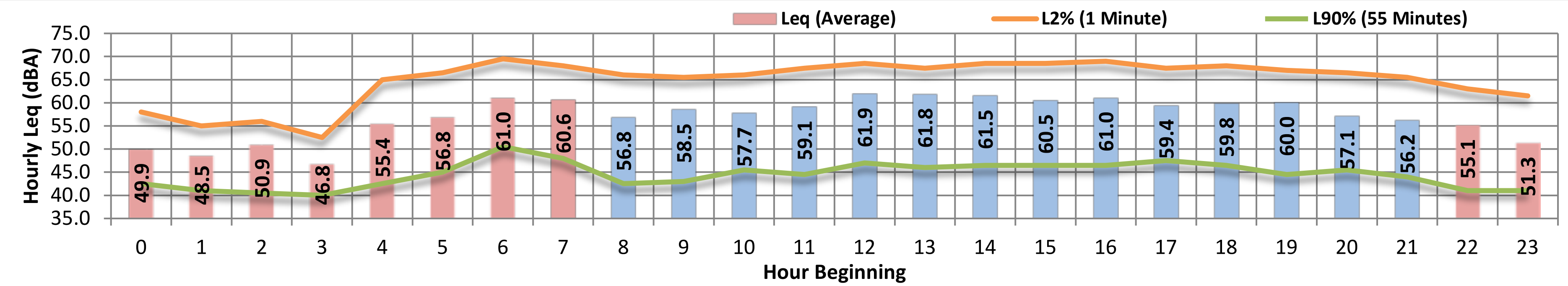
Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	45.4	56.8	36.0	52.5	51.0	49.0	48.0	46.0	43.5	38.0	37.5	37.5
	Max	50.2	67.9	44.9	59.0	56.5	53.5	52.0	50.5	49.5	47.5	47.0	45.5
Energy Average		48.7	63.2	42.2	55.8	54.0	52.0	51.0	48.7	47.1	44.8	44.3	43.3
Night	Min	44.2	57.7	37.3	52.0	50.5	49.0	47.0	43.5	41.0	38.5	38.0	37.5
	Max	52.8	65.5	47.3	59.5	58.0	56.5	55.0	53.0	51.5	49.5	49.0	48.5
Energy Average		49.0	62.0	42.1	56.2	54.8	52.8	51.7	49.2	47.4	44.7	44.1	43.3
Hourly Summary													
Night	0	46.9	58.5	40.3	54.0	52.5	50.5	49.5	47.0	45.5	42.5	42.0	41.0
	1	46.5	57.7	38.7	53.5	52.5	50.5	49.5	47.0	45.0	41.5	40.5	39.0
	2	45.4	58.8	37.7	52.0	50.5	49.0	48.0	46.0	43.5	40.5	39.5	38.5
	3	44.2	58.8	37.3	54.5	52.0	49.0	47.0	43.5	41.0	38.5	38.0	37.5
	4	47.2	65.3	37.8	58.0	56.0	52.5	51.0	45.0	42.5	39.5	39.0	38.5
	5	51.7	61.5	40.7	59.5	58.0	56.5	55.0	52.0	50.0	44.5	43.5	42.5
	6	52.8	63.4	46.5	59.0	58.0	56.0	55.0	53.0	51.5	49.5	49.0	48.5
	7	51.9	65.5	47.3	57.0	56.0	54.5	53.5	52.5	51.0	49.5	49.0	48.0
Day	8	48.4	62.1	38.9	55.0	54.0	52.5	52.0	49.5	46.0	42.0	41.0	39.5
	9	45.4	56.8	38.8	52.5	51.0	49.0	48.0	46.0	43.5	40.5	40.0	39.0
	10	46.5	60.4	36.0	55.0	53.5	52.0	50.5	46.5	43.5	38.0	37.5	37.5
	11	46.9	63.2	39.8	57.0	53.5	50.5	49.5	46.0	44.0	41.5	41.0	40.0
	12	47.5	63.1	38.3	56.0	54.5	53.0	51.5	47.0	44.5	41.5	40.5	39.5
	13	47.9	61.2	41.9	54.5	53.0	50.5	50.0	48.0	46.5	44.5	44.0	43.5
	14	49.4	65.9	43.0	57.5	55.5	52.5	51.0	48.5	47.5	45.5	45.0	44.0
	15	48.9	61.0	43.2	57.0	55.0	52.0	51.0	48.5	47.5	45.5	45.0	44.5
	16	49.0	60.8	44.0	55.0	53.5	52.0	51.0	49.5	48.0	46.0	45.5	44.5
	17	50.0	59.5	44.2	54.5	53.5	52.5	51.5	50.5	49.5	47.5	47.0	45.5
	18	49.8	59.5	44.9	55.0	54.0	52.5	52.0	50.0	49.0	47.0	46.5	45.5
	19	50.2	67.9	42.9	59.0	56.5	53.5	52.0	49.5	48.0	46.0	45.5	44.5
	20	48.6	60.7	42.4	53.5	52.5	51.5	50.5	49.0	47.5	45.5	45.0	44.0
	21	50.2	67.0	43.6	55.5	54.0	52.5	52.0	50.0	49.0	46.0	45.5	44.5
Night	22	47.5	60.8	40.3	54.0	52.5	51.0	50.5	48.0	46.0	43.0	42.5	41.5
	23	46.2	60.6	37.6	53.0	52.0	50.5	50.0	46.5	44.0	40.5	40.0	38.5

URBAN

24-Hour Noise Level Measurement Summary

Project Name: Ironwood Residential	*JN:* 9385	*Energy Average Leq*		*24-Hour*
Location: L3 - Located at the southwestern corner of Ironwood Avenue and Oliver Street adjacent to an existing residential home.	*Analyst:* A. Wolfe	*Day*	*Night*	*CNEL*
	Date: 1/28/2015	59.7	56.1	63.0

Hourly Leq dBA Readings (unadjusted)



Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	56.2	73.5	39.9	67.0	65.5	62.5	59.5	50.5	46.5	42.5	41.5	41.0
	Max	61.9	90.6	44.7	71.5	69.0	66.5	65.5	60.0	53.0	47.5	46.5	45.5
Energy Average		59.7	84.8	42.7	69.4	67.4	65.1	63.6	57.3	50.8	45.7	44.7	43.6
Night	Min	46.8	67.8	38.2	58.0	52.5	47.5	46.0	43.5	42.0	40.0	39.5	38.0
	Max	61.0	81.1	48.1	71.0	69.5	67.5	66.0	61.0	54.0	50.5	50.0	49.0
Energy Average		56.1	77.3	41.9	66.8	64.4	61.4	59.7	54.0	48.7	44.8	44.1	43.0
Hourly Summary													
Night	0	49.9	69.1	41.1	62.0	58.0	53.0	51.0	47.5	45.5	42.5	42.0	41.0
	1	48.5	70.0	38.5	61.0	55.0	49.5	48.0	45.5	43.5	41.0	40.0	40.0
	2	50.9	75.9	39.0	62.0	56.0	49.0	47.1	44.5	43.0	40.5	40.0	40.0
	3	46.8	67.8	38.2	58.0	52.5	47.5	46.0	43.5	42.0	40.0	39.5	38.0
	4	55.4	79.0	39.9	68.0	65.0	57.0	52.0	47.0	45.0	42.5	42.0	41.0
	5	56.8	77.5	41.2	68.5	66.5	63.0	59.6	52.0	49.5	45.0	44.0	42.0
	6	61.0	81.1	48.1	71.0	69.5	67.5	66.0	59.0	53.5	50.5	50.0	49.0
	7	60.6	79.0	42.9	69.5	68.0	66.5	65.5	61.0	54.0	48.0	47.0	45.0
Day	8	56.8	74.1	39.9	67.0	66.0	64.0	62.5	54.0	46.5	42.5	41.5	41.0
	9	58.5	86.9	40.0	67.0	65.5	63.5	61.5	52.5	47.5	43.0	42.0	41.0
	10	57.7	75.6	40.6	67.5	66.0	64.0	62.5	57.0	52.0	45.5	43.5	41.0
	11	59.1	80.6	40.8	69.5	67.5	65.0	63.5	57.0	50.5	44.5	43.5	41.5
	12	61.9	90.6	42.7	71.0	68.5	65.5	64.0	58.5	53.0	47.0	45.5	44.0
	13	61.8	89.2	43.6	69.5	67.5	65.5	64.0	57.5	51.5	46.0	45.5	44.5
	14	61.5	86.1	43.9	70.5	68.5	66.5	65.0	59.5	52.0	46.5	45.5	44.5
	15	60.5	78.4	44.1	70.0	68.5	66.5	65.5	60.0	52.5	46.5	45.5	44.5
	16	61.0	83.7	44.0	71.5	69.0	66.5	65.5	59.5	52.0	46.5	46.0	45.0
	17	59.4	73.5	44.7	68.5	67.5	66.0	64.5	59.5	52.5	47.5	46.5	45.5
	18	59.8	83.4	43.5	70.0	68.0	65.5	64.5	57.5	50.0	46.5	45.5	44.5
	19	60.0	86.8	42.5	69.5	67.0	64.0	62.5	54.0	48.5	44.5	44.0	43.0
	20	57.1	77.2	42.9	68.0	66.5	63.5	62.0	53.5	48.5	45.5	45.0	44.0
	21	56.2	78.4	40.0	68.5	65.5	62.5	59.5	50.5	47.5	44.0	43.0	42.0
Night	22	55.1	80.7	38.2	66.5	63.0	58.0	53.6	46.5	44.0	41.0	40.5	40.0
	23	51.3	70.8	38.2	65.0	61.5	54.0	51.0	47.0	44.5	41.0	40.0	39.5

URBAN

24-Hour Noise Level Measurement Summary

Project Name: Ironwood Residential

Location: L4 - Located north of Ironwood Avenue along the eastern Project site boundary.

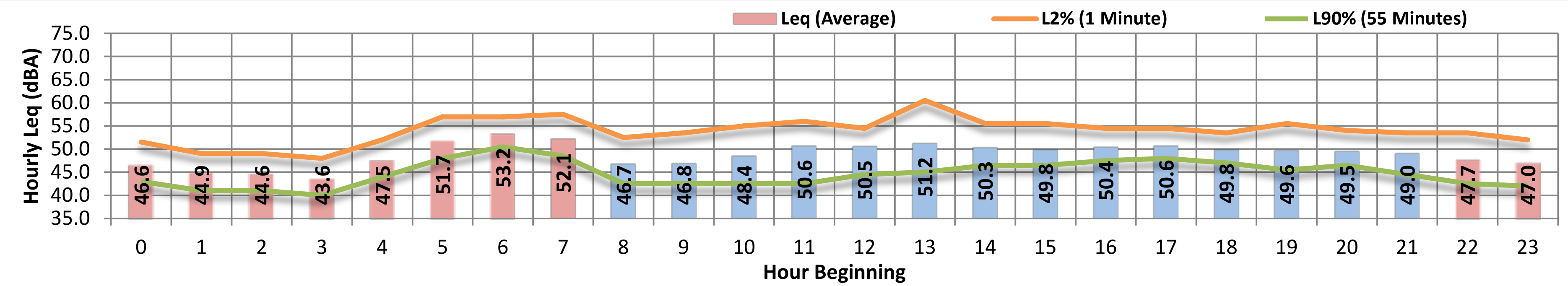
JN: 9385

Analyst: A. Wolfe

Date: 1/28/2015

Energy Average Leq		24-Hour
Day	Night	CNEL
49.7	49.1	55.5

Hourly Leq dBA Readings (unadjusted)



Time Period	Hour	Leq	Lmax	Lmin	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	46.7	57.5	39.9	54.0	52.5	50.0	49.0	46.5	45.0	42.5	42.0	41.0
	Max	51.2	78.7	45.9	62.0	60.5	57.0	54.0	51.0	49.5	48.0	47.5	46.5
Energy Average		49.7	71.4	43.2	57.0	55.4	52.9	51.6	49.3	47.8	45.5	44.9	44.1
Night	Min	43.6	54.2	38.8	49.5	48.0	46.5	45.5	44.0	43.0	40.0	40.0	39.0
	Max	53.2	67.0	48.5	59.5	57.5	55.5	55.0	53.5	52.5	50.5	50.5	49.5
Energy Average		49.1	63.0	42.9	55.5	53.9	52.1	51.3	49.3	48.0	45.6	45.2	44.0
Hourly Summary													
Night	0	46.6	57.7	40.6	53.0	51.5	50.0	49.0	47.0	45.5	43.0	42.5	41.5
	1	44.9	54.5	38.8	50.0	49.0	48.0	47.5	45.5	44.0	41.0	40.5	39.5
	2	44.6	59.3	38.8	50.5	49.0	48.0	47.0	45.0	43.5	41.0	40.0	40.0
	3	43.6	54.2	38.8	49.5	48.0	46.5	45.5	44.0	43.0	40.0	40.0	39.0
	4	47.5	65.1	41.9	54.0	52.0	50.5	50.0	47.5	46.0	44.0	43.5	42.5
	5	51.7	65.5	45.6	58.0	57.0	55.0	54.0	52.0	50.5	48.0	47.5	46.5
	6	53.2	62.6	48.5	58.5	57.0	55.5	55.0	53.5	52.5	50.5	50.5	49.5
	7	52.1	64.5	43.4	59.5	57.5	55.0	54.0	52.0	51.0	48.5	48.0	45.5
Day	8	46.7	61.4	40.3	54.0	52.5	50.0	49.0	46.5	45.0	42.5	42.5	41.5
	9	46.8	61.8	40.7	54.5	53.5	50.0	49.0	47.0	45.0	42.5	42.0	41.0
	10	48.4	62.6	39.9	56.5	55.0	53.0	51.5	48.5	46.0	42.5	42.0	41.0
	11	50.6	78.2	40.1	58.0	56.0	52.0	50.5	47.5	45.5	42.5	42.0	41.0
	12	50.5	78.7	40.9	55.5	54.5	52.5	51.0	48.5	47.0	44.5	44.0	43.0
	13	51.2	67.0	41.8	62.0	60.5	57.0	54.0	49.0	47.5	45.0	44.0	43.5
	14	50.3	75.0	44.2	57.5	55.5	53.0	52.0	49.5	48.5	46.5	46.0	45.5
	15	49.8	61.7	44.8	57.0	55.5	53.0	52.0	50.0	48.5	46.5	46.0	45.5
	16	50.4	60.8	45.2	56.0	54.5	53.0	52.5	50.5	49.5	47.5	46.5	46.0
	17	50.6	63.1	45.9	55.0	54.5	53.0	52.5	51.0	49.5	48.0	47.5	46.5
	18	49.8	57.5	44.8	54.5	53.5	52.0	51.5	50.5	49.0	47.0	46.5	45.5
	19	49.6	63.9	43.4	58.0	55.5	53.5	52.0	49.5	47.5	45.5	45.0	44.5
	20	49.5	63.6	44.3	56.0	54.0	52.0	51.0	49.5	48.5	46.5	46.0	45.0
	21	49.0	58.2	41.0	55.0	53.5	52.5	51.5	49.5	48.0	44.5	43.5	42.0
Night	22	47.7	67.0	40.1	55.5	53.5	51.0	50.0	47.5	45.5	42.5	42.0	41.0
	23	47.0	62.4	38.8	53.5	52.0	51.0	50.0	47.5	45.5	42.0	41.5	40.5

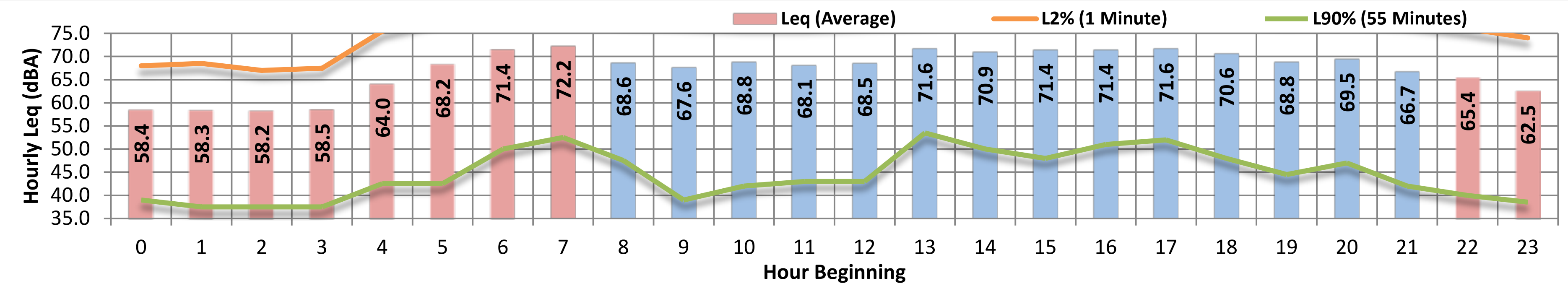
Attachment: Noise Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

URBAN

24-Hour Noise Level Measurement Summary

Project Name: Ironwood Residential	JN: 9385	Energy Average Leq	24-Hour
Location: L5 - Located south of the Project site across Ironwood Avenue adjacent to existing residential homes.	Analyst: A. Wolfe	Day: 69.9 / Night: 66.8	CNEL: 73.2
	Date: 1/28/2015		

Hourly Leq dBA Readings (unadjusted)



Time Period	Hour	Leq	Lmax	Lmin	L1%	L2%	L5%	L8%	L25%	L50%	L90%	L95%	L99%
Day	Min	66.7	81.6	37.6	78.0	77.0	74.5	71.5	60.5	50.5	39.0	37.5	37.5
	Max	71.6	99.7	45.3	80.5	79.5	78.0	77.0	72.0	64.5	53.5	51.0	47.5
Energy Average		69.9	91.2	41.6	79.4	78.3	76.6	75.3	69.0	60.3	48.3	46.1	43.1
Night	Min	58.2	80.8	34.8	72.5	67.0	57.0	52.5	41.0	39.0	37.5	35.5	35.0
	Max	72.2	89.1	47.0	81.0	80.0	78.5	77.5	72.5	64.5	52.5	50.5	48.0
Energy Average		66.8	85.4	40.8	77.8	75.8	73.1	71.4	65.1	56.9	45.5	43.6	41.8
Hourly Summary													
Night	0	58.4	82.3	37.5	73.0	68.0	58.0	53.5	43.5	41.5	39.0	37.5	37.5
	1	58.3	80.9	34.8	73.0	68.5	58.5	54.0	44.0	41.5	37.5	37.5	35.0
	2	58.2	82.5	34.8	72.5	67.0	58.5	53.5	41.0	39.0	37.5	37.0	35.0
	3	58.5	80.8	34.8	73.0	67.5	57.0	52.5	43.5	40.0	37.5	35.5	35.0
	4	64.0	85.5	38.7	78.0	75.5	70.0	65.5	52.0	47.0	42.5	40.5	39.5
	5	68.2	87.3	39.5	80.0	78.5	76.0	73.5	62.5	52.5	42.5	41.5	40.5
	6	71.4	85.8	44.4	80.5	79.5	78.0	77.0	71.0	62.5	50.0	47.5	46.0
	7	72.2	87.7	47.0	81.0	80.0	78.5	77.5	72.5	64.5	52.5	50.5	48.0
Day	8	68.6	86.3	40.7	79.0	78.0	76.0	74.5	66.5	57.5	47.5	45.5	42.5
	9	67.6	87.3	37.6	78.5	77.5	75.0	73.5	64.0	54.0	39.0	37.5	37.5
	10	68.8	94.2	37.7	78.0	77.0	75.5	74.0	66.5	55.0	42.0	40.5	38.5
	11	68.1	81.6	37.7	78.0	77.0	75.5	74.0	67.0	56.5	43.0	40.5	38.0
	12	68.5	86.0	37.7	78.5	77.5	75.5	74.0	66.0	55.0	43.0	41.0	39.5
	13	71.6	99.7	45.3	79.5	78.0	76.5	75.5	70.0	61.5	53.5	51.0	47.5
	14	70.9	90.9	42.8	80.0	79.0	77.5	76.5	71.0	62.0	50.0	48.0	44.5
	15	71.4	86.3	42.5	80.0	79.0	78.0	77.0	72.0	63.5	48.0	46.0	44.0
	16	71.4	88.5	43.1	80.5	79.0	78.0	77.0	72.0	64.0	51.0	48.0	45.0
	17	71.6	87.2	44.7	80.5	79.5	78.0	77.0	72.0	64.5	52.0	50.0	46.0
	18	70.6	86.4	41.8	80.0	79.0	77.5	76.5	70.0	61.0	48.0	46.0	43.5
	19	68.8	90.4	40.7	79.5	78.0	76.0	74.5	65.0	56.0	44.5	43.0	41.5
	20	69.5	84.4	41.5	79.5	78.5	76.5	75.5	68.0	59.5	47.0	44.5	42.5
	21	66.7	83.7	37.7	79.0	77.5	74.5	71.5	60.5	50.5	42.0	40.5	38.5
Night	22	65.4	89.1	37.7	78.5	76.0	70.5	66.5	52.0	44.0	40.0	39.5	38.5
	23	62.5	83.8	37.4	77.0	74.0	67.0	61.5	47.0	42.0	38.5	37.5	37.5

URBAN

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APPENDIX 6.1:

SITE PLAN

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CITY OF MORENO VALLEY, STATE OF CALIFORNIA

TENTATIVE TRACT MAP NO. 37001

AUGUST, 2015

N

80' 0' 40' 80' 160' 240'

GRAPHIC SCALE
1 INCH = 80' FT

ANDERSON
CONSULTING
ENGINEERS, INC.
12526 HIGH BLUFF DR., SUITE 300
SAN DIEGO, CA 92130
(858) 925-7918

TENTATIVE TRACT MAP NO. 37001
CITY OF MORENO VALLEY, STATE OF CALIFORNIA

SITE PLAN

SUBMITTALS:

DESIGNED BY: JAA
DRAWN BY: IMC
CHECKED BY: JAA
SHEET 2 OF 2

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APPENDIX 7.1:

OFF-SITE TRAFFIC NOISE CONTOURS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project | *Project Name:* Ironwood Village (Tract No
Road Name: Nason St. | *Job Number:* 9385
Road Segment: s/o Ironwood Av.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	430 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-5.62	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.85	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.81	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.6	61.7	59.9	53.9	62.5	63.1
Medium Trucks:	57.4	55.9	49.5	48.0	56.4	56.7
Heavy Trucks:	58.2	56.8	47.8	49.0	57.4	57.5
Vehicle Noise:	65.4	63.7	60.5	55.9	64.4	64.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	19	40	86	186
CNEL:	20	43	93	200

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project | *Project Name:* Ironwood Village (Tract No
Road Name: Nason St. | *Job Number:* 9385
Road Segment: n/o SR-60 WB Ramps

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	480 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-5.14	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.38	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.33	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.1	62.2	60.4	54.3	63.0	63.6
Medium Trucks:	57.9	56.3	50.0	48.4	56.9	57.1
Heavy Trucks:	58.7	57.3	48.2	49.5	57.8	58.0
Vehicle Noise:	65.9	64.2	61.0	56.3	64.9	65.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	20	43	93	201
CNEL:	22	46	100	215

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project | *Project Name:* Ironwood Village (Tract No
Road Name: Nason St. | *Job Number:* 9385
Road Segment: n/o SR-60 WB Fwy

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,270 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.91	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.15	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.11	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.3	66.4	64.6	58.6	67.2	67.8
Medium Trucks:	62.1	60.6	54.2	52.7	61.1	61.4
Heavy Trucks:	62.9	61.5	52.5	53.7	62.1	62.2
Vehicle Noise:	70.1	68.4	65.2	60.6	69.1	69.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	38	83	178	384
CNEL:	41	89	191	411

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project | *Project Name:* Ironwood Village (Tract No
Road Name: Nason St. | *Job Number:* 9385
Road Segment: s/o SR-60 EB Ramps

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,780 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.55	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.69	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.64	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.8	67.9	66.1	60.0	68.7	69.3
Medium Trucks:	63.5	62.0	55.7	54.1	62.6	62.8
Heavy Trucks:	64.4	63.0	53.9	55.2	63.5	63.7
Vehicle Noise:	71.6	69.9	66.7	62.0	70.6	71.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	48	103	223	480
CNEL:	52	111	239	515

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Ironwood Av.
Road Segment: w/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 6,800 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 680 vehicles
Vehicle Speed: 45 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: 0.0 feet
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 44.0 feet
Centerline Dist. to Observer: 44.0 feet
Barrier Distance to Observer: 0.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 0.0 feet
Road Elevation: 0.0 feet
Road Grade: 0.0%
Left View: -90.0 degrees
Right View: 90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos: 15
Medium Trucks (2 Axles): 15
Heavy Trucks (3+ Axles): 15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 0.000
Medium Trucks: 2.297
Heavy Trucks: 8.006 Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos: 36.551
Medium Trucks: 36.308
Heavy Trucks: 36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.63	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.86	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.82	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.6	63.7	61.9	55.9	64.5	65.1
Medium Trucks:	59.4	57.9	51.5	50.0	58.4	58.6
Heavy Trucks:	60.2	58.8	49.8	51.0	59.4	59.5
Vehicle Noise:	67.4	65.7	62.5	57.9	66.4	66.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	54	117	253
CNEL:	27	58	126	271

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Ironwood Av.
Road Segment: e/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 4,600 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 460 vehicles
Vehicle Speed: 55 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: 0.0 feet
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 44.0 feet
Centerline Dist. to Observer: 44.0 feet
Barrier Distance to Observer: 0.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 0.0 feet
Road Elevation: 0.0 feet
Road Grade: 0.0%
Left View: -90.0 degrees
Right View: 90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos: 15
Medium Trucks (2 Axles): 15
Heavy Trucks (3+ Axles): 15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 0.000
Medium Trucks: 2.297
Heavy Trucks: 8.006 Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos: 36.551
Medium Trucks: 36.308
Heavy Trucks: 36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-6.19	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-23.43	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-27.39	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.3	64.4	62.7	56.6	65.2	65.8
Medium Trucks:	59.8	58.2	51.9	50.3	58.8	59.0
Heavy Trucks:	59.8	58.4	49.3	50.6	58.9	59.1
Vehicle Noise:	67.9	66.2	63.2	58.3	66.9	67.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	27	59	126	272
CNEL:	29	63	136	293

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Ironwood Av.
Road Segment: e/o Lantz Ln.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 4,300 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 430 vehicles
Vehicle Speed: 55 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: 0.0 feet
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 44.0 feet
Centerline Dist. to Observer: 44.0 feet
Barrier Distance to Observer: 0.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 0.0 feet
Road Elevation: 0.0 feet
Road Grade: 0.0%
Left View: -90.0 degrees
Right View: 90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos: 15
Medium Trucks (2 Axles): 15
Heavy Trucks (3+ Axles): 15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 0.000
Medium Trucks: 2.297
Heavy Trucks: 8.006 Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos: 36.551
Medium Trucks: 36.308
Heavy Trucks: 36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-6.49	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-23.73	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-27.68	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.0	64.1	62.4	56.3	64.9	65.5
Medium Trucks:	59.5	58.0	51.6	50.0	58.5	58.7
Heavy Trucks:	59.5	58.1	49.0	50.3	58.6	58.8
Vehicle Noise:	67.6	65.9	62.9	58.0	66.6	67.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	26	56	121	260
CNEL:	28	60	130	280

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Ironwood Av.
Road Segment: e/o Oliver St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 4,300 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 430 vehicles
Vehicle Speed: 55 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: 0.0 feet
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 44.0 feet
Centerline Dist. to Observer: 44.0 feet
Barrier Distance to Observer: 0.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 0.0 feet
Road Elevation: 0.0 feet
Road Grade: 0.0%
Left View: -90.0 degrees
Right View: 90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos: 15
Medium Trucks (2 Axles): 15
Heavy Trucks (3+ Axles): 15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 0.000
Medium Trucks: 2.297
Heavy Trucks: 8.006 Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos: 36.551
Medium Trucks: 36.308
Heavy Trucks: 36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-6.49	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-23.73	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-27.68	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.0	64.1	62.4	56.3	64.9	65.5
Medium Trucks:	59.5	58.0	51.6	50.0	58.5	58.7
Heavy Trucks:	59.5	58.1	49.0	50.3	58.6	58.8
Vehicle Noise:	67.6	65.9	62.9	58.0	66.6	67.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	26	56	121	260
CNEL:	28	60	130	280

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project — *Project Name:* Ironwood Village (Tract No
Road Name: Nason St. — *Job Number:* 9385
Road Segment: s/o Ironwood Av.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	530 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.71	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.95	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.90	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.5	62.6	60.8	54.8	63.4	64.0
Medium Trucks:	58.3	56.8	50.4	48.9	57.3	57.6
Heavy Trucks:	59.1	57.7	48.7	49.9	58.3	58.4
Vehicle Noise:	66.3	64.6	61.4	56.8	65.3	65.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	21	46	99	214
CNEL:	23	49	107	230

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project — *Project Name:* Ironwood Village (Tract No
Road Name: Nason St. — *Job Number:* 9385
Road Segment: n/o SR-60 WB Ramps

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	570 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.39	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.63	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.59	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.8	62.9	61.1	55.1	63.7	64.3
Medium Trucks:	58.6	57.1	50.7	49.2	57.6	57.9
Heavy Trucks:	59.4	58.0	49.0	50.2	58.6	58.7
Vehicle Noise:	66.7	64.9	61.8	57.1	65.6	66.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	22	48	104	225
CNEL:	24	52	112	241

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project — *Project Name:* Ironwood Village (Tract No
Road Name: Nason St. — *Job Number:* 9385
Road Segment: n/o SR-60 WB Fwy

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,330 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.71	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.95	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.91	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.5	66.6	64.8	58.8	67.4	68.0
Medium Trucks:	62.3	60.8	54.4	52.9	61.3	61.6
Heavy Trucks:	63.1	61.7	52.7	53.9	62.3	62.4
Vehicle Noise:	70.3	68.6	65.4	60.8	69.3	69.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	40	85	184	396
CNEL:	42	91	197	424

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project — *Project Name:* Ironwood Village (Tract No
Road Name: Nason St. — *Job Number:* 9385
Road Segment: s/o SR-60 EB Ramps

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,820 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.65	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.59	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.54	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.8	67.9	66.2	60.1	68.8	69.4
Medium Trucks:	63.6	62.1	55.8	54.2	62.7	62.9
Heavy Trucks:	64.5	63.1	54.0	55.3	63.6	63.8
Vehicle Noise:	71.7	70.0	66.8	62.1	70.7	71.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	49	105	226	488
CNEL:	52	113	243	523

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project *Project Name:* Ironwood Village (Tract No
Road Name: Ironwood Av. *Job Number:* 9385
Road Segment: w/o Nason St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	710 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.44	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.68	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.63	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.8	63.9	62.1	56.0	64.7	65.3
Medium Trucks:	59.6	58.0	51.7	50.1	58.6	58.8
Heavy Trucks:	60.4	59.0	49.9	51.2	59.5	59.7
Vehicle Noise:	67.6	65.9	62.7	58.0	66.6	67.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	26	56	121	260
CNEL:	28	60	130	279

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project *Project Name:* Ironwood Village (Tract No
Road Name: Ironwood Av. *Job Number:* 9385
Road Segment: e/o Nason St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	530 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-5.58	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-22.82	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-26.77	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.9	65.0	63.3	57.2	65.8	66.4
Medium Trucks:	60.4	58.9	52.5	51.0	59.4	59.6
Heavy Trucks:	60.4	59.0	49.9	51.2	59.5	59.7
Vehicle Noise:	68.5	66.8	63.8	58.9	67.5	68.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	30	65	139	299
CNEL:	32	69	149	322

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project *Project Name:* Ironwood Village (Tract No
Road Name: Ironwood Av. *Job Number:* 9385
Road Segment: e/o Lantz Ln.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	450 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-6.29	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-23.53	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-27.48	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.2	64.3	62.6	56.5	65.1	65.7
Medium Trucks:	59.7	58.1	51.8	50.2	58.7	58.9
Heavy Trucks:	59.7	58.3	49.2	50.5	58.8	59.0
Vehicle Noise:	67.8	66.1	63.1	58.2	66.8	67.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	27	58	125	268
CNEL:	29	62	134	289

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing With Project *Project Name:* Ironwood Village (Tract No
Road Name: Ironwood Av. *Job Number:* 9385
Road Segment: e/o Oliver St.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	480 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-6.01	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-23.25	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-27.20	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.5	64.6	62.8	56.8	65.4	66.0
Medium Trucks:	59.9	58.4	52.1	50.5	59.0	59.2
Heavy Trucks:	60.0	58.5	49.5	50.8	59.1	59.2
Vehicle Noise:	68.1	66.3	63.4	58.5	67.1	67.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	60	130	280
CNEL:	30	65	140	301

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Attachment: Noise Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Nason St.
Road Segment: s/o Ironwood Av.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	900 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-2.41	1.94	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	79.45	-19.65	1.98	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-23.60	1.98	-1.20	*-5.50*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	66.8	64.9	63.1	57.1	65.7	66.3
Medium Trucks:	60.6	59.1	52.7	51.2	59.6	59.9
Heavy Trucks:	61.4	60.0	51.0	52.2	60.6	60.7
Vehicle Noise:	68.6	66.9	63.7	59.1	67.6	68.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	30	66	142	305
CNEL:	33	70	152	327

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	950 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-2.17	1.94	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	79.45	-19.41	1.98	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-23.37	1.98	-1.20	*-5.50*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.0	65.1	63.4	57.3	65.9	66.5
Medium Trucks:	60.8	59.3	52.9	51.4	59.9	60.1
Heavy Trucks:	61.7	60.2	51.2	52.5	60.8	60.9
Vehicle Noise:	68.9	67.1	64.0	59.3	67.8	68.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	32	68	147	316
CNEL:	34	73	157	339

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Fwy
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,870 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	0.77	1.94	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	79.45	-16.47	1.98	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-20.43	1.98	-1.20	*-5.50*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	70.0	68.1	66.3	60.2	68.9	69.5
Medium Trucks:	63.8	62.3	55.9	54.3	62.8	63.0
Heavy Trucks:	64.6	63.2	54.1	55.4	63.7	63.9
Vehicle Noise:	71.8	70.1	66.9	62.2	70.8	71.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	50	107	230	496
CNEL:	53	115	247	532

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Nason St.
Road Segment: s/o SR-60 EB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,490 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.01	1.94	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	79.45	-15.23	1.98	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-19.18	1.98	-1.20	*-5.50*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	71.2	69.3	67.5	61.5	70.1	70.7
Medium Trucks:	65.0	63.5	57.1	55.6	64.0	64.3
Heavy Trucks:	65.8	64.4	55.4	56.6	65.0	65.1
Vehicle Noise:	73.1	71.3	68.2	63.5	72.0	72.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	60	129	279	601
CNEL:	64	139	299	644

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Ironwood Av.
Road Segment: w/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,220 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.09	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.33	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.28	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.1	66.2	64.4	58.4	67.0	67.6
Medium Trucks:	61.9	60.4	54.0	52.5	61.0	61.2
Heavy Trucks:	62.7	61.3	52.3	53.5	61.9	62.0
Vehicle Noise:	70.0	68.2	65.1	60.4	68.9	69.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	37	80	173	373
CNEL:	40	86	186	401

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Ironwood Av.
Road Segment: e/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	780 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.90	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-21.14	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-25.10	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.6	66.7	65.0	58.9	67.5	68.1
Medium Trucks:	62.0	60.5	54.2	52.6	61.1	61.3
Heavy Trucks:	62.1	60.7	51.6	52.9	61.2	61.4
Vehicle Noise:	70.2	68.4	65.5	60.6	69.2	69.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	39	83	180	387
CNEL:	42	90	193	417

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Ironwood Av.
Road Segment: e/o Lantz Ln.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	740 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-4.13	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-21.37	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-25.32	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.4	66.5	64.7	58.7	67.3	67.9
Medium Trucks:	61.8	60.3	53.9	52.4	60.9	61.1
Heavy Trucks:	61.8	60.4	51.4	52.6	61.0	61.1
Vehicle Noise:	70.0	68.2	65.3	60.4	68.9	69.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	37	81	174	374
CNEL:	40	87	187	402

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 Without Project
Road Name: Ironwood Av.
Road Segment: e/o Oliver St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	740 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-4.13	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-21.37	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-25.32	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.4	66.5	64.7	58.7	67.3	67.9
Medium Trucks:	61.8	60.3	53.9	52.4	60.9	61.1
Heavy Trucks:	61.8	60.4	51.4	52.6	61.0	61.1
Vehicle Noise:	70.0	68.2	65.3	60.4	68.9	69.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	37	81	174	374
CNEL:	40	87	187	402

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 With Project
Road Name: Nason St.
Road Segment: s/o Ironwood Av.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	990 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-1.99	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.23	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.19	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.2	65.3	63.5	57.5	66.1	66.7
Medium Trucks:	61.0	59.5	53.1	51.6	60.0	60.3
Heavy Trucks:	61.8	60.4	51.4	52.6	61.0	61.1
Vehicle Noise:	69.1	67.3	64.2	59.5	68.0	68.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	32	70	151	325
CNEL:	35	75	162	348

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 With Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,040 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-1.78	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.02	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.97	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.4	65.5	63.8	57.7	66.3	66.9
Medium Trucks:	61.2	59.7	53.3	51.8	60.3	60.5
Heavy Trucks:	62.1	60.6	51.6	52.8	61.2	61.3
Vehicle Noise:	69.3	67.5	64.4	59.7	68.2	68.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	34	72	156	336
CNEL:	36	78	167	360

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 With Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Fwy
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,940 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	0.93	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.31	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.27	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	70.1	68.2	66.5	60.4	69.0	69.6
Medium Trucks:	63.9	62.4	56.0	54.5	63.0	63.2
Heavy Trucks:	64.8	63.3	54.3	55.6	63.9	64.0
Vehicle Noise:	72.0	70.2	67.1	62.4	70.9	71.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	51	110	236	509
CNEL:	55	118	253	546

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 With Project
Road Name: Nason St.
Road Segment: s/o SR-60 EB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,520 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.06	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.18	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.13	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	71.3	69.4	67.6	61.5	70.2	70.8
Medium Trucks:	65.1	63.5	57.2	55.6	64.1	64.3
Heavy Trucks:	65.9	64.5	55.4	56.7	65.0	65.2
Vehicle Noise:	73.1	71.4	68.2	63.5	72.1	72.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	61	130	281	606
CNEL:	65	140	302	650

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 With Project
Road Name: Ironwood Av.
Road Segment: w/o Nason St.

Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,250 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.98	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.22	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.18	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.2	66.3	64.6	58.5	67.1	67.7
Medium Trucks:	62.0	60.5	54.1	52.6	61.1	61.3
Heavy Trucks:	62.9	61.4	52.4	53.6	62.0	62.1
Vehicle Noise:	70.1	68.3	65.2	60.5	69.0	69.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	38	82	176	380
CNEL:	41	88	189	407

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 With Project
Road Name: Ironwood Av.
Road Segment: e/o Nason St.

Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	860 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.48	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-20.72	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-24.67	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.0	67.1	65.4	59.3	67.9	68.5
Medium Trucks:	62.5	61.0	54.6	53.1	61.5	61.7
Heavy Trucks:	62.5	61.1	52.0	53.3	61.6	61.8
Vehicle Noise:	70.6	68.9	65.9	61.0	69.6	70.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	41	89	192	413
CNEL:	44	96	206	445

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 With Project
Road Name: Ironwood Av.
Road Segment: e/o Lantz Ln.

Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	770 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.96	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-21.20	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-25.15	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.6	66.7	64.9	58.8	67.5	68.1
Medium Trucks:	62.0	60.5	54.1	52.6	61.0	61.3
Heavy Trucks:	62.0	60.6	51.6	52.8	61.2	61.3
Vehicle Noise:	70.2	68.4	65.4	60.6	69.1	69.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	38	83	178	384
CNEL:	41	89	192	413

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2020 With Project
Road Name: Ironwood Av.
Road Segment: e/o Oliver St.

Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	780 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.90	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-21.14	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-25.10	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.6	66.7	65.0	58.9	67.5	68.1
Medium Trucks:	62.0	60.5	54.2	52.6	61.1	61.3
Heavy Trucks:	62.1	60.7	51.6	52.9	61.2	61.4
Vehicle Noise:	70.2	68.4	65.5	60.6	69.2	69.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	39	83	180	387
CNEL:	42	90	193	417

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Attachment: Noise Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Nason St.
Road Segment: s/o Ironwood Av.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	990 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000	
Medium Trucks:	2.297	
Heavy Trucks:	8.006	*Grade Adjustment:* 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-1.99	1.94	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	79.45	-19.23	1.98	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-23.19	1.98	-1.20	*-5.50*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.2	65.3	63.5	57.5	66.1	66.7
Medium Trucks:	61.0	59.5	53.1	51.6	60.0	60.3
Heavy Trucks:	61.8	60.4	51.4	52.6	61.0	61.1
Vehicle Noise:	69.1	67.3	64.2	59.5	68.0	68.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	32	70	151	325
CNEL:	35	75	162	348

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,040 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000	
Medium Trucks:	2.297	
Heavy Trucks:	8.006	*Grade Adjustment:* 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	-1.78	1.94	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	79.45	-19.02	1.98	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-22.97	1.98	-1.20	*-5.50*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	67.4	65.5	63.8	57.7	66.3	66.9
Medium Trucks:	61.2	59.7	53.3	51.8	60.3	60.5
Heavy Trucks:	62.1	60.6	51.6	52.8	61.2	61.3
Vehicle Noise:	69.3	67.5	64.4	59.7	68.2	68.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	34	72	156	336
CNEL:	36	78	167	360

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Fwy
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,060 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000	
Medium Trucks:	2.297	
Heavy Trucks:	8.006	*Grade Adjustment:* 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	1.19	1.94	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	79.45	-16.05	1.98	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-20.01	1.98	-1.20	*-5.50*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	70.4	68.5	66.7	60.7	69.3	69.9
Medium Trucks:	64.2	62.7	56.3	54.8	63.2	63.5
Heavy Trucks:	65.0	63.6	54.6	55.8	64.2	64.3
Vehicle Noise:	72.2	70.5	67.3	62.7	71.2	71.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	53	114	246	530
CNEL:	57	122	264	568

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Nason St.
Road Segment: s/o SR-60 EB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,740 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000	
Medium Trucks:	2.297	
Heavy Trucks:	8.006	*Grade Adjustment:* 0.0

Lane Equivalent Distance (in feet)

Autos:	36.551
Medium Trucks:	36.308
Heavy Trucks:	36.332

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	68.46	2.43	1.94	-1.20	*-4.61*	0.000	0.000
Medium Trucks:	79.45	-14.81	1.98	-1.20	*-4.87*	0.000	0.000
Heavy Trucks:	84.25	-18.77	1.98	-1.20	*-5.50*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	71.6	69.7	68.0	61.9	70.5	71.1
Medium Trucks:	65.4	63.9	57.5	56.0	64.5	64.7
Heavy Trucks:	66.3	64.8	55.8	57.1	65.4	65.5
Vehicle Noise:	73.5	71.7	68.6	63.9	72.4	72.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	64	138	297	640
CNEL:	69	148	319	687

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Ironwood Av.
Road Segment: w/o Nason St.

Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 13,400 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 1,340 vehicles
Vehicle Speed: 45 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: 0.0 feet
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 44.0 feet
Centerline Dist. to Observer: 44.0 feet
Barrier Distance to Observer: 0.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 0.0 feet
Road Elevation: 0.0 feet
Road Grade: 0.0%
Left View: -90.0 degrees
Right View: 90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos: 15
Medium Trucks (2 Axles): 15
Heavy Trucks (3+ Axles): 15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 0.000
Medium Trucks: 2.297
Heavy Trucks: 8.006 Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos: 36.551
Medium Trucks: 36.308
Heavy Trucks: 36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.68	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.92	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.87	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.5	66.6	64.9	58.8	67.4	68.0
Medium Trucks:	62.3	60.8	54.4	52.9	61.4	61.6
Heavy Trucks:	63.2	61.7	52.7	53.9	62.3	62.4
Vehicle Noise:	70.4	68.6	65.5	60.8	69.3	69.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	40	86	185	398
CNEL:	43	92	198	426

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Ironwood Av.
Road Segment: e/o Nason St.

Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 8,600 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 860 vehicles
Vehicle Speed: 55 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: 0.0 feet
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 44.0 feet
Centerline Dist. to Observer: 44.0 feet
Barrier Distance to Observer: 0.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 0.0 feet
Road Elevation: 0.0 feet
Road Grade: 0.0%
Left View: -90.0 degrees
Right View: 90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos: 15
Medium Trucks (2 Axles): 15
Heavy Trucks (3+ Axles): 15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 0.000
Medium Trucks: 2.297
Heavy Trucks: 8.006 Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos: 36.551
Medium Trucks: 36.308
Heavy Trucks: 36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.48	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-20.72	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-24.67	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.0	67.1	65.4	59.3	67.9	68.5
Medium Trucks:	62.5	61.0	54.6	53.1	61.5	61.7
Heavy Trucks:	62.5	61.1	52.0	53.3	61.6	61.8
Vehicle Noise:	70.6	68.9	65.9	61.0	69.6	70.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	41	89	192	413
CNEL:	44	96	206	445

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Ironwood Av.
Road Segment: e/o Lantz Ln.

Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 8,100 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 810 vehicles
Vehicle Speed: 55 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: 0.0 feet
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 44.0 feet
Centerline Dist. to Observer: 44.0 feet
Barrier Distance to Observer: 0.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 0.0 feet
Road Elevation: 0.0 feet
Road Grade: 0.0%
Left View: -90.0 degrees
Right View: 90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos: 15
Medium Trucks (2 Axles): 15
Heavy Trucks (3+ Axles): 15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 0.000
Medium Trucks: 2.297
Heavy Trucks: 8.006 Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos: 36.551
Medium Trucks: 36.308
Heavy Trucks: 36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.74	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-20.98	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-24.93	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.8	66.9	65.1	59.1	67.7	68.3
Medium Trucks:	62.2	60.7	54.3	52.8	61.3	61.5
Heavy Trucks:	62.2	60.8	51.8	53.0	61.4	61.5
Vehicle Noise:	70.4	68.6	65.6	60.8	69.3	69.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	40	86	184	397
CNEL:	43	92	198	427

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 Without Project
Road Name: Ironwood Av.
Road Segment: e/o Oliver St.

Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 8,100 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 810 vehicles
Vehicle Speed: 55 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: 0.0 feet
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 44.0 feet
Centerline Dist. to Observer: 44.0 feet
Barrier Distance to Observer: 0.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 0.0 feet
Road Elevation: 0.0 feet
Road Grade: 0.0%
Left View: -90.0 degrees
Right View: 90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos: 15
Medium Trucks (2 Axles): 15
Heavy Trucks (3+ Axles): 15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 0.000
Medium Trucks: 2.297
Heavy Trucks: 8.006 Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos: 36.551
Medium Trucks: 36.308
Heavy Trucks: 36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.74	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-20.98	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-24.93	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.8	66.9	65.1	59.1	67.7	68.3
Medium Trucks:	62.2	60.7	54.3	52.8	61.3	61.5
Heavy Trucks:	62.2	60.8	51.8	53.0	61.4	61.5
Vehicle Noise:	70.4	68.6	65.6	60.8	69.3	69.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	40	86	184	397
CNEL:	43	92	198	427

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Nason St.
Road Segment: s/o Ironwood Av.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 10,800 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 1,080 vehicles
Vehicle Speed: 45 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: **0.0 feet**
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 44.0 feet
Centerline Dist. to Observer: 44.0 feet
Barrier Distance to Observer: 0.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 0.0 feet
Road Elevation: 0.0 feet
Road Grade: 0.0%
Left View: -90.0 degrees
Right View: 90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos: 15
Medium Trucks (2 Axles): 15
Heavy Trucks (3+ Axles): 15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 0.000
Medium Trucks: 2.297
Heavy Trucks: 8.006 *Grade Adjustment:* 0.0

Lane Equivalent Distance (in feet)

Autos: 36.551
Medium Trucks: 36.308
Heavy Trucks: 36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.62	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.86	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.81	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.6	65.7	63.9	57.9	66.5	67.1
Medium Trucks:	61.4	59.9	53.5	52.0	60.4	60.7
Heavy Trucks:	62.2	60.8	51.8	53.0	61.4	61.5
Vehicle Noise:	69.4	67.7	64.5	59.9	68.4	68.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	34	74	160	344
CNEL:	37	80	171	369

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 11,400 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 1,140 vehicles
Vehicle Speed: 45 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: **0.0 feet**
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 44.0 feet
Centerline Dist. to Observer: 44.0 feet
Barrier Distance to Observer: 0.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 0.0 feet
Road Elevation: 0.0 feet
Road Grade: 0.0%
Left View: -90.0 degrees
Right View: 90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos: 15
Medium Trucks (2 Axles): 15
Heavy Trucks (3+ Axles): 15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 0.000
Medium Trucks: 2.297
Heavy Trucks: 8.006 *Grade Adjustment:* 0.0

Lane Equivalent Distance (in feet)

Autos: 36.551
Medium Trucks: 36.308
Heavy Trucks: 36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.38	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.62	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.58	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.8	65.9	64.2	58.1	66.7	67.3
Medium Trucks:	61.6	60.1	53.7	52.2	60.7	60.9
Heavy Trucks:	62.5	61.0	52.0	53.2	61.6	61.7
Vehicle Noise:	69.7	67.9	64.8	60.1	68.6	69.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	36	77	166	357
CNEL:	38	82	178	383

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Nason St.
Road Segment: n/o SR-60 WB Fwy
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 21,300 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 2,130 vehicles
Vehicle Speed: 45 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: **0.0 feet**
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 44.0 feet
Centerline Dist. to Observer: 44.0 feet
Barrier Distance to Observer: 0.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 0.0 feet
Road Elevation: 0.0 feet
Road Grade: 0.0%
Left View: -90.0 degrees
Right View: 90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos: 15
Medium Trucks (2 Axles): 15
Heavy Trucks (3+ Axles): 15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 0.000
Medium Trucks: 2.297
Heavy Trucks: 8.006 *Grade Adjustment:* 0.0

Lane Equivalent Distance (in feet)

Autos: 36.551
Medium Trucks: 36.308
Heavy Trucks: 36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.33	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.91	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.86	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.5	68.6	66.9	60.8	69.4	70.0
Medium Trucks:	64.3	62.8	56.5	54.9	63.4	63.6
Heavy Trucks:	65.2	63.7	54.7	56.0	64.3	64.4
Vehicle Noise:	72.4	70.6	67.5	62.8	71.4	71.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	54	117	251	541
CNEL:	58	125	270	581

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Nason St.
Road Segment: s/o SR-60 EB Ramps
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 27,700 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 2,770 vehicles
Vehicle Speed: 45 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: **0.0 feet**
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 44.0 feet
Centerline Dist. to Observer: 44.0 feet
Barrier Distance to Observer: 0.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 0.0 feet
Road Elevation: 0.0 feet
Road Grade: 0.0%
Left View: -90.0 degrees
Right View: 90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos: 15
Medium Trucks (2 Axles): 15
Heavy Trucks (3+ Axles): 15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 0.000
Medium Trucks: 2.297
Heavy Trucks: 8.006 *Grade Adjustment:* 0.0

Lane Equivalent Distance (in feet)

Autos: 36.551
Medium Trucks: 36.308
Heavy Trucks: 36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.47	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-14.76	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.72	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.7	69.8	68.0	62.0	70.6	71.2
Medium Trucks:	65.5	64.0	57.6	56.1	64.5	64.7
Heavy Trucks:	66.3	64.9	55.9	57.1	65.5	65.6
Vehicle Noise:	73.5	71.8	68.6	64.0	72.5	72.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	65	139	299	645
CNEL:	69	149	321	692

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Ironwood Av.
Road Segment: w/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 13,700 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 1,370 vehicles
Vehicle Speed: 45 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: 0.0 feet
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 44.0 feet
Centerline Dist. to Observer: 44.0 feet
Barrier Distance to Observer: 0.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 0.0 feet
Road Elevation: 0.0 feet
Road Grade: 0.0%
Left View: -90.0 degrees
Right View: 90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos: 15
Medium Trucks (2 Axles): 15
Heavy Trucks (3+ Axles): 15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 0.000
Medium Trucks: 2.297
Heavy Trucks: 8.006 Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos: 36.551
Medium Trucks: 36.308
Heavy Trucks: 36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.58	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.82	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.78	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.6	66.7	64.9	58.9	67.5	68.1
Medium Trucks:	62.4	60.9	54.5	53.0	61.5	61.7
Heavy Trucks:	63.3	61.8	52.8	54.0	62.4	62.5
Vehicle Noise:	70.5	68.7	65.6	60.9	69.4	69.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	40	87	187	403
CNEL:	43	93	201	433

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Ironwood Av.
Road Segment: e/o Nason St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 9,400 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 940 vehicles
Vehicle Speed: 55 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: 0.0 feet
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 44.0 feet
Centerline Dist. to Observer: 44.0 feet
Barrier Distance to Observer: 0.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 0.0 feet
Road Elevation: 0.0 feet
Road Grade: 0.0%
Left View: -90.0 degrees
Right View: 90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos: 15
Medium Trucks (2 Axles): 15
Heavy Trucks (3+ Axles): 15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 0.000
Medium Trucks: 2.297
Heavy Trucks: 8.006 Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos: 36.551
Medium Trucks: 36.308
Heavy Trucks: 36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.09	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-20.33	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-24.29	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.4	67.5	65.8	59.7	68.3	68.9
Medium Trucks:	62.9	61.3	55.0	53.4	61.9	62.1
Heavy Trucks:	62.9	61.5	52.4	53.7	62.0	62.2
Vehicle Noise:	71.0	69.3	66.3	61.4	70.0	70.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	44	95	204	439
CNEL:	47	102	219	472

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Ironwood Av.
Road Segment: e/o Lantz Ln.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 8,400 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 840 vehicles
Vehicle Speed: 55 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: 0.0 feet
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 44.0 feet
Centerline Dist. to Observer: 44.0 feet
Barrier Distance to Observer: 0.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 0.0 feet
Road Elevation: 0.0 feet
Road Grade: 0.0%
Left View: -90.0 degrees
Right View: 90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos: 15
Medium Trucks (2 Axles): 15
Heavy Trucks (3+ Axles): 15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 0.000
Medium Trucks: 2.297
Heavy Trucks: 8.006 Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos: 36.551
Medium Trucks: 36.308
Heavy Trucks: 36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.58	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-20.82	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-24.77	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.9	67.0	65.3	59.2	67.8	68.4
Medium Trucks:	62.4	60.9	54.5	53.0	61.4	61.6
Heavy Trucks:	62.4	61.0	51.9	53.2	61.5	61.7
Vehicle Noise:	70.5	68.8	65.8	60.9	69.5	70.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	41	88	189	407
CNEL:	44	94	203	438

Monday, August 31, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Year 2035 With Project
Road Name: Ironwood Av.
Road Segment: e/o Oliver St.
Project Name: Ironwood Village (Tract No
Job Number: 9385

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt): 8,500 vehicles
Peak Hour Percentage: 10%
Peak Hour Volume: 850 vehicles
Vehicle Speed: 55 mph
Near/Far Lane Distance: 50 feet

Site Data

Barrier Height: 0.0 feet
Barrier Type (0-Wall, 1-Berm): 0.0
Centerline Dist. to Barrier: 44.0 feet
Centerline Dist. to Observer: 44.0 feet
Barrier Distance to Observer: 0.0 feet
Observer Height (Above Pad): 5.0 feet
Pad Elevation: 0.0 feet
Road Elevation: 0.0 feet
Road Grade: 0.0%
Left View: -90.0 degrees
Right View: 90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos: 15
Medium Trucks (2 Axles): 15
Heavy Trucks (3+ Axles): 15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos: 0.000
Medium Trucks: 2.297
Heavy Trucks: 8.006 Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos: 36.551
Medium Trucks: 36.308
Heavy Trucks: 36.332

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	71.78	-3.53	1.94	-1.20	-4.61	0.000	0.000
Medium Trucks:	82.40	-20.77	1.98	-1.20	-4.87	0.000	0.000
Heavy Trucks:	86.40	-24.72	1.98	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.0	67.1	65.3	59.3	67.9	68.5
Medium Trucks:	62.4	60.9	54.5	53.0	61.5	61.7
Heavy Trucks:	62.5	61.0	52.0	53.2	61.6	61.7
Vehicle Noise:	70.6	68.8	65.9	61.0	69.5	70.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	41	88	190	410
CNEL:	44	95	205	441

Monday, August 31, 2015

APPENDIX 8.1:

ON-SITE TRAFFIC NOISE CALCULATIONS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard No Wall | *Project Name:* Ironwood
Road Name: Ironwood Av. | *Job Number:* 9385
Lot No: 1 | *Analyst:* A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	194.0 feet
Centerline Dist. to Observer:	204.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,861.0 feet
Road Elevation:	1,839.0 feet
Barrier Elevation:	1,861.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,839.000
Medium Trucks:	1,841.297
Heavy Trucks:	1,847.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	204.255
Medium Trucks:	203.964
Heavy Trucks:	203.351

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.27	-1.20	-0.63	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.26	-1.20	-0.67	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.24	-1.20	-0.78	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.5	54.5	63.1	63.7
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.4
Heavy Trucks:	54.1	52.7	43.7	44.9	53.3	53.4
Vehicle Noise:	65.0	63.2	60.8	55.3	63.9	64.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.5	54.5	63.1	63.7
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.4
Heavy Trucks:	54.1	52.7	43.7	44.9	53.3	53.4
Vehicle Noise:	65.0	63.2	60.8	55.3	63.9	64.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard No Wall | *Project Name:* Ironwood
Road Name: Ironwood Av. | *Job Number:* 9385
Lot No: 5 | *Analyst:* A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	196.0 feet
Centerline Dist. to Observer:	206.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,853.1 feet
Road Elevation:	1,838.5 feet
Barrier Elevation:	1,853.1 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,838.500
Medium Trucks:	1,840.797
Heavy Trucks:	1,846.506

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	205.415
Medium Trucks:	205.208
Heavy Trucks:	204.806

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.31	-1.20	-0.78	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.30	-1.20	-0.82	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.29	-1.20	-0.94	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.5	54.4	63.1	63.7
Medium Trucks:	54.1	52.6	46.2	44.6	53.1	53.3
Heavy Trucks:	54.1	52.7	43.6	44.9	53.2	53.4
Vehicle Noise:	64.9	63.1	60.7	55.3	63.9	64.4

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.5	54.4	63.1	63.7
Medium Trucks:	54.1	52.6	46.2	44.6	53.1	53.3
Heavy Trucks:	54.1	52.7	43.6	44.9	53.2	53.4
Vehicle Noise:	64.9	63.1	60.7	55.3	63.9	64.4

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard No Wall | *Project Name:* Ironwood
Road Name: Ironwood Av. | *Job Number:* 9385
Lot No: 12 | *Analyst:* A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	196.0 feet
Centerline Dist. to Observer:	206.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,847.5 feet
Road Elevation:	1,834.4 feet
Barrier Elevation:	1,847.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,834.400
Medium Trucks:	1,836.697
Heavy Trucks:	1,842.406

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	205.277
Medium Trucks:	205.087
Heavy Trucks:	204.726

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.30	-1.20	-0.81	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.30	-1.20	-0.85	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.29	-1.20	-0.98	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.5	54.5	63.1	63.7
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.3
Heavy Trucks:	54.1	52.7	43.6	44.9	53.2	53.4
Vehicle Noise:	64.9	63.1	60.7	55.3	63.9	64.4

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.5	54.5	63.1	63.7
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.3
Heavy Trucks:	54.1	52.7	43.6	44.9	53.2	53.4
Vehicle Noise:	64.9	63.1	60.7	55.3	63.9	64.4

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard No Wall | *Project Name:* Ironwood
Road Name: Ironwood Av. | *Job Number:* 9385
Lot No: 19 | *Analyst:* A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	195.0 feet
Centerline Dist. to Observer:	205.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,849.5 feet
Road Elevation:	1,835.0 feet
Barrier Elevation:	1,849.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,835.000
Medium Trucks:	1,837.297
Heavy Trucks:	1,843.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	204.402
Medium Trucks:	204.196
Heavy Trucks:	203.794

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.28	-1.20	-0.78	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.27	-1.20	-0.82	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.26	-1.20	-0.95	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.5	54.5	63.1	63.7
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.4
Heavy Trucks:	54.1	52.7	43.7	44.9	53.3	53.4
Vehicle Noise:	65.0	63.2	60.8	55.3	63.9	64.4

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.5	54.5	63.1	63.7
Medium Trucks:	54.1	52.6	46.2	44.7	53.1	53.4
Heavy Trucks:	54.1	52.7	43.7	44.9	53.3	53.4
Vehicle Noise:	65.0	63.2	60.8	55.3	63.9	64.4

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard No Wall
Road Name: Ironwood Av.
Lot No: 20

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	199.0 feet
Centerline Dist. to Observer:	209.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,854.7 feet
Road Elevation:	1,835.0 feet
Barrier Elevation:	1,854.7 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,835.000
Medium Trucks:	1,837.297
Heavy Trucks:	1,843.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	208.964
Medium Trucks:	208.705
Heavy Trucks:	208.170

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.42	-1.20	-0.68	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.41	-1.20	-0.73	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.40	-1.20	-0.84	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.1	62.2	60.4	54.3	63.0	63.6
Medium Trucks:	54.0	52.4	46.1	44.5	53.0	53.2
Heavy Trucks:	54.0	52.6	43.5	44.8	53.1	53.2
Vehicle Noise:	64.8	63.0	60.6	55.2	63.8	64.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.1	62.2	60.4	54.3	63.0	63.6
Medium Trucks:	54.0	52.4	46.1	44.5	53.0	53.2
Heavy Trucks:	54.0	52.6	43.5	44.8	53.1	53.2
Vehicle Noise:	64.8	63.0	60.6	55.2	63.8	64.3

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard No Wall
Road Name: Ironwood Av.
Lot No: 23

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	233.0 feet
Centerline Dist. to Observer:	243.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,863.5 feet
Road Elevation:	1,839.5 feet
Barrier Elevation:	1,863.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,839.500
Medium Trucks:	1,841.797
Heavy Trucks:	1,847.506

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	243.444
Medium Trucks:	243.181
Heavy Trucks:	242.621

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-10.41	-1.20	-0.67	0.000	0.000
Medium Trucks:	79.85	-15.29	-10.41	-1.20	-0.71	0.000	0.000
Heavy Trucks:	83.81	-19.25	-10.39	-1.20	-0.81	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.1	61.2	59.4	53.3	62.0	62.6
Medium Trucks:	53.0	51.4	45.1	43.5	52.0	52.2
Heavy Trucks:	53.0	51.6	42.5	43.8	52.1	52.3
Vehicle Noise:	63.8	62.0	59.6	54.2	62.8	63.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.1	61.2	59.4	53.3	62.0	62.6
Medium Trucks:	53.0	51.4	45.1	43.5	52.0	52.2
Heavy Trucks:	53.0	51.6	42.5	43.8	52.1	52.3
Vehicle Noise:	63.8	62.0	59.6	54.2	62.8	63.3

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard No Wall
Road Name: Ironwood Av.
Lot No: 25

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	188.0 feet
Centerline Dist. to Observer:	198.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,867.4 feet
Road Elevation:	1,845.0 feet
Barrier Elevation:	1,867.4 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,845.000
Medium Trucks:	1,847.297
Heavy Trucks:	1,853.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	198.317
Medium Trucks:	198.013
Heavy Trucks:	197.371

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.08	-1.20	-0.61	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.07	-1.20	-0.65	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.05	-1.20	-0.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.4	62.5	60.7	54.7	63.3	63.9
Medium Trucks:	54.3	52.8	46.4	44.9	53.3	53.6
Heavy Trucks:	54.3	52.9	43.9	45.1	53.5	53.6
Vehicle Noise:	65.2	63.3	61.0	55.5	64.1	64.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.4	62.5	60.7	54.7	63.3	63.9
Medium Trucks:	54.3	52.8	46.4	44.9	53.3	53.6
Heavy Trucks:	54.3	52.9	43.9	45.1	53.5	53.6
Vehicle Noise:	65.2	63.3	61.0	55.5	64.1	64.6

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard With Wall
Road Name: Ironwood Av.
Lot No: 27

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**4.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	136.0 feet
Centerline Dist. to Observer:	146.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,871.6 feet
Road Elevation:	1,852.8 feet
Barrier Elevation:	1,871.6 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,852.800
Medium Trucks:	1,855.097
Heavy Trucks:	1,860.806

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	145.663
Medium Trucks:	145.295
Heavy Trucks:	144.548

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-7.07	-1.20	0.02	-5.200	-8.200
Medium Trucks:	79.85	-15.29	-7.05	-1.20	0.01	-5.100	-8.100
Heavy Trucks:	83.81	-19.25	-7.02	-1.20	0.00	-4.900	-7.900

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.4	64.5	62.7	56.7	65.3	65.9
Medium Trucks:	56.3	54.8	48.4	46.9	55.4	55.6
Heavy Trucks:	56.4	54.9	45.9	47.1	55.5	55.6
Vehicle Noise:	67.2	65.4	63.0	57.5	66.1	66.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.2	59.3	57.5	51.5	60.1	60.7
Medium Trucks:	51.2	49.7	43.3	41.8	50.3	50.5
Heavy Trucks:	51.5	50.0	41.0	42.2	50.6	50.7
Vehicle Noise:	62.0	60.2	57.8	52.4	61.0	61.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Backyard With Wall
Road Name: Ironwood Av.
Lot No: 30
Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**4.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	129.0 feet
Centerline Dist. to Observer:	139.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,877.5 feet
Road Elevation:	1,856.6 feet
Barrier Elevation:	1,877.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,856.600
Medium Trucks:	1,858.897
Heavy Trucks:	1,864.606

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	139.031
Medium Trucks:	138.607
Heavy Trucks:	137.727

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-6.77	-1.20	0.04	-5.400	-8.400
Medium Trucks:	79.85	-15.29	-6.75	-1.20	0.02	-5.200	-8.200
Heavy Trucks:	83.81	-19.25	-6.70	-1.20	0.00	-4.900	-7.900

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.7	64.8	63.0	57.0	65.6	66.2
Medium Trucks:	56.6	55.1	48.7	47.2	55.7	55.9
Heavy Trucks:	56.7	55.2	46.2	47.5	55.8	55.9
Vehicle Noise:	67.5	65.7	63.3	57.8	66.4	67.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.3	59.4	57.6	51.6	60.2	60.8
Medium Trucks:	51.4	49.9	43.5	42.0	50.5	50.7
Heavy Trucks:	51.8	50.3	41.3	42.6	50.9	51.0
Vehicle Noise:	62.2	60.3	57.9	52.5	61.1	61.6

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall
Road Name: Ironwood Av.
Lot No: 1
Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	194.0 feet
Centerline Dist. to Observer:	214.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,861.0 feet
Road Elevation:	1,839.0 feet
Barrier Elevation:	1,861.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,839.000
Medium Trucks:	1,841.297
Heavy Trucks:	1,847.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	214.243
Medium Trucks:	213.966
Heavy Trucks:	213.382

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.58	-1.20	-0.16	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.57	-1.20	-0.19	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.56	-1.20	-0.27	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.2	62.8	63.4
Medium Trucks:	53.8	52.3	45.9	44.4	52.8	53.1
Heavy Trucks:	53.8	52.4	43.4	44.6	53.0	53.1
Vehicle Noise:	64.7	62.8	60.5	55.0	63.6	64.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.2	62.8	63.4
Medium Trucks:	53.8	52.3	45.9	44.4	52.8	53.1
Heavy Trucks:	53.8	52.4	43.4	44.6	53.0	53.1
Vehicle Noise:	64.7	62.8	60.5	55.0	63.6	64.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall
Road Name: Ironwood Av.
Lot No: 5
Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	196.0 feet
Centerline Dist. to Observer:	216.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,853.1 feet
Road Elevation:	1,838.5 feet
Barrier Elevation:	1,853.1 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,838.500
Medium Trucks:	1,840.797
Heavy Trucks:	1,846.506

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	215.442
Medium Trucks:	215.245
Heavy Trucks:	214.861

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.62	-1.20	-0.27	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.61	-1.20	-0.30	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.60	-1.20	-0.41	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	53.8	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.3	43.3	44.6	52.9	53.0
Vehicle Noise:	64.6	62.8	60.4	55.0	63.6	64.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	53.8	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.3	43.3	44.6	52.9	53.0
Vehicle Noise:	64.6	62.8	60.4	55.0	63.6	64.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall
Road Name: Ironwood Av.
Lot No: 12
Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	196.0 feet
Centerline Dist. to Observer:	216.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,847.5 feet
Road Elevation:	1,834.4 feet
Barrier Elevation:	1,847.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,834.400
Medium Trucks:	1,836.697
Heavy Trucks:	1,842.406

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	215.310
Medium Trucks:	215.130
Heavy Trucks:	214.786

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.61	-1.20	-0.29	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.61	-1.20	-0.33	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.60	-1.20	-0.44	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	53.8	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.3	43.3	44.6	52.9	53.0
Vehicle Noise:	64.6	62.8	60.4	55.0	63.6	64.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	53.8	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.3	43.3	44.6	52.9	53.0
Vehicle Noise:	64.6	62.8	60.4	55.0	63.6	64.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall | *Project Name:* Ironwood
Road Name: Ironwood Av. | *Job Number:* 9385
Lot No: 19 | *Analyst:* A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	195.0 feet
Centerline Dist. to Observer:	215.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,849.5 feet
Road Elevation:	1,835.0 feet
Barrier Elevation:	1,849.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,835.000
Medium Trucks:	1,837.297
Heavy Trucks:	1,843.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	214.430
Medium Trucks:	214.233
Heavy Trucks:	213.851

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.59	-1.20	-0.27	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.58	-1.20	-0.30	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.57	-1.20	-0.41	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.2	62.8	63.4
Medium Trucks:	53.8	52.3	45.9	44.4	52.8	53.1
Heavy Trucks:	53.8	52.4	43.3	44.6	52.9	53.1
Vehicle Noise:	64.7	62.8	60.5	55.0	63.6	64.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.2	62.8	63.4
Medium Trucks:	53.8	52.3	45.9	44.4	52.8	53.1
Heavy Trucks:	53.8	52.4	43.3	44.6	52.9	53.1
Vehicle Noise:	64.7	62.8	60.5	55.0	63.6	64.1

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall | *Project Name:* Ironwood
Road Name: Ironwood Av. | *Job Number:* 9385
Lot No: 20 | *Analyst:* A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	199.0 feet
Centerline Dist. to Observer:	219.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,854.7 feet
Road Elevation:	1,835.0 feet
Barrier Elevation:	1,854.7 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,835.000
Medium Trucks:	1,837.297
Heavy Trucks:	1,843.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	218.966
Medium Trucks:	218.719
Heavy Trucks:	218.208

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.72	-1.20	-0.20	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.72	-1.20	-0.23	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.70	-1.20	-0.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.8	61.9	60.1	54.0	62.7	63.3
Medium Trucks:	53.6	52.1	45.8	44.2	52.7	52.9
Heavy Trucks:	53.7	52.2	43.2	44.5	52.8	52.9
Vehicle Noise:	64.5	62.7	60.3	54.9	63.5	64.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.8	61.9	60.1	54.0	62.7	63.3
Medium Trucks:	53.6	52.1	45.8	44.2	52.7	52.9
Heavy Trucks:	53.7	52.2	43.2	44.5	52.8	52.9
Vehicle Noise:	64.5	62.7	60.3	54.9	63.5	64.0

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall | *Project Name:* Ironwood
Road Name: Ironwood Av. | *Job Number:* 9385
Lot No: 23 | *Analyst:* A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	233.0 feet
Centerline Dist. to Observer:	253.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,863.5 feet
Road Elevation:	1,839.5 feet
Barrier Elevation:	1,863.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,839.500
Medium Trucks:	1,841.797
Heavy Trucks:	1,847.506

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	253.427
Medium Trucks:	253.174
Heavy Trucks:	252.636

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-10.68	-1.20	-0.19	0.000	0.000
Medium Trucks:	79.85	-15.29	-10.67	-1.20	-0.21	0.000	0.000
Heavy Trucks:	83.81	-19.25	-10.66	-1.20	-0.29	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.8	60.9	59.1	53.1	61.7	62.3
Medium Trucks:	52.7	51.2	44.8	43.3	51.7	52.0
Heavy Trucks:	52.7	51.3	42.3	43.5	51.9	52.0
Vehicle Noise:	63.6	61.7	59.4	53.9	62.5	63.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.8	60.9	59.1	53.1	61.7	62.3
Medium Trucks:	52.7	51.2	44.8	43.3	51.7	52.0
Heavy Trucks:	52.7	51.3	42.3	43.5	51.9	52.0
Vehicle Noise:	63.6	61.7	59.4	53.9	62.5	63.0

Thursday, August 27, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall | *Project Name:* Ironwood
Road Name: Ironwood Av. | *Job Number:* 9385
Lot No: 25 | *Analyst:* A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	188.0 feet
Centerline Dist. to Observer:	208.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,867.4 feet
Road Elevation:	1,845.0 feet
Barrier Elevation:	1,867.4 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,845.000
Medium Trucks:	1,847.297
Heavy Trucks:	1,853.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	208.302
Medium Trucks:	208.012
Heavy Trucks:	207.401

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.40	-1.20	-0.15	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.39	-1.20	-0.17	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.37	-1.20	-0.26	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.1	62.2	60.4	54.4	63.0	63.6
Medium Trucks:	54.0	52.5	46.1	44.6	53.0	53.3
Heavy Trucks:	54.0	52.6	43.5	44.8	53.1	53.3
Vehicle Noise:	64.9	63.0	60.7	55.2	63.8	64.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.1	62.2	60.4	54.4	63.0	63.6
Medium Trucks:	54.0	52.5	46.1	44.6	53.0	53.3
Heavy Trucks:	54.0	52.6	43.5	44.8	53.1	53.3
Vehicle Noise:	64.9	63.0	60.7	55.2	63.8	64.3

Thursday, August 27, 2015

Attachment: Noise Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall
Road Name: Ironwood Av.
Lot No: 27
Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**4.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	136.0 feet
Centerline Dist. to Observer:	156.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,871.6 feet
Road Elevation:	1,852.8 feet
Barrier Elevation:	1,871.6 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,852.800
Medium Trucks:	1,855.097
Heavy Trucks:	1,860.806

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	155.638
Medium Trucks:	155.271
Heavy Trucks:	154.524

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-7.50	-1.20	*0.12*	-6.160	-9.160
Medium Trucks:	79.85	-15.29	-7.49	-1.20	*0.08*	-5.800	-8.800
Heavy Trucks:	83.81	-19.25	-7.45	-1.20	*0.03*	-5.300	-8.300

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.0	64.1	62.3	56.3	64.9	65.5
Medium Trucks:	55.9	54.4	48.0	46.5	54.9	55.2
Heavy Trucks:	55.9	54.5	45.5	46.7	55.1	55.2
Vehicle Noise:	66.8	64.9	62.6	57.1	65.7	66.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	59.8	57.9	56.1	50.1	58.7	59.3
Medium Trucks:	50.1	48.6	42.2	40.7	49.1	49.4
Heavy Trucks:	50.6	49.2	40.2	41.4	49.8	49.9
Vehicle Noise:	60.7	58.9	56.4	51.1	59.6	60.2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: First Floor With Wall
Road Name: Ironwood Av.
Lot No: 30
Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**4.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	129.0 feet
Centerline Dist. to Observer:	149.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,877.5 feet
Road Elevation:	1,856.6 feet
Barrier Elevation:	1,877.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,856.600
Medium Trucks:	1,858.897
Heavy Trucks:	1,864.606

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	149.006
Medium Trucks:	148.582
Heavy Trucks:	147.702

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-7.22	-1.20	*0.17*	-6.560	-9.560
Medium Trucks:	79.85	-15.29	-7.20	-1.20	*0.13*	-6.240	-9.240
Heavy Trucks:	83.81	-19.25	-7.16	-1.20	*0.05*	-5.500	-8.500

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.3	64.4	62.6	56.5	65.2	65.8
Medium Trucks:	56.2	54.7	48.3	46.8	55.2	55.4
Heavy Trucks:	56.2	54.8	45.8	47.0	55.4	55.5
Vehicle Noise:	67.0	65.2	62.8	57.4	66.0	66.5

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	59.7	57.8	56.0	50.0	58.6	59.2
Medium Trucks:	49.9	48.4	42.1	40.5	49.0	49.2
Heavy Trucks:	50.7	49.3	40.3	41.5	49.9	50.0
Vehicle Noise:	60.6	58.8	56.3	51.0	59.5	60.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Ironwood Av.
Lot No: 1
Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	194.0 feet
Centerline Dist. to Observer:	214.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,861.0 feet
Road Elevation:	1,839.0 feet
Barrier Elevation:	1,861.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,839.000
Medium Trucks:	1,841.297
Heavy Trucks:	1,847.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	215.562
Medium Trucks:	215.190
Heavy Trucks:	214.370

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.62	-1.20	*-2.59*	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.61	-1.20	*-2.71*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.59	-1.20	*-3.03*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	53.8	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.4	43.3	44.6	52.9	53.1
Vehicle Noise:	64.6	62.8	60.4	55.0	63.6	64.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	53.8	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.4	43.3	44.6	52.9	53.1
Vehicle Noise:	64.6	62.8	60.4	55.0	63.6	64.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Ironwood Av.
Lot No: 5
Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	196.0 feet
Centerline Dist. to Observer:	216.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,853.1 feet
Road Elevation:	1,838.5 feet
Barrier Elevation:	1,853.1 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,838.500
Medium Trucks:	1,840.797
Heavy Trucks:	1,846.506

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	216.446
Medium Trucks:	216.155
Heavy Trucks:	215.534

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.65	-1.20	*-3.00*	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.64	-1.20	*-3.13*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.62	-1.20	*-3.47*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.8	61.9	60.2	54.1	62.7	63.3
Medium Trucks:	53.7	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.7	52.3	43.3	44.5	52.9	53.0
Vehicle Noise:	64.6	62.8	60.4	55.0	63.5	64.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.8	61.9	60.2	54.1	62.7	63.3
Medium Trucks:	53.7	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.7	52.3	43.3	44.5	52.9	53.0
Vehicle Noise:	64.6	62.8	60.4	55.0	63.5	64.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Ironwood Av.
Lot No: 12

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	196.0 feet
Centerline Dist. to Observer:	216.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,847.5 feet
Road Elevation:	1,834.4 feet
Barrier Elevation:	1,847.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,834.400
Medium Trucks:	1,836.697
Heavy Trucks:	1,842.406

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	216.253
Medium Trucks:	215.977
Heavy Trucks:	215.396

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.64	-1.20	-3.09	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.63	-1.20	-3.22	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.62	-1.20	-3.56	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.8	61.9	60.2	54.1	62.7	63.3
Medium Trucks:	53.7	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.3	43.3	44.5	52.9	53.0
Vehicle Noise:	64.6	62.8	60.4	55.0	63.5	64.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.8	61.9	60.2	54.1	62.7	63.3
Medium Trucks:	53.7	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.3	43.3	44.5	52.9	53.0
Vehicle Noise:	64.6	62.8	60.4	55.0	63.5	64.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Ironwood Av.
Lot No: 19

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	195.0 feet
Centerline Dist. to Observer:	215.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,849.5 feet
Road Elevation:	1,835.0 feet
Barrier Elevation:	1,849.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,835.000
Medium Trucks:	1,837.297
Heavy Trucks:	1,843.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	215.435
Medium Trucks:	215.143
Heavy Trucks:	214.523

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.62	-1.20	-3.00	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.61	-1.20	-3.13	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.59	-1.20	-3.47	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	53.8	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.4	43.3	44.6	52.9	53.1
Vehicle Noise:	64.6	62.8	60.4	55.0	63.6	64.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	53.8	52.2	45.9	44.3	52.8	53.0
Heavy Trucks:	53.8	52.4	43.3	44.6	52.9	53.1
Vehicle Noise:	64.6	62.8	60.4	55.0	63.6	64.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Ironwood Av.
Lot No: 20

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	199.0 feet
Centerline Dist. to Observer:	219.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,854.7 feet
Road Elevation:	1,835.0 feet
Barrier Elevation:	1,854.7 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,835.000
Medium Trucks:	1,837.297
Heavy Trucks:	1,843.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	220.163
Medium Trucks:	219.823
Heavy Trucks:	219.080

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.76	-1.20	-2.75	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.75	-1.20	-2.87	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.73	-1.20	-3.18	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.7	61.8	60.0	54.0	62.6	63.2
Medium Trucks:	53.6	52.1	45.7	44.2	52.7	52.9
Heavy Trucks:	53.6	52.2	43.2	44.4	52.8	52.9
Vehicle Noise:	64.5	62.7	60.3	54.8	63.4	64.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.7	61.8	60.0	54.0	62.6	63.2
Medium Trucks:	53.6	52.1	45.7	44.2	52.7	52.9
Heavy Trucks:	53.6	52.2	43.2	44.4	52.8	52.9
Vehicle Noise:	64.5	62.7	60.3	54.8	63.4	64.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall
Road Name: Ironwood Av.
Lot No: 23

Project Name: Ironwood
Job Number: 9385
Analyst: A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	233.0 feet
Centerline Dist. to Observer:	253.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,863.5 feet
Road Elevation:	1,839.5 feet
Barrier Elevation:	1,863.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,839.500
Medium Trucks:	1,841.797
Heavy Trucks:	1,847.506

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	254.613
Medium Trucks:	254.281
Heavy Trucks:	253.542

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-10.71	-1.20	-2.75	0.000	0.000
Medium Trucks:	79.85	-15.29	-10.70	-1.20	-2.85	0.000	0.000
Heavy Trucks:	83.81	-19.25	-10.68	-1.20	-3.12	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.8	60.9	59.1	53.0	61.7	62.3
Medium Trucks:	52.7	51.2	44.8	43.3	51.7	51.9
Heavy Trucks:	52.7	51.3	42.2	43.5	51.8	52.0
Vehicle Noise:	63.5	61.7	59.3	53.9	62.5	63.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.8	60.9	59.1	53.0	61.7	62.3
Medium Trucks:	52.7	51.2	44.8	43.3	51.7	51.9
Heavy Trucks:	52.7	51.3	42.2	43.5	51.8	52.0
Vehicle Noise:	63.5	61.7	59.3	53.9	62.5	63.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall — *Project Name:* Ironwood
Road Name: Ironwood Av. — *Job Number:* 9385
Lot No: 25 — *Analyst:* A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	188.0 feet
Centerline Dist. to Observer:	208.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,867.4 feet
Road Elevation:	1,845.0 feet
Barrier Elevation:	1,867.4 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,845.000
Medium Trucks:	1,847.297
Heavy Trucks:	1,853.006

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	209.676
Medium Trucks:	209.289
Heavy Trucks:	208.435

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-9.44	-1.20	*-2.53*	0.000	0.000
Medium Trucks:	79.85	-15.29	-9.43	-1.20	*-2.65*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-9.40	-1.20	*-2.97*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.0	62.1	60.4	54.3	62.9	63.5
Medium Trucks:	53.9	52.4	46.1	44.5	53.0	53.2
Heavy Trucks:	54.0	52.5	43.5	44.8	53.1	53.2
Vehicle Noise:	64.8	63.0	60.6	55.2	63.7	64.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.0	62.1	60.4	54.3	62.9	63.5
Medium Trucks:	53.9	52.4	46.1	44.5	53.0	53.2
Heavy Trucks:	54.0	52.5	43.5	44.8	53.1	53.2
Vehicle Noise:	64.8	63.0	60.6	55.2	63.7	64.3

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall — *Project Name:* Ironwood
Road Name: Ironwood Av. — *Job Number:* 9385
Lot No: 27 — *Analyst:* A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**4.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	136.0 feet
Centerline Dist. to Observer:	156.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,871.6 feet
Road Elevation:	1,852.8 feet
Barrier Elevation:	1,871.6 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,852.800
Medium Trucks:	1,855.097
Heavy Trucks:	1,860.806

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	157.438
Medium Trucks:	156.976
Heavy Trucks:	155.967

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-7.58	-1.20	*-0.83*	0.000	0.000
Medium Trucks:	79.85	-15.29	-7.56	-1.20	*-0.92*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-7.51	-1.20	*-1.18*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.9	64.0	62.2	56.2	64.8	65.4
Medium Trucks:	55.8	54.3	47.9	46.4	54.9	55.1
Heavy Trucks:	55.9	54.4	45.4	46.6	55.0	55.1
Vehicle Noise:	66.7	64.9	62.5	57.0	65.6	66.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.9	64.0	62.2	56.2	64.8	65.4
Medium Trucks:	55.8	54.3	47.9	46.4	54.9	55.1
Heavy Trucks:	55.9	54.4	45.4	46.6	55.0	55.1
Vehicle Noise:	66.7	64.9	62.5	57.0	65.6	66.2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario: Second Floor With Wall — *Project Name:* Ironwood
Road Name: Ironwood Av. — *Job Number:* 9385
Lot No: 30 — *Analyst:* A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	30,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,000 vehicles
Vehicle Speed:	55 mph
Near/Far Lane Distance:	50 feet

Site Data

Barrier Height:	**4.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	129.0 feet
Centerline Dist. to Observer:	149.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,877.5 feet
Road Elevation:	1,856.6 feet
Barrier Elevation:	1,877.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,856.600
Medium Trucks:	1,858.897
Heavy Trucks:	1,864.606

Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	150.977
Medium Trucks:	150.462
Heavy Trucks:	149.329

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	72.73	1.95	-7.30	-1.20	*-0.69*	0.000	0.000
Medium Trucks:	79.85	-15.29	-7.28	-1.20	*-0.78*	0.000	0.000
Heavy Trucks:	83.81	-19.25	-7.23	-1.20	*-1.03*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.2	64.3	62.5	56.5	65.1	65.7
Medium Trucks:	56.1	54.6	48.2	46.7	55.1	55.4
Heavy Trucks:	56.1	54.7	45.7	46.9	55.3	55.4
Vehicle Noise:	67.0	65.1	62.8	57.3	65.9	66.4

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.2	64.3	62.5	56.5	65.1	65.7
Medium Trucks:	56.1	54.6	48.2	46.7	55.1	55.4
Heavy Trucks:	56.1	54.7	45.7	46.9	55.3	55.4
Vehicle Noise:	67.0	65.1	62.8	57.3	65.9	66.4

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APPENDIX 10.1:

RCNM EQUIPMENT DATABASE

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U.S. Department
of Transportation

Federal Highway Administration

FHWA
Roadway Construction Noise Model User's Guide

FHWA-HEP-05-054
DOT-VNTSC-FHWA-05-01

Final Report
January 2006

Prepared for
U.S. Department of Transportation
Federal Highway Administration
Office of Natural and Human Environment
Washington, DC 20590

Prepared by
U.S. Department of Transportation
Research and Innovative Technology Administration
John A. Volpe National Transportation Systems Center
Acoustics Facility
Cambridge, MA 02142

Table 1. CA/T equipment noise emissions and acoustical usage factors database.

CA/T Noise Emission Reference Levels and Usage Factors					
filename: EQUIPLST.xls					
revised: 7/26/05		Acoustical	Spec 721.560	Actual Measured	No. of Actual
	Impact	Use Factor	Lmax @ 50ft	Lmax @ 50ft	Data Samples
Equipment Description	Device ?	(%)	(dBA, slow)	(dBA, slow)	(Count)
				(samples averaged)	
All Other Equipment > 5 HP	No	50	85	-- N/A --	0
Auger Drill Rig	No	20	85	84	36
Backhoe	No	40	80	78	372
Bar Bender	No	20	80	-- N/A --	0
Blasting	Yes	-- N/A --	94	-- N/A --	0
Boring Jack Power Unit	No	50	80	83	1
Chain Saw	No	20	85	84	46
Clam Shovel (dropping)	Yes	20	93	87	4
Compactor (ground)	No	20	80	83	57
Compressor (air)	No	40	80	78	18
Concrete Batch Plant	No	15	83	-- N/A --	0
Concrete Mixer Truck	No	40	85	79	40
Concrete Pump Truck	No	20	82	81	30
Concrete Saw	No	20	90	90	55
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
Drill Rig Truck	No	20	84	79	22
Drum Mixer	No	50	80	80	1
Dump Truck	No	40	84	76	31
Excavator	No	40	85	81	170
Flat Bed Truck	No	40	84	74	4
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (<25KVA, VMS signs)	No	50	70	73	74
Gradall	No	40	85	83	70
Grader	No	40	85	-- N/A --	0
Grapple (on backhoe)	No	40	85	87	1
Horizontal Boring Hydr. Jack	No	25	80	82	6
Hydra Break Ram	Yes	10	90	-- N/A --	0
Impact Pile Driver	Yes	20	95	101	11
Jackhammer	Yes	20	85	89	133
Man Lift	No	20	85	75	23
Mounted Impact Hammer (hoe ram)	Yes	20	90	90	212
Pavement Scarafier	No	20	85	90	2
Paver	No	50	85	77	9
Pickup Truck	No	40	55	75	1
Pneumatic Tools	No	50	85	85	90
Pumps	No	50	77	81	17
Refrigerator Unit	No	100	82	73	3
Rivit Buster/chipping gun	Yes	20	85	79	19
Rock Drill	No	20	85	81	3
Roller	No	20	85	80	16
Sand Blasting (Single Nozzle)	No	20	85	96	9
Scraper	No	40	85	84	12
Shears (on backhoe)	No	40	85	96	5
Slurry Plant	No	100	78	78	1
Slurry Trenching Machine	No	50	82	80	75
Soil Mix Drill Rig	No	50	80	-- N/A --	0
Tractor	No	40	84	-- N/A --	0
Vacuum Excavator (Vac-truck)	No	40	85	85	149
Vacuum Street Sweeper	No	10	80	82	19
Ventilation Fan	No	100	85	79	13
Vibrating Hopper	No	50	85	87	1
Vibratory Concrete Mixer	No	20	80	80	1
Vibratory Pile Driver	No	20	95	101	44
Warning Horn	No	5	85	83	12
Welder / Torch	No	40	73	74	5

Attachment: Noise Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Geotechnical & Environmental Solutions

PHASE I ENVIRONMENTAL SITE ASSESSMENT

GLOBAL INVESTMENTS AND DEVELOPMENT, LLC

Ironwood Avenue Property – 75.1-Acres
Northwest of Ironwood Avenue and Oliver Street
APN 473-160-004-5
City of Moreno Valley, Riverside County, California 92555

October 15, 2014

EEI Project Number GLO-71982.1

2195 Faraday Avenue • Suite K • Carlsbad, California 92008-7207 • Ph: 760-431-3747 • Fax: 760-431-3748 • www.eeitiger.com

PHASE I ENVIRONMENTAL SITE ASSESSMENT

Prepared for:

Mr. Joseph Rivani
Bellacap, LLC
3470 Wilshire Boulevard
Suite 1020
Los Angeles, California 90010
c/o
Mr. Jeff Anderson
President
Anderson Consulting Engineers
12526 High Bluff Drive, Suite 300
San Diego, California 92130

Property location:
Ironwood Avenue Property – 75.1-Acres
Northwest of Ironwood Avenue and Oliver Street
APN 473-160-004-5
City of Moreno Valley, Riverside County, California 92545

Prepared and Edited by:

Daniel Phelps
Staff Geologist

Reviewed by:

Bernard A. Sentianin
Principal Geologist

EEI
2195 Faraday Avenue, Suite K
Carlsbad, California 92008-7207
760-431-3747

EEI Project Number GLO-71982.1

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GENERAL SITE INFORMATION

Project Information: Ironwood Avenue Property – 75.1-Acres

EEI Project Number: GLO-71982.1

Site Information:
Northwest of Ironwood Avenue and Oliver Street
APN 473-160-004-5
City of Moreno Valley, Riverside County, California 92555

Site Access Contact: Mr. Joseph Rivani, Office: 213-365-0005

Consultant Information:
EEI
2195 Faraday Ave., Suite K
Carlsbad, California 92008
Phone: 760.431.3747
Fax: 760.431.3748
E-mail Address: bsentianin@eeitiger.com

Inspection Date: October 6, 2014; **Report Date:** October 15, 2014

Client Information:
Mr. Joseph Rivani,Bellacap, LLC
3470 Wilshire Boulevard, Suite 1020, Los Angeles, California 90010
c/o
Mr. Jeff Anderson, President
Anderson Consulting Engineers
12526 High Bluff Drive, Suite 300, San Diego, California 92130

Site Assessor:
Dylan Ehrsam – Staff Scientist

EP Certification:
I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in 40 CFR 312.10 (**Resume, Appendix A**).

Bernard A. Sentianin – Principal Geologist

AAI Certification:
We have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. We have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Bernard A. Sentianin – Principal Geologist

EXECUTIVE SUMMARY

At the request and authorization of the Client (Global Investments and Development, LLC), EEI conducted a Phase I Environmental Site Assessment (ESA) for the property located northwest of Ironwood Avenue and Oliver Street, City of Moreno Valley, Riverside County, California. The purpose of this Phase I ESA was to assess the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment (i.e., recognized *environmental condition* as delineated in ASTM E1527-13). A D*e minimis* condition is not considered a *recognized environmental condition*.

The subject property is comprised of 75.1-acres of undeveloped land, on a single parcel identified by Assessor's Parcel Number (APN) 473-160-004-5. There is no street address associated with the subject property and the property is currently vacant land. Several unimproved roadways traverse the subject property. EEI understands that the subject property is proposed to be purchased by Global Investments and Development, LLC, for the purpose of residential development.

The rectangular shaped subject property is bound by mountainous and undeveloped land to the north. To the south, the property is bound by Ironwood Avenue, followed by residential development. To the east, the property is bound by an un-named access road, followed by undeveloped land. To the west, the property is bound by Nason Street, followed by residential development. According to the City of Moreno Valley zoning map, the northwest portion of the subject property is zoned as Hillside Residential (HR) and the remainder of the property is zone as Residential Agriculture (RA2).

Based on the information reviewed, with the exception of several unimproved roadways, the subject property has been historically undeveloped. Residential and agricultural development likely began in the property vicinity during the 1930s.

EEI contacted the County of Riverside Department of Environmental Health, California Department of Toxic Substances Control (DTSC), State Water Resources Control Board (SWRCB), and reviewed other state and federal databases to determine if the subject property, or any adjacent properties, were listed as hazardous waste generators, underground storage tank (UST) releases, or as having other environmental concerns (i.e., spill, leak, or aboveground tank [AST]). Neither the subject property nor any adjacent properties were listed on any of the databases researched.

On October 6, 2014, EEI personnel conducted a site reconnaissance to physically observe the subject property and adjoining properties for conditions indicating a potential environmental concern. Concerns would include any evidence of contamination, distressed vegetation, petroleum-hydrocarbon staining, waste drums, illegal dumping, or improper waste storage and/or handling. No evidence of environmental concern was noted on the subject property during our site reconnaissance.

EEI performed a Vapor Encroachment Screen (VES) for the subject property, in accordance with ASTM E2600-10. The purpose was to evaluate whether sites (e.g., gas stations, dry cleaners, or other listings of environmental concern) that store or dispose of potential chemicals of concern or have documented releases, may migrate as vapors onto the property, as a result of contaminated soil and/or groundwater which may be present on or near the property (i.e., a Vapor Encroachment Condition or VEC). Based on the results of a Tier 1 VES, EEI concluded that a VEC for the subject property can be ruled out, because a VEC does not or is not likely to exist due to the lack of known or suspected contaminated properties within the Area of Concern (AOC).

We have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E1527-13 of APN 473-016-004-5, the *subject property*. Any exceptions to, or deletions from, this practice are described in Section 7.0 of this report. This assessment has revealed no evidence of *recognized environmental conditions* in connection with the *subject property*.

1.0 INTRODUCTION

1.1 Purpose

The purpose of this Phase I Environmental Site Assessment (ESA) was to assess the possible presence of *recognized environmental conditions* for the property located northwest of Ironwood Avenue and Oliver Street, in the City of Moreno Valley, Riverside County, California (**Figure 1**). *Recognized environmental condition*s *(RECs)* include property uses that may indicate the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. The term *RECs* is not intended to include *de minimis* conditions that generally do not present a material risk of harm to public health or the environment, and that would not be subject to enforcement action by a regulatory agency.

This ESA was performed in general conformance with the American Society for Testing and Materials (ASTM) *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*, Designation E1527-13.

1.2 Scope of Services

The following scope of services was conducted by EEI:

- A review of readily available documents which included topographic, geologic, and hydrogeologic conditions associated with the subject property.

- A review of readily available maps, aerial photographs and other documents relative to historical subject property usage and development.

- A review of readily available federal, state, county, and city documents and database files concerning hazardous material storage, generation and disposal, active and inactive landfills, existing environmental concerns, and associated permits related to the subject property and/or immediately adjacent sites.

- A site reconnaissance to ascertain current conditions of the subject property.

- Interviews with person(s) knowledgeable of the subject property.

- The preparation of this report which presents our findings, conclusions, and recommendations.

1.3 Reliance

This ESA has been prepared for the sole use of Global Investments and Development, LLC (Client). This assessment should not be relied upon by other parties without the express written consent of EEI and the Client. Any use or reliance upon this assessment by a party other than Client; therefore, shall be solely at the risk of such third party and without legal recourse against EEI, its employees, officers, or directors, regardless of whether the action in which recovery of damages is brought or based upon contract, tort, statute or otherwise.

This assessment should not be interpreted as a statistical evaluation of the subject property, but rather is intended to provide a preliminary indication of onsite impacts from previous site usage and/or the release of hazardous materials. If no significant indicators of the presence of hazardous materials and/or petroleum contamination are encountered during this search, this does not preclude their presence.

The findings in this report are based upon published geologic and hydrogeologic information and information (both documentary and oral) provided by City of Moreno Valley, the County of Riverside, Environmental Data Resources Inc. (EDR®) (i.e., agency database search, and various state and federal agencies, and EEI's field observations. Some of these data are subject to change over time. Some of these data are based on information not currently observable or measurable, but recorded by documents or orally reported by individuals.

2.0 PHYSIOGRAPHIC SETTING

2.1 Subject Property Description

The subject property is located northwest of the intersection of Ironwood Avenue and Oliver Street, in the City of Moreno Valley, Riverside County, California (**Figure 2**). The subject property is comprised of 75.1-acres of undeveloped land, on a single parcel identified by Assessor's Parcel Number (APN) 473-160-004-5 (**Appendix B**). There is no street address associated with the subject property and the property is currently vacant land. Several unimproved roadways traverse the subject property. EEI understands that the subject property is proposed to be purchased by Global Investments and Development, LLC, for the purpose of residential development.

The rectangular shaped subject property is bound by mountainous, undeveloped land to the north. To the south, the property is bound by Ironwood Avenue, followed by residential development. To the east, the property is bound by an un-named access road, followed by undeveloped land. To the west, the property is bound by Nason Street, followed by residential development. According to the City of Moreno Valley zoning map, the northwest portion of the subject property is zoned as Hillside Residential (HR) and the remainder of the property is zone as Residential Agriculture (RA2).

Based on the information reviewed, with the exception of several unimproved roadways, the subject property has been historically undeveloped. In 1985, it appeared a small area of the subject property, located in the northern and central portion, was utilized for agriculture; this agriculture appeared to be removed from the subject property by the time of the following aerial photograph in 1989. Residential and agricultural development likely began in the site vicinity during the 1930s.

2.2 Topography

The subject property is located on the United States Geological Survey (USGS) 7.5 Minute Sunnymead Quadrangle map (USGS, 1980). The map indicates the elevation of the subject property ranges from approximately 1,830 feet above mean sea level (amsl) in the southern portions to 1,920 feet amsl in the northern portions. The northern portion of the subject property is characterized by steeply sloping mountainous terrain and the southern portion of the property appears to have moderate to gentle topography. The subject property slopes downwards to the south and any surface runoff generated on the property would flow towards the south and southwest.

2.3 Regional and Local Geology

The subject property lies within the Peninsular Ranges Geomorphic Province. The Peninsular Ranges geomorphic province, one of the largest geomorphic units in western North America, extends from the Transverse Ranges geomorphic province and the Los Angeles Basin, south to Baja California. It is bound on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province. The Peninsular Ranges are essentially a series of northeast-southeast oriented fault blocks (CGS, 2002).

Three major fault zones and some subordinate fault zones are found in this province. The Elsinore Fault zone and the San Jacinto Fault zone trend northwest-southeast, and are found near the middle of the province. The San Andreas Fault zone borders the northeasterly margin of the province, whereas, a fault related to the San Andreas Transform Fault System, the Newport-Inglewood-Rose Canyon Fault zone exists near the western margin and Continental Borderland Geomorphic Province (CDMG, 1998). The nearest major active fault, the Claremont Fault, is located approximately one and one-half miles northeast of the subject property (CGS, 2010). According to the 2010 geologic maps of California, the central and southern portions of the subject property are underlain by Quaternary aged, semi-consolidated alluvium, lake or playa deposits, and in the northwestern portion of the property, is underlain by Mesozoic aged granites,

Soil in the vicinity of the subject property has been identified by the United States Department of Agriculture - Natural Resource Conservation Service, online Web Soil Survey database as a mix of Monserate Sandy Loam and the Hanford coarse sandy loam. The Monserate sandy loams formed in alluvial fans from granitic rocks and occur on slopes of 15 to 25 percent (USDA, 2014). Monserate sandy loams are up to 70-inches thick, well drained and have a very low capacity to transmit water. Hanford coarse sandy loams are typically 60-inches thick, well drained soils, with a high capacity to transmit water. These soils form in alluvial fans from granitic rocks and occur on slopes of 2 to 8 percent.

2.4 Regional and Local Hydrogeology

According to the California Regional Water Quality Control Board, Santa Ana Region, Water Quality Control Plan - Santa Ana River Basin (8) (SARWQCB, 1995), the subject property is located within the Perris North Hydrologic Area, of the San Jacinto Valley Hydrologic Unit. Groundwater in this subarea has been designated as beneficial for municipal domestic, agricultural, industrial process and industrial supply.

The California Department of Water Resources Water Data Library (WDL, 2014) website does not indicate the presence of water supply wells located on the subject property (Township 02 South, Range 03 West, Section 34); however, two wells were indicated within one-mile of the subject property. Data indicated depth to groundwater in Well No. EMWD12003, located approximately three-quarter miles northeast, was 239 feet as measured in 2014. Data from the second nearby well, state Well No. 002S03W34C001S, located approximately eight-tenths of a mile north-northwest, indicated depth to groundwater was 240 feet, as measured in 2014. Based solely on topography, groundwater flow direction for the subject property would be expected to flow to the south.

2.5 Hydrologic Flood Plain Information

EEI reviewed the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) online database and the Riverside County Land Information System (RCLIS) to determine if the subject property was in a flood zone. The subject property is located on two separate FIRM maps.

According to FIRM Number FM06065C0755G, Panel No. 0755 of 3805 and FIRM Number FM06065C0760G, Panel No. 0760 of 3805 – both effective August 28, 2008, the subject property is located within flood Zone X. FEMA defines Zone X as an area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. The FIRM also indicates that a small area of the subject property at the southeast corner, and adjacent property to the southeast, are located within Zone A. FEMA defines Zone A as areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. A copy of the FIRM is included in **Appendix B**.

2.6 Protected Flora and Fauna and/or Wetlands

EEI contacted the county of Riverside for information regarding protected flora and fauna and/or wetlands on or near the subject property. According to the Riverside County Integrated Project (RCIP), the subject property lies within an independent cell group of the Reche Canyon/Badlands Area Plan, of the Proposed Multiple Species Habitat Conservation Plan (MSHCP) (**Appendix B**). According to MSHCP, the subject property is located within an area group with high conservation goals. The MSHCP states that prior to property development; a site assessment which addresses the following MSHCP sections should be conducted by a qualified biologist:

- Section 6.1.2 Protection of Species associated with Riparian/Riverine areas and Vernal Pools
- Section 6.1.3 Protection of Narrow Endemic Plant Species
- Section 6.1.4 Guidelines pertaining to the Urban/Wildlands Interface

In addition, the MSHCP states that a habitat assessment is required to address at a minimum, potential habitat for the Burrowing Owl. According to the MSHCP, if potential habitat for the aforementioned species is determined to be located on the property, focused surveys may be required during the appropriate season.

3.0 SUBJECT PROPERTY BACKGROUND

3.1 Subject Property Ownership

Information regarding subject property ownership was obtained from the county of Riverside Assessor's office and a Preliminary Title Report (PTR) prepared by Title 365, dated February 13, 2014. According to the information reviewed, the current ownership of the subject property is vested in Ironwood 8 Properties, a California Limited Partnership. A copy of the PTR is included in **Appendix B.**

3.2 Subject Property History

EEI reviewed readily available information sources to evaluate historic land use in and around the subject property. These information sources include aerial photographs, USGS maps, City of Moreno Valley and County of Riverside Planning and Building and Safety Department files. The information sources are reviewed in the following sections.

3.2.1 Historical Use Review

Aerial photographs and historical topographical maps, provided by EDR®, were reviewed to identify historical land development and any surface conditions which may have impacted the subject property. Photographs and historical topographic maps dating between 1901 and 2012 were reviewed. A 2012 aerial photograph was obtained from Google Earth®, a copy of which is included herein (**Figure 2**). **Table 1** summarizes the results of the aerial photograph and historical topographic map review. Copies of the aerial photographs and historical topographic maps provided by EDR®, Inc. are included in **Appendix C**.

Based on the information reviewed, with the exception of several unimproved roadways, the subject property has been historically undeveloped. Residential and agricultural development likely began in the site vicinity during the 1930s.

TABLE 1
Summary of Historical Use Review

Year	Source and Scale	Comments
1901	Topographic Maps 1:250,000/ 250'000	Scale of the map did not allow for a detailed review of the subject property. Subject property appeared in the general area north of Moreno Valley. The city of Moreno Valley appeared with limited urban development.
1938	Aerial Photograph 1-inch = 500 feet	Subject property and adjacent property appeared as undeveloped land located to the north of Ironwood Avenue. The southern and central portions of the subject property appeared to be cleared of vegetation. Ironwood Avenue appeared as an unimproved road to the south. An unimproved roadway enters the subject property from the north. Land to the north, south and west appeared to be undeveloped. Land to the east appeared to be developed for agriculture. There is limited agricultural development in the subject property vicinity.
1943	Topographic Map 1:62,500	Subject property and adjacent property appeared as undeveloped land located to the northwest of Ironwood Avenue and Nason Street. Ironwood Avenue appeared as an improved road. Two unimproved roadways are present on the subject property. Land to the north, south and west appeared to be undeveloped. Land to the east appeared to be developed for agriculture.
1953	Topographic Map 1:24,000	Subject property and surrounding properties appeared as they did in the 1943 map, except the northern portion of the subject property appeared to be developed with a windmill.
1953/ 1966	Aerial Photographs 1-inch = 500 feet	Subject property and adjacent properties appeared as they did in the 1938 photograph except an additional portion in the north of the subject property appeared to be cleared of vegetation. There is an increase in agricultural development in surrounding properties and a residential structure appeared north of the subject property in the 1966 photo.
1967	Topographic Map 1:24,000	Subject property appeared as it did in the 1943 map. Increased agricultural development appeared north of the subject property. Limited residential appeared on the adjacent property to the east of the subject property. Land to the south and east of the subject property appeared as undeveloped land.
1973	Topographic Map 1:24,000	Subject property, adjacent property and surrounding property appeared as it did in the 1967 map, except the adjacent property to the south appeared with increased agricultural development.
1975	Aerial Photograph 1-inch = 500 feet	Resolution of photo did not allow for detailed analysis of the subject property. Subject property and vicinity appeared as it did in the 1966 photograph. An additional unimproved roadway appeared to enter the subject property from the west.
1980	Topographic Map 1:24,000	Subject property, adjacent property and surrounding property appeared as it did in the 1973 map.
1985	Aerial Photograph 1-inch = 500 feet	A small area in the northern and central portion of the subject property appeared to be developed with agriculture. The rest of the subject property appeared as it did in the 1975 and 1966 photographs. Increased residential and agricultural development appeared west of the subject property. Land to the south of the subject property appeared to be graded for development.
1989	Aerial Photograph 1-inch = 500 feet	Agriculture appeared to be cleared from the subject property. Except for the northwest portion, the subject property appeared to be cleared of vegetation. There is an increase in residential development on the adjacent property to the south.

TABLE 1
Summary of Historical Use Review

Year	Source and Scale	Comments
1994/ 2002/ 2005/ 2006/ 2009 2010/ 2012	Aerial Photographs 1-inch = 500 feet	No apparent changes appeared on the subject property or adjacent properties since the 1989 photograph. Several unimproved roadways appeared to cross the central portion of the subject property in the 2002 photograph. The subject property appeared to be disced or partially graded in the 2009 photograph. Residential development increased to the south of the subject property in the 2002 photograph.
2012	Aerial Photograph Google Earth (Color)	Subject property appeared in its current configuration, as undeveloped land with several unimproved roadways. The southern portion of the subject property appeared to have been disced or partially graded in a grid pattern. Land to the north and east appeared as undeveloped. Land to the south is developed by Ironwood Avenue, followed by single family residential development. To the west, the subject property is bound by Nason Street, followed by rural residential development.

3.2.2 City/County Directories

Due to the absence of development of the subject property and recent development of the surrounding area, this information source was not researched as it was not deemed to be sufficiently useful and not researched during this Phase I ESA.

3.2.3 Sanborn Fire Insurance Maps

Sanborn Fire Insurance maps were developed in the late 1800s and early 1900s for use as an assessment tool for fire insurance rates in urbanized areas. A search was made at the Los Angeles Public Library's collection of Sanborn Fire Insurance Maps. Sanborn map coverage was not available for the subject property indicating little or no development in the subject property vicinity prior to 1950.

3.2.4 City of Moreno Valley Building and Safety Department Files

EEI contacted the City of Moreno Valley, Building and Safety Department, to review any existing files related to the subject property. According to personnel with the Building and Safety Department, a search of the subject property's APN revealed that there are no planning cases or building permits on file for the subject property.

3.3 Regulatory Database Search

EEI reviewed known electronic database listings for possible hazardous waste generating establishments in the vicinity of the subject property, as well as adjacent sites with known environmental concerns. Facilities were identified by county, state, or federal agencies that generate, store, or dispose of hazardous materials. The majority of information in this section was obtained from EDR®, an environmental information/database retrieval service. A copy of the EDR® report is provided in **Appendix D,** along with a description of the individual databases. The subject property was not listed on any of the databases reviewed as having environmental concerns. Following is a list of databases that were reviewed in the preparation of this report.

3.3.1 Federal Databases

Federal National Priority site list (NPL) – No listings were reported within a one mile radius of the subject property.

Federal Delisted NPL site list – No listings were reported within a one mile radius of the subject property.

Federal Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list – No listings were reported within a one-half mile radius of the subject property.

Federal CERCLIS No Further Assessment Planned (NFRAP) site list – No listings were reported within a one-half mile radius of the subject property.

Federal Resource Conservation Recovery Act (RCRA) Corrective Action Sites (CORRACTS) facilities list – No listings were reported within a one mile radius of the subject property.

Federal RCRA non-CORRACTS facilities list – No listings were reported within a one mile radius of the subject property.

Federal RCRA non-CORRACTS Treatment, Storage and Disposal (TSD) facility list (RCRA-TSDF) – No listings were reported within a one-half mile radius of the subject property.

Federal RCRA generators list (RCRA-LQG SQG CESQG) – No listings were reported within a one-quarter mile radius of the subject property.

Federal institutional controls/engineering controls (IC/EC) registries – No listings were reported within a one-half mile radius of the subject property.

Federal Emergency Response Notification System (ERNS) – No listings were reported for the subject property.

The subject property was not identified on any of the above-referenced databases researched.

3.3.2 State and Regional Sources

State and Tribal equivalent NPL sites – No listings were reported within a one mile radius of the subject property.

State/Tribal equivalent CERCLIS sites – No listings were reported within a one mile radius of the subject property.

State and tribal landfill and/or solid waste disposal site lists – One listing was reported within a one-half mile radius of the subject property. The listing, **Badlands Sanitary Landfill** (31125 Ironwood Avenue, 0.34 miles west) is listed as active permitted solid waste landfill, operated by the County of Riverside Waste Management Department, that accepts agricultural, ash, construction, green, industrial, inert, metal mixed municipal, tire and wood wastes. The site has operated as a landfill since 1966 and was operated as a burn site until early 1977. Site has been issued several notices in relation to runoff control compliance. Based on topographical separation and distance from the subject property (greater than one-quarter mile) this site is not considered to be an environmental concern.

State and tribal leaking storage tank lists – No listings were reported within a one-half mile radius of the subject property.

State and tribal registered storage tank lists – No listings were reported within a one-quarter mile radius of the subject property.

State and Tribal voluntary cleanup sites – No listings were reported within a one-half mile radius of the subject property.

Local Brownfield lists – No listings were reported within a one-half mile radius of the subject property.

Local Lists of Landfill and Hazardous Waste/Contaminated Sites – One listing was reported within a one-half mile radius of the subject property. The listing, **Badlands Sanitary Landfill** (31125 Ironwood Avenue, 0.34 miles west) is listed as active permitted solid waste landfill, operated by the County of Riverside Waste Management Department, that accepts agricultural, ash, construction, green, industrial, inert, metal mixed municipal, tire and wood wastes. The site has operated as a landfill since 1966 and was operated as a burn site until early 1977. Site has been issued several notices in relation to runoff control compliance. Based on topographical separation and distance from the subject property (greater than one-quarter mile) this site is not considered to be an environmental concern.

Local Lists of Registered Storage Tanks – No listings were reported within a one-quarter mile radius of the subject property.

Local Land Records – No listings were reported within a one-half mile radius of the subject property.

Records of Emergency Release Reports – No listings were reported for the subject property.

Other Ascertainable Records – No listings were reported within a one mile radius of the subject property.

EDR Exclusive Records – No listings were reported within a one mile radius of the subject property.

Exclusive Recovered Government Archives – No listings were reported within a one-half mile radius of the subject property.

Orphan Summary – The EDR® database search report lists a number of sites identified as "orphans." EDR was unable to confirm the physical locations of these sites relative to the subject property or to assess whether they were located within the designated search radii. EEI attempted to locate these "orphan" sites, to the extent possible, using various maps and our knowledge of the site area. Any of the "orphan" sites determined to be within the designated search radii were included in our evaluation of the various listed sites with potential to result in a recognized environmental condition relative to the subject property.

3.4 Regulatory Agency Review

3.4.1 City of Moreno Valley/Riverside County Fire Departments

EEI contacted the City of Moreno Valley and Riverside County Fire Departments concerning any permit, inspection, UST, or cleanup information available for the subject site. According to both the City and County Fire Department personnel, neither department's hold or track permits regarding hazardous materials. This information is regulated by the County of Riverside Department of Environmental Health (see Section 3.4.2). No other pertinent information was available with the RCFD.

3.4.2 County of Riverside Department of Environmental Health

EEI contacted the County of Riverside Department of Environmental Health (CRDEH) for information regarding any Underground Storage Tank (UST) permits, LUST cases, Hazardous Waste Generator permits, Emergency Responses, Complaint and Investigation (ERCI) documents, DTSC Calsite listings, and Superfund Site listings, pertaining to the subject property. According to the RCDEH, the aforementioned database listings are reported by site address. Given that the subject property does not have an assigned address, this information source was not deemed to be sufficiently useful; and therefore, not researched during this Phase I ESA.

3.4.3 Department of Toxic Substances Control

EEI reviewed the Department of Toxic Substances Control (DTSC, 2014) online database EnviroStor for listings on or adjacent to the subject property. The subject property was listed as the site of a DTSC school investigation. EEI reviewed information provided by the website and found that, because the subject property was the proposed location of a high school, the DTSC required a Phase I Environmental Site Assessment (ESA) to investigate any potential recognized environmental conditions (RECs) in connection with the subject property. The Phase I ESA, prepared by The Planning Center, titled **Proposed Alternate High School No. 5 – Ironwood/Nason, Moreno Valley, California**, dated June 25, 2008, stated that the subject property had been undeveloped since 1901 and found no RECs in connection with the subject property. The report recommended no further assessment or investigation. The DTSC concurred with the findings of the Phase I and issued a No Further Action determination as of July 31, 2008. See Section 3.7.1 for a detailed summary of this assessment.

3.4.4 State Water Resources Control Board

EEI reviewed the Spills, Leaks, Investigations, and Cleanup (SLIC) list, as well as the online database GeoTracker, which provides records on LUSTs, both maintained by the State Water Resources Control Board (SWRCB, 2014). Neither the school or subject property was listed as a DTSC investigation site. Please see Sections 3.4.3 and 3.7.1 for a detailed summary.

3.4.5 Review of Division of Oil, Gas and Geothermal Resources Files

Oil and gas wells were not observed at the subject property during our site reconnaissance. A review of the California Division of Oil, Gas, and Geothermal Resources Website for oil and gas fields in California and Alaska (CDOGGR, 2014) did not indicate the presence of oil and gas wells on or adjacent to the subject property (Township 02 South, Range 03 West, and Section 34).

3.4.6 National Pipeline Mapping System

EEI reviewed the National Pipeline Mapping System (NPMS, 2014) public viewer website for gas transmission pipelines and hazardous liquid trunklines on or close to the subject property. According to the information reviewed, no pipelines are located on or in close proximity to the subject property.

3.5 Interview with Current Property Owner

EEI contacted the property owners, Mr. Chang Chung Yang and Mrs. Fu Mei Yang, for information regarding the subject property. Mr. and Mrs. Yang provided the information documented below.

3.5.1 Past or Present Uses Indicating Environmental Concerns

Mr. and Mrs. Yang stated that the subject property is not in use and has not been used since it was purchased.

3.5.2 Environmental Liens or Governmental Notifications

Mr. and Mrs. Yang stated that they are not aware of any environmental liens or governmental notification relating to past or recurrent violations of environmental laws with respect to the property or any facility located on the subject property.

3.5.3 Presence of Hazardous Substances or Environmental Violations

Mr. and Mrs. Yang stated that they are not aware of any hazardous substances or environmental violations on the subject property.

3.5.4 Previous Assessments

Mr. and Mrs. Yang stated that an environmental impact assessment was done by the City of Moreno Valley as a part of its feasibility study to us the subject property for a new high school. According to Mr. and Mrs. Yang, the assessment reported no negative findings.

3.5.5 Legal Proceedings

Mr. and Mrs. Yang stated that they are not aware of any past, threatened, or pending lawsuits or administrative proceedings concerning a release or threatened release of any hazardous substance or petroleum products involving the property by any owner or occupant of the subject property.

3.6 User Specific Information

Pursuant to ASTM E1527-13, EEI provided a Phase I ESA User Specific Questionnaire to the “user” (the person on whose behalf the Phase I ESA is being conducted), Mr. Joseph Rivani, with Global Investments and Development, LLC. The User Specific Information provided by Mr. Rivani is documented below. A list of the user specific questions (per ASTM E1527-13) with associated responses is included in **Appendix E**.

3.6.1 Environmental Liens or Activity and Use Limitations

Mr. Rivani was unaware of any environmental liens or activity and use limitations in association with the subject property. To supplement this information, a Preliminary Title report was obtained from the Client. A review of the report confirmed the absence of any environmental liens or and other activity and use limitations (AULs) associated with the subject property.

3.6.2 Specialized Knowledge

Mr. Rivani stated that he has no specialized knowledge or experience related to the property or nearby properties (i.e., knowledge of the chemicals or processes used by a type of business).

3.6.3 Valuation Reduction for Environmental Issues

Mr. Rivani stated that the purchase price being paid for the subject property reasonably reflects the fair market value of the property.

3.6.4 Presence or Likely Presence of Contamination

Mr. Rivani stated that he was not aware of any environmental issues related to the subject property.

3.6.5 Other

Mr. Rivani stated that the Phase I ESA is required by City of Moreno Valley. The type of property transaction in the case of the subject property was described by Mr. Rivani as a sale.

3.7 Previous Assessments

3.7.1 The Planning Center, Phase I ESA, Proposed Alternate High School No. 5 – Ironwood/Nason, Moreno Valley, California, Dated June 25, 2008

The above-referenced ESA was conducted for the subject property, consisting of 75.1-acres on a single parcel identified by APN 473-160-004-5, known as the Proposed Alternate High School No. 5 – Ironwood/Nason property. The Phase I was prepared as required by the DTSC because the subject property was the proposed location of a high school.

The Planning Center (PC) conducted the site visit on May 16, 2008, and noted that the subject property was undeveloped land, situated in an area with both undeveloped land and residential development. PC stated that the subject property had been undeveloped since 1901 and had never been used for agriculture. PC also noted that site water would be provided to the site by the Eastern Municipal Water District, who sources its water from the Colorado River Aqueduct and groundwater wells. PC's assessment revealed no evidence of any recognized environmental conditions in connection with the subject property. The report recommended no further assessment or investigation of the subject property.

3.8 Other Environmental Issues

3.8.1 Asbestos-Containing Materials

Asbestos, a natural fiber used in the manufacturing of a number of different building materials, has been identified as a human carcinogen. Most friable (i.e., easily broken or crushed) Asbestos-Containing Materials (ACM) were banned in building materials by 1978. By 1989, most major manufacturers had voluntarily removed non-friable ACM (i.e., flooring, roofing, and mastics/sealants) from the market. These materials, however, were not banned completely.

The subject property is currently undeveloped land; therefore, the presence of Asbestos-Containing Materials is not considered an environmental concern.

3.8.2 Lead-Based Paint

Lead-Based Paint has been identified by Occupational Safety and Health Administration (OSHA), the United States Environmental Protection Agency (U.S. EPA) and the Department of Housing and Urban Development (HUD) as being a potential health risk to humans, particularly children, based on its effects to the central nervous system, kidneys, and bloodstream. The risk of Lead-Based Paint has been classified by HUD based upon the age and condition of the painted surface.

The subject property is currently undeveloped land; therefore, the presence of Lead-Based Paint is not considered an environmental concern.

3.8.3 Radon

Radon is a radioactive gas which has been identified as a human carcinogen. Radon gas is typically associated with fine-grained rock and soil, and results from the radioactive decay of radium. The U.S. EPA recommends that homeowners in areas with radon screening levels greater than 4 Picocurries per liter (pCi/L) conduct mitigation of radon gas to reduce exposure.

Sections 307 and 309 of the Indoor Radon Abatement Act of 1988 (IRAA) directed the U.S. EPA to list and identify areas of the U.S. with the potential for elevated indoor radon levels. U.S. EPA's Map of Radon Zones (EPA-402-R-93-071) assigns each of the 3,141 counties in the U.S. to one of three zones based on radon potential:

- Zone 1 counties have a predicted average indoor radon screening level greater than 4 pCi/L.
- Zone 2 counties have a predicted average indoor radon screening level between 2 and 4 pCi/L.
- Zone 3 counties have a predicted average indoor radon screening level less than 2 pCi/L.

Based on such factors as indoor radon measurements, geology, aerial radioactivity, and soil permeability; the U.S. EPA has identified the County of Riverside as Zone 2 (i.e., a predicted average indoor radon screening level between 2 and 4 pCi/L). EEI does not consider radon as a significant environmental concern at this time.

4.0 SITE RECONNAISSANCE

4.1 Purpose

The purpose of our site reconnaissance was to physically observe the subject property, site structures (if any), and adjoining properties for conditions indicating an existing release, past release, or threatened release of any hazardous substances or petroleum products into structures on the subject site, or into soil and/or groundwater beneath the subject property. This would include any evidence of contamination, distressed vegetation, petroleum-hydrocarbon surface staining, waste drums, USTs, ASTs, illegal dumping, or improper waste storage/handling. Detailed information pertaining to our site reconnaissance is provided in the text below.

4.2 Subject Property

On October 6, 2014, EEI personnel conducted a site reconnaissance to visually observe the subject property and adjoining properties for conditions indicating a potential environmental concern. Visual conditions present during the site reconnaissance are documented in the Photographic Log (**Appendix G**), and summarized in **Table 2**.

The subject property is located northwest of the intersection of Ironwood Avenue and Oliver Street, in the City of Moreno Valley, California (**Figure 2**). The subject property is located within Riverside County on a single parcel, denoted by the APN: 473-160-004-5. The subject property is located on the north side of Ironwood Avenue, bound by Oliver Street to the east, Nason Street to the west, and rural open land to the north. The subject property is rectangular in shape, oriented west-east, and comprises roughly 75.1 acres in size. The subject property is currently undeveloped open land, with no structural development. The subject property is currently vacant, and is not assigned a specific address.

EEI staff accessed the subject property by vehicle along the intersection of Ironwood Avenue and Nason Street, through one of the many unimproved roadways located on the property. The subject property was open and unfenced on all boundaries, with the exception of one locked gate northbound of the intersection of Ironwood Avenue and Oliver Street. This inaccessible gravel road leads up to a water storage tank, beyond the subject property. EEI staff entered the site and continued the site reconnaissance by both vehicle and foot, in order to properly assess the property and gain practical vantage points. Overhead power lines were noted on the southern perimeter of the subject property, along Ironwood Avenue. EEI personnel observed what appeared to be seven roughly graded or disced patches, oriented both north-south and west-east, which spanned the entire subject property. Staff also noted random debris and littering throughout the subject property. The trash observed included broken piping, tires, plastic recyclables, cardboard, and other windblown debris. With the exception of the small amounts of litter and windblown debris located throughout the subject property, EEI staff did not recognize any other conditions which would indicate a potential environmental concern.

The ground surface on the subject property consists of undeveloped land with a mix of natural soils and native vegetation. The overall property locale is characterized by high topographic relief, sloping downward to the south. Based on topography, surface runoff generated on the subject property would flow south towards Ironwood Avenue, eventually ending up in the local storm drain system.

No evidence of contamination, distressed vegetation, petroleum-hydrocarbon surface staining, waste drums, USTs, ASTs, illegal dumping, or improper waste storage/handling was noted during our site reconnaissance.

TABLE 2
Summary of Site Reconnaissance

Item	Concerns	Comments
General Housekeeping	No	No concerns observed.
Surface Spills	No	No concerns observed.
Stained Surfaces	No	No concerns observed.
Fill Materials	No	No concerns observed.
Pits/Ponds/Lagoons	No	No concerns observed.
Surface Impoundments	No	No concerns observed.
ASTs/USTs	No	No concerns observed.
Distressed Vegetation	No	No concerns observed.
Wetlands	No	No concerns observed.
Electrical Substations	No	No concerns observed.
Areas of Dumping	No	No concerns observed.
Transformers	No	No concerns observed.
Waste/Scrap Storage	No	No concerns observed.
Chemical Use/Storage	No	No concerns observed.

4.3 Adjacent Properties

EEI conducted a visual and auto reconnaissance of the adjoining neighborhoods (to the extent practical) to evaluate the potential for offsite impacts that may affect the subject property. These would include evidence of chemical storage or usage, surface staining or leakage, distressed vegetation, or evidence of illegal dumping.

The subject property is located northwest of the intersection of Ironwood Avenue and Oliver Street, with adjacent properties consisting of a mix of rural, undeveloped land, and single-family residences. To the north, the subject property is bound by mountainous terrain and undeveloped land. To the south, the subject property is bound by Ironwood Avenue, followed by a single-family residential development. To the west, the subject property is bound by Nason Street, followed by both single-family residences and undeveloped land. To the east, the subject property is bound by Oliver Street, followed by rural, undeveloped land.

Adjacent properties were not identified as having environmental related issues on any of the databases researched, and are not considered as an environmental concern at this time. No service stations, dry cleaners, or industrial properties were located in the immediate vicinity.

5.0 VAPOR ENCROACHMENT SCREEN

ASTM Standard E2600-10 Standard Guide for Vapor Encroachment Screening (VES) on Property Involved in Real Estate Transactions was used as guidance for conducting a VES for the subject property. The purpose of the screening is to determine whether a Vapor Encroachment Condition (VEC) exists from chemicals of concern (COC*)* that may migrate as vapors onto a property as a result of contaminated soil and groundwater on or near the subject property. The screening involves a two tiered approach to assessing VEC risk as described below. The VES process includes a review of site conditions (e.g., aerial photographs, city directories, and environmental database information), which is information typically collected during a Phase I ESA, user provided information, and in some instances the use of a third-party vapor encroachment application. The following sections describe the VES performed on the subject property.

5.1 Subject Property Conditions

The subject property is located northwest of the intersection of Ironwood Avenue and Oliver Street, in the City of Moreno Valley, Riverside County, California (**Figure 2**). The subject property is comprised of 75.1-acres of undeveloped land, on a single parcel identified by Assessor's Parcel Number (APN) 473-160-004-5 (**Appendix B**). There is no street address associated with the property and the property is vacant land. Several unimproved roadways traverse the subject property. EEI understands that the subject property is proposed to be purchased by Global Investments and Development, LLC, for the purpose of residential development.

The rectangular shaped subject property is bound by mountainous and undeveloped land to the north. To the south, the property is bound by Ironwood Avenue, followed by residential development. To the east, the property is bound by an un-named access road, followed by undeveloped land. To the west, the property is bound by Nason Street, followed by residential development.

Based on the information reviewed, with the exception of several unimproved roadways, the subject property has been historically undeveloped. Residential and agricultural development likely began in the subject property vicinity during the 1930s.

Based on EEI's historical review, there has been no man-made vapor conduits identified on or immediately adjacent to the subject property.

Soil in the vicinity of the subject property has been identified by the USDA-NRCS, online Web Soil Survey database as a mix of Monserate Sandy Loam and the Hanford coarse sandy loam. The Monserate sandy loams formed in alluvial fans from granitic rocks and occur on slopes of 15 to 25 percent (USDA, 2014). Monserate sandy loams are up to 70-inches thick, well drained and have a very low capacity to transmit water. Hanford coarse sandy loams are typically 60-inches thick, well drained soils, with a high capacity to transmit water. These soils form in alluvial fans from granitic rocks and occur on slopes of 2 to 8 percent.

The California Department of Water Resources Water Data Library (WDL, 2014) website does not indicate the presence of water supply wells located on the subject property (Township 02 South, Range 03 West, Section 34); however, two wells were indicated within one-mile of the subject property. Data indicated depth to groundwater in Well No. EMWD12003, located approximately three-quarter miles northeast, was 239 feet as measured in 2014. Data from the second nearby well, state Well No. 002S03W34C001S, located approximately eight-tenths of a mile north-northwest, indicated depth to groundwater was 240 feet, as measured in 2014. Based solely on topography, groundwater flow direction for the subject property would be expected to flow to the south.

5.2 User Provided Information

To assist EEI in the completion of the VES, Mr. Joseph Rivani, with Global Investments and Development, LLC, completed a Vapor Encroachment Screen - User Questionnaire (**Appendix G**). The questionnaire provided basic information regarding the use, condition, and proposed development of the subject property.

According to Mr. Joseph Rivani, the property is proposed to be developed with single-family, detached residential units. Hot air circulation and hot water radiation are the proposed heating systems. Fuel energy in the proposed development will come from natural gas and electricity. Mr. Rivani stated that he does not know of any reported instances of gas stations, cleaners, storage tanks, odors, chemicals, or health concerns reported on the property.

5.3 Tier 1 Screening – Search Distance Test/Chemicals of Concern

A Tier 1 Screening includes the search distance test that involves a review of the regulatory database report and available historical records obtained during the Phase I ESA process to make a determination if any *known or suspect potentially contaminated* properties exist within the Area of Concern (AOC). High risk sites are typically current and former gas stations, former and current dry cleaners, manufactured gas plants, and industrial sites (Brownfields). The AOC is defined as any up gradient sites within the ASTM E1527-13 standard search distances and any cross or down gradient sites within 1/3 mile for solvents and petroleum products.

If the contamination at the known site or potentially contaminated sites within the AOC consists of Chemicals of Concern (COCs), then a potential Vapor Encroachment Condition (pVEC) exists, and a Tier 2 Screening evaluation is recommended. If no known or potentially contaminated sites with COCs exist within the AOC, no further inquiry is necessary. Based on EEI's Tier 1 Screening evaluation, no sites were identified within the AOC that were considered to pose a pVEC at the subject property.

5.4 Findings

Based on the results of the Tier 1 VES, EEI concluded that a Vapor Encroachment Condition (VEC) for the subject property can be ruled out, because a VEC does not or is not likely to exist due to the lack of known or suspected contaminated properties within the Area of Concern (AOC).

6.0 FINDINGS AND OPINIONS

Based on the information obtained in this ESA, EEI has the following findings and opinions:

- *Known or suspected REC's* – are defined by the ASTM Standard Practice E 1527-13 as the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment.

  No *known or suspected RECs* have been revealed during the preparation of this ESA.

- *Controlled REC's (CRECs)* – are defined by the ASTM Standard Practice E 1527-13 as a REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (e.g., as evidenced by the issuance of a NFA letter or equivalent, or meeting risk-based criteria established by regulatory authority), with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (e.g., property use restrictions, AULs, institutional controls, or engineering controls)

  No *CREC's* have been revealed during the preparation of this ESA.

- *Historical Recognized Environmental Conditions (HRECs)* – are defined by the ASTM Standard Practice E 1527-13 as a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted residential use criteria established by a regulatory authority, without subjecting the property to any required controls (e.g., property use restrictions, AULs, institutional controls, or engineering controls).

  No *HREC's* have been revealed during the preparation of this ESA.

- *De minimis* Conditions – include environmental concerns identified which may warrant discussion but do not qualify as RECs, as defined by the ASTM Standard Practice E 1527-13.

  No *de minimis* conditions were identified during the preparation of this ESA.

7.0 DATA GAPS AND DEVIATIONS FROM ASTM PRACTICES

Section 3.2.20 (ASTM 1527-13) defines a data gap as "a lack or inability to obtain information required by the practice despite good faith efforts of the environmental professional to gather such information."

7.1 Historical Data Gaps

Based on the information obtained during the course of this investigation, no historical data gaps were encountered.

7.2 Regulatory Data Gaps

Based on the information obtained during the course of this investigation, no regulatory data gaps were encountered.

7.3 Onsite Data Gaps

Based on the information obtained during the course of this investigation, no onsite data gaps were encountered.

7.4 Deviations from ASTM Practices

Section 12.10 (ASTM 1527-13), states that all deletions and deviations from this practice shall be listed individually and in detail, including Client imposed constraints, and all additions should be listed.

EEI believes that there are no exceptions to, or deletions from, the ASTM Designation E1527-13 Guidelines.

8.0 CONCLUSIONS

We have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E1527-13 of APN 473-160-004-5, the *subject property*. Any exceptions to, or deletions from, this practice are described in Section 7.0 of this report. This assessment has revealed no evidence of *recognized environmental conditions* in connection with the *subject property*.

9.0 REFERENCES

California Department of Conservation Division of Mines and Geology (CDMG), 1998, Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada, published by International Conference of Building Officials.

California Department of Toxic Substances (DTSC), Website (http://www.envirostor.dtsc.ca.gov/public/), EnviroStor database, accessed October 2014.

California Department of Water Resources, Water Data Library (WDL), Website (http://www.water.ca.gov/waterdatalibrary), accessed October 2014.

California Division of Mines and Geology (CDMG), 1966, Geologic Map of California, Santa Ana Sheet.

California Division of Oil, Gas, and Geothermal Resources (CDOGGR) website, www.consrv.ca.gov, Oil and Gas Maps District 1, accessed October 2014.

California Geological Survey (CGS), 2002, California Geomorphic Provinces Note 36, Electronic Copy, Revised December 2002.

California Geological Survey (CGS), 2010, Geologic Data Map Number 2, Electronic Copy, Revised 2010.

Federal Emergency Management Agency (FEMA) website, (www.fema.gov), accessed October 2014.

National Pipeline Mapping System (NPMS), Public Map Viewer Website, (https://www.npms.phmsa.dot.gov/PublicViewer/), accessed October 2014.

Riverside County Integrated Project (RCIP) Proposed Multiple Species Habitat Conservation Plan (MSHCP) Website (http://www.tlma.co.riverside.ca.us), accessed October 2014.

California Regional Water Quality Control Board, Santa Ana Region, Water Quality Control Plan - Santa Ana River Basin (8) (SARWQCB, 1995)

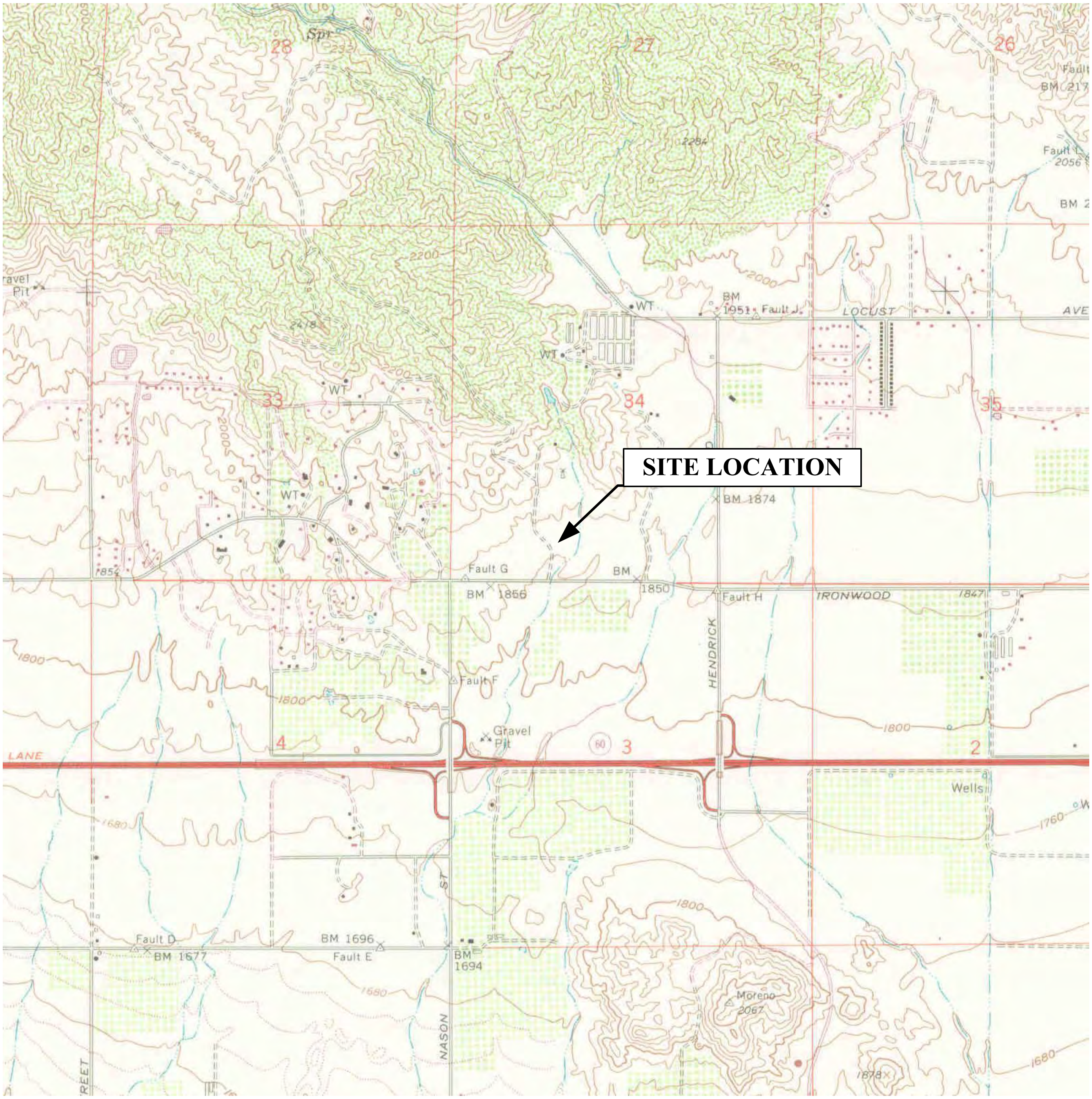
State Water Resources Control Board, Website, GeoTracker database, (http://www.geotracker.swrcb.ca.gov/), accessed October 2014.

The Planning Center, Phase I ESA, Proposed Alternate High School No. 5 – Ironwood/Nason, Moreno Valley, June 2008.

United States Department of Agriculture (USDA), Natural Resources Conservation Center, Website, Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx), accessed October 2014.

United States Geological Survey (USGS), 1980, 7.5' Topographic Map, Sunnymead Quadrangle.

FIGURES



Map Source: USGS, Murrieta, California 7.5 Minute Quadrangle map (USGS, 2012)

LEGEND

N

Scale: 1" = 2,000'

0 1,200FT 2,000FT 4,000FT

Note: All Locations Are Approximate

SITE LOCATION MAP

GLOBAL INVESTMENT AND DEVELOPMENT LLC

Ironwood Avenue Property – 75.1 Acres

APN: 473-160-004-5

Northwest of Ironwood Avenue and Oliver Street

Moreno Valley, Riverside County, California 92555

EEI Project No. GLO-71982.1

Created October 2014

EEI Geotechnical & Environmental Solutions

FIGURE 1

Source: Google Earth, Accessed September 2013; Image Date: November 6, 2012

LEGEND

N

Scale: 1" = 550'

0 330 FT 550 FT 1,100 FT

Note: All Locations Are Approximate

AERIAL SITE MAP

GLOBAL INVESTMENT AND DEVELOPMENT LLC

Ironwood Avenue Property – 75.1 Acres

APN: 473-160-004-5

Northwest of Ironwood Avenue and Oliver Street

Moreno Valley, Riverside County, California 92555

EEI Project No. GLO-71982.1

Created October 2014

EEI Geotechnical & Environmental Solutions

FIGURE 2

APPENDIX A
RESUME OF ENVIRONMENTAL PROFESSIONAL

Geotechnical & Environmental Solutions

BERNARD A. SENTIANIN, CPG, RG

Principal Geologist

SUMMARY

As Principal Geologist of EEI since 1997, Mr. Sentianin provides consulting and technical services as a project manager, expert witness, and senior geologist for investigation and cleanup efforts at sites impacted by Petroleum Hydrocarbons, heavy metals, pesticides, and chlorinated solvents. As a remediation specialist, he has hands on experience designing, installing, and managing large scale projects involving above ground and in-situ bioremediation, soil vapor extraction, sparging, and groundwater extraction/treatment. He has over 22 years of environmental project management experience, and 25 years professional geologic experience. Mr. Sentianin has extensive experience in planning, implementing and evaluating Phase I and Phase II environmental assessments in commercial real estate transactions following ASTM E1527-05, E1903-97 (-02), E2600-10, and 40 CFR Part 312 (AAI).

EDUCATION

1985 Bachelor of Science, Geology, California State University, Bakersfield
1989 Master of Science, Geological Sciences, San Diego State University

REGISTRATIONS/CERTIFICATIONS

Registered Environmental Assessor I No. 3477, State of California.
Professional Geologist No. 5530, State of California.
Certified Professional Geologist No. 9059, American Institute of Professional Geologists
OSHA 40-Hour HAZWOPER Training and 8-Hour Refreshers

WORK HISTORY

1991 TO 1997 Senior Geologist, Senior Project Manager
PW Environmental
Established in-house engineering and consulting services for mid-sized environmental contractor. Established regulatory, vendor, and client contacts. Initiated policies governing technical report content and format and instituted in-house training program for new technical staff. Selected prioritized and procured required support equipment. Actively managed Phase I and Phase II investigation and remediation projects. Reviewed assessment data, prepared feasibility studies, and evaluated remedial alternatives while preparing Remedial Action Plans (RAP) for fuel, heavy metal, and solvent-impacted sites. Prepared health-based risk assessment on large cleanup site adjacent to health care facility. Permitted, implemented, and successfully completed the first in-situ groundwater bioremediation system in Ventura County. Reviewed and implemented numerous Phase I and Phase II environmental site assessments throughout Central and Southern California.

2195 Faraday Avenue, Suite K ♦ Carlsbad, California 92008-7207 ♦ Ph: 760-431-3747 ♦ Fax: 760-431-3748 ♦ www.eeitiger.com

1989 TO 1991 Staff/Project Geologist
Nachant Environmental, Inc.
Planned, implemented, and managed environmental site investigations and remediation projects following appropriate regulatory and professional guidelines. Prepared and reviewed project cost proposals, correspondence, regulatory permits, assessment and investigation reports, and remedial action plans.

1987 TO 1989 Teaching Assistant
San Diego State University – Department of Geological Sciences and Department of Engineering

REPRESENTATIVE PROJECTS

Globe Mills, Sacramento CA - Conducted Phase I and Phase II environmental site assessment, evaluated environmental concerns for adaptive reuse project on behalf of Sacramento Housing and Redevelopment Agency. Managed and coordinated site cleanup, obtaining regulatory closure from the Sacramento County Environmental Management Division.

K Street Corridor – Sacramento, CA. Evaluated and conducted Phase I environmental site assessments on a multi-block area of downtown Sacramento, as well as a number of individual properties in other areas within the K Street Corridor, on behalf of the City of Sacramento Downtown Development Group.

Southside Garden and Fremont Mews, Sacramento, CA – Conducted Phase I/Phase II environmental site assessments and evaluated environmental concerns on three community garden projects on behalf of the Capitol Area Development Authority. Coordinated regulatory oversight with Sacramento County Environmental Management Division and the State Office of Environmental Health Hazard Assessment. Prepared an SAP and facilitated compliance with a Brownfield Grant from EPA Region 9. Prepared and evaluated RFP's from cleanup contractors and provided remediation oversight and management. Prepared closure documentation and obtained regulatory concurrence for both the Southside Garden and Fremont Mews projects.

Electronics Manufacturing Facility/Fueling Depot, Santa Monica, CA. Performed soil and groundwater investigation, feasibility testing and evaluation of fuel hydrocarbon and chlorinated solvent plumes. Prepared RAP with design criteria for soil vapor extraction. After approval of RAP by State regulators, implemented and successfully completed remediation at site, obtaining closure.

Former Aerospace Facility, Santa Ana, CA. Evaluated existing Phase I and Phase II assessments. Performed soil, soil vapor, and groundwater investigations of chlorinated solvent plumes at multiple locations on site. Modeled and evaluated potential plume source areas. Initiated site specific sampling protocol for chlorinated solvents. Negotiated with lead regulatory agency regarding regional contamination issues and site closure requirements.

Major Land Owner/Developer, San Juan Capistrano, CA. Conducted Phase I and Phase II environmental site assessments at multiple sites in southern Orange County. Evaluated potential environmental concerns related to sand & gravel operations, fueling facilities, ordinance testing facilities, aerospace engineering labs, vehicle maintenance and repair facilities, agricultural operations, and illicit dump sites.

Major Fast Food Restaurant Chain, Multiple Locations, CA. Conducted Phase I and Phase II environmental site assessments at multiple sites throughout California. Evaluated potential environmental concerns related to historic property uses and potential effects on site operations.

APPENDIX B
COUNTY OF RIVERSIDE PROPERTY INFORMATION/FIRM/
PRELIMINARY TITLE REPORT

RIVERSIDE COUNTY GIS

Selected parcel(s):

473-160-004

STANDARD WITH PERMITS REPORT

APNs
473-160-004-5

OWNER NAME
NOT AVAILABLE ONLINE

ADDRESS
473-160-004
ADDRESS NOT AVAILABLE

MAILING ADDRESS
(SEE OWNER)
14 ESTRELLA
IRVINE CA. 92614

LEGAL DESCRIPTION
LEGAL DESCRIPTION IS NOT AVAILABLE

LOT SIZE
RECORDED LOT SIZE IS 75.1 ACRES

PROPERTY CHARACTERISTICS
NO PROPERTY DESCRIPTION AVAILABLE

THOMAS BROS. MAPS PAGE/GRID
PAGE: 718 GRID: B1, C1

CITY BOUNDARY/SPHERE
CITY OF MORENO VALLEY
NOT WITHIN A CITY SPHERE
ANNEXATION DATE: NOT APPLICABLE
LAFCO CASE #: 83-101-5
PROPOSALS: NOT APPLICABLE

MARCH JOINT POWERS AUTHORITY
NOT IN THE JURISDICTION OF THE MARCH JOINT POWERS AUTHORITY

INDIAN TRIBAL LAND
NOT IN A TRIBAL LAND

SUPERVISORIAL DISTRICT 2011 (ORD. 813)
MARION ASHLEY, DISTRICT 5

SUPERVISORIAL DISTRICT (2001 BOUNDARIES)
MARION ASHLEY, DISTRICT 5

TOWNSHIP/RANGE

T2SR3W SEC 34

ELEVATION RANGE
1832/1992 FEET

PREVIOUS APN
NO DATA AVAILABLE

PLANNING

LAND USE DESIGNATIONS
Consult with the city for land use information.

SANTA ROSA ESCARPMENT BOUNDARY
NOT IN THE SANTA ROSA ESCARPMENT BOUNDARY

AREA PLAN (RCIP)
RECHE CANYON / BADLANDS

COMMUNITY ADVISORY COUNCILS
NOT IN A COMMUNITY ADVISORY COUNCIL AREA

GENERAL PLAN POLICY OVERLAYS
NOT IN A GENERAL PLAN POLICY OVERLAY AREA

GENERAL PLAN POLICY AREAS
NONE

ZONING CLASSIFICATIONS (ORD. 348)
See the city for more information

ZONING DISTRICTS AND ZONING AREAS
NOT IN A ZONING DISTRICT/AREA

ZONING OVERLAYS
NOT IN A ZONING OVERLAY

HISTORIC PRESERVATION DISTRICTS
NOT IN AN HISTORIC PRESERVATION DISTRICT

SPECIFIC PLANS
NOT WITHIN A SPECIFIC PLAN

AGRICULTURAL PRESERVE
NOT IN AN AGRICULTURAL PRESERVE

REDEVELOPMENT AREAS
NOT IN A REDEVELOPMENT AREA

AIRPORT INFLUENCE AREAS
NOT IN AN AIRPORT INFLUENCE AREA

AIRPORT COMPATIBLITY ZONES
NOT IN AN AIRPORT COMPATIBILTY ZONE

ENVIRONMENTAL

CVMSHCP (COACHELLA VALLEY MULTI-SPECIES HABITAT CONSERVATION PLAN) CONSERVATION AREA
NOT IN A CONSERVATION AREA

CVMSHCP FLUVIAL SAND TRANSPORT SPECIAL PROVISION AREAS
NOT IN A FLUVIAL SAND TRANSPORT SPECIAL PROVISION AREA

WRMSHCP (WESTERN RIVERSIDE COUNTY MULTI-SPECIES HABITAT CONSERVATION PLAN) CELL GROUP
NOT IN A CELL GROUP

WRMSHCP CELL NUMBER
NOT IN A CELL

HANS/ERP (HABITAT ACQUISITION AND NEGOTIATION STRATEGY/EXPEDITED REVIEW PROCESS)
NONE

VEGETATION (2005)
AGRICULTURAL LAND
COASTAL SAGE SCRUB
RIPARIAN SCRUB, WOODLAND, FOREST

FIRE

HIGH FIRE AREA (ORD. 787)
NOT IN A HIGH FIRE AREA

FIRE RESPONSIBLITY AREA
NOT IN A FIRE RESPONSIBILITY AREA

DEVELOPMENT FEES

CVMSHCP FEE AREA (ORD. 875)
NOT WITHIN THE COACHELLA VALLEY MSHCP FEE AREA

WRMSHCP FEE AREA (ORD. 810)
IN OR PARTIALLY WITHIN THE WESTERN RIVERSIDE MSHCP FEE AREA. SEE MAP FOR MORE INFORMATION.

ROAD & BRIDGE DISTRICT
NOT IN A DISTRICT

EASTERN TUMF (TRANSPORTATION UNIFORM MITIGATION FEE ORD. 673)
NOT WITHIN THE EASTERN TUMF FEE AREA

WESTERN TUMF (TRANSPORTATION UNIFORM MITIGATION FEE ORD. 824)
IN OR PARTIALLY WITHIN A TUMF FEE AREA. SEE MAP FOR MORE INFORMATION.CENTRAL

DIF (DEVELOPMENT IMPACT FEE AREA ORD. 659)
RECHE CANYON/BADLANDS

SKR FEE AREA (STEPHEN'S KANGAROO RAT ORD. 663.10)

IN OR PARTIALLY WITHIN AN SKR FEE AREA. SEE MAP FOR MORE INFORMATION.

DEVELOPMENT AGREEMENTS
NOT IN A DEVELOPMENT AGREEMENT AREA

TRANSPORTATION

CIRCULATION ELEMENT ULTIMATE RIGHT-OF-WAY
IN OR PARTIALLY WITHIN A CIRCULATION ELEMENT RIGHT-OF-WAY. SEE MAP FOR MORE INFORMATION. CONTACT THE TRANSPORTATION DEPT. PERMITS SECTION AT (951) 955-6790 FOR INFORMATION REGARDING THIS PARCEL IF IT IS IN AN UNINCORPORATED AREA.

ROAD BOOK PAGE
49

TRANSPORTATION AGREEMENTS
NOT IN A TRANSPORTATION AGREEMENT

CETAP (COMMUNITY AND ENVIRONMENTAL TRANSPORTATION ACCEPTABILITY PROCESS) CORRIDORS
NOT IN A CETAP CORRIDOR.

HYDROLOGY

FLOOD PLAIN REVIEW
WITHIN AREAS OF FLOODING SENSITIVITY. CONTACT THE FLOOD PLAIN MANAGEMENT SECTION AT (951) 955-1200 FOR INFORMATION

WATER DISTRICT
EMWD

FLOOD CONTROL DISTRICT
RIVERSIDE COUNTY FLOOD CONTROL DISTRICT

WATERSHED
SAN JACINTO VALLEY

GEOLOGIC

FAULT ZONE
NOT IN A FAULT ZONE

FAULTS
NOT WITHIN A 1/2 MILE OF A FAULT

LIQUEFACTION POTENTIAL
LOW
MODERATE

SUBSIDENCE
SUSCEPTIBLE

PALEONTOLOGICAL SENSITIVITY

LOW POTENTIAL.
FOLLOWING A LITERATURE SEARCH, RECORDS CHECK AND A FIELD SURVEY, AREAS MAY BE DETERMINED BY A QUALIFIED VERTEBRATE PALEONTOLOGIST AS HAVING LOW POTENTIAL FOR CONTAINING SIGNIFICANT PALEONTOLOGICAL RESOURCES SUBJECT TO ADVERSE IMPACTS.

MISCELLANEOUS

SCHOOL DISTRICT
MORENO VALLEY UNIFIED

COMMUNITIES
NOT IN A COMMUNITY

COUNTY SERVICE AREA
NOT IN A COUNTY SERVICE AREA.

LIGHTING (ORD. 655)
ZONE B, 44.63 MILES FROM MT. PALOMAR OBSERVATORY

2010 CENSUS TRACT
042412

FARMLAND
GRAZING LAND
LOCAL IMPORTANCE
OTHER LANDS

TAX RATE AREAS
021026
•CITY OF MORENO VALLEY
•CITY OF MORENO VALLEY LIBRARY
•CSA 152
•EASTERN MUN WATER IMP DIST 3
•EASTERN MUNICIPAL WATER
•FLOOD CONTROL ADMINISTRATION
•FLOOD CONTROL ZONE 4
•GENERAL
•GENERAL PURPOSE
•METRO WATER EAST 1301999
•MORENA VAL UNIFIED SCH B AND I
•MORENO VAL COMM SV ZN A
•MORENO VAL COMM SVC ZN D
•MORENO VAL COMM SVC ZN E
•MORENO VALL COMM SVC ZN C
•MORENO VALLEY COMM SVC
•MORENO VALLEY FIRE
•MORENO VALLEY UNIFIED SCHOOL
•RIV. CO. OFFICE OF EDUCATION
•RIVERSIDE CITY COMMUNITY COLLEGE
•SAN JACINTO BASIN RESOURCE CONS

SPECIAL NOTES
NO SPECIAL NOTES

BUILDING PERMITS

Case #	Description	Status
NO PLANNING PERMITS	NOT APPLICABLE	NOT APPLICABLE

ENVIRONMENTAL HEALTH PERMITS

Case #	Description	Status
NO ENVIRONMENTAL PERMITS	NOT APPLICABLE	NOT APPLICABLE

PLANNING PERMITS

Case #	Description	Status
NO PLANNING PERMITS	NOT APPLICABLE	NOT APPLICABLE

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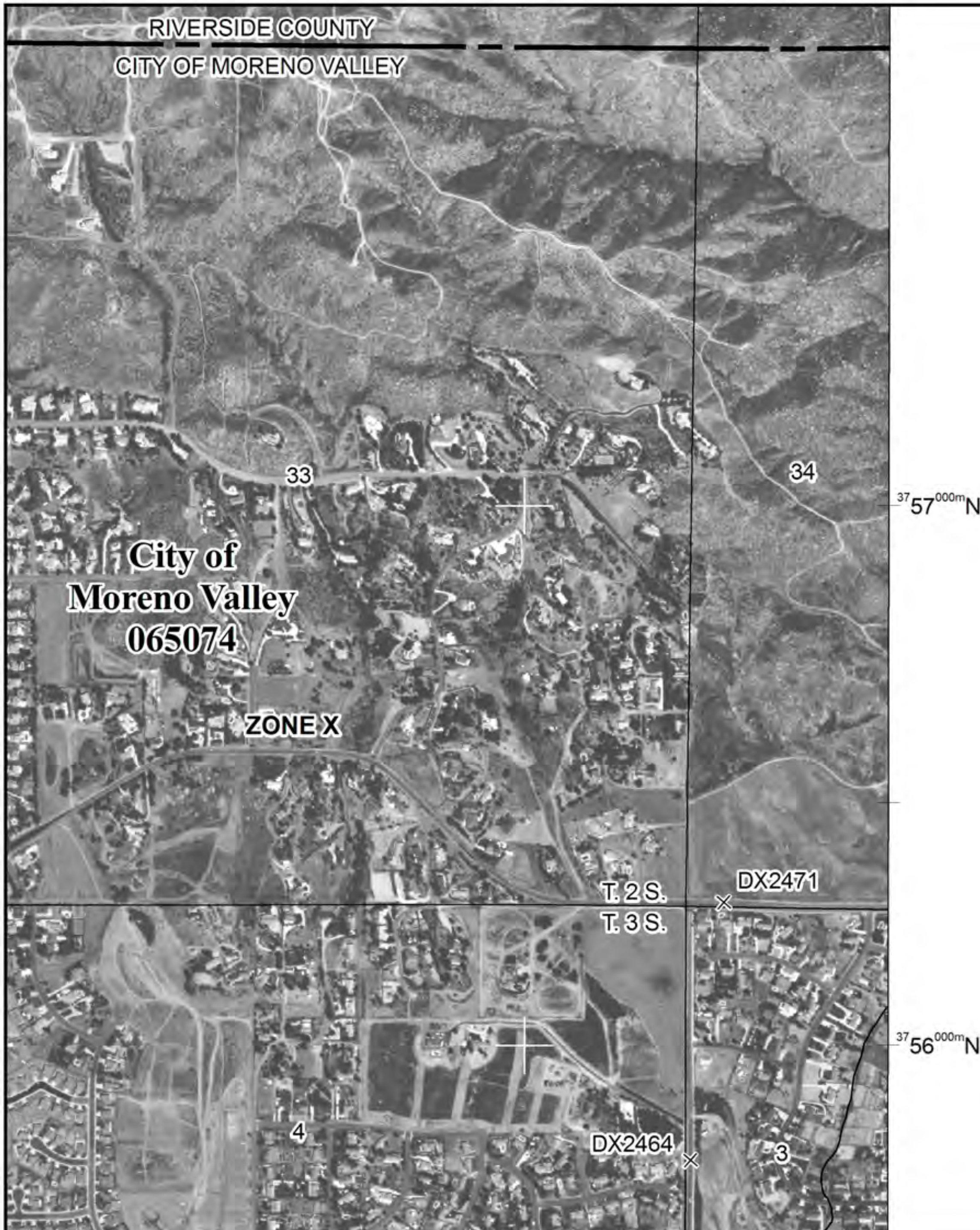
Version 131127



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

METERS

NATIONAL FLOOD INSURANCE PROGRAM

NFIP

PANEL 0755G

FIRM

FLOOD INSURANCE RATE MAP

RIVERSIDE COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 755 OF 3805
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MORENO VALLEY, CITY OF	065074	0755	G
RIVERSIDE COUNTY	060245	0755	G

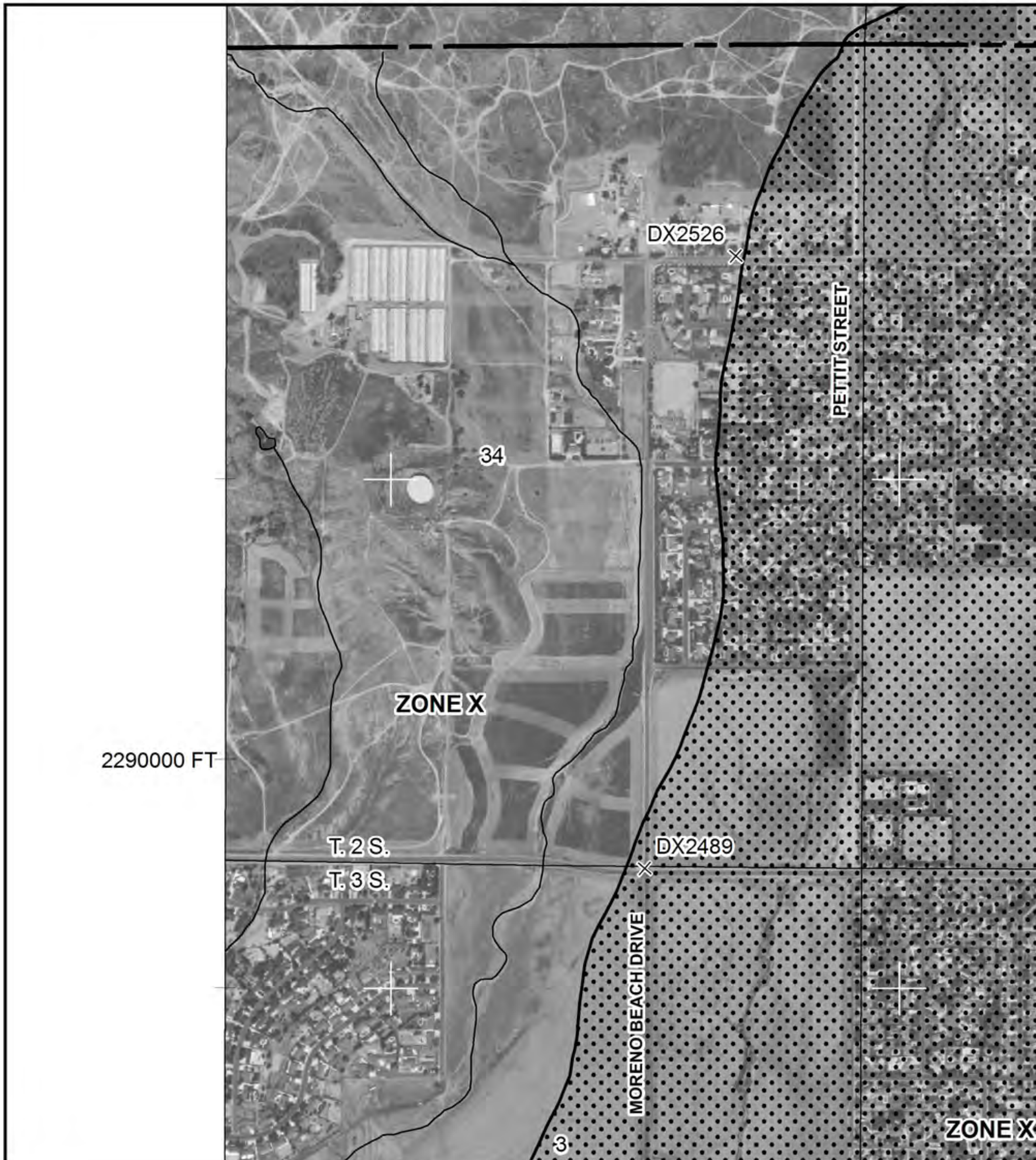
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06065C0755G

EFFECTIVE DATE
AUGUST 28, 2008

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0760G

FIRM
FLOOD INSURANCE RATE MAP

RIVERSIDE COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 760 OF 3805
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MORENO VALLEY, CITY OF	065074	0760	G
RIVERSIDE COUNTY	060245	0760	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

U.S. DEPARTMENT OF HOMELAND SECURITY

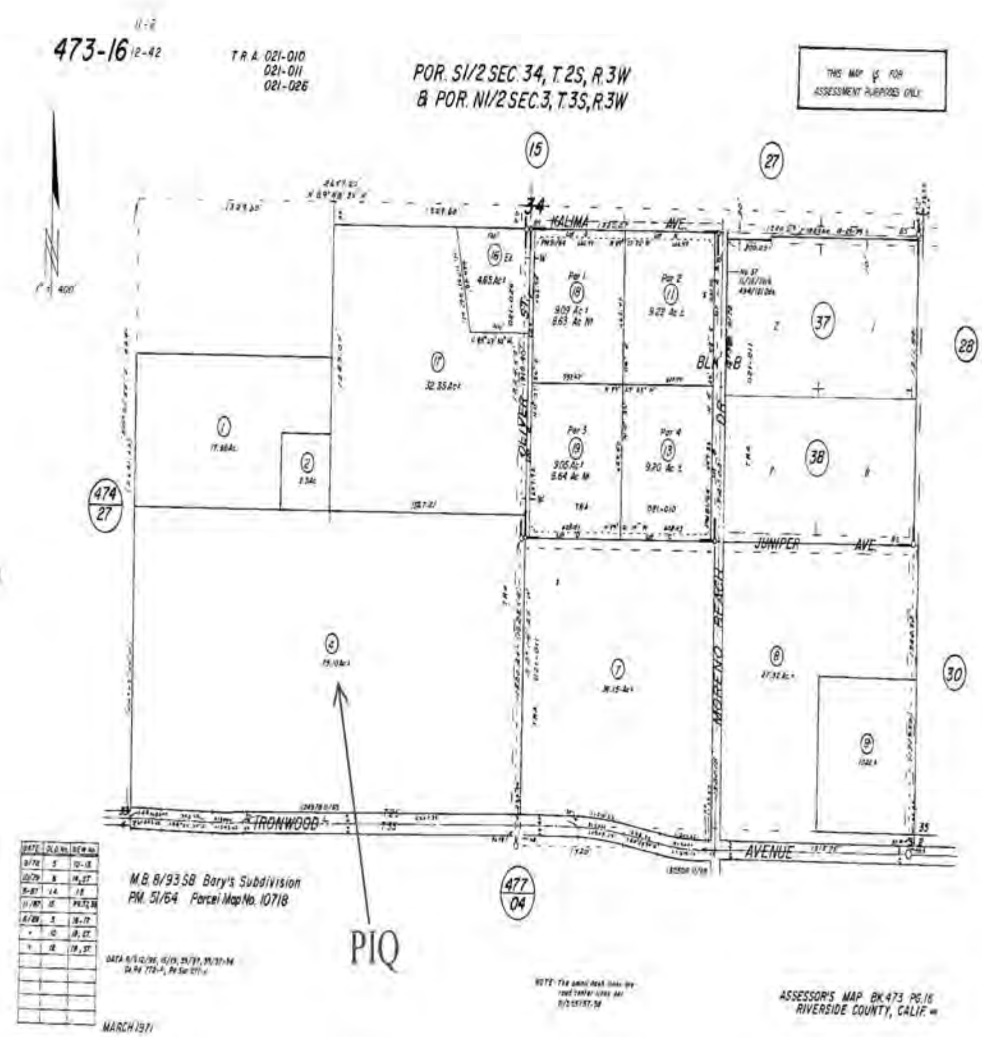
MAP NUMBER
06065C0760G

EFFECTIVE DATE
AUGUST 28, 2008

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

6



This map is for your aid in locating the subject property with reference to streets and other parcels. While this map is believed to be correct, Title365 Company. and subsequent insurance companies, assume no liability for any loss occurred by reason of reliance thereon.

801 North Brand Boulevard, Suite 320, Glendale, CA 91203
Toll Free: (888)365-3801 ext.   Direct: (888)365-3801 Fax: (855)386-4142

PRELIMINARY REPORT

Mutual Escrow Corp
5825 Rosemead Blvd
Temple City, CA 91780
Attn: Ruby Tsai

Our Order: 310-1402202-35
Escrow Ref: 023593-RT
Listing Agent Ref: 473-160 004
When Replying Please Contact:
Title365 Company
801 North Brand Boulevard, Suite 320
Glendale, CA 91203
Attn: Sue Starr
(888)365-3801

Todays Date: February 19, 2014

Property Address: Apn 473-160-004, Moreno Valley, CA 92555

In response to the application for a Policy of Title Insurance, Title365 Company hereby reports that it is prepared to issue, or cause to be issued, as of the date hereof, a Policy or Policies of Title Insurance describing the land and the estate or interest therein hereinafter set forth, insuring against loss which may be sustained by reason of any defect, lien or encumbrance not shown or referred to as an exception herein and/or not excluded from coverage pursuant to the printed Schedules, Conditions and Stipulations of said Policy forms.

The printed Exceptions and Exclusions from the coverage and Limitations on Covered Risks of said Policy or Policies of Title Insurance are set forth in Exhibit B attached. The policy to be issued may contain an arbitration clause. When the Amount of Insurance is less than that set forth in the arbitration clause, all arbitrable matters shall be arbitrated at the option of either the Company or the Insured as the exclusive remedy of the parties. Limitations on Covered Risks applicable to the CLTA and ALTA Homeowner's Policies of Title Insurance which establish a Deductible Amount and a Maximum Dollar Limit of Liability for certain coverages are also set forth in Exhibit B. Copies of the Policy forms should be read. They are available from the office which issued this report.

Please read the exceptions shown or referred to herein and the exceptions and exclusions set forth in Exhibit B of this report carefully. The exceptions and exclusions are meant to provide you with notice of matters which are not covered under the terms of the Policy or Policies of Title Insurance and should be carefully considered.

It is important to note that this preliminary report is not a written representation as to the condition of title and may not list all liens, defects and encumbrances affecting title to the land.

This report (and any supplements or amendments hereto) is issued solely for the purpose of facilitating the issuance of a Policy or Policies of Title Insurance and no liability is assumed hereby. If it is desired that liability be assumed prior to the issuance of a Policy or Policies of Title Insurance, a Binder or Commitment should be requested.

Dated as of February 13, 2014, at 07:30AM.

Sue Starr
Title Officer (E)
TU35@title365.com

The form of policy of title insurance contemplated by this report is:
CLTA Owners Policy (1/1/08) CLTA Standard Coverage Policy 1990 Underwritten by: First American Title Insurance Company

SCHEDULE A

The estate or interest in the land hereinafter described or referred to covered by this Report is:

A Fee

Title to said estate or interest at the date hereof is vested in:

Ironwood 8 Properties, a California Limited Partnership

The land referred to in this Report is situated in the County of Riverside, State of California, and is described as follows:

The South half of the Southwest quarter of Section 34, Township 2 South, Range 3 West, San Bernardino Meridian, County of Riverside, State of California, according to the Official Plat thereof.

Excepting therefrom that portion thereof within Ironwood Avenue.

Also excepting therefrom that portion described in deed to the County of Riverside recorded November 11, 1965 as Instrument No. 124978.

Except therefrom all oil, gas, minerals and other hydrocarbon substances, lying below a depth of 500 feet, without the right of surface entry.

APN: 473-160-004-5

SCHEDULE B

At the date hereof, Exceptions to coverage, in addition to the printed Exception and Exclusions contained in said policy form would be as follows:

1. Property taxes, which are a lien not yet due and payable, including any assessments collected with taxes, to be levied for the fiscal year 2014 - 2015 which are a lien not yet payable.

2. General and Special City and/or County taxes, including any personal property taxes and any assessments collected with taxes, for the fiscal year 2013 - 2014:
   1st Installment: $18,045.80 Paid
   Penalty: $1,804.58
   2nd Installment: $18,045.80 Open
   Penalty: $1,842.08
   Exemption: Not Set Out
   Code Area: 021-026
   Assessment No. 473-160-004-5

3. Assessments, if any, for community facility districts affecting said land which may exist by virtue of assessment maps or notices filed by said districts. Said assessments are collected with the County Taxes.

4. The lien of supplemental taxes, if any, assessed pursuant to the provisions of Chapter 3.5 (commencing with Section 75) of the revenue and taxation code of the State of California.

5. Reservations contained in the Patent from the United States of America recorded February 4, 1930, in Book 9, Page 431, Patents.

6. An easement for the purpose shown below and rights incidental thereto as set forth in a document:
   Purpose: Poles and other supports
   Recorded: April 24, 1934 in Book 169 and Page 434, of Official Records.
   Affects: A portion of said land

7. An easement for the purpose shown below and rights incidental thereto as set forth in a document:
   Purpose: Public utilities
   Recorded: October 5, 1949 in Book 1113 and Page 247, of Official Records.
   Affects: A portion of said land

8. An easement for the purpose shown below and rights incidental thereto as granted in a document:
   Granted to: Eastern Municipal Water District, a Municipal Water District
   Purpose: Water transmission and distribution
   Recorded: September 28, 1989 as Instrument Number 333886, of Official Records.
   Affects: A portion of said land

9. An Abstract of judgment recorded December 22, 2006 as Instrument No. 2006-0938101, of Official Records:
   Court: Superior
   Case No.: 06CC01478
   Entry Date: October 23, 2006
   Debtor: Chang Yang and Tsingmeng Yang
   Creditor: Orange County Transportation Authority
   Amount: $59,769.30 and any other amounts due thereunder.
   Filing attorney's information-
   Name: Malena R. Leclair-Gibson
   Greenbaum Law Group LLP
   Address: 840 Newport Center Dr. Ste. 720 Newport Beach, CA 92660
   Phone Number: (949)760-1400

10. An Abstract of judgment recorded July 25, 2007 as Instrument No. 2007-0479951, of Official Records:
    Court: Superior
    Case No.: VC046887
    Entry Date: March 28, 2007
    Debtor: Chang Yang, Young Mi Yang and Heoung Ju Yu
    Creditor: Jason Lee and Sung Lee
    Amount: $37,803.33 and any other amounts due thereunder.
    Filing attorney's information-
    Name: John H. Oh
    Address: 3700 Wilshire Blvd., Suite 940 Los Angeles, CA 90010
    Phone Number: (213)637-1333

11. An Abstract of judgment recorded July 25, 2007 as Instrument No. 2007-0479952, of Official Records:
    Court: Superior
    Case No.: VC046887
    Entry Date: March 28, 2007
    Debtor: Chang Yang, Young Mi Yang and Heoung Ju Yu
    Creditor: Jason Lee and Sung Lee
    Amount: $37,803.33 and any other amounts due thereunder.
    Filing attorney's information-
    Name: Law Offices of John H. Oh
    Address: 3700 Wilshire Blvd. #940 Los Angeles, CA 90010
    Phone Number: Not Set Out

12. We find no open Deeds of Trust of record. Please verify by inquiry of escrow personnel and/or agents whether or not we have overlooked something and advise the title department accordingly prior to close of escrow.We will require the attached "Affidavit of No Deed of Trust" to be signed by the sellers/borrowers prior to close of escrow, and forwarded to the title unit.

13. Matters which may be disclosed by an inspection or by a survey of said land satisfactory to this Company, or by inquiry of the parties in possession thereof.

14. An inspection of said land has been ordered; upon its completion we will advise you of our findings.

15. The requirement that there be filed in the Office of the Secretary of State, a certificate of limited partnership in compliance with provisions of The California Revised Limited Partnership Act, Section 15611 et. seq., Corporation Code and that a Certified Copy thereof be recorded:
    Name of Limited Partnership: Ironwood 8 Properties

16. In order to complete this report, this Company requires a Statement of Information to be completed by the following party(ies),

    Party(ies): All Parties, Chang-Chung Yang and Fu Mei Chen Yang

    The Company reserves the right to add additional items or make further requirements after review of the requested Statement(s) of Information.

END OF SCHEDULE B

801 North Brand Boulevard, Suite 320, Glendale, CA 91203
Toll Free: (888)365-3801 ext. Direct: (888)365-3801 Fax: (855)386-4142

Attn:

Borrower: Global Investment & Development, LLC

Lenders supplemental report

The above numbered report (including any supplements or amendments thereto) is hereby modified and/or supplemented in order to reflect the following additional items relating to the issuance of an American Land Title Association loan policy form as follows:

A. This report is preparatory to this issuance of an American Land Title Association loan policy of title insurance . This report discloses nothing, which would preclude the issuance of said American Land Title Association loan policy of title insurance with endorsement No. 100 attached thereto.

B. The improvements on said land are designated as:

Vacant Land (*Unknown)*

Apn 473-160-004, in the City of Moreno Valley, County of Riverside, State of California.

C. Pursuant to information provided to Title365 Company as of the date hereinabove, the proposed insured loan amount is $0.00 with the proposed insured lender being .

D. The only conveyance(s) affecting said land recorded with 24 months of the date of this report are as follows:

NONE

TITLE365

801 North Brand Boulevard, Suite 320, Glendale, CA 91203
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Notes and Requirements Section

Note 1: On July 1, 1985, Assembly Bill 3132 became effective. Assembly Bill 3132 adds and repeals portions of Sections 480.3 and 480.4 of the Revenue and Taxation Code of the State of California.

The act requires the County Assessor and/or Recorder to make available a statutorily prescribed form entitled "Preliminary Change of Ownership Report". Said report must be completed by the buyer and filed concurrently with the recordation of the documents evidencing the change of ownership. Failure to present the Change of Ownership Report at the time of recordation will cause the County Recorder to charge an additional $20.00 penalty recording fee. The fee cannot be charged if the transfer document is accompanied by the affidavit stating that the buyer/transferee is not a resident of the State of California. This report is for official use only and is not open to public inspection.

For further information, contact the Change of Ownership Section in the Assessor's Office located in the County of said property or the County Recorder's Office located in the County of said property.

Note 2: Attached are Privacy Policy Notices in compliance with the Gramm-Leach-Bliley Act (GLBA) effective July 1, 2001. Please review said Notices regarding personal information.

Note 3: The map attached hereto may or may not be a survey of the land depicted thereon. You should not rely upon it for any purpose other than orientation to the general location of the parcel or parcels depicted. This company expressly disclaims any liability for alleged loss or damage which may result from reliance upon this map.

Note 4: The RESPA Rule to simplify and improve of obtaining mortgages and reduce consumer settlement cost includes a provision for average charges, allowing settlement service providers to establish an average recording fee. The average recording charge for all residential refinance transactions is $93.00 and the average recording charge for all residential resale transactions with financing is $89.00. The average charge is applied regardless of the number of documents recorded in the transaction, the number of pages in each document or the actual recording charges. If your transaction is not a residential loan or sale with a new loan, please contact your title provider for actual recording charges. These average recording charges are subject to change in the future without notice.

Note 5: Part of the RESPA Rule to simply and improve the process of obtaining mortgages and reduce consumer settlement costs requires the settlement agent to disclose the agent and underwriter split of title premiums, including endorsements as follows:

> Line 1107 is used to record the amount of the total title insurance premium, including endorsements, that is retained by the title agent. Title365 Company retains 87% of the total premium and endorsements.
>
> Line 1108 is used to record the amount of the total title insurance premium, including endorsements, that is retained by the title underwriter. First American Title Insurance Company retains 13% of the total premium and endorsements.

TITLE365

801 North Brand Boulevard, Suite 320, Glendale, CA 91203
Toll Free: (888)365-3801 ext. Direct: (888)365-3801 Fax: (855)386-4142

Notice Regarding Your Deposit of Funds

California Insurance Code Sections 12413 *et. Seq*. Regulates the disbursement of escrow and sub-escrow funds by title companies. The law requires that funds be deposited in the title company escrow and sub-escrow accounts and be available for withdrawal prior to disbursement. Funds deposited with the Company by wire transfer may be disbursed upon receipt. Funds deposited w ith the Company via cashier's checks drawn on a California based bank may be disbursed the next business day after the day of deposit. If funds are deposited with by other methods, recording or disbursement may be delayed. All escrow and sub-escrow funds received by the Company w ill be deposited with other funds in one or more non-interest bearing escrow accounts of the Company in a financial institution selected by the Company. The Company and/or its parent company may receive certain direct or indirect benefits from the financial institution by reason of the deposit of such funds or the maintenance of such accounts with the financial institution, and the Company shall have no obligation to account to the depositing party in any manner for the value of, or to pay such party, any benefit received by the Company and/or its parent Company. Those benefits may include, without limitation, credits allowed by such financial institution on loans to the Company and/or its parent company and earnings on investments made on the proceeds of such loans, accounting, reporting and other services and products of such financial institution. Such benefits shall be deemed additional compensation of the Company for its services in connection with the escrow or sub-escrow. If funds are to be deposited with **Title365 Company** by wire transfer, they should be wired to the following bank/account:

Wiring Instructions for this Office

Wire To:	**City National Bank** **1801 West Olympic Blvd.** **Los Angeles, CA 90006** **Attn: Wire Department**
ABA/Routing No.:	**122016066**
Bank Account:	**555083726**
Amount:	**$________________________________**
Reference Order No.:	**310-1402202-35**
Attention:	**Sue Starr**

801 North Brand Boulevard, Suite 320, Glendale, CA 91203
Toll Free: (888)365-3801 ext. Direct: (888)365-3801 Fax: (855)386-4142

WIRE INSTRUCTIONS

For incoming wire transfers please use the following information for the transfer of funds to **Title365 Company - Los Angeles County Sub-Escrow Trust- LA**:

Wire To:	**City National Bank** **1801 West Olympic Blvd.** **Los Angeles, CA 90006** **Attn: Wire Department**
ABA/Routing No.:	**122016066**
Bank Account:	**555083726**
Amount:	**$____________________________**
Reference Order No.:	**310-1402202-35**
Attention:	**Sue Starr**

Do not hesitate to contact the undersigned should y ou or your financial institution have any questions with regards to the information provided above.

Sincerely,
Title365 Company

Sue Starr
Title Officer (E)
TU35@title365.com
(888)365-3801

PRIVACY POLICY NOTICE

We are committed to safeguarding customer information;

When we request information from you or about you, it is for our own legitimate business purposes and not for the benefit of any unaffiliated party;

We use personal consumer information only for legitimate business purposes in a manner consistent with title insurance and escrow practices in compliance with applicable laws and regulations;

We will obey the laws governing the collection, use, and dissemination of personal data; and

We will endeavor to educate our employees on the responsible collection and use of personal information.

PURPOSE OF THIS NOTICE

Title V of the Gramm-Leach-Bliley Act ("GLBA") generally requires a financial institution (which term includes title insurers, underwritten title companies and those providing real estate settlement services) to disclose to all its customers the privacy policies and practices with respect to information sharing of consumer nonpublic personal information with both affiliates and non-affiliated third parties. In compliance with GLBA, we are providing you with this document, which notifies you of the privacy policies and practices of Title365 Company This disclosure does not apply to business, commercial or agricultural transactions.

We may collect nonpublic personal information about you from the following sources:

- Information we receive from you, such as on applications or other forms.
- Information about your transactions we secure from our files, or from our affiliates or others.
- Information we receive from a consumer-reporting agency.
- Information we receive from others involved in y our transaction, such as the real estate agent, lender, survey or or appraiser.

Unless it is specifically stated otherwise in an amended Privacy Policy Notice, no additional nonpublic personal information will be collected about you.

We may disclose any of the above information that we collect about our customers or former customers to our affiliates or to non-affiliated third parties as permitted by law. This includes, but is not limited to, financial service providers (e.g., banks, consumer finance lenders, securities and insurance companies, etc.), non-financial companies (e.g., settlement or fulfillment service providers, or title plant operated by a third party vendor).

WE DO NOT DISCLOSE ANY NONPUBLIC PERSONAL INFORMATION ABOUT YOU WITH ANYONE FOR ANY PURPOSE THAT IS NOT SPECIFICALLY PERMITTED BY LAW.

EXHIBIT "A"

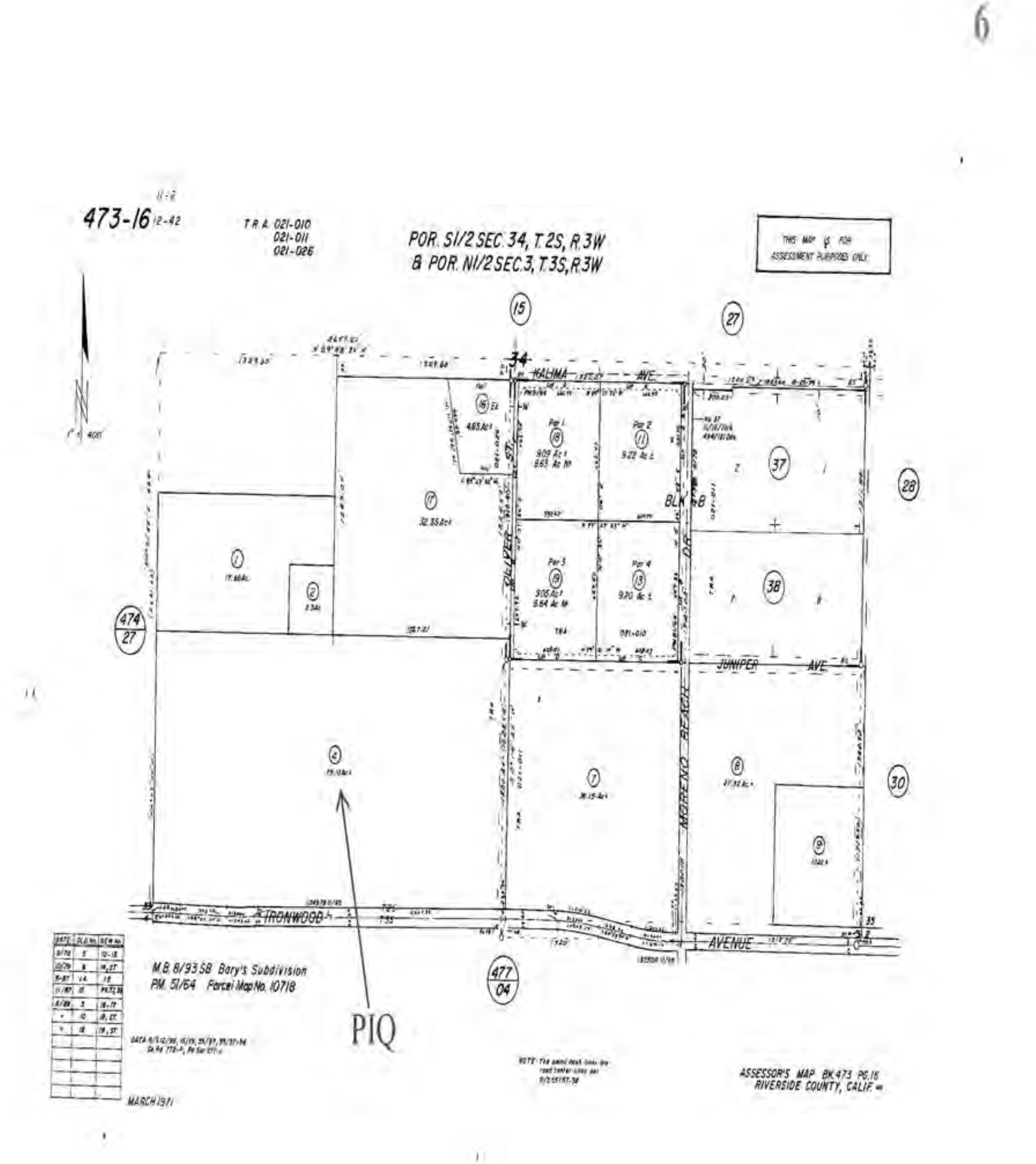
The South half of the Southwest quarter of Section 34, Township 2 South, Range 3 West, San Bernardino Meridian, County of Riverside, State of California, according to the Official Plat thereof.

Excepting therefrom that portion thereof within Ironwood Avenue.

Also excepting therefrom that portion described in deed to the County of Riverside recorded November 11, 1965 as Instrument No. 124978.

Except therefrom all oil, gas, minerals and other hydrocarbon substances, lying below a depth of 500 feet, without the right of surface entry.

APN: 473-160-004-5



This map is for your aid in locating the subject property with reference to streets and other parcels. While this map is believed to be correct, Title365 Company. and subsequent insurance companies, assume no liability for any loss occurred by reason of reliance thereon.

EXHIBIT B (REVISED 11-17-06)

CALIFORNIA LAND TITLE ASSOCIATION STANDARD COVERAGE POLICY - 1990 EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy and the Company will not pay loss or damage, costs, attorneys' fees or expenses which arise by reason of:
1. (a) Any law, ordinance or governmental regulation (including but not limited to building or zoning laws, ordinances, or regulations) restricting, regulating, prohibiting or relating (i) the occupancy, use, or enjoyment of the land; (ii) the character, dimensions or location of any improvement now or hereafter erected on the land; (iii) a separation in ownership or a change in the dimensions or area of the land or any parcel of which the land is or was a part; or (iv) environmental protection, or the effect of any violation of these laws, ordinances or governmental regulations, except to the extent that a notice of the enforcement thereof or a notice of a defect, lien, or encumbrance resulting from a violation or alleged violation affecting the land has been recorded in the public records at Date of Policy. (b) Any governmental police power not excluded by (a) above, except to the extent that a notice of the exercise thereof or notice of a defect, lien or encumbrance resulting from a violation or alleged violation affecting the land has been recorded in the public records at Date of Policy.
2. Rights of eminent domain unless notice of the exercise thereof has been recorded in the public records at Date of Policy, but not excluding from coverage any taking which has occurred prior to Date of Policy which would be binding on the rights of a purchaser for value without knowledge.
3. Defects, liens, encumbrances, adverse claims or other matters: (a) whether or not recorded in the public records at Date of Policy, but created, suffered, assumed or agreed to by the insured claimant; (b) not known to the Company, not recorded in the public records at Date of Policy, but known to the insured claimant and not disclosed in writing to the Company by the insured claimant prior to the date the insured claimant became an insured under this policy; (c) resulting in no loss or damage to the insured claimant; (d) attaching or created subsequent to Date of Policy; or (e) resulting in loss or damage which would not have been sustained if the insured claimant had paid value for the insured mortgage or for the estate or interest insured by this policy.
4. Unenforceability of the lien of the insured mortgage because of the inability or failure of the insured at Date of Policy, or the inability or failure of any subsequent owner of the indebtedness, to comply with the applicable doing business laws of the state in which the land is situated.
5. Invalidity or unenforceability of the lien of the insured mortgage, or claim thereof, which arises out of the transaction evidenced by the insured mortgage and is based upon usury or any consumer credit protection or truth in lending law.
6. Any claim, which arises out of the transaction vesting in the insured the estate of interest insured by this policy or the transaction creating the interest of the insured lender, by reason of the operation of federal bankruptcy, state insolvency or similar creditors' rights laws.

EXCEPTIONS FROM COVERAGE - SCHEDULE B, PART I

This policy does not insure against loss or damage (and the Company will not pay costs, attorneys' fees or expenses) which arise by reason of:
1. (a) Taxes or assessments that are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; (b) proceedings by a public agency that may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.
2. Any facts, rights, interests, or claims that are not shown in the Public Records but that could be ascertained by an inspection of the Land or that may be asserted by persons in possession of the Land.
3. Easements, liens or encumbrances, or claims thereof, not shown by the Public Records.
4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records.
5. (a) Unpatented mining claims; (b) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (c) water rights, claims or title to water, whether or not the matters excepted under (a), (b), or (c) are shown by the Public Records.
6. Any lien or right to a lien for services, labor or material not shown by the public records.

CLTA HOMEOWNER'S POLICY OF TITLE INSURANCE (10/22/03) ALTA HOMEOWNER'S POLICY OF TITLE INSURANCE EXCLUSIONS

In addition to the Exceptions in Schedule B, You are not insured against loss, costs, attorneys' fees, and expenses resulting from:
1. Governmental police power, and the existence or violation of any law or government regulation. This includes ordinances, laws and regulations concerning: a. building, b. zoning, c. Land use d. improvements on the Land, e. Land division, f. environmental protection. This Exclusion does not apply to violations or the enforcement of these matters if notice of the violation or enforcement appears in the Public Records at the Policy Date. This Exclusion does not limit the coverage described in Covered Risk 14, 15, 16, 17 or 24.
2. The failure of Your existing structures, or any part of them, to be constructed in accordance with applicable building codes. This Exclusion does not apply to violations of building codes if notice of the violation appears in the Public Records at the Policy Date.
3. The right to take the Land by condemning it, unless: a. a notice of exercising the right appears in the Public Records at the Policy Date; or b. the taking happened before the Policy Date and is binding on You if You bought the Land without Knowing of the taking.
4. Risks: a. that are created, allowed, or agreed to by You, whether or not they appear in the Public Records; b. that are Known to You at the Policy Date, but not to Us, unless they appear in the Public Records at the Policy Date; c. that result in no loss to You; or d. that first occur after the Policy Date - this does not limit the coverage described in Covered Risk 7, 8.d, 22, 23, 24 or 25.
5. Failure to pay value for Your Title.
6. Lack of a right: a. to any Land outside the area specifically described and referred to in paragraph 3 of Schedule A; and b. in streets, alleys, or waterways that touch the Land. This Exclusion does not limit the coverage described in Covered Risk 11 or 18.

LIMITATIONS ON COVERED RISKS

Your insurance for the following Covered Risks is limited on the Owner's Coverage Statement as follows:
• For Covered Risk 14, 15, 16 and 18, Your Deductible Amount and Our Maximum Dollar Limit of Liability shown in Schedule A.
The deductible amounts and maximum dollar limits shown on Schedule A are as follows:

	Your Deductible Amount	Our Maximum Dollar Limit of Liability
Covered Risk 14:	**1 % of Policy Amount or $2,500 (whichever is less)**	**$10,000**
Covered Risk 15:	**1 % of Policy Amount or $5,000 (whichever is less)**	**$25,000**
Covered Risk 16:	**1 % of Policy Amount or $5,000 (whichever is less)**	**$25,000**
Covered Risk 18:	**1 % of Policy Amount or $2,500 (whichever is less)**	**$5,000**

AMERICAN LAND TITLE ASSOCIATION RESIDENTIAL TITLE INSURANCE POLICY (6-1-87) EXCLUSIONS

In addition to the Exceptions in Schedule B, you are not insured against loss, costs, attorneys' fees, and expenses resulting from:
1. Governmental police power, and the existence or violation of any law or government regulation. This includes building and zoning ordinances and also laws and regulations concerning: * land use * improvements on the land * land division * environmental protection. This exclusion does not apply to violations or the enforcement of these matters which appear in the public records at Policy Date. This exclusion does not limit the zoning coverage described in Items 12 and 13 of Covered Title Risks.
2. The right to take the land by condemning it, unless: *a notice of exercising the right appears in the public records *on the Policy Date *the taking happened prior to the Policy Date and is binding on you if you bought the land without knowing of the taking
3. Title Risks: *that are created, allowed, or agreed to by you *that are known to you, but not to us, on the Policy Date -- unless they appeared in the public records *that result in no loss to you *that first affect your title after the Policy Date -- this does not limit the labor and material lien coverage in Item 8 of Covered Title Risks
4. Failure to pay value for your title.
5. Lack of a right: *to any land outside the area specifically described and referred to in Item 3 of Schedule A OR *in streets, alleys, or waterways that touch your land. This exclusion does not limit the access coverage in Item 5 of Covered Title Risks.

ALTA LOAN POLICY (10-17-92) WITH ALTA ENDORSEMENT-FORM 1 COVERAGE EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy and the Company will not pay loss or damage, costs, attorneys' fees or expenses which arise by reason of:
1. (a) Any law, ordinance or governmental regulation (including but not limited to building and zoning laws, ordinances, or regulations) restricting, regulating, prohibiting or relating to (i) the occupancy, use, or enjoyment of the land; (ii) the character, dimensions or location of any improvement now or hereafter erected on the land; (iii) a separation in ownership or a change in the dimensions or area of the land or any parcel of which the land is or was a part; or (iv) environmental protection, or the effect of any violation of these laws, ordinances or governmental regulations, except to the extent that a notice of the enforcement thereof or a notice of a defect, lien or encumbrance resulting from a violation or alleged violation affecting the land has been recorded in the public records at Date of Policy. (b) Any governmental police power not excluded by (a) above, except to the extent that a notice of the exercise thereof or a notice of a defect, lien or encumbrance resulting from a violation or alleged violation affecting the land has been recorded in the public records at Date of Policy.
2. Rights of eminent domain unless notice of the exercise thereof has been recorded in the public records at Date of Policy, but not excluding from coverage any taking which has occurred prior to Date of Policy which would be binding on the rights of a purchaser for value without knowledge.
3. Defects, liens, encumbrances, adverse claims or other matters:(a)created, suffered, assumed or agreed to by the insured claimant; (b)not known to the Company, not recorded in the public records at Date of Policy, but known to the insured claimant and not disclosed in writing to the Company by the insured claimant prior to the date the insured claimant became an insured under this policy; (c) resulting in no loss or damage to the insured claimant; (d) attaching or created subsequent to Date of Policy (except to the extent that this policy insures the priority of the lien of the insured mortgage over any statutory lien for services, labor or material or to the extent insurance is afforded herein as to assessments for street improvements under construction or completed at Date of Policy);or(e) resulting in loss or damage which would not have been sustained if the insured claimant had paid value for the insured mortgage.
4. Unenforceability of the lien of the insured mortgage because of the inability or failure of the insured at Date of Policy, or the inability or failure of any subsequent owner of the indebtedness, to comply with applicable doing business laws of the state in which the land is situated.
5. Invalidity or unenforceability of the lien of the insured mortgage, or claim thereof, which arises out of the transaction evidenced by the insured mortgage and is based upon usury or any consumer credit protection or truth in lending law.
6. Any statutory lien for services, labor or materials (or the claim of priority of any statutory lien for services, labor or materials over the lien of the insured mortgage) arising from an improvement or work related tothe land which is contracted for and commenced subsequent to Date of Policy and is not financed in whole or in part by proceeds of the indebtedness secured by the insured mortgage which at Date of Policy the insured has advanced or is obligated to advance.
7. Any claim, which arises out of the transaction creating the interest of the mortgagee insured by this policy, by reason of the operation of federal bankruptcy, state insolvency, or similar creditors' rights laws, that is based on: (i) the transaction creating the interest of the insured mortgagee being deemed a fraudulent conveyance or fraudulent transfer; or(ii) the subordination of the interest of the insured mortgagee as a result of the application of the doctrine or equitable subordination; or(iii) the transaction creating the interest of the insured mortgagee being deemed a preferential transfer except where the preferential transfer results from the failure:(a)to timely record the instrument of transfer; or(b) of such recordation to impart notice to a purchaser for value or a judgement or lien creditor. The above policy form may be issued to afford either Standard Coverage or Extended Coverage. In addition to the above Exclusions from Coverage, the Exceptions from Coverage in a Standard Coverage policy will also include the following Exceptions from Coverage:

EXCEPTIONS FROM COVERAGE

This policy does not insure against loss or damage (and the Company will not pay costs, attorneys' fees or expenses) which arise by reason of:
1. (a) Taxes or assessments that are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; (b) proceedings by a public agency that may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.
2. Any facts, rights, interests, or claims that are not shown in the Public Records but that could be ascertained by an inspection of the Land or that may be asserted by persons in possession of the Land.
3. Easements, liens or encumbrances, or claims thereof, not shown by the Public Records.
4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records.
5. (a) Unpatented mining claims; (b) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (c) water rights, claims or title to water, whether or not the matters excepted under (a), (b), or (c) are shown by the Public Records.
6. Any lien or right to a lien for services, labor or material not shown by the public records.

2006 ALTA LOAN POLICY (06-17-06) EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy, and the Company will not pay loss or damage, costs, attorneys' fees, or expenses that arise by reason of:
1. (a) Any law, ordinance, permit, or governmental regulation (including those relating to building and zoning) restricting, regulating, prohibiting, or relating to: (i) the occupancy, use, or enjoyment of the Land; (ii) the character, dimensions, or location of any improvement erected on the Land; (iii) the subdivision of land; or (IV) environmental protection; or the effect of any violation of these laws, ordinances, or governmental regulations. This Exclusion 1(a) does not modify or limit the coverage provided under Covered Risk 5. (b) Any governmental police power. This Exclusion 1(b) does not modify or limit the coverage provided under Covered Risk 6.
2. Rights of eminent domain. This Exclusion does not modify or limit the coverage provided under Covered Risk 7 or 8.
3. Defects, liens, encumbrances, adverse claims, or other matters: (a) created, suffered, assumed, or agreed to by the Insured Claimant; (b) not Known to the Company, not recorded in the Public Records at Date of Policy, but Known to the Insured Claimant and not disclosed in writing to the Company by the Insured Claimant prior to the date the Insured Claimant became an Insured under this policy;(c) resulting in no loss or damage to the Insured Claimant; (d) attaching or

created subsequent to Date of Policy (however, this does not modify or limit the coverage provided under Covered Risk 11, 13, or 14); or (e) resulting in loss or damage that would not have been sustained if the Insured Claimant had paid value for the Insured Mortgage.
4. Unenforceability of the lien of the Insured Mortgage because of the inability or failure of an Insured to comply with applicable doing-business laws of the state where the Land is situated.
5. Invalidity or unenforceability in whole or in part of the lien of the Insured Mortgage that arises out of the transaction evidenced by the Insured Mortgage and is based upon usury or any consumer credit protection or truth-in-lending law.
6. Any claim, by reason of the operation of federal bankruptcy, state insolvency, or similar creditors' rights laws, that the transaction creating the lien of the Insured Mortgage, is: (a) a fraudulent conveyance or fraudulent transfer, or (b) a preferential transfer for any reason not stated in Covered Risk 13(b) of this policy.
7. Any lien on the Title for real estate taxes or assessments imposed by governmental authority and created or attaching between Date of Policy and the date of recording of the Insured Mortgage in the Public Records.
This Exclusion does not modify or limit the coverage provided under Covered Risk 11(b). The above policy form may be issued to afford either Standard Coverage or Extended Coverage. In addition to the above Exclusions from Coverage, the Exceptions from Coverage in a Standard Coverage policy will also include the following Exceptions from Coverage:

EXCEPTIONS FROM COVERAGE

This policy does not insure against loss or damage (and the Company will not pay costs, attorneys' fees or expenses) that arise by reason of:
1. (a) Taxes or assessments that are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; (b) proceedings by a public agency that may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.
2. Any facts, rights, interests, or claims that are not shown in the Public Records but that could be ascertained by an inspection of the Land or that may be asserted by persons in possession of the Land.
3. Easements, liens or encumbrances, or claims thereof, not shown by the Public Records.
4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records.
5. (a) Unpatented mining claims; (b) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (c) water rights, claims or title to water, whether or not the matters excepted under (a), (b), or (c) are shown by the Public Records.
6. Any lien or right to a lien for services, labor or material not shown by the public records.

ALTA OWNER'S POLICY (10-17-92) EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy and the Company will not pay loss or damage, costs, attorneys' fees or expenses which arise by reason of:
1. (a) Any law, ordinance or governmental regulation (including but not limited to building and zoning laws, ordinances, or regulations) restricting, regulating, prohibiting or relating to (i) the occupancy, use, or enjoyment of the land; (ii) the character, dimensions or location of any improvement now or hereafter erected on the land; (iii) a separation in ownership or a change in the dimensions or area of the land or any parcel of which the land is or was a part; or (iv) environmental protection, or the effect of any violation of these laws, ordinances or governmental regulations, except to the extent that a notice of the enforcement thereof or a notice of a defect, lien or encumbrance resulting from a violation or alleged violation affecting the land has been recorded in the public records at Date of Policy. (b) Any governmental police power not excluded by (a) above, except to the extent that a notice of the exercise thereof or a notice of a defect, lien or encumbrance resulting from a violation or alleged violation affecting the land has been recorded in the public records at Date of Policy.
2. Rights of eminent domain unless notice of the exercise thereof has been recorded in the public records at Date of Policy, but not excluding from coverage any taking which has occurred prior to Date of Policy which would be binding on the rights of a purchaser for value without knowledge.
3. Defects, liens, encumbrances, adverse claims or other matters: (a) created, suffered, assumed or agreed to by the insured claimant;(b) not known to the Company, not recorded in the public records at Date of Policy, but known to the insured claimant and not disclosed in writing to the Company by the insured claimant prior to the date the insured claimant became an insured under this policy;(c)resulting in no loss or damage to the insured claimant; (d) attaching or created subsequent to Date of Policy; or(e) resulting in loss or damage which would not have been sustained if the insured claimant had paid value for the estate or interest insured by this policy.
4. Any claim, which arises out of the transaction vesting in the insured the estate or interest insured by this policy, by reason of the operation of federal bankruptcy, state insolvency, or similar creditors' rights laws, that is based on: (i) the transaction creating the estate or interest insured by this policy being deemed a fraudulent conveyance or fraudulent transfer; or (ii) the transaction creating the estate or interest insured by this policy being deemed a preferential transfer except where the preferential transfer results from the failure: (a) to timely record the instrument of transfer; or (b) of such recordation to impart notice to a purchaser for value or a judgement or lien creditor. The above policy form may be issued to afford either Standard Coverage or Extended Coverage. In addition to the above Exclusions from Coverage, the Exceptions from Coverage in a Standard Coverage Policy will also include the following Exceptions from Coverage:

EXCEPTIONS FROM COVERAGE

This policy does not insure against loss or damage (and the Company will not pay costs, attorneys' fees or expenses) which arise by reason of:
1. (a) Taxes or assessments that are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; (b) proceedings by a public agency that may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.
2. Any facts, rights, interests, or claims that are not shown in the Public Records but that could be ascertained by an inspection of the Land or that may be asserted by persons in possession of the Land.
3. Easements, liens or encumbrances, or claims thereof, not shown by the Public Records.
4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records.
5. (a) Unpatented mining claims; (b) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (c) water rights, claims or title to water, whether or not the matters excepted under (a), (b), or (c) are shown by the Public Records.
6. Any lien or right to a lien for services, labor or material not shown by the public records.

2006 ALTA OWNER'S POLICY (06-17-06) EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy, and the Company will not pay loss or damage, costs, attorneys' fees, or expenses that arise by reason of:
1. (a) Any law, ordinance, permit, or governmental regulation (including those relating to building and zoning) restricting, regulating, prohibiting, or relating to (i) the occupancy, use, or enjoyment of the Land; (ii) the character, dimensions, or location of any improvement erected on the Land; (iii) the subdivision of land; or (iv) environmental protection; or the effect of any violation of these laws, ordinances, or governmental regulations. This Exclusion 1(a)does not modify or limit the coverage provided under Covered Risk 5. (b) Any governmental police power. This Exclusion 1(b) does not modify or limit the coverage provided under Covered Risk 6.
2. Rights of eminent domain. This Exclusion does not modify or limit the coverage provided under Covered Risk 7 or 8.
3. Defects, liens, encumbrances, adverse claims, or other matters (a) created, suffered, assumed, or agreed to by the Insured Claimant; (b) not Known to the Company, not recorded in the Public Records at Date of Policy, but Known to the Insured Claimant and not disclosed in writing to the Company by the Insured Claimant prior to the date the Insured Claimant became an Insured under this policy; (c) resulting in no loss or damage to the Insured Claimant; (d) attaching or created subsequent to Date of Policy (however, this does not modify or limit the coverage provided under Covered Risk 9 and 10); or (e) resulting in loss or damage that would not have been sustained if the Insured Claimant had paid value for the Title.
4. Any claim, by reason of the operation of federal bankruptcy, state insolvency, or similar creditors' rights laws, that the transaction vesting the Title as shown in Schedule A, is (a) a fraudulent conveyance or fraudulent transfer; or (b) a preferential transfer for any reason not stated in Covered Risk 9 of this policy.
5. Any lien on the Title for real estate taxes or assessments imposed by governmental authority and created or attaching between Date of Policy and the date of recording of the deed or other instrument of transfer in the Public Records that vests Title as shown in Schedule A. The above policy form may be issued to afford either Standard Coverage or Extended Coverage. In addition to the above Exclusions from Coverage, the Exceptions from Coverage in a Standard Coverage policy will also include the following Exceptions from Coverage:

EXCEPTIONS FROM COVERAGE

This policy does not insure against loss or damage (and the Company will not pay costs, attorneys' fees or expenses) that arise by reason of:
1. (a) Taxes or assessments that are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; (b) proceedings by a public agency that may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.
2. Any facts, rights, interests, or claims that are not shown in the Public Records but that could be ascertained by an inspection of the Land or that may be asserted by persons in possession of the Land.
3. Easements, liens or encumbrances, or claims thereof, not shown by the Public Records.
4. Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records.
5. (a) Unpatented mining claims; (b) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (c) water rights, claims or title to water, whether or not the matters excepted under (a), (b), or (c) are shown by the Public Records.
6. Any lien or right to a lien for services, labor or material not shown by the public records.

ALTA EXPANDED COVERAGE RESIDENTIAL LOAN POLICY (10/13/01)EXCLUSIONS FROM COVERAGE

The following matters are expressly excluded from the coverage of this policy and the Company will not pay loss or damage, costs, attorneys fees or expenses which arise by reason of:
1. (a) Any law, ordinance or governmental regulation (including but not limited to building and zoning laws, ordinances, or regulations) restricting, regulating, prohibiting or relating to (i) the occupancy, use, or enjoyment of the Land; (ii) the character, dimensions or location of any improvement now or hereafter erected on the Land; (iii) a separation in ownership or a change in the dimensions or areas of the Land or any parcel of which the Land is or was a part; or (iv) environmental protection, or the effect of any violation of these laws, ordinances or governmental regulations, except to the extent that s notice of the enforcement thereof or a notice of a defect, lien or encumbrance resulting from a violation or alleged violation affecting the Land has been recorded in the Public Records at Date of Policy. This exclusion does not limit the coverage provided under Covered Risks 12, 13, 14, and 16 of this policy.(b) Any governmental police power not excluded by (a) above, except to the extent that a notice of the exercise thereof or a notice of a defect, lien or encumbrance resulting from a violation or alleged violation affecting the Land has been recorded in the Public Records at Date of Policy. This exclusion does not limit the coverage provided under Covered Risks 12, 13, 14, and 16 of this policy.
2. Rights of eminent domain unless notice of the exercise thereof has been recorded in the Public Records at Date of Policy, but not excluding from coverage any taking which has occurred prior to Date of Policy which would be binding on the rights of a purchaser for value without Knowledge.
3.Defects, liens, encumbrances, adverse claims or other matters:(a) created, suffered, assumed or agreed to by the Insured Claimant; (b) not Known to the Company, not recorded in the Public Records at Date of Policy, but Known to the Insured Claimant and not disclosed in writing to the Company by the Insured Claimant prior to the date the Insured Claimant became an Insured under this policy;(c) resulting In no loss or damage to the Insured Claimant;(d) attaching or created subsequent to Date of Policy (this paragraph does not limit the coverage provided under Covered Risks 8, 16, 18, 19, 20, 21, 22, 23, 24, 25 and 26); or(e)resulting in loss or damage which would not have been sustained if the Insured Claimant had paid value for the Insured Mortgage.
4. Unenforceability of the lien of the Insured Mortgage because of the inability or failure of the Insured at Date of Policy, or the inability or failure of any subsequent owner of the indebtedness, to comply with applicable doing business laws of the state in which the Land is situated.
5. Invalidity or unenforceability of the lien of the Insured Mortgage, or claim thereof, which arises out of the transaction evidenced by the Insured Mortgage and is based upon usury, except as provided in Covered Risk 27, or any consumer credit protection or truth in lending law.
6. Real property taxes or assessments of any governmental authority which become a lien on the Land subsequent to Date of Policy. This exclusion does not limit the coverage provided under Covered Risks 7, 8(e) and 26.
7. Any claim of invalidity, unenforceability or lack of priority of the lien of the Insured Mortgage as to advances or modifications made after the Insured has Knowledge that the vestee shown in Schedule A is no longer the owner of the estate or interest covered by this policy. This exclusion does not limit the coverage provided in Covered Risk 8.
8.Lack of priority of the lien of the Insured Mortgage as to each and every advance made after Date of Policy, and all interest charged thereon, over liens, encumbrances and other matters affecting the title, the existence of which are Known to the Insured at:(a) The time of the advance; or(b) The time a modification is made to the terms of the Insured Mortgage which changes the rate of interest charged, if the rate of Interest is greater as a result of the modification than it would have been before the modification. This exclusion does not limit the coverage provided in Covered Risk 8.
9. The failure of the residential structure, or any portion thereof to have been constructed before, on or after Date of Policy in accordance with applicable building codes. This exclusion does not apply to violations of building codes if notice of the violation appears in the Public Records at Date of Policy.

For large print please view at www.title365.com under menu option Resources.

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 12/05/2013

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Barney & Barney LLC
CA Insurance Lic: 0C03950
101 Enterprise, Suite 330
Aliso Viejo, CA 92656
949-900-1780

CONTACT NAME: Silvia Vela
PHONE (A/C, No, Ext): (949) 544-8481 FAX (A/C, No): (858) 909-9768
E-MAIL ADDRESS: silviav@barneyandbarney.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : Starr Surplus Lines Insurance Company	13604
INSURER B :	
INSURER C :	
INSURER D :	
INSURER E :	
INSURER F :	

INSURED
Experience1, Inc., Title365 Company
5000 Birch St. Ste 300
Newport Beach, CA 92660
Client # 56797

COVERAGES CERTIFICATE NUMBER: MST NUMBER REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
	GENERAL LIABILITY COMMERCIAL GENERAL LIABILITY CLAIMS-MADE / OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY / PRO-JECT / LOC						EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	\$ \$ \$ \$ \$ \$ \$
	AUTOMOBILE LIABILITY ANY AUTO ALL OWNED AUTOS / SCHEDULED AUTOS HIRED AUTOS / NON-OWNED AUTOS						COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	\$ \$ \$ \$ \$
	UMBRELLA LIAB / OCCUR EXCESS LIAB / CLAIMS-MADE DED / RETENTION \$						EACH OCCURRENCE AGGREGATE	\$ \$ \$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A					WC STATU-TORY LIMITS / OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 \$ \$ \$
A	Title Agent/Escrow Agent-Claims-Made Professional Liability/Errors & Omissions			SLSLPRO26233513	10/03/2013	10/03/2014	\$3M Per Claim/\$3M Aggregate \$250K Retention All States except FL /\$10K Retention FL	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Re: General Service Agreement- Professional Liability/Errors & Omissions

See attached for Title Company insured locations
E&O Evidence of Insurance applies to Title Agent/Abstractor/Escrow Agent Only*

CERTIFICATE HOLDER

Title365 Company
5000 Birch St. Ste 300
Newport Beach CA 92660

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE
Silvia Vela

Subject

ACORD 25 (2010/05) The ACORD name and logo are registered marks of ACORD

Insured: Experience1, Inc. Master # 29640 Cert #

Attachment Page

NAMED INSURED:
Experience 1
Title365 Company
Title365, Inc.
Advantage Title, Inc. DBA Advantage Title Agency
Advantage Title, Inc.
XI Exchange, Inc.
XI Labs
X1 Analytics, Inc.
Title365 Company; DBA: Title365
Title365 Company; DBA: Title365 Agency

LOCATIONS:
5000 Birch St. Ste. 300 & 330 Newport CA 92660
5000 Birch St. Ste. 150 Newport CA 92660
2111 Palomar Airport Rd., Ste.130 Carlsbad CA 92011
801 N. Brand Blvd., #320 Glendale CA 91203
801 N. Brand Blvd., #240 Glendale CA 91203
78100 Main St., #209 La Quinta CA 92253
7095 Indiana Ave., Ste. 120, Riverside CA 92506
Rio Vista Tower, 8880 Rio San Diego Dr., #102 San Diego CA 92108
29995 Technology Drive, Ste. 305 Murrieta CA 92590
4195 E. Thousand Oaks Blvd., #107 Westlake Village CA 91362
850 Trafalgar Court, Ste. 105 Maitland FL 32751
2901 N. Dallas Parkway Ste. 130, Plano TX 75093
115 Wild Basin Road Suite 100 Austin TX 78746
306 Laurel Mountain Road #106 Mammoth Lakes CA 93546
5343 N 16th Street #100 Phoenix AZ 85016
4500 S. Lakeshore Dr., #650 Tempe AZ 85282
3303 E. Baseline Road Ste. 106, Gilbert AZ 85234
267 West Mill Street New Braunfels, TX 78130.
2010 FM 2673 Canyon Lake, TX 78133.
300 Sonterra Blvd. Bldg I. Suite 1130 San Antonio, TX 78258
2222 Breezewood, Ste. B San Antonio, TX 78209
375 E. Main Street Ventura, CA 93001
5101 Broadway, San Antonio, TX 78209
7121 W Bell Rd Ste. 100 Glendale, AZ 85308
6136 Frisco Square Blvd Ste. 400 Frisco, TX 75034
9442 Capital of Texas Hwy N Plaza 1 Ste. 500 Austin, TX 78746
7200 N Mopac Suite 170 Austin, TX 78731
400 Rouser Rd Coraopolis, PA 15108
8800 E Chaparral Rd. Suite 100 Scottsdale, AZ 85250

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 12/05/2013

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Barney & Barney LLC
CA Insurance Lic: 0C03950
101 Enterprise, Suite 330
Aliso Viejo, CA 92656
949-900-1780

CONTACT NAME: Silvia Vela
PHONE (A/C, No, Ext): (949) 544-8481 FAX (A/C, No): (858) 909-9768
E-MAIL ADDRESS: silviav@barneyandbarney.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : Underwriters at Lloyd's London	15792
INSURER B :	
INSURER C :	
INSURER D :	
INSURER E :	
INSURER F :	

INSURED
Experience1, Inc., Title365 Company
5000 Birch St. Ste 300
Newport Beach CA 92660
Client # 56797

COVERAGES CERTIFICATE NUMBER: MST NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
	GENERAL LIABILITY COMMERCIAL GENERAL LIABILITY CLAIMS-MADE OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY PRO-JECT LOC						EACH OCCURRENCE $ DAMAGE TO RENTED PREMISES (Ea occurrence) $ MED EXP (Any one person) $ PERSONAL & ADV INJURY $ GENERAL AGGREGATE $ PRODUCTS - COMP/OP AGG $ $
	AUTOMOBILE LIABILITY ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS HIRED AUTOS NON-OWNED AUTOS						COMBINED SINGLE LIMIT (Ea accident) $ BODILY INJURY (Per person) $ BODILY INJURY (Per accident) $ PROPERTY DAMAGE (Per accident) $ $
	UMBRELLA LIAB OCCUR EXCESS LIAB CLAIMS-MADE DED RETENTION $						EACH OCCURRENCE $ AGGREGATE $ $
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N/A					WC STATU-TORY LIMITS OTH-ER E.L. EACH ACCIDENT $ E.L. DISEASE - EA EMPLOYEE $ E.L. DISEASE - POLICY LIMIT $
A	Claims -Made Title/Escrow Agent Fidelity Bond			SUA60735	10/03/2013	10/03/2014	$3M Single Loss Limit/$75K Deductible

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

Re: General Service Agreement -Title/Escrow Agent Fidelity Bond
See attached for Title Company insured locations

Title/Escrow Agent Fidelity Bond certificate applies to Title Company*

CERTIFICATE HOLDER

Title365 Company
5000 Birch St. Ste. 300
Newport Beach, CA 92660

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE
Silvia Vela

Subject

ACORD 25 (2010/05)

Insured: Experience1, Inc. Master # 29640 Cert #

Attachment Page

NAMED INSURED:
Experience 1
Title365 Company
Title365, Inc.
Advantage Title, Inc. DBA Advantage Title Agency
Advantage Title, Inc.
XI Exchange, Inc.
XI Labs
X1 Analytics, Inc.
Title365 Company; DBA: Title365
Title365 Company; DBA: Title365 Agency

LOCATIONS:
5000 Birch St. Ste. 300 & 330 Newport CA 92660
5000 Birch St. Ste. 150 Newport CA 92660
2111 Palomar Airport Rd., Ste.130 Carlsbad CA 92011
801 N. Brand Blvd., #320 Glendale CA 91203
801 N. Brand Blvd., #240 Glendale CA 91203
78100 Main St., #209 La Quinta CA 92253
7095 Indiana Ave., Ste. 120, Riverside CA 92506
Rio Vista Tower, 8880 Rio San Diego Dr., #102 San Diego CA 92108
29995 Technology Drive, Ste. 305 Murrieta CA 92590
4195 E. Thousand Oaks Blvd., #107 Westlake Village CA 91362
850 Trafalgar Court, Ste. 105 Maitland FL 32751
2901 N. Dallas Parkway Ste. 130, Plano TX 75093
115 Wild Basin Road Suite 100 Austin TX 78746
306 Laurel Mountain Road #106 Mammoth Lakes CA 93546
5343 N 16th Street #100 Phoenix AZ 85016
4500 S. Lakeshore Dr., #650 Tempe AZ 85282
3303 E. Baseline Road Ste. 106, Gilbert AZ 85234
267 West Mill Street New Braunfels, TX 78130.
2010 FM 2673 Canyon Lake, TX 78133.
300 Sonterra Blvd. Bldg I. Suite 1130 San Antonio, TX 78258
2222 Breezewood, Ste. B San Antonio, TX 78209
375 E. Main Street Ventura, CA 93001
5101 Broadway, San Antonio, TX 78209
7121 W Bell Rd Ste. 100 Glendale, AZ 85308
6136 Frisco Square Blvd Ste. 400 Frisco, TX 75034
9442 Capital of Texas Hwy N Plaza 1 Ste. 500 Austin, TX 78746
7200 N Mopac Suite 170 Austin, TX 78731
400 Rouser Rd Coraopolis, PA 15108
8800 E Chaparral Rd. Suite 100 Scottsdale, AZ 85250

THIS AFFIDAVIT W HEN COMPLETED IS TO BE SIGNED AND NOTARIZED. BEFORE RETURNING, BE SURE TO COMPLETE ALL THE REQUIRED INFORMATION T O ENABLE THIS COMPANY TO PROPERLY PROCESS THE TRANSACTION PRESENTLY PENDING.

THIS AFFIDAVIT OF NO MORTGAGE OR DEED OF TRUST

____

OWNER OF RECORD TYPE OR PRINT ABOVE

Each for Himself and or Herself, declare: That to my/our personal knowledge there are NO encumbrances in the form of a Mortgage or Deed of Trust against the property in this transaction.

That this declaration is made for the protection of all parties to this transaction, and particularly for the benefit of Title365 Company, which is about to insure the title to said property in reliance thereon, and any other title company which may hereafter insure the title to said property.

That I/W e will testify, declare, depose, or certify before any competent tribunal, officer, or person, in any case now pending or which may hereafter be instituted, to the truth of particular facts hereinabove set forth.

TITLE ORDER: 310-1402202-35
PROPERTY ADDRESS: Apn 473-160-004, Moreno Valley, CA 92555

OWNERS OF RECORD: ____
(Type or Print Above)

______________________________ ______________________________
Owners of Record Signature Owners of Record Signature

State of California
County of ______________________________
On ______________________________ before me,
______________________________ , Notary Public,
personally appeared ______________________________
______________________________ who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they ex ecuted the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.
Witness my hand and official seal.

Signature______________________________ (Seal)

Statement of Information (Confidential)

Note: This form is needed in order to eliminate judgments and liens against people with similar names

The street address of the property in this transaction is: (if none, leave blank)

Address ____________________ City ____________________

Occupied by: o Owner o Tenants o Lessee o Single Residence o Multiple Residence o Commercial o Vacant Land

Any construction/improvements in last 6 months? o Yes o No Is any portion of new loan to be used for improvements? o Yes o No

If yes, state nature of work done or contemplated ____________________

Party 1

First Middle Last

Former last name(s), if any

Birthplace Birth Date

Social Security No. Driver's License No.

I o am single o am married o Have a domestic partner

Name of current spouse or domestic partner (if other than Party 2)

Name of former spouse/domestic partner (if none, write "none")

Party 2

First Middle Last

Former last name(s), if any

Birthplace Birth Date

Social Security No. Driver's License No.

I o am single o am married o Have a domestic partner

Name of current spouse or domestic partner (if other than Party 1)

Name of former spouse/domestic partner (if none, write "none")

Marriage or Domestic Partnership Between Parties 1 and 2

Are Parties 1 & 2: Married?__________ Domestic Partners? __________ Date of Marriage/Domestic Partnership:________________

Party 1 – Occupations for Last 10 Years

Present Occupation Firm Name Address No. of Years

Prior Occupation Firm Name Address No. of Years

Party 1 – Residences for Last 10 Years

Number and Street	City and State	From To

Party 2 – Occupations for Last 10 Years

Present Occupation Firm Name Address No. of Years

Prior Occupation Firm Name Address No. of Years

Party 2 – Residences for Last 10 Years

Number and Street	City and State	From To

Have any of the above parties owned or operated a business? o Yes o No If so, please list names ____________________

I have never been adjudged, bankrupt nor are there any unsatisfied judgments or other matters pending against me which might affect my title to this property, except as follows: ____________________

The undersigned declare under penalty of perjury that the above information is true and correct. (all parties must sign)

Date

Signature

Home Phone Work Phone

Email Address

Signature

Home Phone Work Phone

Email Address

Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

AFFIDAVIT - UNINSURED DEED

NOTE: Must be notarized by a notary who is an EMPLOYEE of the title or escrow company

STATE OF ______________________)
) SS.
COUNTY OF ____________________)

____________________________________ of legal age, being first duly sworn, deposes and says that the following information and answers are true:

17. I am the person who executed and delivered the deed dated ________________________ to ____, grantee, recorded on ________________________ as Instrument No. __________________, Official Records of __________________ County, _____________, conveying title to the following described real property (the "Property"):

2. Who is currently occupying the Property? ____.

3. What is the approximate value of the Property? $_________________________.

4. I received the following consideration for the deed: $_________________ and/or other Property described as follows: ____.

5. If the deed was a gift or I otherwise received no consideration for it, the reason I gave the Property away is: ____.

6. Do you have an option to repurchase the Property? _________. If so, please attach a copy of the agreement or documentation that gives you the right to repurchase.

7. This Affidavit is made for the protection and benefit of the grantee, the grantee's successors and assignsand for all other parties hereafter dealing with or who may acquire an interest in the Property, and for the purpose of inducing ____ ("Title Company") to insure title to the Property. I know that Title Company will rely on this Affidavit and would not insure title without this Affidavit.

Dated: ______________________________ ______________________________

____

Subscribed and sworn to (or affirmed) before me on this _______ day of ___________________, _______, by ____, proved to me on the basis of satisfactory evidence to be the person(s) who appeared before me.

Signature ____________________________ (This area for notary stamp)

BOE-502-A (P1) REV. 12 (05-13)

PRELIMINARY CHANGE OF OWNERSHIP REPORT

To be completed by the transferee (buyer) prior to a transfer of subject property, in accordance with section 480.3 of the Revenue and Taxation Code. A *Preliminary Change of Ownership Report* must be filed with each conveyance in the County Recorder's office for the county where the property is located.

NAME AND MAILING ADDRESS OF BUYER/TRANSFEREE
(Make necessary corrections to the printed name and mailing address)

Global Investment & Development, LLC
Apn 473-160-004
Moreno Valley, CA 92555

ASSESSOR'S PARCEL NUMBER
, 473-160-004-5

SELLER/TRANSFEROR
Ironwood 8 Prop

BUYER'S DAYTIME TELEPHONE NUMBER
( )

BUYER'S EMAIL ADDRESS

STREET ADDRESS OR PHYSICAL LOCATION OF REAL PROPERTY
Apn 473-160-004, Moreno Valley, CA 92555

MAIL PROPERTY TAX INFORMATION TO (NAME)
Global Investment & Development, LLC

ADDRESS	CITY	STATE	ZIP CODE
Apn 473-160-004	Moreno Valley	CA	92555

		MO	DAY	YEAR
¨ YES ¨ NO	This property is intended as my principal residence. If YES, please indicate the date of occupancy or intended occupancy.			

PART 1. TRANSFER INFORMATION *Please complete all statements.*

This section contains possible exclusions from reassessment for certain types of transfers.

YES NO

¨ ¨ A. This transfer is solely between spouses *(addition or removal of a spouse, death of a spouse, divorce settlement, etc.)*.

¨ ¨ B. This transfer is solely between domestic partners currently registered with the California Secretary of State *(addition or removal of a partner, death of a partner, termination settlement, etc.)*.

¨ ¨ *C. This is a transfer: ¨ between parent(s) and child(ren) ¨ from grandparent(s) to grandchild(ren).

¨ ¨ *D. This transfer is the result of a cotenant's death. Date of death ______________

¨ ¨ *E. This transaction is to replace a principal residence by a person 55 years of age or older.
Within the same county? ¨ YES ¨ NO

¨ ¨ *F. This transaction is to replace a principal residence by a person who is severely disabled as defined by Revenue and Taxation Code section 69.5. Within the same county? ¨ YES ¨ NO

¨ ¨ G. This transaction is only a correction of the name(s) of the person(s) holding title to the property *(e.g., a name change upon marriage).*
If YES, please explain: ______________

¨ ¨ H. The recorded document creates, terminates, or reconveys a lender's interest in the property.

¨ ¨ I. This transaction is recorded only as a requirement for financing purposes or to create, terminate, or reconvey a security interest *(e.g., cosigner)*. If YES, please explain: ______________

¨ ¨ J. The recorded document substitutes a trustee of a trust, mortgage, or other similar document.

K. This is a transfer of property:

¨ ¨ 1. to/from a revocable trust that may be revoked by the transferor and is for the benefit of
¨ the transferor, and/or ¨ the transferor's spouse ¨ registered domestic partner.

¨ ¨ 2. to/from a trust that may be revoked by the creator/grantor/trustor who is also a joint tenant, and which names the other joint tenant(s) as beneficiaries when the creator/grantor/trustor dies.

¨ ¨ 3. to/from an irrevocable trust for the benefit of the
¨ creator/grantor/trustor and/or ¨ grantor's/trustor's spouse ¨ grantor's/trustor's registered domestic partner.

¨ ¨ L. This property is subject to a lease with a remaining lease term of 35 years or more including written options.

¨ ¨ M. This is a transfer between parties in which proportional interests of the transferor(s) and transferee(s) in each and every parcel being transferred remain exactly the same after the transfer.

¨ ¨ N. This is a transfer subject to subsidized low-income housing requirements with governmentally imposed restrictions.

¨ ¨ *O. This transfer is to the first purchaser of a new building containing an active solar energy system.

* Please refer to the instructions for Part 1.

Please provide any other information that will help the Assessor understand the nature of the transfer.

THIS DOCUMENT IS NOT SUBJECT TO PUBLIC INSPECTION

Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

BOE-502-A (P2) REV. 12 (05-13)

PART 2. OTHER TRANSFER INFORMATION *Check and complete as applicable.*

A. Date of transfer, if other than recording date: ______________________________

B. Type of transfer:

¨ Purchase ¨ Foreclosure ¨ Gift ¨ Trade or exchange ¨ Merger, stock, or partnership acquisition (Form BOE-100-B)

¨ Contract of sale. Date of contract: ________________ ¨ Inheritance. Date of death: _________________

¨ Sale/leaseback ¨ Creation of a lease ¨ Assignment of a lease ¨ Termination of a lease. Date lease began: _________________

Original term in years *(including written options)*: _______ Remaining term in years *(including written options)*: _______

¨ Other. Please explain: ____

C. Only a partial interest in the property was transferred. ¨ YES ¨ NO If YES, indicate the percentage transferred: __________%

PART 3. PURCHASE PRICE AND TERMS OF SALE *Check and complete as applicable.*

A. Total purchase price. $_______________

B. Cash down payment or value of trade or exchange excluding closing costs Amount $_________________

C. First deed of trust @__________% interest for __________ years. Monthly payment $_______________ Amount $_________________

¨ FHA (____Discount Points) ¨ Cal-Vet ¨ VA (____Discount Points) ¨ Fixed rate ¨ Variable rate

¨ Bank/Savings & Loan/Credit Union ¨ Loan carried by seller

¨ Balloon payment $________________ Due date: ___________________

D. Second deed of trust @__________% interest for __________ years. Monthly payment $_____________ Amount $_________________

¨ Fixed rate ¨ Variable rate ¨ Bank/Savings & Loan/Credit Union ¨ Loan carried by seller

¨ Balloon payment $________________ Due date: ___________________

E. Was an Improvement Bond or other public financing assumed by the buyer? ¨ YES ¨ NO Outstanding balance $_________________

F. Amount, if any, of real estate commission fees paid by the buyer which are not included in the purchase price $_________________

G. The property was purchased: ¨ Through real estate broker. Broker name: ____________________ Phone number: (   )____________

¨ Direct from seller ¨ From a family member-Relationship ______________________

¨ Other. Please explain: ____

H. Please explain any special terms, seller concessions, broker/agent fees waived, financing, and any other information (e.g., buyer assumed the existing loan balance) that would assist the Assessor in the valuation of your property.

____

PART 4. PROPERTY INFORMATION *Check and complete as applicable.*

A. Type of property transferred

¨ Single-family residence ¨ Co-op/Own-your-own ¨ Manufactured home

¨ Multiple-family residence. Number of units: _____ ¨ Condominium ¨ Unimproved lot

¨ Other. Description: (i.e., timber, mineral, water rights, etc.) ¨ Timeshare ¨ Commercial/Industrial

____

B. ¨ YES ¨ NO Personal/business property, or incentives, provided by seller to buyer are included in the purchase price. Examples of personal property are furniture, farm equipment, machinery, etc. Examples of incentives are club memberships, etc. Attach list if available.

If YES, enter the value of the personal/business property: $___________________ Incentives $_____________________

C. ¨ YES ¨ NO A manufactured home is included in the purchase price.

If YES, enter the value attributed to the manufactured home: $___________________

¨ YES ¨ NO The manufactured home is subject to local property tax. If NO, enter decal number: ___________________

D. ¨ YES ¨ NO The property produces rental or other income.

If YES, the income is from: ¨ Lease/rent ¨ Contract ¨ Mineral rights ¨ Other: ____________________________________

E. The condition of the property at the time of sale was: ¨ Good ¨ Average ¨ Fair ¨ Poor

Please describe: ____

CERTIFICATION

I certify (or declare) that the foregoing and all information hereon, including any accompanying statements or documents, is true and correct to the best of my knowledge and belief.

SIGNATURE OF BUYER/TRANSFEREE OR CORPORATE OFFICER	DATE	TELEPHONE
▶		( )
NAME OF BUYER/TRANSFEREE/LEGAL REPRESENTATIVE/CORPORATE OFFICER (PLEASE PRINT)	TITLE	E-MAIL ADDRESS

The Assessor's office may contact you for additional information regarding this transaction.

LARRY W. WARD
COUNTY OF RIVERSIDE
ASSESSOR-COUNTY CLERK-RECORDER

Recorder
P.O. Box 751
Riverside, CA 92502-0751
(951) 486-7000

Website: www.riversideacr.com

DOCUMENTARY TRANSFER TAX AFFIDAVIT

WARNING

ANY PERSON WHO MAKES ANY MATERIAL MISREPRESENTATION OF FACT FOR THE PURPOSE OF AVOIDING ALL OR ANY PART OF THE DOCUMENTARY TRANSFER TAX IS GUILTY OF A MISDEMEANOR UNDER SECTION 5 OF ORDINANCE 516 OF THE COUNTY OF RIVERSIDE AND IS SUBJECT TO PROSECUTION FOR SUCH OFFENSE.

ASSESSOR'S PARCEL NO. _____--_____--_____
Property Address: ____________________________

I declare that the documentary transfer tax for this transaction is: $_______________.

If this transaction is exempt from Documentary Transfer Tax, the reason must be identified below.

I CLAIM THAT THIS TRANSACTION IS EXEMPT FROM DOCUMENTARY TRANSFER TAX BECAUSE: (The Sections listed below are taken from the Revenue and Taxation Code. Please check one or explain in "Other".)

1. ___ Section 11911. The document is a lease for a term of **less** than thirty-five (35) years (including options).
2. ___ Section 11911. The easement is **not** perpetual, permanent, or for life.
3. ___ Section 11921. The instrument was given to secure a debt.
4. ___ Section 11922. The conveyance is to a governmental entity or political subdivision.
5. ___ Section 11925. The transfer is between individuals and a legal entity, or between legal entities, and does not change the proportional interests held.
6. ___ Section 11926. The instrument is from a trustor to a beneficiary, in lieu of foreclosure, and no additional consideration was paid.
7. ___ Section 11926. The grantee is the foreclosing beneficiary and the consideration paid by the foreclosing beneficiary does not exceed the unpaid debt.
8. ___ Section 11927. The conveyance relates to a dissolution of marriage or legal separation.
9. ___ Section 11930. The conveyance is an *inter vivos* gift* or a transfer by death.
   ***Please be aware that information stated on this document may be given to and used by governmental agencies, including the Internal Reveue Service. Also, certain gifts in excess of the annual Federal gift tax exemption may trigger a Federal Gift Tax. In such cases, the Transferor (donor/grantor) may be required to file Form 709 (Federal Gift Tax Return) with the Internal Revenue Service.**
10. ___ Section 11930. The conveyance is to the grantor's revocable living trust.
11. ___ Other) Include explanation and authority) ____
    ____
    ____

I DECLARE UNDER PENALTY OF PERJURY THAT THE FOREGOING IS TRUE AND CORRECT.

Executed this ____ day of ______________________, 20___ at ____
City State

____
Signature of Affiant

____
Printed Name of Affiant

____
Name of Firm (if applicable)

____
Address of Affiant

____
Telephone Number of Affiant (including area code)

This form is subject to the California Public Records Act (Government Code 6250 et. seq.)

For Recorder's Use:

Affix PCOR Label Here

ACR 521P-AS4EX0 (Rev. 11/2010)

Available in Alternative Formats

Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

APPENDIX C
HISTORICAL AERIAL PHOTOGRAPHS/TOPOGRAPHIC MAPS/
SANBORN MAP REPORT

NW IRONWOOD AVE and OLIVER ST
NW IRONWOOD AVE and OLIVER ST
Moreno Valley, CA 92555

Inquiry Number: 4092958.9
October 06, 2014

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th Floor
Shelton, Connecticut 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

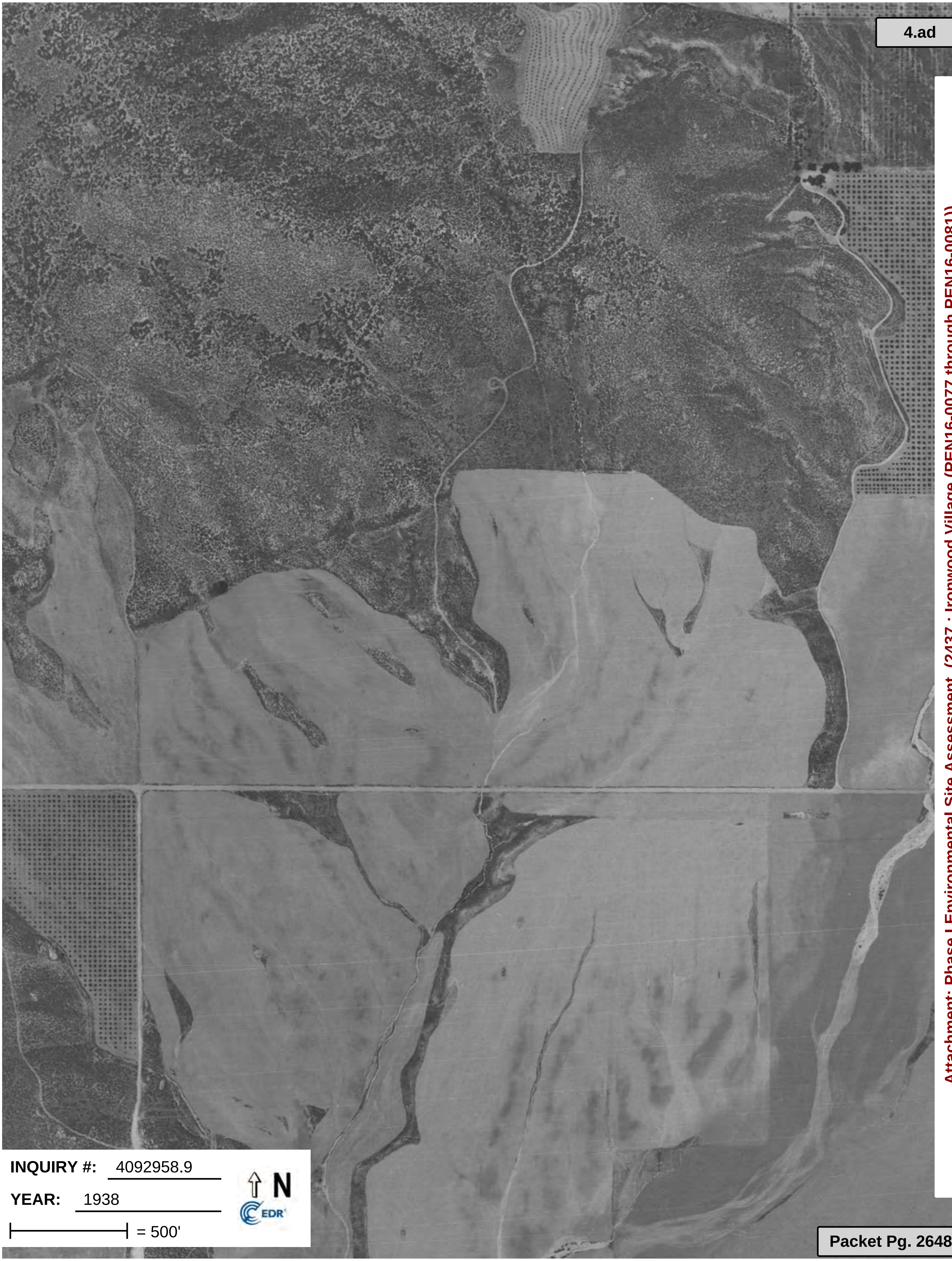
Date EDR Searched Historical Sources:

Aerial Photography October 06, 2014

Target Property:

NW IRONWOOD AVE and OLIVER ST
Moreno Valley, CA 92555

Year	***Scale***	***Details***	***Source***
1938	Aerial Photograph. Scale: 1"=500'	Flight Year: 1938	USGS
1953	Aerial Photograph. Scale: 1"=500'	Flight Year: 1953	Pacific Air
1966	Aerial Photograph. Scale: 1"=500'	Flight Year: 1966	USGS
1975	Aerial Photograph. Scale: 1"=500'	Flight Year: 1975	USGS
1985	Aerial Photograph. Scale: 1"=500'	Flight Year: 1985	USGS
1989	Aerial Photograph. Scale: 1"=500'	Flight Year: 1989	USGS
1994	Aerial Photograph. Scale: 1"=500'	Flight Year: 1994	USGS
2002	Aerial Photograph. Scale: 1"=500'	/DOQQ - acquisition dates: 2002	USGS/DOQQ
2005	Aerial Photograph. Scale: 1"=500'	Flight Year: 2005	USDA/NAIP
2006	Aerial Photograph. Scale: 1"=500'	Flight Year: 2006	USDA/NAIP
2009	Aerial Photograph. Scale: 1"=500'	Flight Year: 2009	USDA/NAIP
2010	Aerial Photograph. Scale: 1"=500'	Flight Year: 2010	USDA/NAIP
2012	Aerial Photograph. Scale: 1"=500'	Flight Year: 2012	USDA/NAIP


INQUIRY #: 4092958.9
YEAR: 1938
= 500'
N
EDR


INQUIRY #: 4092958.9
YEAR: 1953
= 500'
N
EDR

INQUIRY #: 4092958.9

YEAR: 1966

= 500'

N


INQUIRY #: 4092958.9
YEAR: 1975
= 500'
N
EDR

INQUIRY #: 4092958.9

YEAR: 1985

= 500'

N

EDR

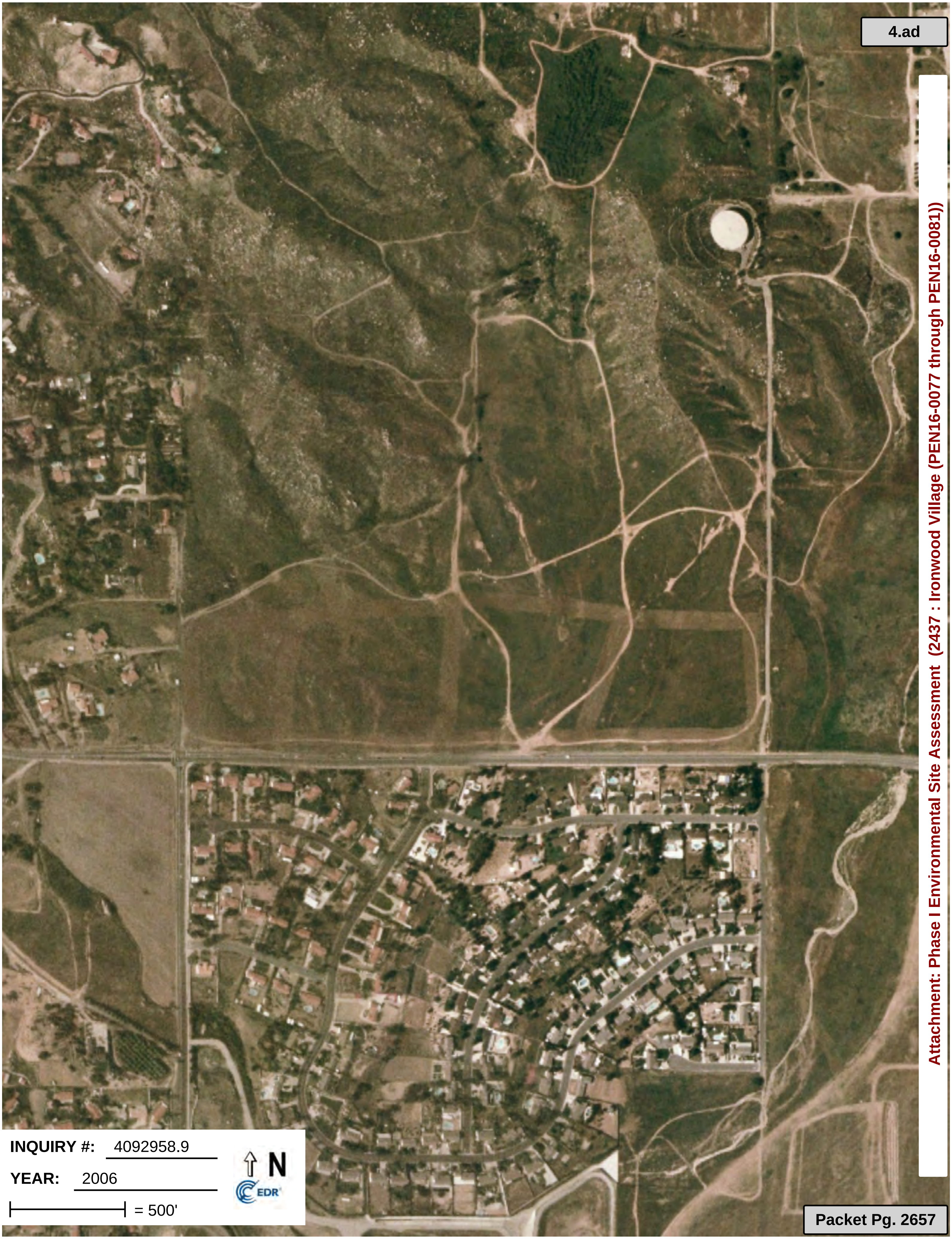
Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))


INQUIRY #: 4092958.9
YEAR: 1989
= 500'
N
EDR

Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))


INQUIRY #: 4092958.9
YEAR: 2005
= 500'
N
EDR


INQUIRY #: 4092958.9
YEAR: 2006
= 500'
N
EDR


INQUIRY #: 4092958.9
YEAR: 2009
N
EDR
= 500'


INQUIRY #: 4092958.9
YEAR: 2010
= 500'
N
EDR


INQUIRY #: 4092958.9
YEAR: 2012
= 500'
N
EDR

NW IRONWOOD AVE and OLIVER ST

NW IRONWOOD AVE and OLIVER ST
Moreno Valley, CA 92555

Inquiry Number: 4092958.4
October 01, 2014

EDR Historical Topographic Map Report

6 Armstrong Road, 4th Floo
Shelton, Connecticut 0648
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topographic Map Report

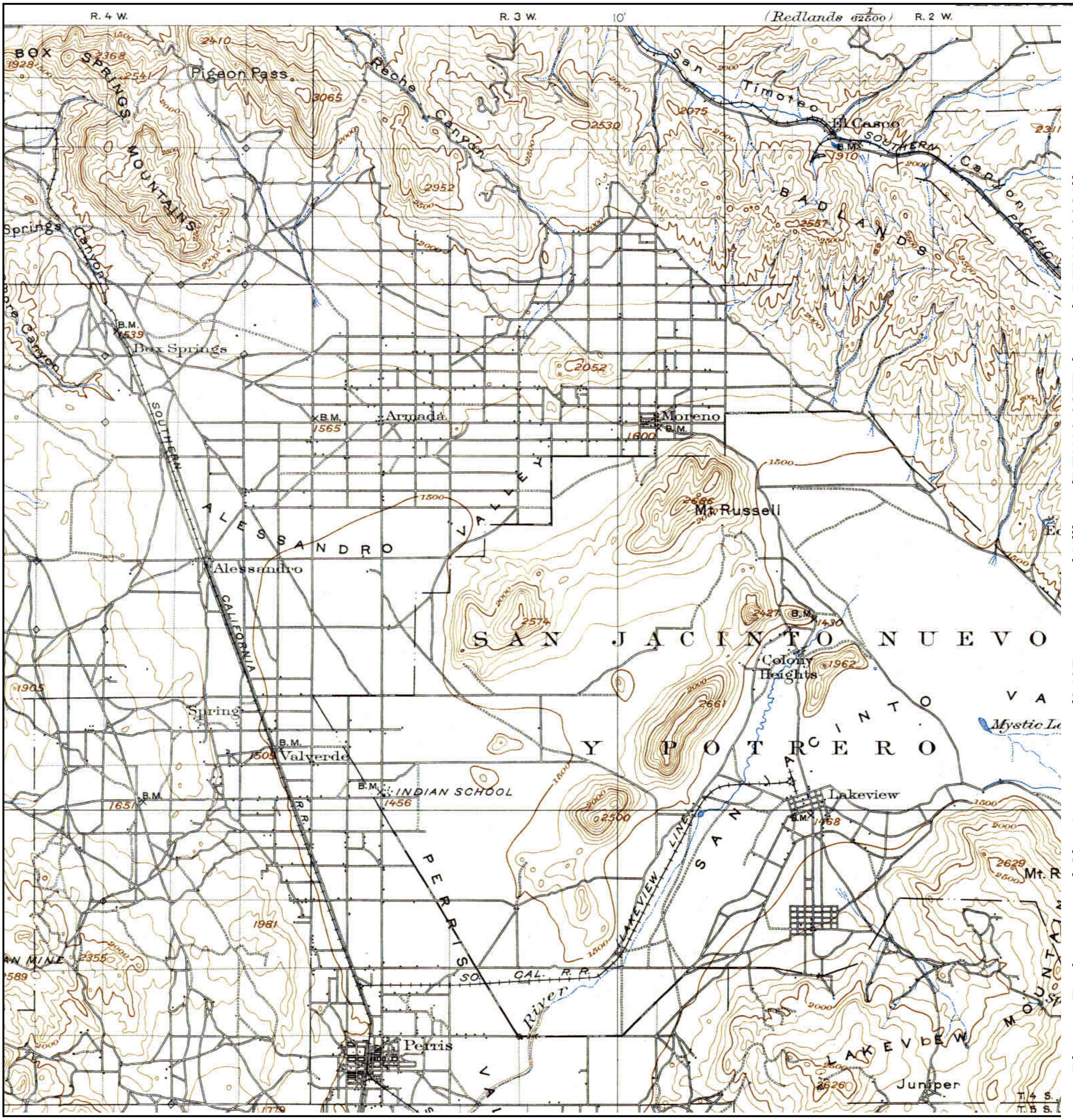
Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Disclaimer - Copyright and Trademark Notice

This Report contains certain information obtained from a variety of public and other sources reasonably available to Environmental Data Resources, Inc. It cannot be concluded from this Report that coverage information for the target and surrounding properties does not exist from other sources. **NO WARRANTY EXPRESSED OR IMPLIED, IS MADE WHATSOEVER IN CONNECTION WITH THIS REPORT. ENVIRONMENTAL DATA RESOURCES, INC. SPECIFICALLY DISCLAIMS THE MAKING OF ANY SUCH WARRANTIES, INCLUDING WITHOUT LIMITATION, MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE OR PURPOSE. ALL RISK IS ASSUMED BY THE USER. IN NO EVENT SHALL ENVIRONMENTAL DATA RESOURCES, INC. BE LIABLE TO ANYONE, WHETHER ARISING OUT OF ERRORS OR OMISSIONS, NEGLIGENCE, ACCIDENT OR ANY OTHER CAUSE, FOR ANY LOSS OF DAMAGE, INCLUDING, WITHOUT LIMITATION, SPECIAL, INCIDENTAL, CONSEQUENTIAL, OR EXEMPLARY DAMAGES. ANY LIABILITY ON THE PART OF ENVIRONMENTAL DATA RESOURCES, INC. IS STRICTLY LIMITED TO A REFUND OF THE AMOUNT PAID FOR THIS REPORT.** Purchaser accepts this Report AS IS. Any analyses, estimates, ratings, environmental risk levels or risk codes provided in this Report are provided for illustrative purposes only, and are not intended to provide, nor should they be interpreted as providing any facts regarding, or prediction or forecast of, any environmental risk for any property. Only a Phase I Environmental Site Assessment performed by an environmental professional can provide information regarding the environmental risk for any property. Additionally, the information provided in this Report is not to be construed as legal advice.

Historical Topographic Map



N

TARGET QUAD
NAME: ELSINORE
MAP YEAR: 1901

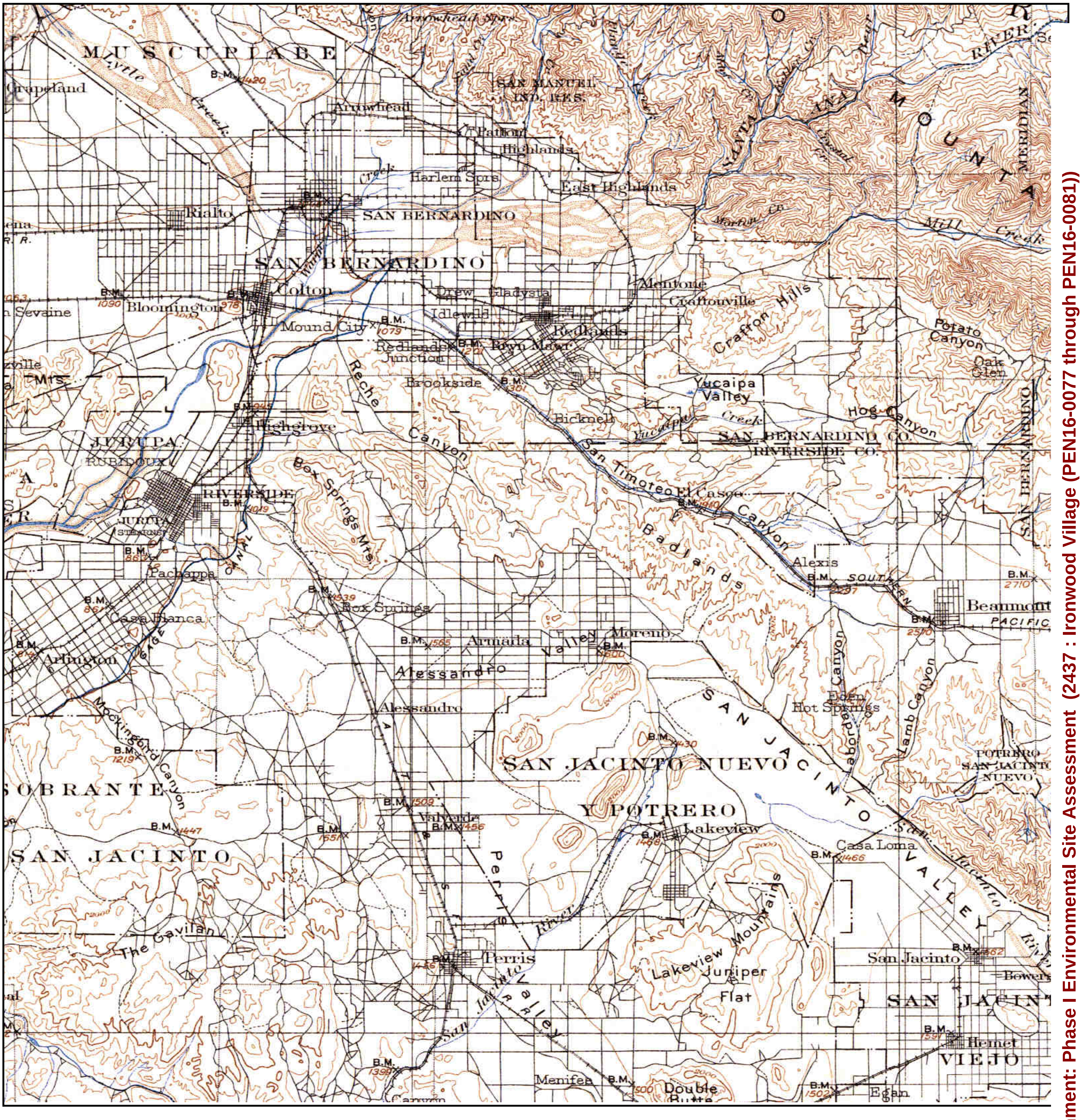
SERIES: 30
SCALE: 1:125000

SITE NAME: NW IRONWOOD AVE and OLIVER ST
ADDRESS: NW IRONWOOD AVE and OLIVER ST
Moreno Valley, CA 92555
LAT/LONG: 33.9483 / -117.187

CLIENT: EEI, Inc.
CONTACT: Polly Ivers
INQUIRY#: 4092958.4
RESEARCH DATE: 10/01/2014

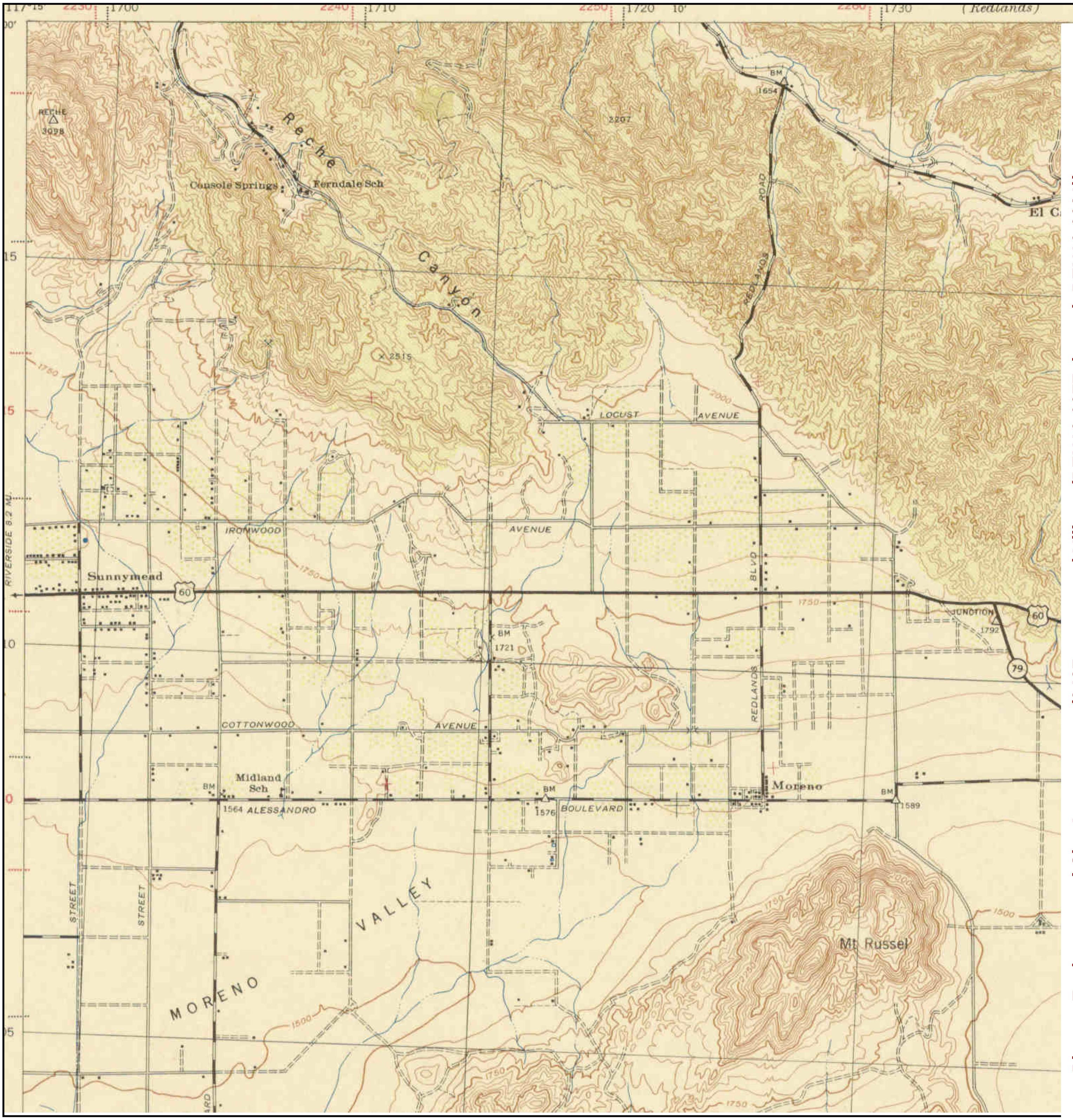
Historical Topographic Map

4.ad



N	TARGET QUAD		SITE NAME:	NW IRONWOOD AVE and OLIVER ST	CLIENT: EEI, Inc.
	NAME:	SOUTHERN CA SHEET 1	ADDRESS:	NW IRONWOOD AVE and OLIVER ST	CONTACT: Polly Ivers
	MAP YEAR:	1901		Moreno Valley, CA 92555	INQUIRY#: 4092958.4
			LAT/LONG:	33.9483 / -117.187	RESEARCH DATE: 10/01/2014
	SERIES:	60			
	SCALE:	1:250000			

Historical Topographic Map



TARGET QUAD NAME: PERRIS MAP YEAR: 1943 SERIES: 15 SCALE: 1:62500	SITE NAME: NW IRONWOOD AVE and OLIVER ST ADDRESS: NW IRONWOOD AVE and OLIVER ST Moreno Valley, CA 92555 LAT/LONG: 33.9483 / -117.187	CLIENT: EEI, Inc. CONTACT: Polly Ivers INQUIRY#: 4092958.4 RESEARCH DATE: 10/01/2014

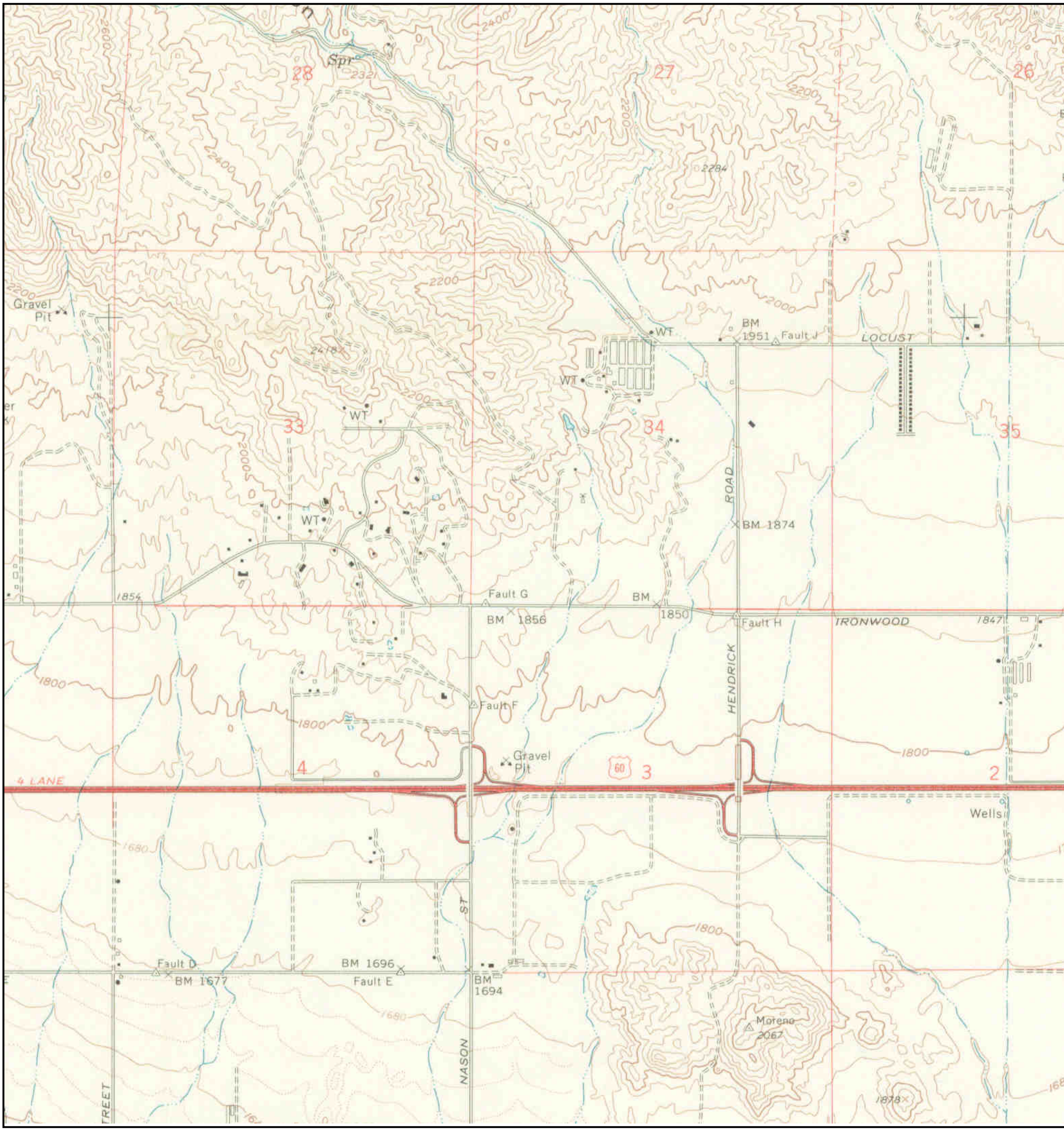
N

Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Historical Topographic Map

N	TARGET QUAD NAME: SUNNYMEAD MAP YEAR: 1953 SERIES: 7.5 SCALE: 1:24000	SITE NAME: NW IRONWOOD AVE and OLIVER ST ADDRESS: NW IRONWOOD AVE and OLIVER ST Moreno Valley, CA 92555 LAT/LONG: 33.9483 / -117.187	CLIENT: EEI, Inc. CONTACT: Polly Ivers INQUIRY#: 4092958.4 RESEARCH DATE: 10/01/2014

Historical Topographic Map



N

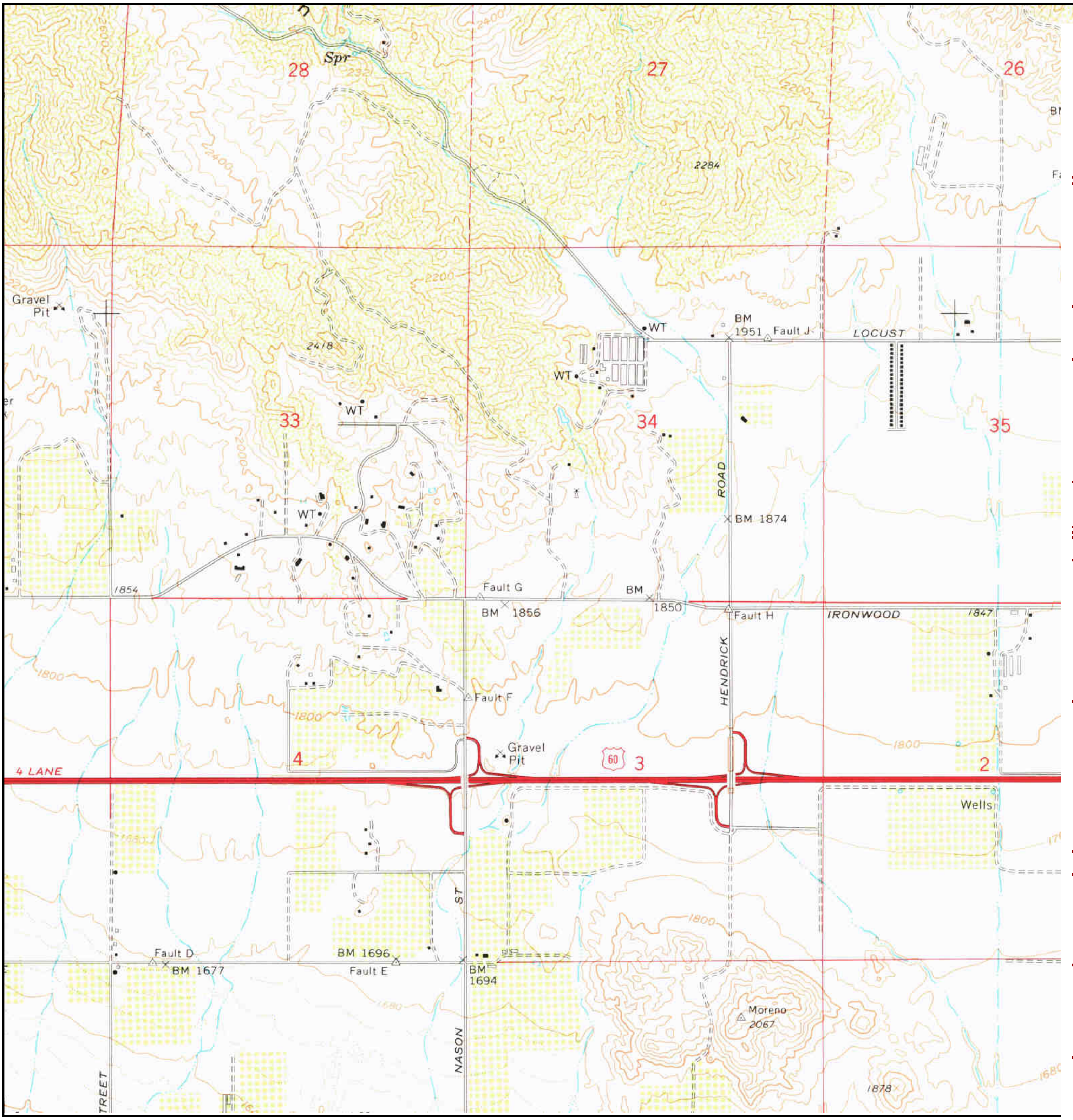
TARGET QUAD
NAME: SUNNYMEAD
MAP YEAR: 1967

SERIES: 7.5
SCALE: 1:24000

SITE NAME: NW IRONWOOD AVE and OLIVER ST
ADDRESS: NW IRONWOOD AVE and OLIVER ST
Moreno Valley, CA 92555
LAT/LONG: 33.9483 / -117.187

CLIENT: EEI, Inc.
CONTACT: Polly Ivers
INQUIRY#: 4092958.4
RESEARCH DATE: 10/01/2014

Historical Topographic Map

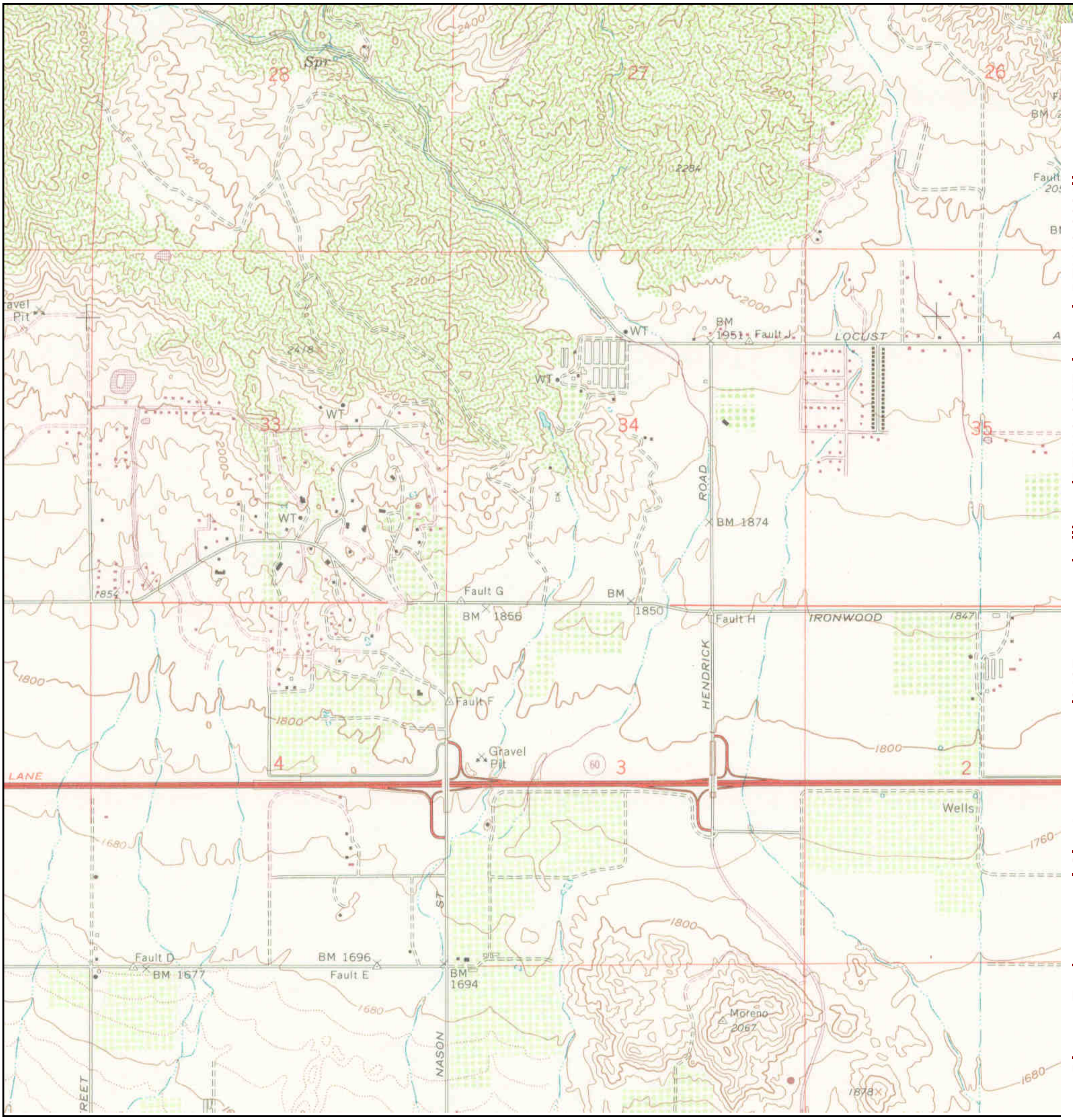


N	TARGET QUAD NAME: SUNNYMEAD MAP YEAR: 1973 PHOTOINSPECTED FROM : 1967 SERIES: 7.5 SCALE: 1:24000	SITE NAME: NW IRONWOOD AVE and OLIVER ST ADDRESS: NW IRONWOOD AVE and OLIVER ST Moreno Valley, CA 92555 LAT/LONG: 33.9483 / -117.187	CLIENT: EEI, Inc. CONTACT: Polly Ivers INQUIRY#: 4092958.4 RESEARCH DATE: 10/01/2014

Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Historical Topographic Map

4.ad



Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

N

TARGET QUAD
NAME: SUNNYMEAD
MAP YEAR: 1980
PHOTOREVISED FROM :1967
SERIES: 7.5
SCALE: 1:24000

SITE NAME: NW IRONWOOD AVE and OLIVER ST
ADDRESS: NW IRONWOOD AVE and OLIVER ST
Moreno Valley, CA 92555
LAT/LONG: 33.9483 / -117.187

CLIENT: EEI, Inc.
CONTACT: Polly Ivers
INQUIRY#: 4092958.4
RESEARCH DATE: 10/01/2014

NW IRONWOOD AVE and OLIVER ST

NW IRONWOOD AVE and OLIVER ST
Moreno Valley, CA 92555

Inquiry Number: 4092958.3
October 01, 2014

Certified Sanborn® Map Report

6 Armstrong Road, 4th Floo
Shelton, Connecticut 0648
Toll Free: 800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

10/01/14

Site Name:	Client Name:
NW IRONWOOD AVE and NW IRONWOOD AVE and Moreno Valley, CA 92555	EEI, Inc. 2195 Faraday Ave, Suite K CARLSBAD, CA 92008
EDR Inquiry # 4092958.3	Contact: Polly Ivers

The Sanborn Library has been searched by EDR and maps covering the target property location as provided by EEI, Inc. were identified for the years listed below. The Sanborn Library is the largest, most complete collection of fire insurance maps. The collection includes maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow, and others. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by the Sanborn Library LLC, the copyright holder for the collection. Results can be authenticated by visiting www.edrnet.com/sanborn.

The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

Certified Sanborn Results:

Site Name: NW IRONWOOD AVE and OLIVER ST
Address: NW IRONWOOD AVE and OLIVER ST
City, State, Zip: Moreno Valley, CA 92555
Cross Street:
P.O. # GLO-71982.1
Project: GLO-71982.1
Certification # 4F27-4246-B3EC

Sanborn® Library search results
Certification # 4F27-4246-B3EC

The Sanborn Library includes more than 1.2 million fire insurance maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow and others which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ✔ Library of Congress
- ✔ University Publications of America
- ✔ EDR Private Collection

The Sanborn Library LLC Since 1866™

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

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APPENDIX D
ENVIRONMENTAL RECORDS SEARCH

NW IRONWOOD AVE and OLIVER ST
NW IRONWOOD AVE and OLIVER ST
Moreno Valley, CA 92555

Inquiry Number: 4092958.2s
October 01, 2014

EDR Summary Radius Map Report

Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

EDR® Environmental Data Resources Inc

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

FORM-NULL-PVC

TABLE OF CONTENTS

SECTION **PAGE**

GEOCHECK ADDENDUM

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

NW IRONWOOD AVE AND OLIVER ST
MORENO VALLEY, CA 92555

COORDINATES

Latitude (North):	33.9483000 - 33˚ 56' 53.88''
Longitude (West):	117.1870000 - 117˚ 11' 13.20''
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	482720.1
UTM Y (Meters):	3756245.0
Elevation:	1865 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property:	TP
Source:	USGS 7.5 min quad index

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20120519
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
NW IRONWOOD AVE AND OLIVER ST
MORENO VALLEY, CA 92555

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft DIRECT
A1	RIV CO., WASTE MGMT,	31125 IRONWOOD AVE	EMI, WMUDS/SWAT, WDS	Higher	1807, W
A2	BADLANDS SANITARY LA	31125 IRONWOOD AVENU	SWF/LF, NPDES, LDS, ENF, Financial Assurance	Higher	1807, W

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: A review of the SWF/LF list, as provided by EDR, and dated 05/19/2014 has revealed that there is 1 SWF/LF site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
BADLANDS SANITARY LA	***31125 IRONWOOD AVENU***	***W 1/4 - 1/2 (0.342 mi.)***	***A2***	***8***

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Landfill / Solid Waste Disposal Sites

WMUDS/SWAT: A review of the WMUDS/SWAT list, as provided by EDR, and dated 04/01/2000 has revealed that there is 1 WMUDS/SWAT site within approximately 0.5 miles of the target property.

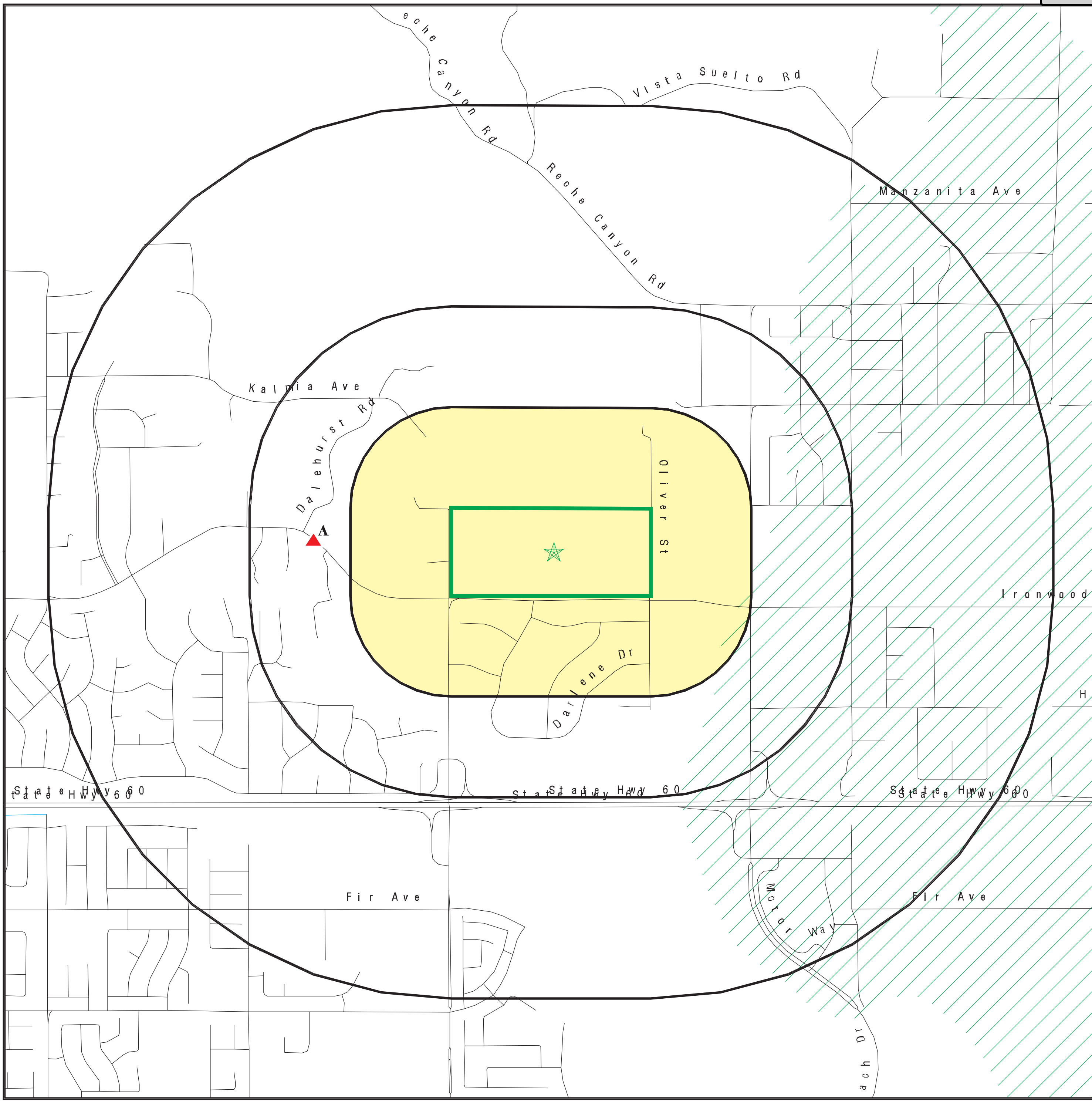
Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
RIV CO., WASTE MGMT,	***31125 IRONWOOD AVE***	***W 1/4 - 1/2 (0.342 mi.)***	***A1***	***8***

Count: 13 records.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
CITY OF REDLANDS	1015730681	REDLANDS SMUDGE POT TANKS SITE	100 FEET WEST OF REDLANDS BLVD	92373	CERCLIS
MORENO VALLEY	S103442684	LANDFILLSAN TIMOTEO BADLANDS	31125 IRONWOOD AVE	0	WMUDS/SWAT, WDS
MORENO VALLEY	S116498059	SINCLAIR ST AND ALESSANDRO BLVD	SINCLAIR STREET AND ALESSANDRO	92555	NPDES
NILAND	1002850076	CHOCOLATE MOUNTAIN AERIAL GUNNERY	3 MILES EAST OF THE TOWN OF NI	92557	CERC-NFRAP
REDLANDS	1003877956	CHURCH ST. LANDFILL	CHURCH ST. (AT THE SANTA ANA R	92373	CERC-NFRAP
REDLANDS	S106927976	JORCO CHEMICAL COMPANY	32185 E HIGHWAY 10	92373	SWEEPS UST
REDLANDS	1003877955	UNIVERSAL RUNDEL	OPAL AVE-300 FT. N OF SAN BERN	92373	CERC-NFRAP
REDLANDS	S110168937	AT&T MOBILITY-LEGACY/ORANGE #50916	31107 OUTER HWY S	92373	San Bern. Co. Permit
REDLANDS	1003878710	CITY OF REDLANDS WELL FIELD	PENNSYLVANIA AVE	92373	CERC-NFRAP
REDLANDS	1003879085	REDLANDS FARMING CO	SAN BERNARDINO AVE E OF TEXAS	92373	CERC-NFRAP
REDLANDS	S105025717	SO CAL GAS/REDLANDS (STAT	STATE ST AT REDLANDS BLVD	92373	HIST CORTESE
REDLANDS	1010726831	SO CAL GAS/REDLANDS I (STATE ST.)	STATE STREET AT REDLANDS BL.	92373	FINDS
UNINCORPORATED COUN	1015740065	FINAL DESTINATION TRANSPORTATION S	HWY 60 E OF GILMAN SPRING RD	92555	RCRA NonGen / NLR

OVERVIEW MAP - 4092958.2S

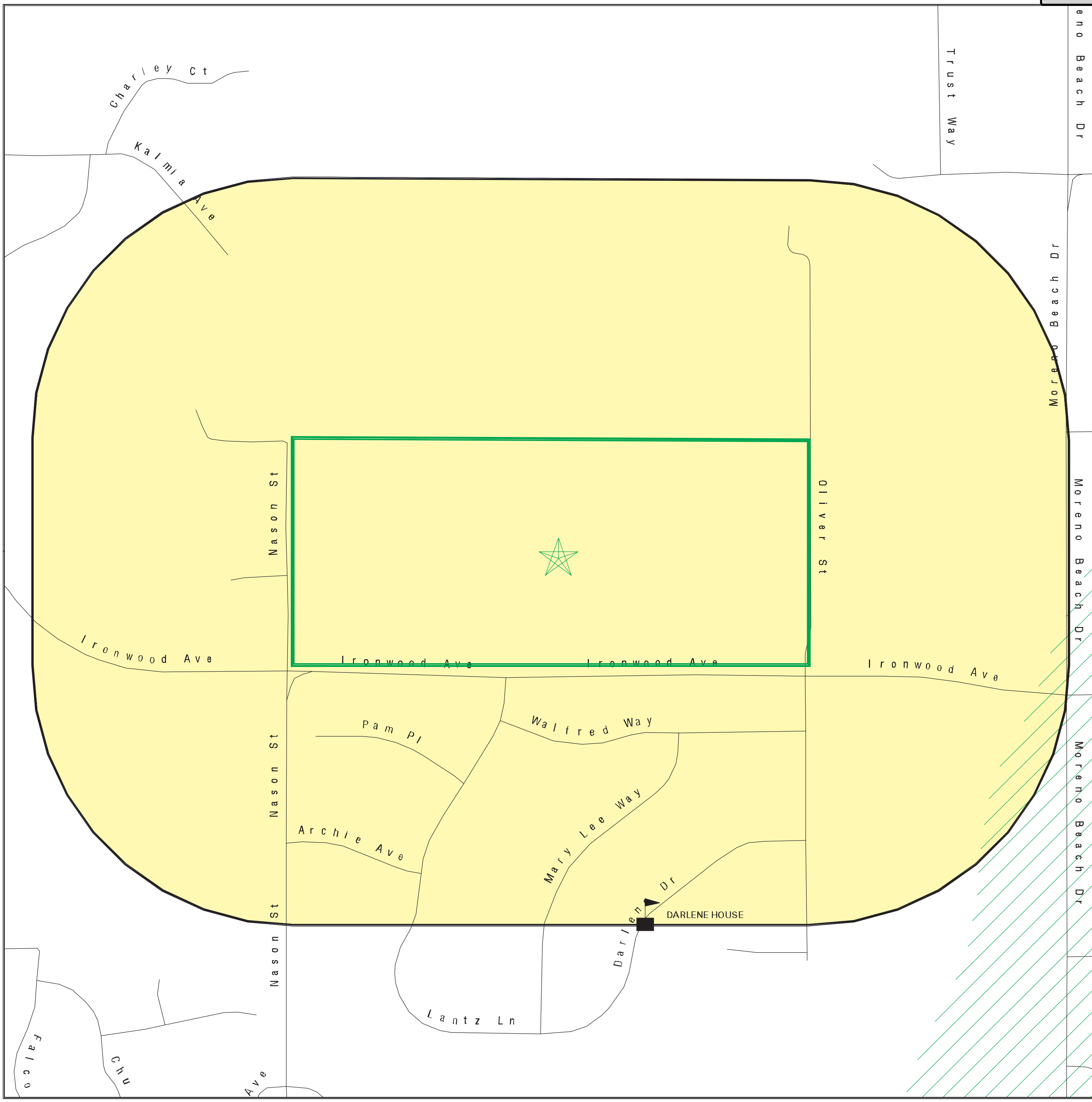


- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- Areas of Concern

This report includes Interactive Map Layers display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: NW IRONWOOD AVE and OLIVER ST ADDRESS: NW IRONWOOD AVE and OLIVER ST Moreno Valley CA 92555 LAT/LONG: 33.9483 / 117.187	CLIENT: EEI, Inc. CONTACT: Polly Ivers INQUIRY #: 4092958.2s DATE: October 01, 2014 3:41 pm

DETAIL MAP - 4092958.2S



0 1/8 1/4 1/2 Miles

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- Areas of Concern

This report includes Interactive Map Layers display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: NW IRONWOOD AVE and OLIVER ST	CLIENT: EEI, Inc.
ADDRESS: NW IRONWOOD AVE and OLIVER ST	CONTACT: Polly Ivers
Moreno Valley CA 92555	INQUIRY #: 4092958.2s
LAT/LONG: 33.9483 / 117.187	DATE: October 01, 2014 3:42 pm

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	TP		NR	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
CERCLIS	0.500		0	0	0	NR	NR	0
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-CESQG	0.250		0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
LUCIS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
RESPONSE	1.000		0	0	0	0	NR	0
State- and tribal - equivalent CERCLIS								
ENVIROSTOR	1.000		0	0	0	0	NR	0
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	1	NR	NR	1
State and tribal leaking storage tank lists								
LUST	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
SLIC	0.500		0	0	0	NR	NR	0
INDIAN LUST	0.500		0	0	0	NR	NR	0
State and tribal registered storage tank lists								
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
FEMA UST	0.250		0	0	NR	NR	NR	0
State and tribal voluntary cleanup sites								
VCP	0.500		0	0	0	NR	NR	0
INDIAN VCP	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
SWRCY	0.500		0	0	0	NR	NR	0
HAULERS	TP		NR	NR	NR	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
WMUDS/SWAT	0.500		0	0	1	NR	NR	1
Local Lists of Hazardous waste / Contaminated Sites								
US CDL	TP		NR	NR	NR	NR	NR	0
HIST Cal-Sites	1.000		0	0	0	0	NR	0
SCH	0.250		0	0	NR	NR	NR	0
Toxic Pits	1.000		0	0	0	0	NR	0
CDL	TP		NR	NR	NR	NR	NR	0
US HIST CDL	TP		NR	NR	NR	NR	NR	0
Local Lists of Registered Storage Tanks								
CA FID UST	0.250		0	0	NR	NR	NR	0
HIST UST	0.250		0	0	NR	NR	NR	0
SWEEPS UST	0.250		0	0	NR	NR	NR	0
Local Land Records								
LIENS 2	TP		NR	NR	NR	NR	NR	0
LIENS	TP		NR	NR	NR	NR	NR	0
DEED	0.500		0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
CHMIRS	TP		NR	NR	NR	NR	NR	0
LDS	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
MCS	TP		NR	NR	NR	NR	NR	0
SPILLS 90	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	0	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
DOD	1.000		0	0	0	0	NR	0
FUDS	1.000		0	0	0	0	NR	0
CONSENT	1.000		0	0	0	0	NR	0
ROD	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
CA BOND EXP. PLAN	1.000		0	0	0	0	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
Cortese	0.500		0	0	0	NR	NR	0
HIST CORTESE	0.500		0	0	0	NR	NR	0
CUPA Listings	0.250		0	0	NR	NR	NR	0
Notify 65	1.000		0	0	0	0	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
WIP	0.250		0	0	NR	NR	NR	0
ENF	TP		NR	NR	NR	NR	NR	0
HAZNET	TP		NR	NR	NR	NR	NR	0
EMI	TP		NR	NR	NR	NR	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
WDS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
Financial Assurance	TP		NR	NR	NR	NR	NR	0
MWMP	0.250		0	0	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
HWT	0.250		0	0	NR	NR	NR	0
HWP	1.000		0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
PROC	0.500		0	0	0	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR US Hist Auto Stat	0.250		0	0	NR	NR	NR	0
EDR US Hist Cleaners	0.250		0	0	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA LF	TP		NR	NR	NR	NR	NR	0
RGA LUST	TP		NR	NR	NR	NR	NR	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

MAP FINDINGS

Map ID / Direction / Distance / Elevation	Site	Database(s)	EDR ID Number / EPA ID Number
A1	**RIV CO., WASTE MGMT, BADLANDS LANDFILL**	**EMI**	**S103442685**
West	**31125 IRONWOOD AVE**	**WMUDS/SWAT**	**N/A**
1/4-1/2	**MORENO VALLEY, CA 92127**	**WDS**	
0.342 mi.			
1807 ft.			
Relative: Higher			

Click here for full text details

EMI
Facility Id: 6979

WDS
Facility Status: Active - Any facility with a continuous or seasonal discharge that is under Waste Discharge Requirements.
Facility Id: 8 33I000634

Map ID / Direction / Distance / Elevation	Site	Database(s)	EDR ID Number / EPA ID Number
A2	**BADLANDS SANITARY LANDFILL**	**SWF/LF**	**S109286294**
West	**31125 IRONWOOD AVENUE**	**NPDES**	**N/A**
1/4-1/2	**MORENO VALLEY, CA 92388**	**LDS**	
0.342 mi.		**ENF**	
1807 ft.		**Financial Assurance**	
Relative: Higher			

Click here for full text details

SWF/LF
Facility ID: 33-AA-0006
Operator Status: Active
Operational Status: Active

NPDES
Facility Status: Active

LDS
Status: Open - Verification Monitoring

ENF
Status: Active
Facility Id: 236492

Financial Assurance
SWIS No: 33-AA-0006

Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
CA	AST	Aboveground Petroleum Storage Tank Facilities	California Environmental Protection Agency	08/01/2009	09/10/2009	10/01/2009
CA	CA BOND EXP. PLAN	Bond Expenditure Plan	Department of Health Services	01/01/1989	07/27/1994	08/02/1994
CA	CA FID UST	Facility Inventory Database	California Environmental Protection Agency	10/31/1994	09/05/1995	09/29/1995
CA	CDL	Clandestine Drug Labs	Department of Toxic Substances Control	06/30/2014	09/02/2014	09/24/2014
CA	CHMIRS	California Hazardous Material Incident Report System	Office of Emergency Services	06/26/2014	07/28/2014	09/15/2014
CA	CORTESE	"Cortese" Hazardous Waste & Substances Sites List	CAL EPA/Office of Emergency Information	06/30/2014	07/01/2014	07/28/2014
CA	DEED	Deed Restriction Listing	DTSC and SWRCB	06/09/2014	06/11/2014	07/09/2014
CA	DRYCLEANERS	Cleaner Facilities	Department of Toxic Substance Control	06/28/2014	07/03/2014	08/21/2014
CA	EMI	Emissions Inventory Data	California Air Resources Board	12/31/2012	03/25/2014	04/28/2014
CA	ENF	Enforcement Action Listing	State Water Resoruces Control Board	08/11/2014	08/12/2014	09/30/2014
CA	ENVIROSTOR	EnviroStor Database	Department of Toxic Substances Control	08/05/2014	08/06/2014	09/26/2014
CA	Financial Assurance 1	Financial Assurance Information Listing	Department of Toxic Substances Control	07/31/2014	08/05/2014	09/26/2014
CA	Financial Assurance 2	Financial Assurance Information Listing	California Integrated Waste Management Board	05/19/2014	05/20/2014	05/22/2014
CA	HAULERS	Registered Waste Tire Haulers Listing	Integrated Waste Management Board	02/18/2014	02/20/2014	03/27/2014
CA	HAZNET	Facility and Manifest Data	California Environmental Protection Agency	12/31/2012	07/16/2013	08/26/2013
CA	HIST CAL-SITES	Calsites Database	Department of Toxic Substance Control	08/08/2005	08/03/2006	08/24/2006
CA	HIST CORTESE	Hazardous Waste & Substance Site List	Department of Toxic Substances Control	04/01/2001	01/22/2009	04/08/2009
CA	HIST UST	Hazardous Substance Storage Container Database	State Water Resources Control Board	10/15/1990	01/25/1991	02/12/1991
CA	HWP	EnviroStor Permitted Facilities Listing	Department of Toxic Substances Control	05/27/2014	05/28/2014	07/07/2014
CA	HWT	Registered Hazardous Waste Transporter Database	Department of Toxic Substances Control	07/14/2014	07/15/2014	07/28/2014
CA	LDS	Land Disposal Sites Listing	State Water Qualilty Control Board	07/30/2014	07/31/2014	08/22/2014
CA	LIENS	Environmental Liens Listing	Department of Toxic Substances Control	05/05/2014	05/06/2014	05/19/2014
CA	LUST	Geotracker's Leaking Underground Fuel Tank Report	State Water Resources Control Board	07/30/2014	07/31/2014	08/22/2014
CA	LUST REG 1	Active Toxic Site Investigation	California Regional Water Quality Control Boa	02/01/2001	02/28/2001	03/29/2001
CA	LUST REG 2	Fuel Leak List	California Regional Water Quality Control Boa	09/30/2004	10/20/2004	11/19/2004
CA	LUST REG 3	Leaking Underground Storage Tank Database	California Regional Water Quality Control Boa	05/19/2003	05/19/2003	06/02/2003
CA	LUST REG 4	Underground Storage Tank Leak List	California Regional Water Quality Control Boa	09/07/2004	09/07/2004	10/12/2004
CA	LUST REG 5	Leaking Underground Storage Tank Database	California Regional Water Quality Control Boa	07/01/2008	07/22/2008	07/31/2008
CA	LUST REG 6L	Leaking Underground Storage Tank Case Listing	California Regional Water Quality Control Boa	09/09/2003	09/10/2003	10/07/2003
CA	LUST REG 6V	Leaking Underground Storage Tank Case Listing	California Regional Water Quality Control Boa	06/07/2005	06/07/2005	06/29/2005
CA	LUST REG 7	Leaking Underground Storage Tank Case Listing	California Regional Water Quality Control Boa	02/26/2004	02/26/2004	03/24/2004
CA	LUST REG 8	Leaking Underground Storage Tanks	California Regional Water Quality Control Boa	02/14/2005	02/15/2005	03/28/2005
CA	LUST REG 9	Leaking Underground Storage Tank Report	California Regional Water Quality Control Boa	03/01/2001	04/23/2001	05/21/2001
CA	MCS	Military Cleanup Sites Listing	State Water Resources Control Board	07/30/2014	07/31/2014	08/25/2014
CA	MWMP	Medical Waste Management Program Listing	Department of Public Health	05/23/2014	06/13/2014	07/09/2014
CA	NOTIFY 65	Proposition 65 Records	State Water Resources Control Board	10/21/1993	11/01/1993	11/19/1993
CA	NPDES	NPDES Permits Listing	State Water Resources Control Board	05/19/2014	05/20/2014	05/28/2014
CA	PROC	Certified Processors Database	Department of Conservation	06/16/2014	06/17/2014	07/10/2014
CA	RESPONSE	State Response Sites	Department of Toxic Substances Control	08/05/2014	08/06/2014	09/26/2014
CA	RGA LF	Recovered Government Archive Solid Waste Facilities List	Department of Resources Recycling and Recover		07/01/2013	01/13/2014
CA	RGA LUST	Recovered Government Archive Leaking Underground Storage Tan	State Water Resources Control Board		07/01/2013	12/30/2013
CA	SCH	School Property Evaluation Program	Department of Toxic Substances Control	08/05/2014	08/06/2014	09/26/2014
CA	SLIC	Statewide SLIC Cases	State Water Resources Control Board	07/30/2014	07/31/2014	08/25/2014
CA	SLIC REG 1	Active Toxic Site Investigations	California Regional Water Quality Control Boa	04/03/2003	04/07/2003	04/25/2003
CA	SLIC REG 2	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	Regional Water Quality Control Board San Fran	09/30/2004	10/20/2004	11/19/2004
CA	SLIC REG 3	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	California Regional Water Quality Control Boa	05/18/2006	05/18/2006	06/15/2006
CA	SLIC REG 4	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	Region Water Quality Control Board Los Angele	11/17/2004	11/18/2004	01/04/2005

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
CA	SLIC REG 5	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	Regional Water Quality Control Board Central	04/01/2005	04/05/2005	04/21/2005
CA	SLIC REG 6L	SLIC Sites	California Regional Water Quality Control Boa	09/07/2004	09/07/2004	10/12/2004
CA	SLIC REG 6V	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	Regional Water Quality Control Board, Victorv	05/24/2005	05/25/2005	06/16/2005
CA	SLIC REG 7	SLIC List	California Regional Quality Control Board, Co	11/24/2004	11/29/2004	01/04/2005
CA	SLIC REG 8	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	California Region Water Quality Control Board	04/03/2008	04/03/2008	04/14/2008
CA	SLIC REG 9	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing	California Regional Water Quality Control Boa	09/10/2007	09/11/2007	09/28/2007
CA	SPILLS 90	SPILLS90 data from FirstSearch	FirstSearch	06/06/2012	01/03/2013	02/22/2013
CA	SWEEPS UST	SWEEPS UST Listing	State Water Resources Control Board	06/01/1994	07/07/2005	08/11/2005
CA	SWF/LF (SWIS)	Solid Waste Information System	Department of Resources Recycling and Recover	05/19/2014	05/20/2014	05/22/2014
CA	SWRCY	Recycler Database	Department of Conservation	06/16/2014	06/17/2014	07/11/2014
CA	TOXIC PITS	Toxic Pits Cleanup Act Sites	State Water Resources Control Board	07/01/1995	08/30/1995	09/26/1995
CA	UIC	UIC Listing	Deaprtment of Conservation	01/15/2014	03/18/2014	04/24/2014
CA	UST	Active UST Facilities	SWRCB	07/30/2014	07/31/2014	08/20/2014
CA	UST MENDOCINO	Mendocino County UST Database	Department of Public Health	09/23/2009	09/23/2009	10/01/2009
CA	VCP	Voluntary Cleanup Program Properties	Department of Toxic Substances Control	08/05/2014	08/06/2014	09/26/2014
CA	WDS	Waste Discharge System	State Water Resources Control Board	06/19/2007	06/20/2007	06/29/2007
CA	WIP	Well Investigation Program Case List	Los Angeles Water Quality Control Board	07/03/2009	07/21/2009	08/03/2009
CA	WMUDS/SWAT	Waste Management Unit Database	State Water Resources Control Board	04/01/2000	04/10/2000	05/10/2000
US	2020 COR ACTION	2020 Corrective Action Program List	Environmental Protection Agency	11/11/2011	05/18/2012	05/25/2012
US	BRS	Biennial Reporting System	EPA/NTIS	12/31/2011	02/26/2013	04/19/2013
US	CERCLIS	Comprehensive Environmental Response, Compensation, and Liab	EPA	10/25/2013	11/11/2013	02/13/2014
US	CERCLIS-NFRAP	CERCLIS No Further Remedial Action Planned	EPA	10/25/2013	11/11/2013	02/13/2014
US	COAL ASH DOE	Sleam-Electric Plan Operation Data	Department of Energy	12/31/2005	08/07/2009	10/22/2009
US	COAL ASH EPA	Coal Combustion Residues Surface Impoundments List	Environmental Protection Agency	03/14/2014	06/11/2014	07/28/2014
US	CONSENT	Superfund (CERCLA) Consent Decrees	Department of Justice, Consent Decree Library	12/31/2013	01/24/2014	02/24/2014
US	CORRACTS	Corrective Action Report	EPA	06/10/2014	07/02/2014	09/18/2014
US	DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations	EPA, Region 9	01/12/2009	05/07/2009	09/21/2009
US	DELISTED NPL	National Priority List Deletions	EPA	10/25/2013	11/11/2013	01/28/2014
US	DOD	Department of Defense Sites	USGS	12/31/2005	11/10/2006	01/11/2007
US	DOT OPS	Incident and Accident Data	Department of Transporation, Office of Pipeli	07/31/2012	08/07/2012	09/18/2012
US	EDR MGP	EDR Proprietary Manufactured Gas Plants	EDR, Inc.			
US	EDR US Hist Auto Stat	EDR Exclusive Historic Gas Stations	EDR, Inc.			
US	EDR US Hist Cleaners	EDR Exclusive Historic Dry Cleaners	EDR, Inc.			
US	EPA WATCH LIST	EPA WATCH LIST	Environmental Protection Agency	08/30/2013	03/21/2014	06/17/2014
US	ERNS	Emergency Response Notification System	National Response Center, United States Coast	09/30/2013	10/01/2013	12/06/2013
US	FEDERAL FACILITY	Federal Facility Site Information listing	Environmental Protection Agency	04/01/2014	07/08/2014	08/22/2014
US	FEDLAND	Federal and Indian Lands	U.S. Geological Survey	12/31/2005	02/06/2006	01/11/2007
US	FEMA UST	Underground Storage Tank Listing	FEMA	01/01/2010	02/16/2010	04/12/2010
US	FINDS	Facility Index System/Facility Registry System	EPA	11/18/2013	02/27/2014	03/12/2014
US	FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fu	EPA/Office of Prevention, Pesticides and Toxi	04/09/2009	04/16/2009	05/11/2009
US	FTTS INSP	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fu	EPA	04/09/2009	04/16/2009	05/11/2009
US	FUDS	Formerly Used Defense Sites	U.S. Army Corps of Engineers	06/06/2014	09/10/2014	09/18/2014
US	HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing	Environmental Protection Agency	10/19/2006	03/01/2007	04/10/2007
US	HIST FTTS INSP	FIFRA/TSCA Tracking System Inspection & Enforcement Case Lis	Environmental Protection Agency	10/19/2006	03/01/2007	04/10/2007
US	HMIRS	Hazardous Materials Information Reporting System	U.S. Department of Transportation	06/30/2014	07/01/2014	09/18/2014
US	ICIS	Integrated Compliance Information System	Environmental Protection Agency	05/06/2014	05/16/2014	06/17/2014
US	INDIAN LUST R1	Leaking Underground Storage Tanks on Indian Land	EPA Region 1	02/01/2013	05/01/2013	11/01/2013

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
US	INDIAN LUST R10	Leaking Underground Storage Tanks on Indian Land	EPA Region 10	05/20/2014	06/10/2014	08/22/2014
US	INDIAN LUST R4	Leaking Underground Storage Tanks on Indian Land	EPA Region 4	07/30/2014	08/12/2014	08/22/2014
US	INDIAN LUST R5	Leaking Underground Storage Tanks on Indian Land	EPA, Region 5	08/04/2014	08/05/2014	08/22/2014
US	INDIAN LUST R6	Leaking Underground Storage Tanks on Indian Land	EPA Region 6	05/14/2014	05/15/2014	07/15/2014
US	INDIAN LUST R7	Leaking Underground Storage Tanks on Indian Land	EPA Region 7	05/22/2014	08/22/2014	09/18/2014
US	INDIAN LUST R8	Leaking Underground Storage Tanks on Indian Land	EPA Region 8	08/13/2014	08/15/2014	08/22/2014
US	INDIAN LUST R9	Leaking Underground Storage Tanks on Indian Land	Environmental Protection Agency	03/01/2013	03/01/2013	04/12/2013
US	INDIAN ODI	Report on the Status of Open Dumps on Indian Lands	Environmental Protection Agency	12/31/1998	12/03/2007	01/24/2008
US	INDIAN RESERV	Indian Reservations	USGS	12/31/2005	12/08/2006	01/11/2007
US	INDIAN UST R1	Underground Storage Tanks on Indian Land	EPA, Region 1	02/01/2013	05/01/2013	01/27/2014
US	INDIAN UST R10	Underground Storage Tanks on Indian Land	EPA Region 10	05/20/2014	06/10/2014	08/15/2014
US	INDIAN UST R4	Underground Storage Tanks on Indian Land	EPA Region 4	07/30/2014	08/12/2014	08/22/2014
US	INDIAN UST R5	Underground Storage Tanks on Indian Land	EPA Region 5	08/04/2014	08/05/2014	08/22/2014
US	INDIAN UST R6	Underground Storage Tanks on Indian Land	EPA Region 6	07/25/2014	07/28/2014	08/22/2014
US	INDIAN UST R7	Underground Storage Tanks on Indian Land	EPA Region 7	08/20/2014	08/22/2014	09/18/2014
US	INDIAN UST R8	Underground Storage Tanks on Indian Land	EPA Region 8	08/13/2014	08/15/2014	08/22/2014
US	INDIAN UST R9	Underground Storage Tanks on Indian Land	EPA Region 9	08/14/2014	08/15/2014	08/22/2014
US	INDIAN VCP R1	Voluntary Cleanup Priority Listing	EPA, Region 1	05/30/2014	07/01/2014	08/15/2014
US	INDIAN VCP R7	Voluntary Cleanup Priority Lisitng	EPA, Region 7	03/20/2008	04/22/2008	05/19/2008
US	LEAD SMELTER 1	Lead Smelter Sites	Environmental Protection Agency	06/04/2014	06/12/2014	07/28/2014
US	LEAD SMELTER 2	Lead Smelter Sites	American Journal of Public Health	04/05/2001	10/27/2010	12/02/2010
US	LIENS 2	CERCLA Lien Information	Environmental Protection Agency	02/18/2014	03/18/2014	04/24/2014
US	LUCIS	Land Use Control Information System	Department of the Navy	05/28/2014	05/30/2014	06/17/2014
US	MLTS	Material Licensing Tracking System	Nuclear Regulatory Commission	07/22/2013	08/02/2013	11/01/2013
US	NPL	National Priority List	EPA	10/25/2013	11/11/2013	01/28/2014
US	NPL LIENS	Federal Superfund Liens	EPA	10/15/1991	02/02/1994	03/30/1994
US	ODI	Open Dump Inventory	Environmental Protection Agency	06/30/1985	08/09/2004	09/17/2004
US	PADS	PCB Activity Database System	EPA	06/01/2013	07/17/2013	11/01/2013
US	PCB TRANSFORMER	PCB Transformer Registration Database	Environmental Protection Agency	02/01/2011	10/19/2011	01/10/2012
US	PRP	Potentially Responsible Parties	EPA	04/15/2013	07/03/2013	09/13/2013
US	Proposed NPL	Proposed National Priority List Sites	EPA	10/25/2013	11/11/2013	01/28/2014
US	RAATS	RCRA Administrative Action Tracking System	EPA	04/17/1995	07/03/1995	08/07/1995
US	RADINFO	Radiation Information Database	Environmental Protection Agency	07/07/2014	07/10/2014	07/28/2014
US	RCRA NonGen / NLR	RCRA - Non Generators	Environmental Protection Agency	06/10/2014	07/02/2014	09/18/2014
US	RCRA-CESQG	RCRA - Conditionally Exempt Small Quantity Generators	Environmental Protection Agency	06/10/2014	07/02/2014	09/18/2014
US	RCRA-LQG	RCRA - Large Quantity Generators	Environmental Protection Agency	06/10/2014	07/02/2014	09/18/2014
US	RCRA-SQG	RCRA - Small Quantity Generators	Environmental Protection Agency	06/10/2014	07/02/2014	09/18/2014
US	RCRA-TSDF	RCRA - Treatment, Storage and Disposal	Environmental Protection Agency	06/10/2014	07/02/2014	09/18/2014
US	RMP	Risk Management Plans	Environmental Protection Agency	04/01/2014	05/23/2014	07/28/2014
US	ROD	Records Of Decision	EPA	11/25/2013	12/12/2013	02/24/2014
US	SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing	Environmental Protection Agency	03/07/2011	03/09/2011	05/02/2011
US	SSTS	Section 7 Tracking Systems	EPA	12/31/2009	12/10/2010	02/25/2011
US	TRIS	Toxic Chemical Release Inventory System	EPA	12/31/2011	07/31/2013	09/13/2013
US	TSCA	Toxic Substances Control Act	EPA	12/31/2006	09/29/2010	12/02/2010
US	UMTRA	Uranium Mill Tailings Sites	Department of Energy	09/14/2010	10/07/2011	03/01/2012
US	US AIRS (AFS)	Aerometric Information Retrieval System Facility Subsystem (	EPA	10/23/2013	11/06/2013	12/06/2013
US	US AIRS MINOR	Air Facility System Data	EPA	10/23/2013	11/06/2013	12/06/2013

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

St	Acronym	Full Name	Government Agency	Gov Date	Arvl. Date	Active Date
US	US BROWNFIELDS	A Listing of Brownfields Sites	Environmental Protection Agency	07/01/2014	07/03/2014	07/28/2014
US	US CDL	Clandestine Drug Labs	Drug Enforcement Administration	05/28/2014	06/20/2014	07/15/2014
US	US ENG CONTROLS	Engineering Controls Sites List	Environmental Protection Agency	06/23/2014	07/15/2014	09/18/2014
US	US FIN ASSUR	Financial Assurance Information	Environmental Protection Agency	06/19/2014	06/20/2014	07/28/2014
US	US HIST CDL	National Clandestine Laboratory Register	Drug Enforcement Administration	05/28/2014	06/20/2014	07/15/2014
US	US INST CONTROL	Sites with Institutional Controls	Environmental Protection Agency	06/23/2014	07/15/2014	09/18/2014
US	US MINES	Mines Master Index File	Department of Labor, Mine Safety and Health A	01/30/2014	03/05/2014	07/15/2014
CT	CT MANIFEST	Hazardous Waste Manifest Data	Department of Energy & Environmental Protecti	07/30/2013	08/19/2013	10/03/2013
NJ	NJ MANIFEST	Manifest Information	Department of Environmental Protection	12/31/2011	07/19/2012	08/28/2012
NY	NY MANIFEST	Facility and Manifest Data	Department of Environmental Conservation	05/01/2014	05/07/2014	06/10/2014
PA	PA MANIFEST	Manifest Information	Department of Environmental Protection	12/31/2013	07/21/2014	08/25/2014
RI	RI MANIFEST	Manifest information	Department of Environmental Management	12/31/2013	07/15/2014	08/13/2014
WI	WI MANIFEST	Manifest Information	Department of Natural Resources	12/31/2013	06/20/2014	08/07/2014
US	Oil/Gas Pipelines	GeoData Digital Line Graphs from 1:100,000-Scale Maps	USGS			
US	AHA Hospitals	Sensitive Receptor: AHA Hospitals	American Hospital Association, Inc.			
US	Medical Centers	Sensitive Receptor: Medical Centers	Centers for Medicare & Medicaid Services			
US	Nursing Homes	Sensitive Receptor: Nursing Homes	National Institutes of Health			
US	Public Schools	Sensitive Receptor: Public Schools	National Center for Education Statistics			
US	Private Schools	Sensitive Receptor: Private Schools	National Center for Education Statistics			
CA	Daycare Centers	Sensitive Receptor: Licensed Facilities	Department of Social Services			
US	Flood Zones	100-year and 500-year flood zones	Emergency Management Agency (FEMA)			
US	NWI	National Wetlands Inventory	U.S. Fish and Wildlife Service			
US	USGS 7.5’ Topographic Map	Scanned Digital USGS 7.5’ Topographic Map (DRG)	USGS			

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

NW IRONWOOD AVE AND OLIVER ST
NW IRONWOOD AVE AND OLIVER ST
MORENO VALLEY, CA 92555

TARGET PROPERTY COORDINATES

Latitude (North):	33.9483 - 33˚ 56’ 53.88’’
Longitude (West):	117.187 - 117˚ 11’ 13.20’’
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	482720.1
UTM Y (Meters):	3756245.0
Elevation:	1865 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	33117-H2 SUNNYMEAD, CA
Most Recent Revision:	1980

EDR’s GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

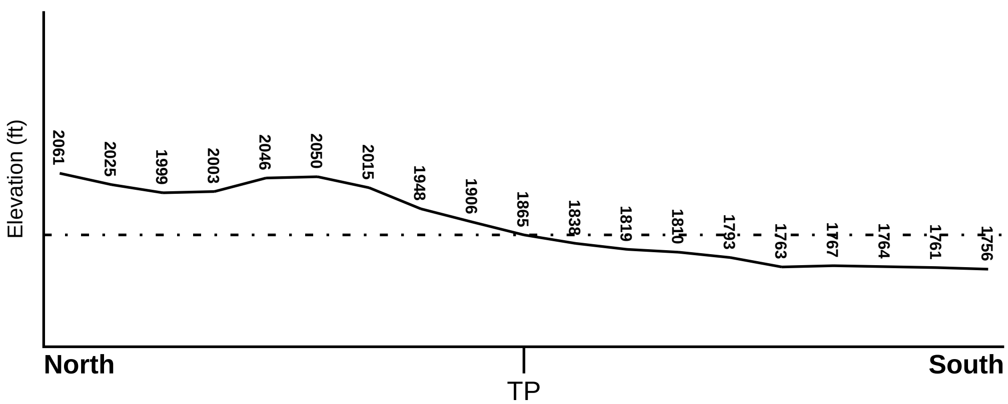
TOPOGRAPHIC INFORMATION

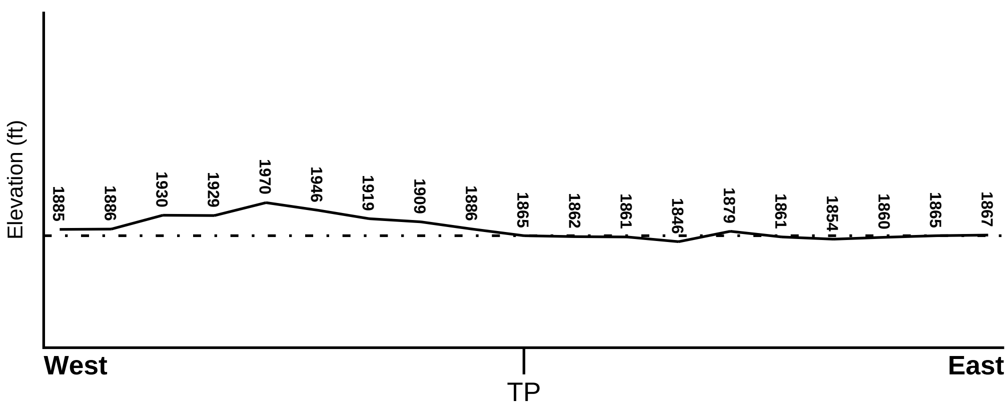
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General SSE

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 1865 ft.

0 1/2 1 Miles

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
RIVERSIDE, CA	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 06065C - FEMA DFIRM Flood data

Additional Panels in search area: Not Reported

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
NOT AVAILABLE	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius: 1.25 miles
Status: Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

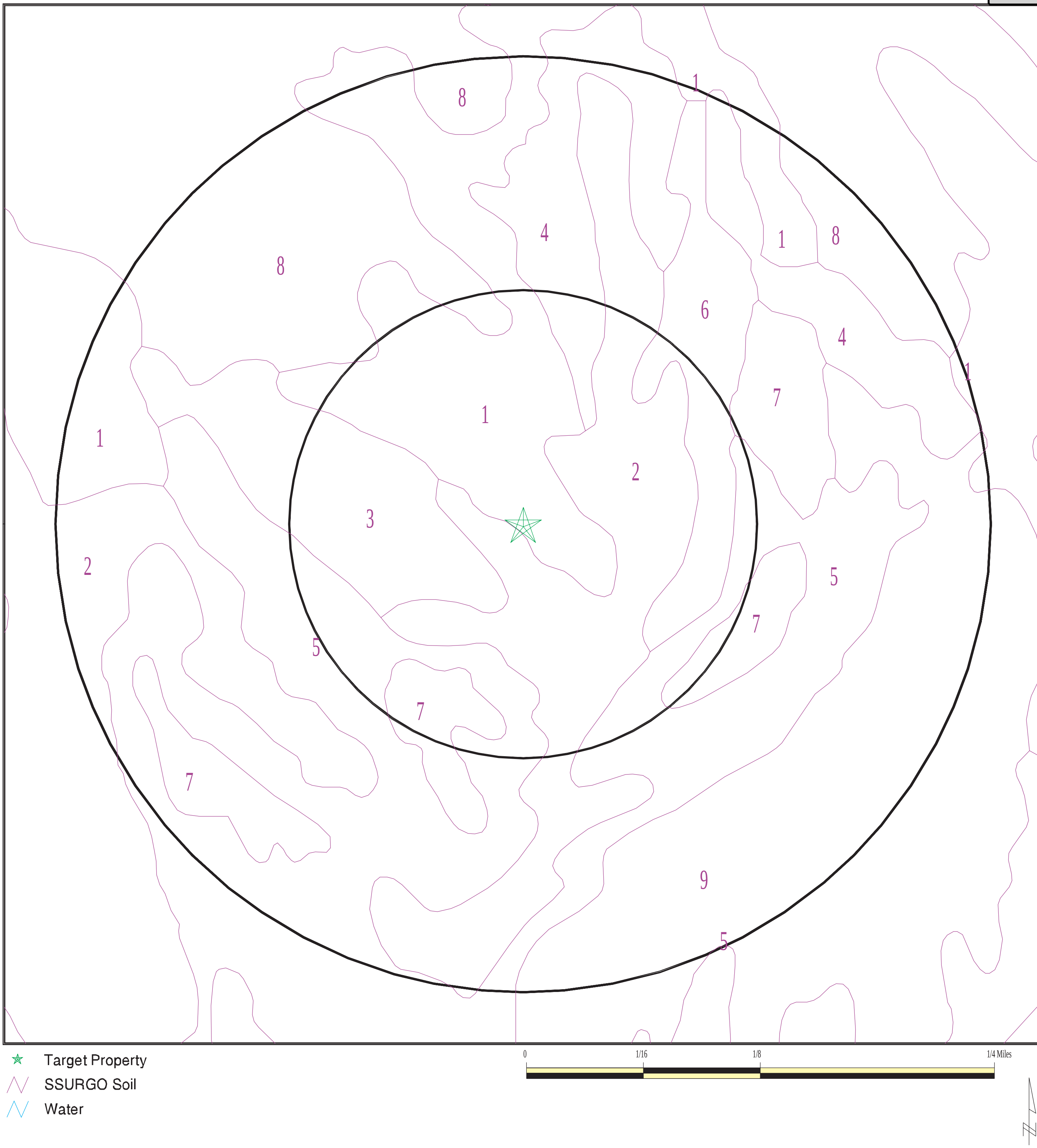
Era: Mesozoic
System: Cretaceous
Series: Cretaceous granitic rocks
Code: Kg *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Plutonic and Intrusive Rocks

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 4092958.2s



SITE NAME:	NW IRONWOOD AVE and OLIVER ST	CLIENT:	EEI, Inc.
ADDRESS:	NW IRONWOOD AVE and OLIVER ST	CONTACT:	Polly Ivers
	Moreno Valley CA 92555	INQUIRY #:	4092958.2s
LAT/LONG:	33.9483 / 117.187	DATE:	October 01, 2014 3:42 pm

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Terrace escarpments

Soil Surface Texture:
Hydrologic Group: Not reported

Soil Drainage Class:
Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

No Layer Information available.

Soil Map ID: 2

Soil Component Name: HANFORD

Soil Surface Texture: coarse sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	coarse sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 5.6
2	7 inches	40 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 5.6
3	40 inches	59 inches	stratified loamy sand to coarse sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 7.8 Min: 5.6

Soil Map ID: 3

Soil Component Name: MONSERATE

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		Soil Reaction (pH)
1	0 inches	9 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1
2	9 inches	27 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 4 Min: 1.4	Max: 7.3 Min: 6.1
3	27 inches	44 inches	indurated	Not reported	Not reported	Max: 0.01 Min: 0	Max: Min:
4	44 inches	57 inches	cemented	Not reported	Not reported	Max: 0.01 Min: 0	Max: Min:
5	57 inches	70 inches	loamy coarse sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 8.4 Min: 6.6

Soil Map ID: 4

Soil Component Name: HANFORD

Soil Surface Texture: coarse sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Somewhat excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	coarse sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 5.6
2	7 inches	40 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 5.6
3	40 inches	59 inches	stratified loamy sand to coarse sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 7.8 Min: 5.6

Soil Map ID: 5

Soil Component Name: MONSERATE

Soil Surface Texture: sandy loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	9 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1
2	9 inches	18 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 4 Min: 1.4	Max: 7.3 Min: 6.1
3	18 inches	44 inches	indurated	Not reported	Not reported	Max: 0.01 Min: 0	Max: Min:
4	44 inches	57 inches	cemented	Not reported	Not reported	Max: 0.01 Min: 0	Max: Min:
5	57 inches	70 inches	loamy coarse sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 8.4 Min: 6.6

Soil Map ID: 6

Soil Component Name: HANFORD

Soil Surface Texture: loamy fine sand

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		Soil Reaction (pH)
1	0 inches	7 inches	loamy fine sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 7.8 Min: 5.6
2	7 inches	40 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 5.6
3	40 inches	59 inches	stratified loamy sand to coarse sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 7.8 Min: 5.6

Soil Map ID: 7

Soil Component Name: MONSERATE

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	9 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1
2	9 inches	27 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 4 Min: 1.4	Max: 7.3 Min: 6.1
3	27 inches	44 inches	indurated	Not reported	Not reported	Max: 0.01 Min: 0	Max: Min:
4	44 inches	57 inches	cemented	Not reported	Not reported	Max: 0.01 Min: 0	Max: Min:
5	57 inches	70 inches	loamy coarse sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 8.4 Min: 6.6

Soil Map ID: 8

Soil Component Name: Cieneba

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Somewhat excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	14 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.1
2	14 inches	22 inches	weathered bedrock	Not reported	Not reported	Max: 0.42 Min: 0	Max: Min:

Soil Map ID: 9

Soil Component Name: RAMONA

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	14 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 5.6

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	**Upper**	**Lower**	**Soil Texture Class**	**AASHTO Group**	**Unified Soil**		
2	14 inches	22 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 7.3 Min: 6.1
3	22 inches	68 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 4 Min: 1.4	Max: 7.3 Min: 6.1
4	68 inches	74 inches	gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 4 Min: 1.4	Max: 8.4 Min: 6.6

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

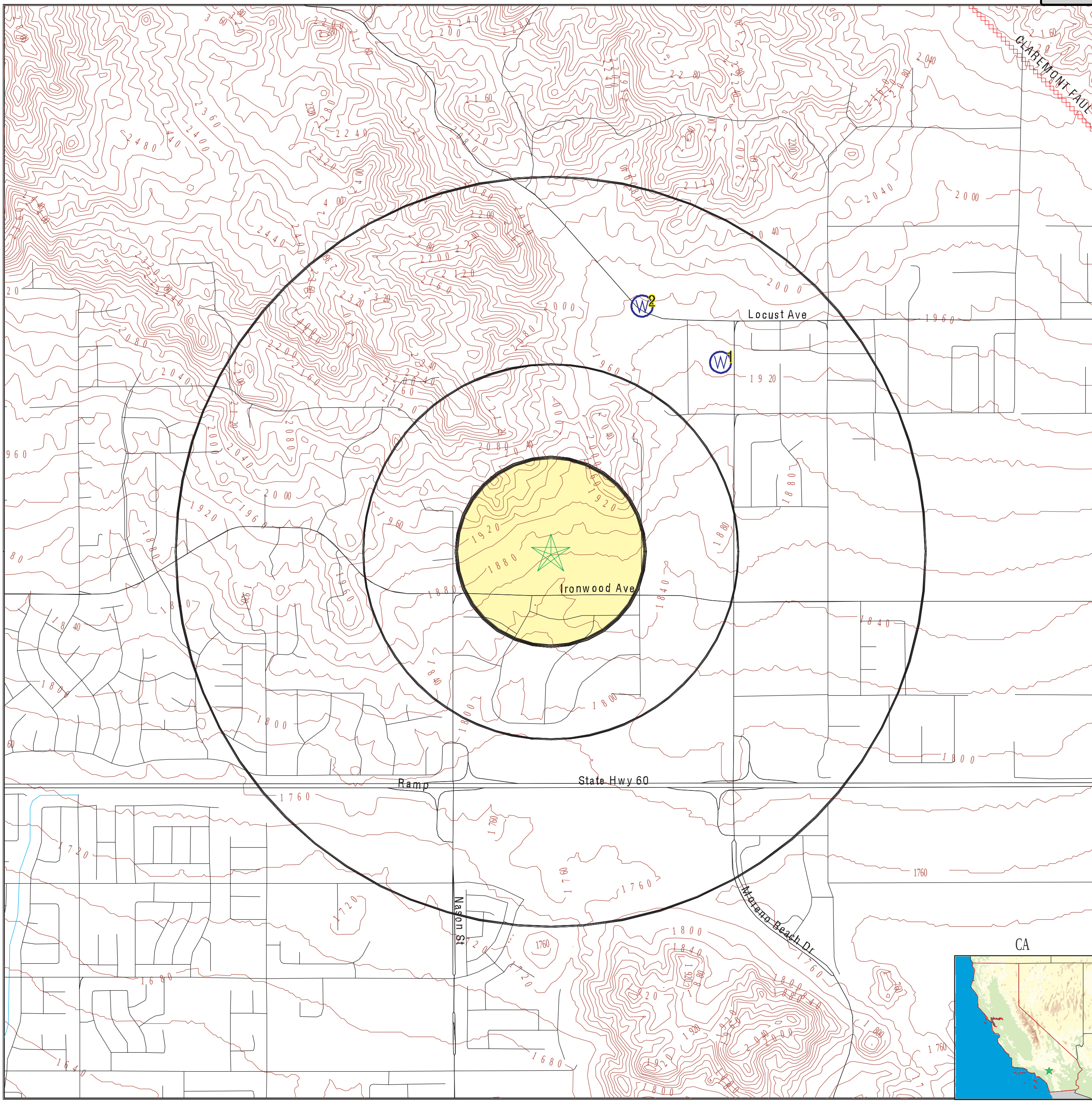
MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	CADW50000003854	1/2 - 1 Mile NE
2	CADW50000003856	1/2 - 1 Mile NNE

PHYSICAL SETTING SOURCE MAP - 4092958.2s



0 1/4 1/2 1 Miles

- County Boundary
- Major Roads
- Contour Lines
- Earthquake Fault Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- HD Closest Hydrogeological Data
- Oil, gas or related wells

SITE NAME:	NW IRONWOOD AVE and OLIVER ST	CLIENT:	EEI, Inc.
ADDRESS:	NW IRONWOOD AVE and OLIVER ST	CONTACT:	Polly Ivers
	Moreno Valley CA 92555	INQUIRY #:	4092958.2s
LAT/LONG:	33.9483 / 117.187	DATE:	October 01, 2014 3:42 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID Direction Distance Elevation		Database	EDR ID Number
1 **NE** **1/2 - 1 Mile** **Higher**	Click here for full text details	**CA WELLS**	**CADW50000003854**
2 **NNE** **1/2 - 1 Mile** **Higher**	Click here for full text details	**CA WELLS**	**CADW50000003856**

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: CA Radon

Radon Test Results

Zipcode	Num Tests	> 4 pCi/L
92555	4	0

Federal EPA Radon Zone for RIVERSIDE County: 2

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for RIVERSIDE COUNTY, CA

Number of sites tested: 12

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.117 pCi/L	100%	0%	0%
Living Area - 2nd Floor	0.450 pCi/L	100%	0%	0%
Basement	1.700 pCi/L	100%	0%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5’ Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5’ Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5’ Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW[R] Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture’s (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Database
Source: Department of Water Resources
Telephone: 916-651-9648

California Drinking Water Quality Database
Source: Department of Public Health
Telephone: 916-324-2319
The database includes all drinking water compliance and special studies monitoring for the state of California since 1984. It consists of over 3,200,000 individual analyses along with well and water system information.

OTHER STATE DATABASE INFORMATION

California Oil and Gas Well Locations
Source: Department of Conservation
Telephone: 916-323-1779
Oil and Gas well locations in the state.

RADON

State Database: CA Radon
Source: Department of Health Services
Telephone: 916-324-2208
Radon Database for California

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

California Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary fault lines, prepared in 1975 by the United State Geological Survey. Additional information (also from 1975) regarding activity at specific fault lines comes from California's Preliminary Fault Activity Map prepared by the California Division of Mines and Geology.

STREET AND ADDRESS INFORMATION

APPENDIX E
USER PROVIDED INFORMATION

EEI
Geotechnical & Environmental Solutions

ASTM E1527-13
USER SPECIFIC QUESTIONNAIRE

Project Name: **EEI Job No.: GLO-71982.1 / Undeveloped Property – 80-Acres**

Project Address: **NWC Ironwood Ave. and Oliver St., Moreno Valley, Riverside County CA 92555**

In order to comply with the ASTM E1527-13 Standard and qualify for one of the *Landowner Liability Protections (LLPs)* offered by the Small Business Liability Relief and Brownfields Revitalization Act of 2001 (the "*Brownfields Amendments*"), the *user* must conduct the following inquiries required by 40 CFR 312.25, 312.28, 312.29, 312.30, and 312.31. These inquiries must also be conducted by EPA Brownfield Assessment and Characterization grantees. The *user* should provide the following information to the *environmental professional*. Failure to conduct these inquiries could result in a determination that "*all appropriate inquiries*" is not complete. Please provide the following information (if available). Your answers will be incorporated into the final Phase I ESA under the section "User-supplied Information."

(1.) Environmental cleanup liens that are filed or recorded against the property (40 CFR 312.25).
Did a search of *recorded land title records* (or judicial records where appropriate, see NOTE below) identify any environmental liens filed or recorded against the *property* under federal, tribal, state or local law? (NOTE - In certain jurisdictions, federal, tribal, state, or local statutes, or regulations specify that environmental liens and AULs be filed in judicial records rather than in land title records. In such cases judicial records must be searched for environmental liens and AULs.

No.

(2.) Activity and land use limitations (AULs) that are in place on the site or that have been filed or recorded in a registry (40 CFR 312.26).
Did a search of *recorded land title records* (or judicial records where appropriate, see NOTE above) identify any AULs, such as *engineering controls*, land use restrictions, or *institutional controls* that are in place at the *property* and/or have been filed or recorded against the *property* under federal, tribal, state or local law?

No.

(3.) Specialized knowledge or experience of the person seeking to qualify for the Landowner Liability Protections (LLP - 40 CFR 312.28).
As the *user* of this *ESA* do you have any specialized knowledge or experience related to the *property* or nearby properties? For example, are you involved in the same line of business as the current or former *occupants* of the *property* or an adjoining *property* so that you would have specialized knowledge of the chemicals and processes used by this type of business? (self-explanatory)

No.

(4.) Relationship of the purchase price to the fair market value of the *property* if it were not contaminated (40 CFR 312.29).
Does the purchase price being paid for this *property* reasonably reflect the fair market value of the *property*? If you conclude that there is a difference, have you considered whether the lower purchase price is because contamination is known or believed to be present at the *property*?

Yes.

(5.) Commonly known or *reasonably ascertainable* information about the *property* (40 CFR 312.30).
Are you aware of commonly known or *reasonably ascertainable* information about the *property* that would help the *environmental professional* to identify conditions indicative of releases or threatened releases? For example, as *user*,

(a.) Do you know the past uses of the *property*?

No.

(b.) Do you know of specific chemicals that are present or once were present at the *property*?

No.

(c.) Do you know of spills or other chemical releases that have taken place at the *property*?

No.

(d.) Do you know of any environmental cleanups that have taken place at the *property*?

No.

(6.) The degree of obviousness of the presence of likely presence of contamination at the *property*, and the ability to detect the contamination by appropriate investigation (40 CFR 312.31).
As the *user* of this *ESA*, based on your knowledge and experience related to the *property* are there any *obvious* indicators that point to the presence or likely presence of contamination at the *property*?

No.

In addition, certain information should be collected, if available, and provided to the e*nvironmental professional* selected to conduct the Phase I. This information is intended to assist the *environmental professional* but is not necessarily required to qualify for one of the *LLPs*. The information includes:

(a) the <u>reason</u> why the Phase I is required,

The city of Moreno Valley needs a phase 1 to process our map.

(b) the <u>type</u> of *property* and type of *property* transaction, for example, sale, purchase, exchange, etc.,

Type of property transaction: SALE

(c) the <u>complete and correct address</u> for the *property* (a map or other documentation showing *property* location and boundaries is helpful),

Legal description

The South half of the Southwest quarter of Section 34, Township 2 South, Range 3 West, San Bernardino Meridian, County of Riverside, State of California, according to the Official Plat thereof. Excepting herefrom that portion thereof within Ironwood Avenue.

Also excepting therefrom that portion described in deed to the County of Riverside recorded November 11, 1965 as Instrument No. 124978.

Except therefrom all oil, gas, minerals and other hydrocarbon substances, lying below a depth of 500 feet, without the right of surface entry.
APN: 473-160-004-5

Please see attached map also.

(d) the scope of services desired for the Phase I (including whether any parties to the *property* transaction may have a required standard scope of services on whether any considerations beyond the requirements of Practice E 1527 are to be considered),

No.

(e) identification of all parties who will rely on the Phase I *report*,

The City of Moreno Valley, Global Investments and Development, All the future residents of the property, and all the other governmental agencies that have to decide on the fate of the project.

(f) identification of the site contact and how the contact can be reached,

Joseph Rivani : (213)-365-0005
jrivani@gidllco.com

(g) any special terms and conditions which must be agreed upon by the *environmental professional*, and

No.

(h) any other knowledge or experience with the *property* that may be pertinent to the *environmental professional* (for example, copies of any available prior *environmental site assessment reports*, documents, correspondence, etc., concerning the *property* and its environmental condition).

No.

Preparer:

Name: **JOSEPH RIVANI**

Address: **3470 WILSHIRE BLVD. STE. 1020 LOS ANGELES, CA 90010**

Signature: ______________________

Date: **10-02-2014**

EEI
Geotechnical & Environmental Solutions

OWNER/LANDLORD/OCCUPANT INTERVIEW QUESTIONS

Project Name: **EEI Job No.: GLO-71982.1 / Undeveloped Property – 80-Acres**

Project Address: **NWC Ironwood Ave. and Oliver St., Moreno Valley, Riverside County CA 92555**

1. What is/are the Current Use(s) of the Property, to the best of your knowledge?

The property is not in any kind of use.

2. What was/were the Past Use(s) of the Property, to the best of your knowledge?

The property has not been in use since purchase.

3. Are there now or were there ever present any aboveground storage tanks, underground storage tanks or vent pipes, fill pipes or accessways indicating underground storage tanks?

Not to the best of our knowledge were there any aboveground storage tanks, underground storage tanks or vent pipes, fill pipes or accessways indicating underground storage tanks.

4. Are there any areas of the site with strong, pungent, or noxious odors?

There are no strong, pungent or noxious odors in any areas of the site.

5. Are there any areas of standing surface water, including Pools or sumps?

There is no standing surface water on the site.

6. Are there any Hazardous Substances and/or Petroleum Product Containers currently stored on site?

There are no hazardous substances and/or petroleum product containers stored on site.

7. Are there any unlabelled Drums or any Unidentified Substance Containers stored on the property?

There are no unlabeled drums and/or any unidentified substance containers stored on the site.

8. Is there any Electrical or hydraulic equipment known to contain PCBs or likely to contain PCBs?

There is no electrical or hydraulic equipment known to contain PCBs or likely to contain PCBs.

9. Do you know of any spills or other chemical releases that have taken place at the property?

We are not aware of any spills or other chemical releases ever taken place on this site.

10. Do you know of any environmental cleanups that have taken place at the property?

We are not aware of any environmental cleanups taken place on this site.

11. Are you aware of any deed restrictions or other activity or land use restrictions that have been placed on the property as a result of an environmental issue?

We are not aware of any restrictions or other activity or land use restrictions that have been placed on this site as a result of an environmental issue.

12. Are you aware of any environmental liens, unresolved notices of violation, or litigation related to a contamination issue at the property?

We are not aware of any environmental liens, unresolved notices of violation or litigation related to a contamination issue on this site.

13. Are you aware of any previous assessments conducted at the subject property?

An environmental impact assessment was done by the City of Moreno Valley as a part of its feasibility study to use this site for a new high school. No negative finding was resulted.

Preparer:

Name:	Chang Chung Yang and Fu Mei Yang
Address:	NWC Ironwood Ave. and Oliver St., Moreno Valley, Riverside County, CA
Signature:	Chang Chung Yang Fu Mei Yang
Date:	October 3, 2014

APPENDIX F
PREVIOUS REPORTS

PHASE I ENVIRONMENTAL SITE ASSESSMENT FOR:

PROPOSED ALTERNATE HIGH SCHOOL NO. 5 – IRONWOOD/NASON

prepared for:

MORENO VALLEY UNIFIED SCHOOL DISTRICT

Alessandro Administrative Center
25634 Alessandro Boulevard
Moreno Valley, California 92553
Phone: 951.571.7692

Contact:
Amber Caudill,
Facilities Planner

prepared by:

THE PLANNING CENTER

2131 S. Grove Avenue, Suite A
Ontario, California 91761
Phone: 909.930.1380
Fax: 909.930.1365

Contact:
Peter A. Garcia, Director
Site Assessment Strategies

MORE-19.0E
JUNE 2008

THE PLANNING CENTER

Governmental Services
Planning & Urban Design
Environmental Studies
Landscape Architecture

2131 S. Grove Avenue, Suite A
Ontario, CA 91761
Phone: 909.930.1380
Fax: 909.930.1365
www.planningcenter.com

25 June 2008
Project No. MORE-19.0E

Moreno Valley Unified School District
Alessandro Administrative Center
25634 Alessandro Boulevard
Moreno Valley, California 92553

Attention: Ms. Amber Caudill

Subject: Phase I Environmental Site Assessment Report Proposed Alternate High School No. 5 – Ironwood/Nason, Moreno Valley, California

Dear Ms. Caudill:

Enclosed please find one copy of the Phase I Environmental Site Assessment (Phase I) report for the Proposed Alternate High School No. 5 – Ironwood/Nason located in Moreno Valley, California. Based on the results of this assessment, no recognized environmental conditions (RECs), historical RECs, or known environmental conditions associated with the subject site were identified. No further assessment or investigation is recommended.

Sincerely yours,
THE PLANNING CENTER

Peter A. Garcia
Director of Site Assessment Strategies

Michael Watson, PG 8177, REA 30041
Geologist

Enclosures

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Executive Summary

The Planning Center has performed a Phase I Environmental Site Assessment (Phase I) on behalf of the Moreno Valley Unified School District (District) for the construction of a high school on an approximately 75.1-acre parcel of vacant land located at the northeast corner of Ironwood Avenue and Nason Street in the City of Moreno Valley, Riverside County, California. The scope of work is described and conditioned by our proposal dated April 15, 2008. As indicated in our proposal, this Phase I was performed in conformance with the scope and limitations of the American Society for Testing and Materials (ASTM) E 1527-05 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, and following the California Environmental Protection Agency Department of Toxic Substances Control (DTSC) guidelines for Phase 1 evaluations for proposed school sites. Exceptions to, or deletions from, this practice are described in Section 1 of this report. Our conclusions are intended to help the user evaluate the "environmental risk" associated with the site, as defined in the ASTM E 1527-05 Standard and discussed in the Introduction section of this report.

RECOGNIZED ENVIRONMENTAL CONDITIONS

The goal of the ASTM E 1527-05 Standard practice is to identify Recognized Environmental Conditions (RECs), as defined in the Standard and in Section 1 of this report

This assessment has revealed no evidence of RECs in connection with the property as defined in the Standard and in Section 1 of this report and DTSC recommended school guidance for Phase I Environmental Site Assessments.

HISTORICAL RECS AND KNOWN OR SUSPECT ENVIRONMENTAL CONDITIONS

The ASTM E 1527-05 Standard also requires identification of historical RECs (HRECs) and other known or suspect environmental conditions, as defined in the Standard, and in Section 1 of this Phase I report.

This assessment has revealed no evidence of HRECs or known environmental conditions in connection with the subject site.

SUMMARY

Based on the results of this assessment, RECs, HRECs, and known environmental conditions associated with the subject site were not identified. No further assessment or investigation is recommended.

The remainder of this report contains additional information regarding the Phase I work performed, the findings summarized above, and any limitations.

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1. Introduction

PURPOSE

This Phase I Environmental Site Assessment (Phase I) was performed in conformance with the scope and limitations of the American Society for Testing and Materials (ASTM) E 1527-05 Standard and following the California Environmental Protection Agency Department of Toxic Substances Control (DTSC) recommended guidelines for Phase 1 evaluations for school sites (DTSC 2001). The proposed school site is being evaluated by the District for the construction of a high school on an approximately 75.1-acre parcel of vacant land. The site is located at the northeast corner of Ironwood Avenue and Nason Street in the City of Moreno Valley, Riverside County, California (Figure 1).

The purpose of this assessment was to evaluate site history, existing observable conditions, current site use, and current and historic uses of surrounding properties to identify the potential presence of Recognized Environmental Conditions (RECs) in connection with the subject site. RECs are defined by ASTM as "the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on a property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimis conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be de minimis are not recognized environmental conditions."

In addition, the Standard requires the identification of historical RECs (HRECs) and known or suspect environmental conditions in the Phase I report. The standard defines historical RECs as environmental conditions "which in the past would have been considered a recognized environmental condition, but which may or may not be considered a recognized environmental condition currently." The term "known or suspect environmental condition" is not specifically defined in the standard, but is used by The Planning Center to highlight environmentally-related information that is not anticipated to adversely affect the subject site and/or does not rise to the level of an REC.

Our conclusions are intended to help the user evaluate the "environmental risk" associated with the site, defined by ASTM as "a risk which can have a material environmental or environmentally-driven financial impact on the business associated with the current or planned use of a parcel of commercial real estate. Consideration of environmental risk issues may involve addressing one or more non-scope considerations."

SITE IDENTIFICATION

The approximately 75.1-acre site is located at located at the northeast corner of Ironwood Avenue and Nason Street in the City of Moreno Valley, Riverside County, California. The District is planning to construct a high school on an approximately 75.1-acre area of vacant land. The site is generally located north of Ironwood Avenue between Oliver Street and Nason Street. The project site consists of Assessor's Parcel Number (APN) 473-160-004-5. The project site and surrounding area are depicted on Figure 2.

DETAILED SCOPE OF SERVICES

The Planning Center performed the following detailed scope of services to complete our Phase I assessment:

1. Introduction

1. Visual observations of site conditions, and of adjoining property use, to evaluate the nature and type of activities that have been or are being conducted at and adjacent to the site, in terms of the potential for release or threat of release of hazardous substances or petroleum products.

2. Review of federal and state environmental database information within the ASTM- specified radii from the subject site using a database service to access records. Use of 7 5-minute topographic maps to evaluate the site's physical setting.

3. Review of federal and state environmental files pertaining to the subject site and nearby sites with the potential to impact the subject site.

4. Review of previous reports (if any) prepared for the subject site.

5. Review of the following sources of historical use information:

   - Aerial Photographs
   - Historical Topographic Maps

6. Contacts with state and local agencies regarding the site and surrounding properties and structures.

7. Interviews with the Key Site Manager and property tenant representatives (if any).

8. Interpretation of information and data assembled as a result of the above work tasks, and formulation of conclusions regarding the potential presence and impact of RECs as defined by the ASTM E 1527-05 Standard

NON-SCOPE CONSIDERATIONS

The ASTM E 1527-05 Standard includes the following list of "additional issues" that are non-scope considerations outside of the scope of the ASTM Phase I practice: Asbestos-Containing Materials, Radon, Lead-Based Paint, Lead in Drinking Water, Wetlands, Regulatory Compliance, Cultural and Historic Risks, Industrial Hygiene, Health and Safety, Ecological Resources, Endangered Species, Indoor Air Quality, and High Voltage Power Lines. The additional issues included in this Phase I include the following:

- A review of agency records to identify high-pressure gas lines and fuel transmission lines in the vicinity of the subject site;
- A review of Division of Oil and Gas records;
- A review of geological references for the presence of naturally occurring asbestos;
- The use of fill material on the subject site;
- Prior usage of subject site for agricultural purposes, mining activities, illegal drug manufacturing and disposal, and U.S. Government ownership; and
- The possibility of lead-based paint used in building construction.

EXCEPTIONS AND DEVIATIONS

1.5.1 Exceptions

The Planning Center has completed this assessment in substantial conformance with ASTM E 1527-05. In our opinion, there were no exceptions made to the ASTM work scope. The Planning Center also included additional information that the DTSC has indicated as being of potential concern for school sites (DTSC 2001)

1.5.2 Deviations

The Planning Center completed this assessment in substantial conformance with the ASTM E 1527-05 Standard. In our opinion there were no deviations and deletions made from the ASTM work scope in completing this Phase I.

LIMITATIONS

Our work for this project was performed generally consistent with the ASTM E 1527-05 Standard for Phase I Environmental Site Assessments. Several organizations other than ASTM, such as professional associations (e g. ASFE and AGWSE) have also developed "guidelines" or "standards" for environmental site assessments. The Phase I presented herein is consistent with the ASTM E 1527-05 Standard, which may vary from the specific "guidelines" or "standards" required by other organizations

This Report was prepared pursuant to an Agreement dated April 15, 2008 between the District and The Planning Center. All uses of this Report are subject to, and deemed acceptance of, the conditions and restrictions contained in the Agreement. The observations and conclusions described in this Report are based solely on the Scope of Services provided pursuant to the Agreement. The Planning Center has not performed any additional observations, investigations, studies or other testing not specified in the Agreement. The Planning Center shall not be liable for the existence of any condition the discovery of which would have required the performance of services not authorized under the Agreement.

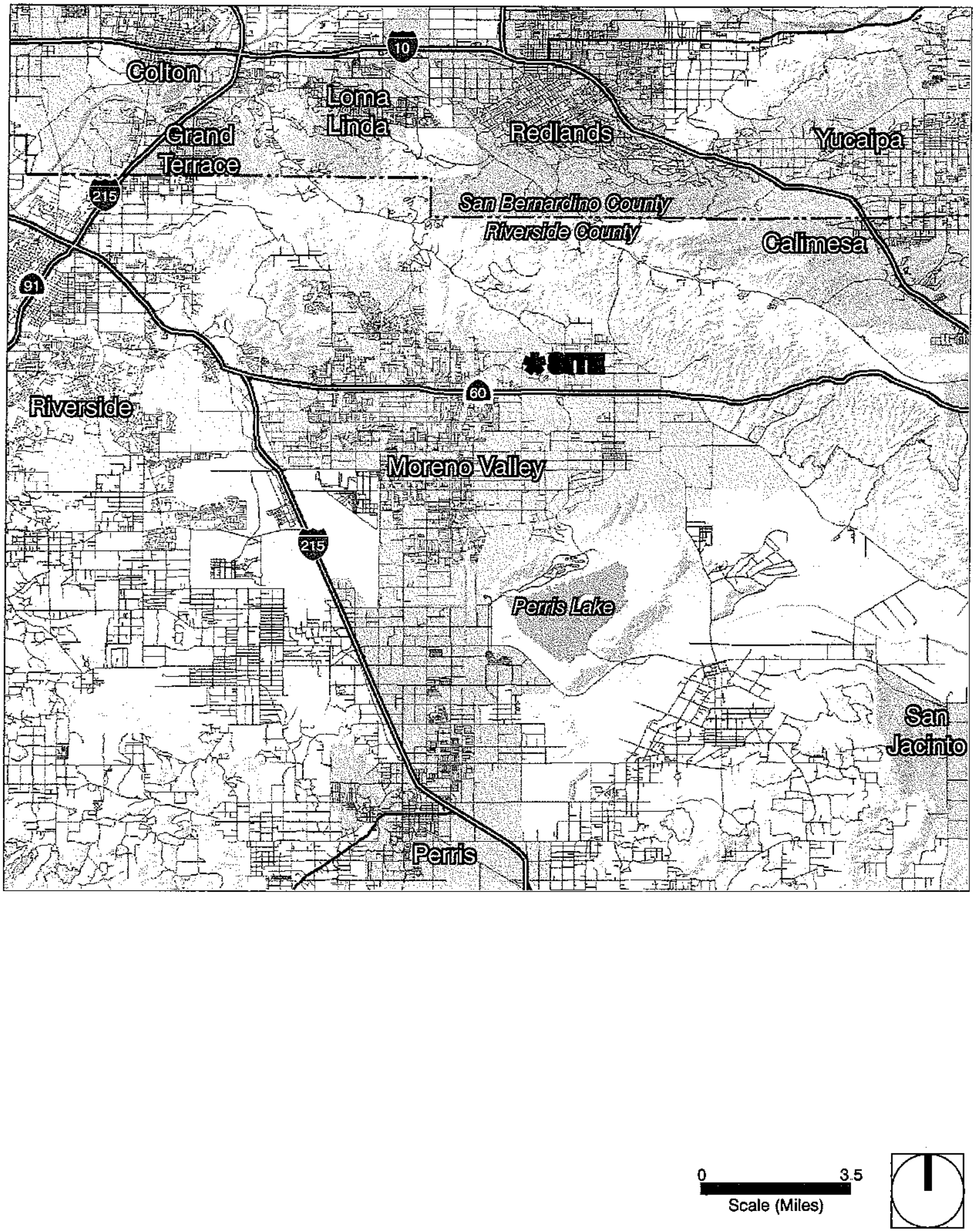
This Report is prepared for the exclusive use of the District in connection with the site located at the northeast corner of Ironwood Avenue and Nason Street in the City of Moreno Valley, Riverside County, California. There are no intended beneficiaries other than the District. The Planning Center shall owe no duty whatsoever to any other person or entity on account of the Agreement or the Report. Use of this Report by any person or entity other than the District for any purpose whatsoever is expressly forbidden unless such other person or entity obtains written authorization from the District and from The Planning Center. Use of this Report by such other person or entity without the written authorization of the District and The Planning Center shall be at such other person's or entity's sole risk, and shall be without legal exposure or liability to The Planning Center.

Use of this Report by any person or entity, including by the District, for a purpose other than the site located at the northeast corner of Ironwood Avenue and Nason Street in the City of Moreno Valley, Riverside County, California, is expressly prohibited unless such person or entity obtains written authorization from The Planning Center indicating that the Report is adequate for such other use. Use of this Report by any person or entity for such other purpose without written authorization by The Planning Center shall be at such person's or entity's sole risk and shall be without legal exposure or liability to The Planning Center.

This Report reflects site conditions observed and described by records available to The Planning Center as of the date of report preparation The passage of time may result in significant changes in site conditions, technology, or economic conditions, which could alter the findings and/or recommendations of the report. Accordingly, the District and any other party to whom the report is provided recognize and agree that The Planning Center shall bear no liability for deviations from observed conditions or available records after the time of report preparation.

Use of this Report by any person or entity in violation of the restrictions expressed in this Report shall be deemed and accepted by the user as conclusive evidence that such use and the reliance placed on this Report, or any portions thereof, is unreasonable, and that the user accepts full and exclusive responsibility and liability for any losses, damages or other liability which may result.

Site Location



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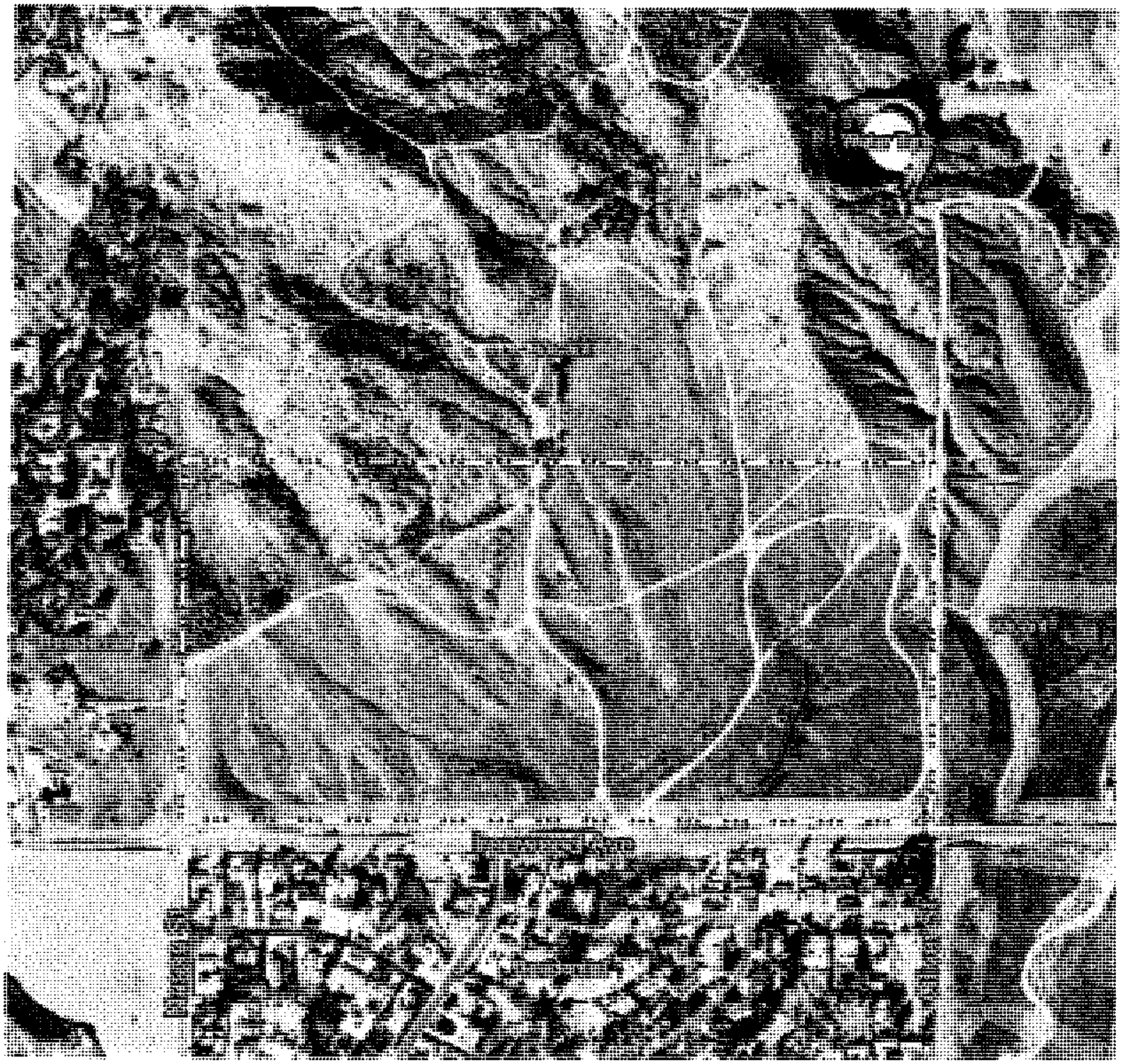
Existing Site Conditions



Site Boundary

0 570
Scale (Feet)

Source: Google Aerial Pro 2008

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2. Site Description

SITE OWNERSHIP AND LOCATION

2.1.1 Name of Site Owner

The name of the site owner is unknown. However, the site owner can be contacted through the following intermediary:

Chang Chung Yang
260 W. Las Flores Avenue
Arcadia, CA 91007

2.1.2 Name of Site Operator

The site is currently vacant land. No site operator has been identified by the District.

2.1.3 Site Location Map

The United States Geological Survey (USGS) topographic map for the site is the 7.5-minute Topographic Series, Sunnymead, California Quadrangle (see Appendix A). The USGS topographic map was used as the source for site setting information. The site is located in Riverside County at 33.9486° north latitude and 117 1864° west longitude.

SITE AND VICINITY DESCRIPTION

The following is a description of the proposed school site and surrounding area:

- The subject site is approximately 75 1 acres in size.
- The site currently consists of vacant land (Figure 2)
- Property around the perimeter of the Site is currently zoned for residential use based on a review of the City of Moreno Valley, General Plan Land Use Map.
- The area in the vicinity of the subject site is generally characterized as a mixed vacant land, residential, and commercial use area.

PHYSICAL SETTING

Subsurface explorations were not performed for this evaluation; therefore site geology and hydrology were evaluated on the basis of readily-available public information or references.

2.3.1 Topography

Topographically, most of the site is gently sloping to the south, although a relatively steep hill is located in the northwest portion and hummocky terrain exists in the central portion. Based on a review of the USGS 7.5-minute Topographic Series, Sunnymead, California Quadrangle Map (USGS 1980), surface elevation of the subject site ranges between approximately 1,830 to 2,040 feet above mean sea level (msl).

2.3.2 Geologic Information

The site is located in the northern highlands of Moreno Valley within the Perris Structural Block, part of the Peninsular Ranges Geomorphic Province. The Peninsular Ranges Province extends approximately 900 miles from the Los Angeles-Pomona-San Bernardino Basins to Baja California, Mexico and is characterized by elongated northwest-trending mountain ranges separated by sediment-floored valleys (Yerkes *et al.* 1965). The most dominant structural features of the province are the northwest-trending fault zones, most of which die out, merge with, or are terminated by the steep reverse faults at the southern margin of the San Gabriel-San Bernardino Mountains within the Transverse Ranges Geomorphic Province far to the north of the Site. The property itself sits atop the Perris structural block, which lies between the Elsinore and San Jacinto faults. Most of the property sits atop Holocene and late Pleistocene young sandy axial channel deposits and early Pleistocene very old sandy alluvial fan deposits, although the northwest portion of the site has outcrops of Cretaceous biotite-hornblende tonalite (Morton and Matti 2001).

Our review of available in-house literature indicates that no active faults or fault traces are known to exist beneath the subject site.

2.3.3 Naturally Occurring Asbestos Containing Minerals

According to the California Division of Mines and Geology (CDMG), no naturally-occurring serpentine rock or rock formations that may contain a significant quantity of asbestos are located in the site vicinity (CDMG 2000).

2.3.4 Ground Water and Surface Water Information

Based on surface topography, surface water at the site generally flows to the south. The groundwater flow would be expected to follow the topographic gradient to the closest water body. An unnamed ephemeral wash is present on the central portion of the site. Hydrogeologic investigations were not performed on the site for this investigation; therefore, it is unknown to what extent localized variations in groundwater presence and flow occur on the site.

Sheet flow runoff from the site during periods of intense or prolonged precipitation would be expected to flow towards the south. According to the Federal Emergency Management Agency [FEMA] online map information (FIRM 1987), the site is located within Zone X, outside of a 100- or 500-year flood zone.

The subject site is located on alluvium with relatively shallow bedrock north of the Perris North Subbasin of the San Jacinto Groundwater Basin. Groundwater in the San Jacinto Groundwater Basin flows generally toward the course of the San Jacinto River and westward out of the basin, however, high extraction rates have produced groundwater depressions and locally reversed the flow pattern. Primary recharge in this basin occurs from percolation of flow from the San Jacinto River and its tributary streams and from infiltration of rainfall on the valley floor. Based on subsurface bedrock topography, the flow direction is expected to be toward the southeast (Wildermuth 2000). According to Wildermuth (2000), the bedrock is shallow on the site, so transient groundwater may exist in alluvium following significant rainfall events

3. *Previous Reports*

No previous reports have been provided or prepared for the subject Site.

3. Previous Reports

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4. Site History

4.1 PAST USAGE OF THE SITE

Past usage of the site was assessed through a review of aerial photographs and historical topographic maps. Copies of historical references reviewed are included in Appendix A.

According to historical aerial photographs and topographic maps, the site has been vacant undeveloped land since at least 1901.

4.1.1 Aerial Photographs

Aerial photographs were obtained from Environmental Data Resources (EDR) for the years 1938, 1953, 1967, 1980, 1989, 1994, 2002 and 2005 and were reviewed for the subject site. Copies of the aerial photographs are included in Appendix A

- 1938 – The subject site is vacant undeveloped land.
- 1953 – The subject site appears relatively unchanged in comparison to the 1938 aerial photograph.
- 1967 – The subject site appears relatively unchanged in comparison to the 1953 aerial photograph.
- 1980 – The subject site appears relatively unchanged in comparison to the 1967 aerial photograph.
- 1989 – The subject site appears relatively unchanged in comparison to the 1980 aerial photograph.
- 1994 – The subject site appears relatively unchanged in comparison to the 1989 aerial photograph.
- 2002 – The subject site appears relatively unchanged in comparison to the 1994 aerial photograph.
- 2005 – The subject site appears relatively unchanged in comparison to the 2002 aerial photograph

4.1.2 Historical Topographic Maps

Historical topographic maps were obtained from EDR for the years 1901, 1943, 1953, 1967 and 1980 were reviewed for the subject site. Copies of the topographic maps are included in Appendix A.

- 1901 – The site appears to be vacant and no structures are depicted.
- 1943 – The subject site is unchanged in comparison to the 1901 topographic map.
- 1953 – The subject site is unchanged in comparison to the 1943 topographic map
- 1967 – The subject site is unchanged in comparison to the 1953 topographic map.
- 1980 – The subject site is unchanged in comparison to the 1967 topographic map

4. Site History

4.1.3 Prior Agricultural Use

Based on the site visit, file reviews, and the review of aerial photographs and historic topographic maps, the subject site does not appear to have been used for agricultural purposes. According to historical aerial photographs, the site has been vacant undeveloped land since at least 1938. In addition, there was no observable evidence of historical irrigation or farming structures during the site reconnaissance.

4.1.4 Mines

Based on the review of historical sources (aerial photographs and historic topographic maps) and the database search report, there is no evidence to indicate that the site was ever utilized for mining operations.

4.1.5 Illegal Drug Manufacturing

The proposed site was not identified by the California Hazardous Material Incident Report System (CHMIRS) which is maintained by the California Office of Emergency Services and contains information regarding hazardous material incidents such as accidental releases or spills. Drug-related waste was not observed on the site during the site inspection

4.1.6 Prior U.S. Government Ownership

According to historical aerial photographs the subject site has been vacant undeveloped land since at least 1938. There is no indication that the property was owned by the U.S. Government or utilized for military operations.

4.2 PAST USAGE OF ADJOINING PROPERTIES

Based on review of historical aerial photographs, the properties immediately surrounding the Site to the south and west were vacant undeveloped land until development for agricultural purposes from about 1967 to about 1980. The properties to the south and west have been residential dwellings since at least 1989. A property to the north was developed with a rural dwelling from at least 1953 to about 2002. The remaining adjoining properties have been vacant, undeveloped land since at least 1901

4.2.1 Aerial Photographs

Aerial photographs were obtained from EDR for the years 1938, 1953, 1967, 1980, 1989, 1994, 2002 and 2005 and were reviewed for properties adjoining the subject site. Copies of the aerial photographs are included in Appendix A. Land immediately surrounding the Site consists of undeveloped vacant land to the north and east, and residential dwellings to the south and west. Land uses surrounding the school have included undeveloped land, residential and some agricultural use.

4.2.2 Historical Topographic Maps

Historical topographic maps were obtained from EDR for the years 1901, 1943, 1953, 1967 and 1980 were reviewed for properties adjoining the subject site. Copies of the topographic maps are included in Appendix A Land immediately surrounding the Site consists of undeveloped vacant land to the north and east, and residential dwellings to the south and west. Land uses surrounding the site have included undeveloped land, residential and some agricultural use.

STANDARD ENVIRONMENTAL RECORDS REVIEW

The Planning Center utilized the electronic database service EDR to complete the environmental records review The database search was used to identify properties that may be listed in the referenced Agency records, located within the ASTM-specified search radii indicated below:

- NPL sites: .... 1 mile
- CERCLIS sites: .... 0.5 mile
- CERCLIS NFRAP sites .... Site and Adjoining
- Federal ERNS: .... Site only
- RCRA non-CORRACTS TSD facilities: .... 0.5 mile
- RCRA CORRACTS TSD facilities: .... 1 mile
- RCRA Generators: .... Site & Adjoining
- State Hazardous Waste Sites: .... 1 mile
- Registered Underground Storage Tanks: .... Site & Adjoining
- State Landfills and Solid Waste Disposal Sites: .... 0.5 mile
- State Leaking Underground Storage Tanks: .... 0.5 mile

A review of selected regulatory agency databases for documented environmental concerns on the site, or in close proximity to the site, was conducted by EDR (a copy of the EDR Report dated February 29, 2008 is included in Appendix B).

The subject site was not identified on any of the databases searched. The following is a summary of information provided for each of the above-listed databases.

5.1.1 *NPL Sites*

The National Priorities List (NPL) is a list of contaminated sites that are considered the highest priority for clean-up by the EPA

- The subject site is not listed on the NPL List
- The database search did not identify any NPL sites within a mile radius of the subject site.

5.1.2 *CERCLIS Sites*

The Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS) list identifies sites which are suspected to have contamination and require additional investigation to assess if they should be considered for inclusion on the NPL.

- The subject site is not listed on the CERCLIS List

- The database search did not identify any CERCLIS sites within a one-half mile radius of the subject site

5.1.3 CERCLIS-NFRAP Sites

CERCLIS-NFRAP status indicates that a site was once on the CERCLIS List but has No Further Response Actions Planned (NFRAP). Sites on the CERCLIS-NFRAP List were removed from the CERCLIS List in February 1995 because, after an initial investigation was performed, no contamination was found, contamination was removed quickly, or the contamination was not significant enough to warrant NPL status.

- The subject site is not listed on the CERCLIS-NFRAP List.
- The database search did not identify any CERCLIS-NFRAP sites adjacent to the subject site.

5.1.4 Federal ERNS List

The Federal Emergency Response Notification System (ERNS) list tracks information on reported releases of oil and hazardous materials.

- The subject site is not identified on the Federal ERNS list.

5.1.5 RCRA Non-CORRACTS TSD Facilities

The Resource Conservation and Recovery Act (RCRA) non-CORRACTS TSD Facilities List tracks facilities which treat, store, or dispose of hazardous waste and are not associated with corrective action activity.

- The subject site is not listed as a RCRA non-CORRACTS TSD facility.
- The database search did not identify any RCRA non-CORRACTS TSD facilities within a one-half mile radius of the subject site.

5.1.6 RCRA CORRACTS TSD Facilities

The RCRA CORRACTS TSD Facilities list catalogues facilities that treat, store, or dispose of hazardous waste and have been associated with corrective action activity.

- The subject site is not listed as a RCRA CORRACTS TSD facility.
- The database search did not identify any RCRA CORRACTS TSD facilities within a one-mile radius of the subject site.

5.1.7 RCRA Generators

The RCRA Generator list is maintained by the EPA to track facilities that generate hazardous waste.

- The subject site is not listed as a RCRA Hazardous Waste Generator.

5.1.8 State Sites and State Spill Sites

The Cal-Sites database, maintained by the DTSC, contains both known and potential hazardous substance sites.

- The subject site is not listed as a State Site or State Spill Site.
- The database search did not identify any State Sites or State Spill Sites within a one mile radius of the subject site

5.1.9 Cortese List

The Cortese list database identifies hazardous waste sites selected for remedial action and underground storage tank (UST) properties having a reportable release and is maintained by the EPA/Office of Emergency Information.

- The subject site is not listed on the Cortese List.
- The database search did not identify any Cortese sites within a one-half mile radius of the subject site.

5.1.10 Registered Underground Storage Tanks (USTs)

The State Water Resources Control Board's Hazardous Substance Storage Container Database maintains a list of USTs regulated by the Resource Conservation and Recovery Act.

- The subject site is not listed on the registered UST list.
- The database search did not identify registered USTs within a ¼-mile of the site.

5.1.11 Facility Inventory Database USTs

The State Water Resource Control Board's Facility Inventory Database contains a historical listing of active and inactive underground storage tank locations.

- The subject site is not listed as containing active and/or inactive underground storage tank locations.
- The database search did not identify sites listed as containing active and/or inactive underground storage tank locations within a ¼-mile of the site

5.1.12 State Landfills and Solid Waste Disposal Sites

- The database search did not identify any State Landfills or Solid Waste Disposal Sites within a one-half mile radius of the subject site.

5.1.13 State Leaking Underground Storage Tanks

The State Water Resources Control Board Leaking Underground Storage Tank Information System contains an inventory of Leaking Underground Storage Tank (LUST) Incident Reports.

- The subject site is not listed on the LUST list

- The database search did not identify any LUST facilities within a half-mile radius of the subject site.

5.1.14 MINES

The Department of Labor, Mines Safety, and Health Administration maintains the Mines Master Index File. The database is updated semi-annually.

- The subject site is not listed on the Mines Master Index File.
- The database search did not identify sites on the Mines Master Index File adjacent to the subject site.

5.2 ADDITIONAL ENVIRONMENTAL RECORDS REVIEW

In conformance with ASTM inquiry was made with representatives of the agencies described below and with the user of this Phase I.

5.2.1 Proximity to High-Pressure Gas Lines or Fuel Transmission Lines

A letter was sent to the Southern California Gas Company (SCGC) on May 2, 2008 requesting information regarding the location of high-pressure pipelines located within a 1,500 foot radius of the subject site. A response was received on May 16, 2008 Based on the information received from the SCGC there [illegible] high pressure pipelines [illegible] in the vicinity of the subject site (Appendix C)

5.2.2 State of California Division of Oil and Gas Records

A review of California Division of Oil and Gas Regional Wildcat Map W1-7 (California Department of Conservation 2004) indicates that there are no active or abandoned oil or gas fields on the subject site or adjoining properties. The closest oil well is located approximately two miles east of the subject site. The well is identified as a plugged and abandoned dry hole drilled by Perri Oil Co in 1956 to a depth of 3,711 feet. The oil wells in the vicinity were dry non-producing wells that were plugged shortly after completion The oil and gas map pages showing the vicinity of the closest oil wells are included in Appendix C.

The environmental databases reviewed as part of this Phase I include the Former Manufactured Gas Sites database (Coal Gas). The subject site and surrounding sites were not identified on the Coal Gas database, thereby, providing additional information on the absence of gas fields in the immediate area of the subject site (Appendix B).

5.2.3 User-Provided Information

The ASTM Standard requires disclosure in the Phase I report whether the user of the report has specialized knowledge about previous ownership or uses of the property that may be material to identifying RECs or HRECs, or whether the user has determined that the property's Title contains environmental liens or other information related to environmental condition of the property, including engineering and institutional controls and Activity and Use Limitations, as defined by ASTM. In addition, we are required by the ASTM Standard to inquire whether the user of the report has prior knowledge that the price of the property has been reduced for environmentally-related reasons.

The Planning Center was informed by the user that to their knowledge there are no liens or other information about the environmental condition of the property in the Title. In addition, the user was not aware of specialized knowledge about previous ownership or uses of the property that may be material to identifying RECs with the exception of the information provided above, and has not indicated that the price of the property has been reduced for environmentally-related reasons.

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6. Site Reconnaissance and Key Personnel Interview(s)

A site visit to observe site conditions was conducted by Michael Watson of The Planning Center on May 16, 2008. Mr Watson was unaccompanied during the site visit. The Planning Center personnel observed the exterior portions of the property, including the property boundaries. No weather-related conditions or other conditions that would limit our ability to observe the site occurred during our site reconnaissance. Site photographs are included in Appendix D.

ASTM Section 9 8 requires that, prior to the site visit, the current site owner or Key Site Manager and user, if different from the current owner or Key Site Manager, be asked if there are any helpful documents or information that can be made available for review. These consist of environmental site assessment reports, audits, permits, tank registrations, Material Safety Data Sheets, Community Right-to-Know plans, safety plans, hydrogeologic or geotechnical reports, or hazardous waste generator reports. The District provided a figure, and verbal information regarding the property.

6.1 CURRENT USE OF THE PROPERTY

The Site consists of an approximately 75.1-acre parcel of vacant, undeveloped land.

6.2 SITE VISIT OBSERVATIONS

6.2.1 General Description of Structures

The subject site contains no structures

6.2.2 Heating and Cooling System

The subject site contains no structures.

6.2.3 Potable Water Supply and Sewage Disposal System or Septic Systems

Potable water and sewer services will be provided to the site by the Eastern Municipal Water District (EMWD). Approximately 75% of EMWD's potable water demand is supplied by imported water from Metropolitan Water District through its Colorado River Aqueduct and its connections to the State Water Project. Approximately 25% of EMWD's potable water demand is supplied by EMWD groundwater wells. The majority of the groundwater produced by EMWD comes from its wells in the Hemet and San Jacinto area, where it is also served. EMWD also has wells in the Moreno Valley, Perris Valley, and Murrieta areas.

6.2.4 Use of Petroleum Products and Hazardous Materials

Use of petroleum products or hazardous materials was not observed at the subject site.

6.2.5 Storage of Petroleum Products and Hazardous Materials (Storage Tanks, Drums)

No hazardous materials were observed or reported at the subject site.

6.2.6 Disposal of Petroleum Products and Hazardous Materials

No evidence of disposal of petroleum products or hazardous materials was observed at the subject site.

6.2.7 *Hydraulic Elevators*

No hydraulic elevators were observed at the subject site.

6.2.8 *Vehicle Maintenance Lifts*

No vehicle maintenance lifts were observed at the subject site.

6.2.9 *Emergency Generators and Sprinkler System Pumps*

No emergency generators or sprinkler system pumps were observed on the subject site.

6.2.10 *Polychlorinated Biphenyls (PCBs) Associated with Electrical or Hydraulic Equipment*

No electrical or hydraulic equipment was observed on the subject site. Pole-mounted transformers were observed in the right-of-way along Ironwood Avenue. Based on the information above, PCBs are not expected to have impacted the subject site.

6.2.11 *Floor Drain and Sumps*

No sumps or floor drains were observed at the subject site.

6.2.12 *Catch Basins*

No catch basins were observed at the subject site.

6.2.13 *Dry Wells*

No dry wells were observed at the subject site.

6.2.14 *Pits, Ponds, Lagoons, and Pools of Liquid*

No pits, ponds, lagoons, observed at the subject site.

6.2.15 *Odors*

No odors were observed at the subject site.

6.2.16 *Stains or Corrosion on Floors, Walls, or Ceilings*

No buildings are located on the subject site.

6.2.17 *Stained Soil or Pavement*

No stained soil or pavement was observed at the subject site.

6.2.18 *Stressed Vegetation*

No stressed vegetation was observed at the subject site

6. Site Reconnaissance and Key Personnel Interview(s)

6.2.19 Solid Waste and Evidence of Waste Filling

No evidence of waste filling was observed on the subject site.

6.2.20 Wastewater and Stormwater Discharge

No wastewater discharge was observed on the subject site The site is not paved and stormwater is expected be minimal.

6.2.21 Monitoring, Water Supply, or Irrigation Wells

No monitoring, water supply, or irrigation wells were observed at the subject site.

6.2.22 Sanitary Sewer and Septic Systems

Sanitary sewage in the vicinity is discharged by the EMWD sewage collection system No septic systems were observed on the subject site

6.2.23 Non-Scope Considerations

- No evidence of fill material was observed on the subject site. The site has not been developed
- Based on a review of aerial photographs, topographic maps, and a site inspection, the proposed school site is not located within 1,500 feet of a railroad track easement.
- According to aerial photographs and topographic maps, the site has been vacant land since at least 1901. Therefore, lead-based paint, termiticides and asbestos-containing material are not expected to have been used on the site

INTERVIEWS

Interviews were conducted with Ms. Amber Caudill on May 29, 2008. Ms. Caudill is a facilities planner for the District. Ms. Caudill participated in filling out a site questionnaire, which is included in Appendix E. Ms. Caudill is not aware of any USTs or other operations associated with the site

6. *Site Reconnaissance and Key Personnel Interview(s)*

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7. *Data Gap Identification*

No site or adjacent land owners were interviewed for this Phase I Environmental Site Assessment. In addition, chain-of-title documents were not obtained for the site.

7. *Data Gap Identification*

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8. Findings and Conclusions

The Planning Center has performed a Phase I Environmental Site Assessment on behalf of the Moreno Valley Unified School District, for the Proposed Alternate High School 5 – Ironwood/Nason located at the northeast corner of Ironwood Avenue and Nason Street in the City of Moreno Valley, Riverside County, California. The subject site consists of an undeveloped parcel of land approximately 75.1 acres in size.

The scope of work is described and conditioned by our proposal dated April 15, 2008 As indicated in our proposal, this Phase I was performed in conformance with the scope and limitations of the American Society for Testing and Materials (ASTM) E 1527-05 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process. Exceptions to, or deletions from, this practice are described in Section 1 of this report Our conclusions are intended to help the user evaluate the "environmental risk" associated with the site, as defined in the ASTM E 1527-05 Standard and discussed in the Introduction section of this report.

RECOGNIZED ENVIRONMENTAL CONDITIONS

The goal of the ASTM E 1527-05 Standard practice is to identify Recognized Environmental Conditions (RECs), as defined in the Standard and in Section 1 of this report.

This assessment has revealed no evidence of RECs in connection with the subject site as defined in the Standard and in Section 1 of this report and DTSC recommended school guidance for Phase I assessments.

HISTORICAL RECS AND KNOWN OR SUSPECT ENVIRONMENTAL CONDTIONS

The ASTM E 1527-05 Standard also requires that historical RECs (HRECs) and other known or suspect environmental conditions, as defined in the Standard and in Section 1 of this report are identified in the Phase I.

This assessment has revealed no evidence of HRECs or known environmental conditions in connection with the subject site.

SUMMARY

Based on the results of this assessment, RECs, HRECs, and known environmental conditions associated with the subject site were not identified. No further assessment or investigation is recommended for the subject site.

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9. Credentials

This report was prepared by Peter Garcia and Michael Watson, who served as the Director-in-Charge and Project Geologist, respectively. Qualifications information for the project personnel is provided in Appendix F.

9. *Credentials*

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References

1. American Society for Testing and Materials (ASTM) Practice for ESAs: Phase I Assessments Process, 2005. ASTM Standard E 1527-05.

2. California Department of Conservation, 2004. California Division of Oil and Gas Regional Map Series, Wildcat Map W1-7

3. California Division of Mines and Geology (CDMG), 1998. Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada.

4. California Division of Mines and Geology (CDMG), 2000. "A General Location Guide for Ultramafic Rocks in California – Areas More Likely to Contain Natural Occurring Asbestos", Open-File Report 2000-19, August 2000.

5. City of Moreno Valley, July 11, 2006. General Plan

6. Environmental Data Resources, Inc., February 29, 2008. Database Report.

7. Federal Emergency Management Agency, 1987. FEMA Digital Flood Insurance Rate Map (FIRM), of the site located at http://www.fema.gov.

8. Morton, D. M., and J. Matti, 2001. Geologic Map of the Sunnymead 7.5' Quadrangle, Riverside County, California, Version 1.0, United States Geological Survey Open-File Report 01-450, scale 1:24,000.

9. Riverside County Land Information System, 2008. Website accessed by The Planning Center on April 21, 2008, at http://www3.tlma.co.riverside.ca.us.

10. The Planning Center, May 16, 2008 Site visit performed by Mr. Michael Watson.

11. United States Geological Survey (USGS), 1980. Sunnymead, California Quadrangle, 7.5 minute series, scale 1:24,000.

12. Yerkes, R. F., *et al.*, 1965. Geology of the Los Angeles Basin, California – An Introduction, United States Geological Survey Professional Paper 420-A

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APPENDIX G
PHOTOGRAPHIC LOG

Photograph 1 – View of the subject property looking west from the central portion of the property.

Photograph 2 – View looking towards the east from the central region of the subject property.

Photograph 3 – View looking towards the north, along Nason Street, from the southwestern corner of the subject property.

Photograph 4 – View looking east along Ironwood Avenue, from the southwestern corner of the subject property.

Photograph 5 – View looking northeast, from the southwestern corner of the subject property.

Photograph 6 – View of debris and litter in the northwestern region of the subject property. This includes broken piping, plastic recyclables, and other trash.

Photograph 7 – View looking east, from the northwestern corner of the subject property.

Photograph 8 – View looking southeast, from the northwestern region of the subject property.

Photograph 9 – View looking south, from the central region of the northern perimeter of the subject property.

Photograph 10 – View looking east, from the central region of the subject property.

Photograph 11 – View looking west, from the central region of the subject property.

Photograph 12 – View looking south along Oliver Street, from the northeastern corner of the subject property.

Photograph 13 – Overview of the subject property looking west, from the highest peak in the northeastern corner of the subject property.

Photograph 14 - Overview of the subject property looking southwest, from the highest peak in the northeastern corner of the subject property.

Photograph 15 – View of litter and other windblown debris found in the northeastern region of the subject property.

Photograph 16 – View looking west along Ironwood Avenue, from the southeastern corner of the subject property.

Photograph 17 – View looking northwest, from the southeastern corner of the subject property.

Photograph 18 – View looking north, from the central region of the southern perimeter of the subject property.

APPENDIX H
VAPOR ENCROACHMENT SCREEN USER QUESTIONNAIRE

EEI
Geotechnical & Environmental Solutions

ASTM E2600-10
VAPOR ENCROACHMENT SCREENING – USER QUESTIONNAIRE

Project Name: **EEI Job No.: GLO-71982.1 / Undeveloped Property – 80-Acres**

Project Address: **NWC Ironwood Ave. and Oliver St., Moreno Valley, Riverside County CA 92555**

1. Property type: [ ] Commercial [ ] Industrial [ ] Multi-Tenant [X] Vacant Land

2. Are there any buildings/ structures on the property? Yes [ ] No [X] Unknown [ ]

If yes, type construction________________________________

3. Will buildings/structures be constructed on the property in the future? Yes [X] No [ ] Unknown [ ]

If yes, type construction _Single Family Detached

4. If buildings exist or are proposed, do/will they have elevators? Yes [ ] No [X]

5. Type of level below grade (existing or proposed)? [ ] Full Basement [ ] Crawl Space [X] Slab on grade [ ] Parking Garage [ ] Multi-level

6. Ventilation in level below grade? Yes [ ] No [X] Unknown [ ]

7. Sump pumps, floor drains, or trenches (existing or proposed)? Yes [ ] No [X] Unknown [ ]

8. Radon or methane mitigation system installed? Yes [ ] No [X] Unknown [ ]

9. Heating system type (existing or proposed)? (CHECK ALL THAT APPLY)

[X] Hot Air Circulation [ ] Electric Baseboard [ ] Hot Air Radiation [ ] Heat Pump [X] Hot Water Radiation

[ ] Wood Stove [ ] Kerosene Heater [ ] Steam Radiation [ ] Fireplace [ ] Coal Furnace [ ] Radiant Floor Heat [ ] Hot Water Circulation [ ] Fuel Oil Furnace [X] Gas Furnace [ ] Other

10. Type of fuel energy (existing or proposed)? (CHECK ALL THAT APPLY)

[X] Natural Gas [X] Electric [ ] Propane [ ] Fuel Oil [ ] Kerosene [ ] Wood [ ] Coal [X] Solar [ ] Other

11. Have there ever been any environmental problems at the property? Yes [ ] No [X] Unknown [ ]

If yes, describe)____

12. Does/will a gas station or dry cleaner operate anywhere on the property? Yes [ ] No [X] Unknown [ ]

13. Do any tenants use hazardous chemicals in relatively large quantities on the property? Yes [ ] No [X] Unknown [ ]

If yes, describe____

14. Have any tenants ever complained about odors in the building or experienced health-related problems that may have been associated with the building? Yes [ ] No [X] Unknown [ ]

2195 Faraday Avenue • Suite K • Carlsbad, California 92008-7207 • Ph: 760-431-3747 • Fax: 760-431-3748 • www.eeitiger.com

15. Are the operations (or proposed operations to be performed) on the property OSHA regulated?
Yes [ ] No [X] Unknown [ ]

16. Are there any existing or proposed underground storage tanks (USTs) or above ground storage tanks (ASTs)? Yes. [ ] No [X] Unknown [ ]

17. Are there any sensitive receptors (for example, children, elderly, people in poor health, and so forth) that occupy or will occupy the property? Yes [ ] No [X] Unknown [ ]

Parcel ID # **473-160-004**

Preparer:

Name: **JOSEPH RIVANI**

Address: **3470 WILSHIRE BLVD. STE. 1020 LOS ANGELES, CA 90010**

Signature: ____________________

Date: **10/02/2014**

NW IRONWOOD AVE and OLIVER ST
NW IRONWOOD AVE and OLIVER ST
Moreno Valley, CA 92555

Inquiry Number: 4092958.6s
October 10, 2014

EDR Vapor Encroachment Screen

Prepared using EDR's Vapor Encroachment Worksheet

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of the ASTM Standard Practice for Assessment of Vapor Encroachment into Structures on Property Involved in Real Estate Transactions (E 2600-10).

STANDARD ENVIRONMENTAL RECORDS	Maximum Search Distance*	Summary: property	1/10	1/10 - 1/3
Federal NPL	0.333	0	0	0
Federal CERCLIS	0.333	0	0	0
Federal RCRA CORRACTS facilities list	0.333	0	0	0
Federal RCRA TSD facilities list	0.333	0	0	0
Federal RCRA generators list	property	0	-	-
Federal institutional controls / engineering controls registries	0.333	0	0	0
Federal ERNS list	property	0	-	-
State and tribal - equivalent NPL	0.333	0	0	0
State and tribal - equivalent CERCLIS	0.333	0	0	0
State and tribal landfill / solid waste disposal	0.333	0	0	0
State and tribal leaking storage tank lists	0.333	0	0	0
State and tribal registered storage tank lists	property	0	-	-
State and tribal institutional control / engineering control registries	not searched	-	-	-
State and tribal voluntary cleanup sites	0.333	0	0	0
State and tribal Brownfields sites	not searched	-	-	-
Other Standard Environmental Records	0.333	0	0	0

HISTORICAL USE RECORDS				
Former manufactured Gas Plants	0.333	0	0	0
Historical Gas Stations	0.25	0	0	0
Historical Dry Cleaners	0.25	0	0	0
Exclusive Recovered Govt. Archives	property	0	-	-

*Each category may include several separate databases, each having a different search distance. For each category, the table reports the maximum search distance applied. See the section 'Record Sources and Currency' for information on individual databases.

EXECUTIVE SUMMARY

TARGET PROPERTY INFORMATION

ADDRESS

NW IRONWOOD AVE AND OLIVER ST
NW IRONWOOD AVE AND OLIVER ST
MORENO VALLEY, CA 92555

COORDINATES

Latitude (North):	33.9483 - 33˚ 56´ 53.87787˝
Longitude (West):	117.187 - 117˚ 11´ 13.187256˝
Elevation:	1865 ft. above sea level

EXECUTIVE SUMMARY

PHYSICAL SETTING INFORMATION

Flood Zone:	Available
NWI Wetlands:	Available

AQUIFLOW®

Search Radius: 0.333 Mile.

No Aquiflow sites reported.

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Terrace escarpments

Soil Surface Texture:
Hydrologic Group: Not reported

Soil Drainage Class:
Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

No Layer Information available.

Soil Map ID: 2

Soil Component Name: VISTA

Soil Surface Texture: coarse sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

EXECUTIVE SUMMARY

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	14 inches	coarse sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6
2	14 inches	24 inches	coarse sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6
3	24 inches	27 inches	weathered bedrock	Not reported	Not reported	Max: 0.42 Min: 0	Max: Min:

Soil Map ID: 3

Soil Component Name: HANFORD

Soil Surface Texture: coarse sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

EXECUTIVE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		Soil Reaction (pH)
1	0 inches	7 inches	coarse sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 5.6
2	7 inches	40 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 5.6
3	40 inches	59 inches	stratified loamy sand to coarse sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 7.8 Min: 5.6

Soil Map ID: 4

Soil Component Name: MONSERATE

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

EXECUTIVE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	9 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1
2	9 inches	27 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 4 Min: 1.4	Max: 7.3 Min: 6.1
3	27 inches	44 inches	indurated	Not reported	Not reported	Max: 0.01 Min: 0	Max: Min:
4	44 inches	57 inches	cemented	Not reported	Not reported	Max: 0.01 Min: 0	Max: Min:
5	57 inches	70 inches	loamy coarse sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 8.4 Min: 6.6

Soil Map ID: 5

Soil Component Name:	HANFORD
Soil Surface Texture:	coarse sandy loam
Hydrologic Group:	Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.
Soil Drainage Class:	Somewhat excessively drained
Hydric Status:	Not hydric
Corrosion Potential - Uncoated Steel:	Low
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

EXECUTIVE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	coarse sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 5.6
2	7 inches	40 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 5.6
3	40 inches	59 inches	stratified loamy sand to coarse sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 7.8 Min: 5.6

Soil Map ID: 6

Soil Component Name:	MONSERATE
Soil Surface Texture:	sandy loam
Hydrologic Group:	Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.
Soil Drainage Class:	Well drained
Hydric Status:	Not hydric
Corrosion Potential - Uncoated Steel:	Low
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

EXECUTIVE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	9 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1
2	9 inches	18 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 4 Min: 1.4	Max: 7.3 Min: 6.1
3	18 inches	44 inches	indurated	Not reported	Not reported	Max: 0.01 Min: 0	Max: Min:
4	44 inches	57 inches	cemented	Not reported	Not reported	Max: 0.01 Min: 0	Max: Min:
5	57 inches	70 inches	loamy coarse sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 8.4 Min: 6.6

Soil Map ID: 7

Soil Component Name: HANFORD

Soil Surface Texture: loamy fine sand

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

EXECUTIVE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		Soil Reaction (pH)
1	0 inches	7 inches	loamy fine sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 7.8 Min: 5.6
2	7 inches	40 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 5.6
3	40 inches	59 inches	stratified loamy sand to coarse sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 7.8 Min: 5.6

Soil Map ID: 8

Soil Component Name:	MONSERATE
Soil Surface Texture:	sandy loam
Hydrologic Group:	Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
Soil Drainage Class:	Well drained
Hydric Status:	Not hydric
Corrosion Potential - Uncoated Steel:	Low
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

EXECUTIVE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	9 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1
2	9 inches	27 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 4 Min: 1.4	Max: 7.3 Min: 6.1
3	27 inches	44 inches	indurated	Not reported	Not reported	Max: 0.01 Min: 0	Max: Min:
4	44 inches	57 inches	cemented	Not reported	Not reported	Max: 0.01 Min: 0	Max: Min:
5	57 inches	70 inches	loamy coarse sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 8.4 Min: 6.6

Soil Map ID: 9

Soil Component Name:	Cieneba
Soil Surface Texture:	sandy loam
Hydrologic Group:	Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
Soil Drainage Class:	Somewhat excessively drained
Hydric Status:	Not hydric
Corrosion Potential - Uncoated Steel:	Low
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

EXECUTIVE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	14 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.1
2	14 inches	22 inches	weathered bedrock	Not reported	Not reported	Max: 0.42 Min: 0	Max: Min:

Soil Map ID: 10

Soil Component Name: RAMONA

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	14 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 5.6

EXECUTIVE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	14 inches	22 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 7.3 Min: 6.1
3	22 inches	68 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 4 Min: 1.4	Max: 7.3 Min: 6.1
4	68 inches	74 inches	gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 4 Min: 1.4	Max: 8.4 Min: 6.6

Soil Map ID: 11

Soil Component Name: MONSERATE

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

EXECUTIVE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	9 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1
2	9 inches	27 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 4 Min: 1.4	Max: 7.3 Min: 6.1
3	27 inches	44 inches	indurated	Not reported	Not reported	Max: 0.01 Min: 0	Max: Min:
4	44 inches	57 inches	cemented	Not reported	Not reported	Max: 0.01 Min: 0	Max: Min:
5	57 inches	70 inches	loamy coarse sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 8.4 Min: 6.6

Soil Map ID: 12

Soil Component Name: ROCKLAND

Soil Surface Texture: unweathered bedrock

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class:
Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

EXECUTIVE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	59 inches	unweathered bedrock	Not reported	Not reported	Max: Min:	Max: Min:

Soil Map ID: 13

Soil Component Name: TUJUNGA

Soil Surface Texture: loamy sand

Hydrologic Group: Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.

Soil Drainage Class: Excessively drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	9 inches	loamy sand	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 7.3 Min: 6.1
2	9 inches	59 inches	loamy sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Clean Sands, Well-graded sand.	Max: 141 Min: 42	Max: 7.8 Min: 6.1

EXECUTIVE SUMMARY

Soil Map ID: 14

Soil Component Name: CIENEBA

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Somewhat excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	14 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.1
2	14 inches	22 inches	weathered bedrock	Not reported	Not reported	Max: 0.42 Min: 0	Max: Min:

Soil Map ID: 15

Soil Component Name: GREENFIELD

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

EXECUTIVE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	25 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 6.1
2	25 inches	42 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.8 Min: 6.1
3	42 inches	59 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 7.8 Min: 6.1
4	59 inches	72 inches	stratified loamy sand to sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 8.4 Min: 6.6

Soil Map ID: 16

Soil Component Name:	FALLBROOK
Soil Surface Texture:	sandy loam
Hydrologic Group:	Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
Soil Drainage Class:	Well drained
Hydric Status:	Not hydric
Corrosion Potential - Uncoated Steel:	Low
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

EXECUTIVE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	14 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6
2	14 inches	24 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 6.1
3	24 inches	27 inches	weathered bedrock	Not reported	Not reported	Max: 0.42 Min: 0	Max: Min:

Soil Map ID: 17

Soil Component Name: MONSERATE

Soil Surface Texture: sandy loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	9 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 6.1

EXECUTIVE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
2	9 inches	18 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 4 Min: 1.4	Max: 7.3 Min: 6.1
3	18 inches	44 inches	indurated	Not reported	Not reported	Max: 0.01 Min: 0	Max: Min:
4	44 inches	57 inches	cemented	Not reported	Not reported	Max: 0.01 Min: 0	Max: Min:
5	57 inches	70 inches	loamy coarse sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 8.4 Min: 6.6

Soil Map ID: 18

Soil Component Name: CIENEBA

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Somewhat excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

EXECUTIVE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	14 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.1
2	14 inches	22 inches	weathered bedrock	Not reported	Not reported	Max: 0.42 Min: 0	Max: Min:

Soil Map ID: 19

Soil Component Name: FALLBROOK

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	14 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6
2	14 inches	24 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 6.1

Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

EXECUTIVE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		Soil Reaction (pH)
3	24 inches	27 inches	weathered bedrock	Not reported	Not reported	Max: 0.42 Min: 0	Max: Min:

Soil Map ID: 20

Soil Component Name: GORGONIO

Soil Surface Texture: stratified gravelly loamy sand to gravelly loamy fine sand

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Somewhat excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		Soil Reaction (pH)
1	14 inches	59 inches	stratified gravelly loamy sand to gravelly loamy fine sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 7.3 Min: 5.6
2	0 inches	14 inches	loamy sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 141 Min: 42	Max: 7.3 Min: 5.6

EXECUTIVE SUMMARY

Soil Map ID: 21

Soil Component Name: FALLBROOK

Soil Surface Texture: sandy loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		Soil Reaction (pH)
1	0 inches	7 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42 Min: 14	Max: 7.3 Min: 5.6
2	7 inches	18 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 7.3 Min: 6.1
3	18 inches	22 inches	weathered bedrock	Not reported	Not reported	Max: 0.42 Min: 0	Max: Min:

Soil Map ID: 22

Soil Component Name: RAMONA

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

EXECUTIVE SUMMARY

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information

	Boundary			Classification			
Layer	**Upper**	**Lower**	**Soil Texture Class**	**AASHTO Group**	**Unified Soil**	**Saturated hydraulic conductivity micro m/sec**	**Soil Reaction (pH)**
1	0 inches	14 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 14 Min: 4	Max: 7.3 Min: 5.6
2	14 inches	22 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay. FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), silt.	Max: 14 Min: 4	Max: 7.3 Min: 6.1
3	22 inches	68 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 4 Min: 1.4	Max: 7.3 Min: 6.1
4	68 inches	74 inches	gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand. COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 4 Min: 1.4	Max: 8.4 Min: 6.6

EXECUTIVE SUMMARY

SEARCH RESULTS

Unmappable (orphan) sites are not considered in the foregoing analysis.

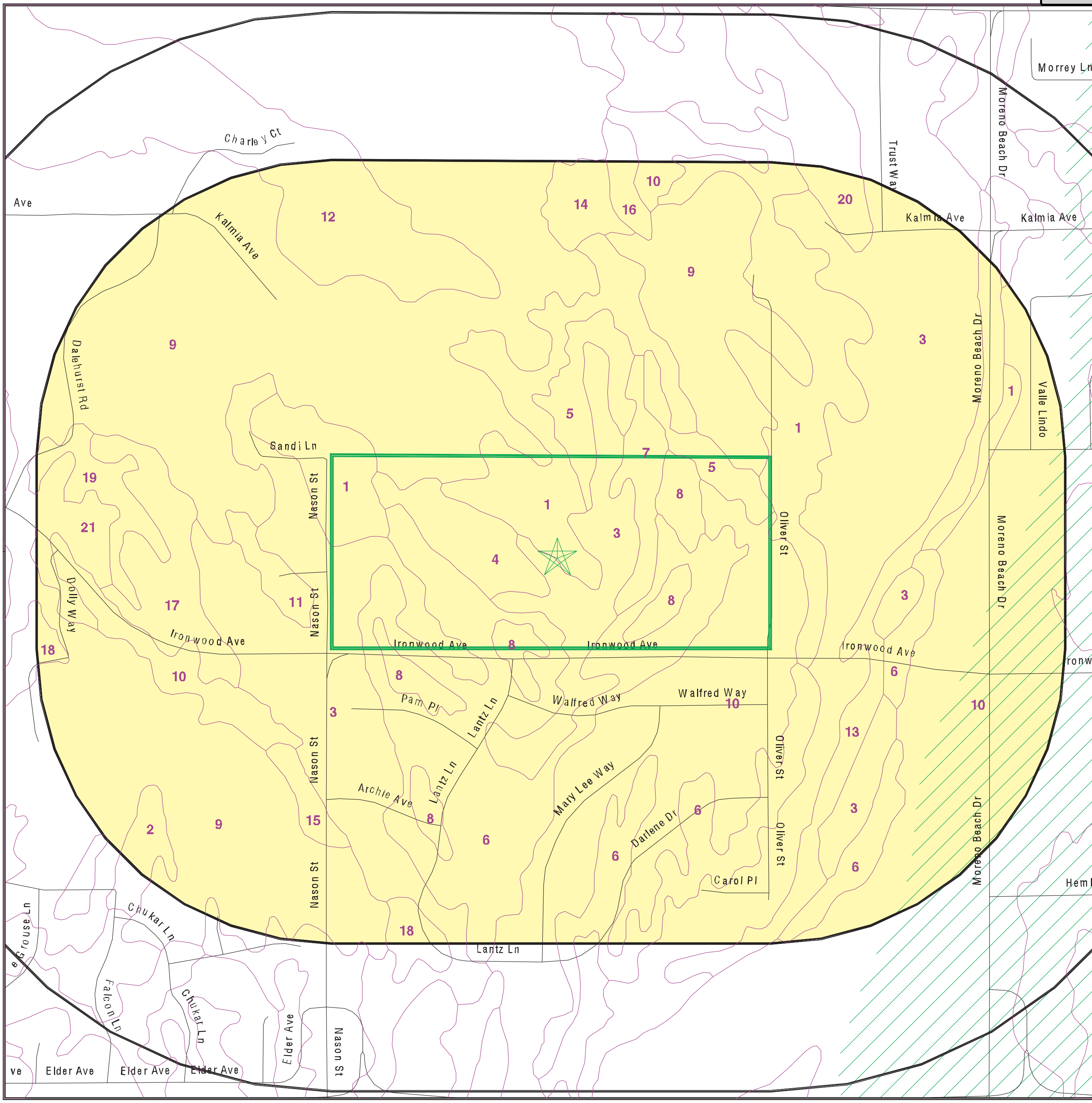
STANDARD ENVIRONMENTAL RECORDS

Name	Address	Dist/Dir	Map ID	Page
Not Reported				

HISTORICAL USE RECORDS

Name	Address	Dist/Dir	Map ID	Page
Not Reported				

PRIMARY MAP - 4092958.6S

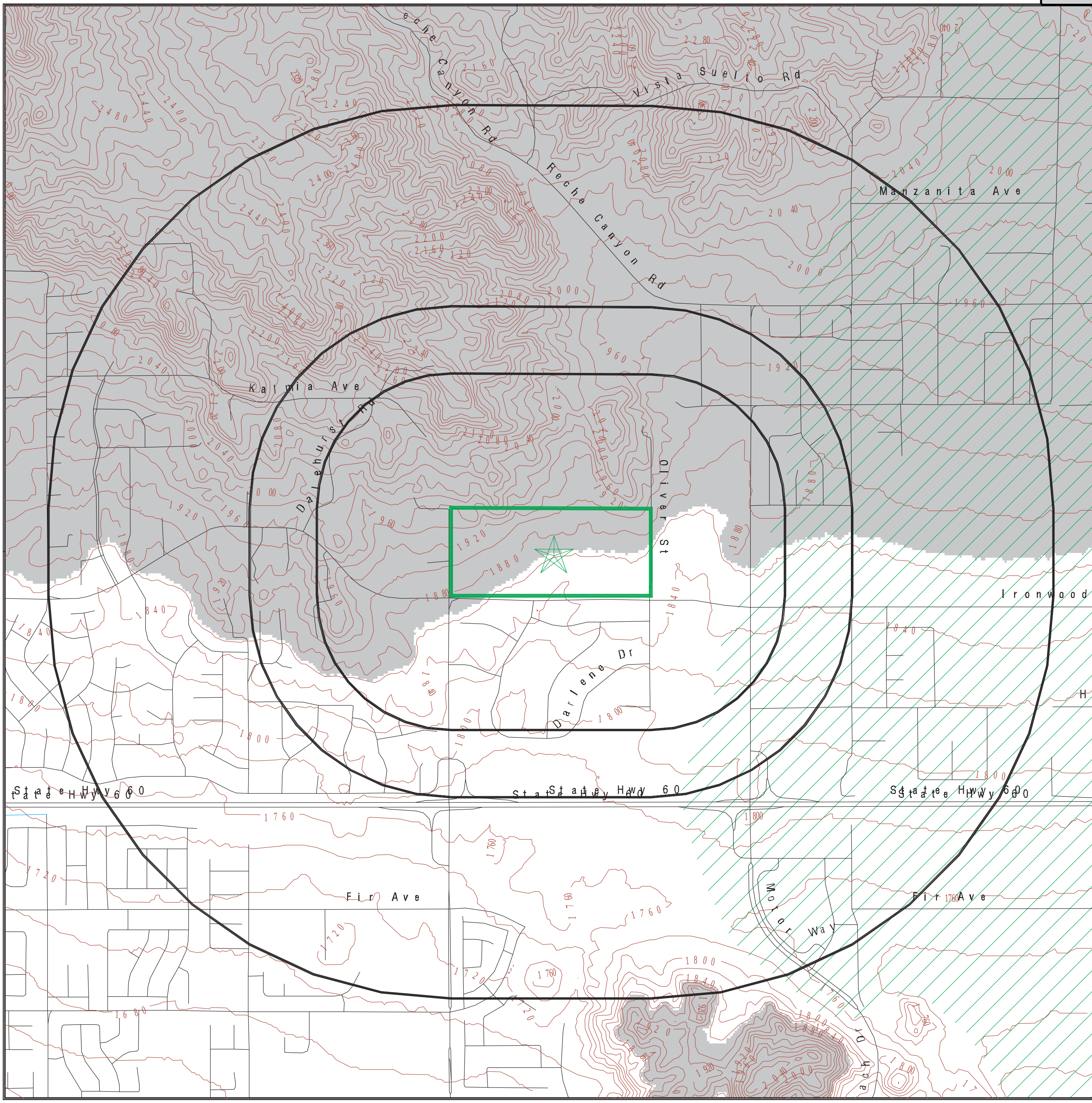


0 300 1/3 1/2 Miles

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- SSURGO Soil
- Areas of Concern

SITE NAME:	NW IRONWOOD AVE and OLIVER ST	CLIENT:	EEI, Inc.
ADDRESS:	NW IRONWOOD AVE and OLIVER ST Moreno Valley CA 92555	CONTACT:	Polly Ivers
		INQUIRY #:	4092958.6s
LAT/LONG:	33.9483 / 117.187	DATE:	October 01, 2014 4:29 pm

SECONDARY MAP - 4092958.6S



0 300 1/3 1 Miles

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Contour Lines
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- Upgradient Area
- Areas of Concern

SITE NAME: NW IRONWOOD AVE and OLIVER ST ADDRESS: NW IRONWOOD AVE and OLIVER ST Moreno Valley CA 92555 LAT/LONG: 33.9483 / 117.187	CLIENT: EEI, Inc. CONTACT: Polly Ivers INQUIRY #: 4092958.6s DATE: October 01, 2014 4:28 pm

Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

AERIAL PHOTOGRAPHY - 4092958.6s

SITE NAME:	NW IRONWOOD AVE and OLIVER ST	CLIENT:	EEI, Inc.
ADDRESS:	NW IRONWOOD AVE and OLIVER ST	CONTACT:	Polly Ivers
	Moreno Valley CA 92555	INQUIRY #:	4092958.6s
LAT/LONG:	33.9483 / 117.187	DATE:	October 01, 2014 4:30 pm

MAP FINDINGS

LEGEND

FACILITY NAME **FACILITY ADDRESS, CITY, ST, ZIP**			EDR SITE ID NUMBER
▼ **MAP ID#**	Direction Distance Range Relative Elevation	(Distance feet / miles) Feet Above Sea Level	ASTM 2600 Record Sources found in this report. Each database searched has been assigned to one or more categories. For detailed information about categorization, see the section of the report Records Searched and Currency.
Worksheet:			
Comments: Comments may be added on the online Vapor Encroachment Worksheet.			

DATABASE ACRONYM: Applicable categories (A hoverbox with database description).

RECORD SOURCES AND CURRENCY

To maintain currency of the following databases, EDR contacts the appropriate agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

PRP: Potentially Responsible Parties

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A listing of verified Potentially Responsible Parties

Date of Government Version: 04/15/2013
Number of Days to Update: 72
Last EDR Contact :09/30/2014

Source: EPA
Telephone: 202-564-6023

RMP: Risk Management Plans

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 04/01/2014
Number of Days to Update: 66
Last EDR Contact :07/22/2014

Source: Environmental Protection Agency
Telephone: 202-564-8600

ALAMEDA CO. UST: Underground Tanks

Standard Environmental Record Source: State and tribal registered storage tank lists
Underground storage tank sites located in Alameda county.

Date of Government Version: 07/25/2014
Number of Days to Update: 23
Last EDR Contact :09/29/2014

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700

AST: Aboveground Petroleum Storage Tank Facilities

Standard Environmental Record Source: State and tribal registered storage tank lists
Search Distance: Property

A listing of aboveground storage tank petroleum storage tank locations.

Date of Government Version: 08/01/2009
Number of Days to Update: 21
Last EDR Contact :07/18/2014

Source: California Environmental Protection Agency
Telephone: 916-327-5092

Alameda County CS: Contaminated Sites

Standard Environmental Record Source: State and tribal leaking storage tank lists
Search Distance: 0.333 Mile

RECORD SOURCES AND CURRENCY

A listing of contaminated sites overseen by the Toxic Release Program (oil and groundwater contamination from chemical releases and spills) and the Leaking Underground Storage Tank Program (soil and ground water contamination from leaking petroleum USTs).

Date of Government Version: 07/25/2014
Number of Days to Update: 49
Last EDR Contact :09/29/2014

Source: Alameda County Environmental Health Services
Telephone: 510-567-6700

CA BOND EXP. PLAN: Bond Expenditure Plan

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

Date of Government Version: 01/01/1989
Number of Days to Update: 6
Last EDR Contact :05/31/1994

Source: Department of Health Services
Telephone: 916-255-2118

CA FID UST: Facility Inventory Database

Standard Environmental Record Source: State and tribal registered storage tank lists
Search Distance: Property

The Facility Inventory Database (FID) contains a historical listing of active and inactive underground storage tank locations from the State Water Resource Control Board. Refer to local/county source for current data.

Date of Government Version: 10/31/1994
Number of Days to Update: 24
Last EDR Contact :12/28/1998

Source: California Environmental Protection Agency
Telephone: 916-341-5851

CA LA LF: City of Los Angeles Landfills

Standard Environmental Record Source: State and tribal landfill / solid waste disposal
Landfills owned and maintained by the City of Los Angeles.

Date of Government Version: 03/05/2009
Number of Days to Update: 29
Last EDR Contact :08/14/2014

Source: Engineering & Construction Division
Telephone: 213-473-7869

CDL: Clandestine Drug Labs

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A listing of drug lab locations. Listing of a location in this database does not indicate that any illegal drug lab materials were or were not present there, and does not constitute a determination that the location either requires or does not require additional cleanup work.

Date of Government Version: 06/30/2014
Number of Days to Update: 22
Last EDR Contact :08/29/2014

Source: Department of Toxic Substances Control
Telephone: 916-255-6504

CHMIRS: California Hazardous Material Incident Report System

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

California Hazardous Material Incident Reporting System. CHMIRS contains information on reported hazardous material incidents (accidental releases or spills).

Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

RECORD SOURCES AND CURRENCY

Date of Government Version: 06/26/2014
Number of Days to Update: 49
Last EDR Contact :07/28/2014

Source: Office of Emergency Services
Telephone: 916-845-8400

CONTRA COSTA CO. SITE LIST: Site List
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.25 Mile

List includes sites from the underground tank, hazardous waste generator and business plan/2185 programs.

Date of Government Version: 02/24/2014
Number of Days to Update: 21
Last EDR Contact :08/05/2014

Source: Contra Costa Health Services Department
Telephone: 925-646-2286

CORTESE: "Cortese" Hazardous Waste & Substances Sites List
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

The sites for the list are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites).

Date of Government Version: 06/30/2014
Number of Days to Update: 27
Last EDR Contact :09/30/2014

Source: CAL EPA/Office of Emergency Information
Telephone: 916-323-3400

CUPA AMADOR: CUPA Facility List
Standard Environmental Record Source: Other Standard Environmental Records
Cupa Facility List

Date of Government Version: 09/08/2014
Number of Days to Update: 15
Last EDR Contact :09/08/2014

Source: Amador County Environmental Health
Telephone: 209-223-6439

CUPA BUTTE: CUPA Facility Listing
Standard Environmental Record Source: Other Standard Environmental Records
Cupa facility list.

Date of Government Version: 08/01/2013
Number of Days to Update: 20
Last EDR Contact :07/08/2014

Source: Public Health Department
Telephone: 530-538-7149

CUPA CALVERAS: CUPA Facility Listing
Standard Environmental Record Source: Other Standard Environmental Records
Cupa Facility Listing

Date of Government Version: 07/02/2014
Number of Days to Update: 27
Last EDR Contact :09/29/2014

Source: Calveras County Environmental Health
Telephone: 209-754-6399

CUPA COLUSA: CUPA Facility List
Standard Environmental Record Source: Other Standard Environmental Records
Cupa facility list.

Date of Government Version: 06/11/2014
Number of Days to Update: 24

Source: Health & Human Services
Telephone: 530-458-0396

RECORD SOURCES AND CURRENCY

Last EDR Contact :08/08/2014

CUPA DEL NORTE: CUPA Facility List

Standard Environmental Record Source: Other Standard Environmental Records

Cupa Facility list

Date of Government Version: 07/31/2014
Number of Days to Update: 52
Last EDR Contact :07/30/2014

Source: Del Norte County Environmental Health Division
Telephone: 707-465-0426

CUPA EL DORADO: CUPA Facility List

Standard Environmental Record Source: Other Standard Environmental Records

CUPA facility list.

Date of Government Version: 08/25/2014
Number of Days to Update: 34
Last EDR Contact :08/05/2014

Source: El Dorado County Environmental Management Department
Telephone: 530-621-6623

CUPA FRESNO: CUPA Resources List

Standard Environmental Record Source: Other Standard Environmental Records

Certified Unified Program Agency. CUPA's are responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that deal with hazardous materials, operate underground storage tanks or aboveground storage tanks.

Date of Government Version: 06/30/2014
Number of Days to Update: 35
Last EDR Contact :07/11/2014

Source: Dept. of Community Health
Telephone: 559-445-3271

CUPA HUMBOLDT: CUPA Facility List

Standard Environmental Record Source: Other Standard Environmental Records

CUPA facility list.

Date of Government Version: 09/10/2014
Number of Days to Update: 14
Last EDR Contact :08/20/2014

Source: Humboldt County Environmental Health
Telephone: Not Reported

CUPA IMPERIAL: CUPA Facility List

Standard Environmental Record Source: Other Standard Environmental Records

Cupa facility list.

Date of Government Version: 07/28/2014
Number of Days to Update: 47
Last EDR Contact :07/25/2014

Source: San Diego Border Field Office
Telephone: 760-339-2777

CUPA INYO: CUPA Facility List

Standard Environmental Record Source: Other Standard Environmental Records

Cupa facility list.

Date of Government Version: 09/10/2013
Number of Days to Update: 33
Last EDR Contact :08/20/2014

Source: Inyo County Environmental Health Services
Telephone: 760-878-0238

CUPA KINGS: CUPA Facility List

Standard Environmental Record Source: Other Standard Environmental Records

RECORD SOURCES AND CURRENCY

A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 08/21/2014
Number of Days to Update: 34
Last EDR Contact :08/20/2014

Source: Kings County Department of Public Health
Telephone: 559-584-1411

CUPA LAKE: CUPA Facility List

Standard Environmental Record Source: Other Standard Environmental Records

Cupa facility list

Date of Government Version: 07/23/2014
Number of Days to Update: 28
Last EDR Contact :07/18/2014

Source: Lake County Environmental Health
Telephone: 707-263-1164

CUPA MADERA: CUPA Facility List

Standard Environmental Record Source: Other Standard Environmental Records

A listing of sites included in the county's Certified Unified Program Agency database. California's Secretary for Environmental Protection established the unified hazardous materials and hazardous waste regulatory program as required by chapter 6.11 of the California Health and Safety Code. The Unified Program consolidates the administration, permits, inspections, and enforcement activities.

Date of Government Version: 06/09/2014
Number of Days to Update: 16
Last EDR Contact :08/26/2014

Source: Madera County Environmental Health
Telephone: 559-675-7823

CUPA MERCED: CUPA Facility List

Standard Environmental Record Source: Other Standard Environmental Records

CUPA facility list.

Date of Government Version: 08/20/2014
Number of Days to Update: 35
Last EDR Contact :08/20/2014

Source: Merced County Environmental Health
Telephone: 209-381-1094

CUPA MONO: CUPA Facility List

Standard Environmental Record Source: Other Standard Environmental Records

CUPA Facility List

Date of Government Version: 09/02/2014
Number of Days to Update: 19
Last EDR Contact :09/02/2014

Source: Mono County Health Department
Telephone: 760-932-5580

CUPA MONTEREY: CUPA Facility Listing

Standard Environmental Record Source: Other Standard Environmental Records

CUPA Program listing from the Environmental Health Division.

Date of Government Version: 06/09/2014
Number of Days to Update: 28
Last EDR Contact :08/26/2014

Source: Monterey County Health Department
Telephone: 831-796-1297

CUPA NEVADA: CUPA Facility List

Standard Environmental Record Source: Other Standard Environmental Records

RECORD SOURCES AND CURRENCY

CUPA facility list.

Date of Government Version: 09/16/2014
Number of Days to Update: 7
Last EDR Contact :09/16/2014

Source: Community Development Agency
Telephone: 530-265-1467

CUPA SAN LUIS OBISPO: CUPA Facility List
Standard Environmental Record Source: Other Standard Environmental Records
Cupa Facility List.

Date of Government Version: 06/11/2014
Number of Days to Update: 26
Last EDR Contact :08/20/2014

Source: San Luis Obispo County Public Health Department
Telephone: 805-781-5596

CUPA SANTA BARBARA: CUPA Facility Listing
Standard Environmental Record Source: Other Standard Environmental Records
CUPA Program Listing from the Environmental Health Services division.

Date of Government Version: 09/08/2011
Number of Days to Update: 28
Last EDR Contact :09/22/2014

Source: Santa Barbara County Public Health Department
Telephone: 805-686-8167

CUPA SANTA CLARA: Cupa Facility List
Standard Environmental Record Source: Other Standard Environmental Records
Cupa facility list

Date of Government Version: 06/02/2014
Number of Days to Update: 20
Last EDR Contact :08/22/2014

Source: Department of Environmental Health
Telephone: 408-918-1973

CUPA SANTA CRUZ: CUPA Facility List
Standard Environmental Record Source: Other Standard Environmental Records
CUPA facility listing.

Date of Government Version: 09/09/2014
Number of Days to Update: 14
Last EDR Contact :09/08/2014

Source: Santa Cruz County Environmental Health
Telephone: 831-464-2761

CUPA SHASTA: CUPA Facility List
Standard Environmental Record Source: Other Standard Environmental Records
Cupa Facility List.

Date of Government Version: 06/10/2014
Number of Days to Update: 8
Last EDR Contact :08/26/2014

Source: Shasta County Department of Resource Management
Telephone: 530-225-5789

CUPA SONOMA: Cupa Facility List
Standard Environmental Record Source: Other Standard Environmental Records
Cupa Facility list

Date of Government Version: 12/31/2013
Number of Days to Update: 40
Last EDR Contact :09/29/2014

Source: County of Sonoma Fire & Emergency Services Department
Telephone: 707-565-1174

RECORD SOURCES AND CURRENCY

CUPA TUOLUMNE: CUPA Facility List

Standard Environmental Record Source: Other Standard Environmental Records

Cupa facility list

Date of Government Version: 05/16/2014
Number of Days to Update: 28
Last EDR Contact :08/08/2014

Source: Divison of Environmental Health
Telephone: 209-533-5633

CUPA YUBA: CUPA Facility List

Standard Environmental Record Source: Other Standard Environmental Records

CUPA facility listing for Yuba County.

Date of Government Version: 05/19/2014
Number of Days to Update: 28
Last EDR Contact :07/31/2014

Source: Yuba County Environmental Health Department
Telephone: 530-749-7523

DEED: Deed Restriction Listing

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: 0.333 Mile

Site Mitigation and Brownfields Reuse Program Facility Sites with Deed Restrictions & Hazardous Waste Management Program Facility Sites with Deed / Land Use Restriction. The DTSC Site Mitigation and Brownfields Reuse Program (SMBRP) list includes sites cleaned up under the program's oversight and generally does not include current or former hazardous waste facilities that required a hazardous waste facility permit. The list represents deed restrictions that are active. Some sites have multiple deed restrictions. The DTSC Hazardous Waste Management Program (HWMP) has developed a list of current or former hazardous waste facilities that have a recorded land use restriction at the local county recorder's office. The land use restrictions on this list were required by the DTSC HWMP as a result of the presence of hazardous substances that remain on site after the facility (or part of the facility) has been closed or cleaned up. The types of land use restriction include deed notice, deed restriction, or a land use restriction that binds current and future owners.

Date of Government Version: 06/09/2014
Number of Days to Update: 28
Last EDR Contact :09/10/2014

Source: DTSC and SWRCB
Telephone: 916-323-3400

DRYCLEANERS: Cleaner Facilities

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: 0.25 Mile

A list of drycleaner related facilities that have EPA ID numbers. These are facilities with certain SIC codes: power laundries, family and commercial; garment pressing and cleaner's agents; linen supply; coin-operated laundries and cleaning; drycleaning plants, except rugs; carpet and upholster cleaning; industrial launderers; laundry and garment services.

Date of Government Version: 06/28/2014
Number of Days to Update: 49
Last EDR Contact :09/08/2014

Source: Department of Toxic Substance Control
Telephone: 916-327-4498

EL SEGUNDO UST: City of El Segundo Underground Storage Tank

Standard Environmental Record Source: State and tribal registered storage tank lists

Underground storage tank sites located in El Segundo city.

Date of Government Version: 07/23/2014
Number of Days to Update: 23
Last EDR Contact :07/18/2014

Source: City of El Segundo Fire Department
Telephone: 310-524-2236

EMI: Emissions Inventory Data

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

RECORD SOURCES AND CURRENCY

Toxics and criteria pollutant emissions data collected by the ARB and local air pollution agencies.

Date of Government Version: 12/31/2012
Number of Days to Update: 34
Last EDR Contact :09/26/2014

Source: California Air Resources Board
Telephone: 916-322-2990

ENF: Enforcement Action Listing

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A listing of Water Board Enforcement Actions. Formal is everything except Oral/Verbal Communication, Notice of Violation, Expedited Payment Letter, and Staff Enforcement Letter.

Date of Government Version: 08/11/2014
Number of Days to Update: 49
Last EDR Contact :08/08/2014

Source: State Water Resoruces Control Board
Telephone: 916-445-9379

ENVIROSTOR: EnviroStor Database

Standard Environmental Record Source: State and tribal - equivalent CERCLIS
Search Distance: 0.333 Mile

The Department of Toxic Substances Control's (DTSC's) Site Mitigation and Brownfields Reuse Program's (SMBRP's) EnviroStor database identifes sites that have known contamination or sites for which there may be reasons to investigate further. The database includes the following site types: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in CalSites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites.

Date of Government Version: 08/05/2014
Number of Days to Update: 51
Last EDR Contact :08/06/2014

Source: Department of Toxic Substances Control
Telephone: 916-323-3400

HAULERS: Registered Waste Tire Haulers Listing

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A listing of registered waste tire haulers.

Date of Government Version: 02/18/2014
Number of Days to Update: 35
Last EDR Contact :08/14/2014

Source: Integrated Waste Management Board
Telephone: 916-341-6422

HAZNET: Facility and Manifest Data

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

Facility and Manifest Data. The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000 - 1,000,000 annually, representing approximately 350,000 - 500,000 shipments. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, and disposal method.

Date of Government Version: 12/31/2012
Number of Days to Update: 41
Last EDR Contact :07/18/2014

Source: California Environmental Protection Agency
Telephone: 916-255-1136

HIST CAL-SITES: Calsites Database

Standard Environmental Record Source: State and tribal - equivalent CERCLIS

RECORD SOURCES AND CURRENCY

Search Distance: 0.333 Mile

The Calsites database contains potential or confirmed hazardous substance release properties. In 1996, California EPA reevaluated and significantly reduced the number of sites in the Calsites database. No longer updated by the state agency. It has been replaced by ENVIROSTOR.

Date of Government Version: 08/08/2005
Number of Days to Update: 21
Last EDR Contact :02/23/2009

Source: Department of Toxic Substance Control
Telephone: 916-323-3400

HIST CORTESE: Hazardous Waste & Substance Site List

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

The sites for the list are designated by the State Water Resource Control Board [LUST], the Integrated Waste Board [SWF/LS], and the Department of Toxic Substances Control [CALSITES]. This listing is no longer updated by the state agency.

Date of Government Version: 04/01/2001
Number of Days to Update: 76
Last EDR Contact :01/22/2009

Source: Department of Toxic Substances Control
Telephone: 916-323-3400

HIST LUST SANTA CLARA: HIST LUST - Fuel Leak Site Activity Report

Standard Environmental Record Source: State and tribal leaking storage tank lists
Search Distance: 0.333 Mile

A listing of open and closed leaking underground storage tanks. This listing is no longer updated by the county. Leaking underground storage tanks are now handled by the Department of Environmental Health.

Date of Government Version: 03/29/2005
Number of Days to Update: 22
Last EDR Contact :03/23/2009

Source: Santa Clara Valley Water District
Telephone: 408-265-2600

HIST UST: Hazardous Substance Storage Container Database

Standard Environmental Record Source: State and tribal registered storage tank lists
Search Distance: Property

The Hazardous Substance Storage Container Database is a historical listing of UST sites. Refer to local/county source for current data.

Date of Government Version: 10/15/1990
Number of Days to Update: 18
Last EDR Contact :07/26/2001

Source: State Water Resources Control Board
Telephone: 916-341-5851

HWP: EnviroStor Permitted Facilities Listing

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

Detailed information on permitted hazardous waste facilities and corrective action ("cleanups") tracked in EnviroStor.

Date of Government Version: 05/27/2014
Number of Days to Update: 40
Last EDR Contact :08/26/2014

Source: Department of Toxic Substances Control
Telephone: 916-323-3400

HWT: Registered Hazardous Waste Transporter Database

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

RECORD SOURCES AND CURRENCY

A listing of hazardous waste transporters. In California, unless specifically exempted, it is unlawful for any person to transport hazardous wastes unless the person holds a valid registration issued by DTSC. A hazardous waste transporter registration is valid for one year and is assigned a unique registration number.

Date of Government Version: 07/14/2014
Number of Days to Update: 13
Last EDR Contact :07/15/2014

Source: Department of Toxic Substances Control
Telephone: 916-440-7145

KERN CO. UST: Underground Storage Tank Sites & Tank Listing

Standard Environmental Record Source: State and tribal registered storage tank lists

Kern County Sites and Tanks Listing.

Date of Government Version: 08/31/2010
Number of Days to Update: 29
Last EDR Contact :08/08/2014

Source: Kern County Environment Health Services Department
Telephone: 661-862-8700

LA Co. Site Mitigation: Site Mitigation List

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

Industrial sites that have had some sort of spill or complaint.

Date of Government Version: 01/07/2014
Number of Days to Update: 28
Last EDR Contact :07/16/2014

Source: Community Health Services
Telephone: 323-890-7806

LDS: Land Disposal Sites Listing

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

The Land Disposal program regulates of waste discharge to land for treatment, storage and disposal in waste management units.

Date of Government Version: 07/30/2014
Number of Days to Update: 22
Last EDR Contact :09/17/2014

Source: State Water Qualilty Control Board
Telephone: 866-480-1028

LIENS: Environmental Liens Listing

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

A listing of property locations with environmental liens for California where DTSC is a lien holder.

Date of Government Version: 05/05/2014
Number of Days to Update: 13
Last EDR Contact :09/08/2014

Source: Department of Toxic Substances Control
Telephone: 916-323-3400

LONG BEACH UST: City of Long Beach Underground Storage Tank

Standard Environmental Record Source: State and tribal registered storage tank lists

Underground storage tank sites located in the city of Long Beach.

Date of Government Version: 07/28/2014
Number of Days to Update: 23
Last EDR Contact :07/25/2014

Source: City of Long Beach Fire Department
Telephone: 562-570-2563

LOS ANGELES CO. HMS: HMS: Street Number List

RECORD SOURCES AND CURRENCY

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

Industrial Waste and Underground Storage Tank Sites.

Date of Government Version: 03/31/2014 | Source: Department of Public Works
Number of Days to Update: 41 | Telephone: 626-458-3517
Last EDR Contact :07/21/2014

LOS ANGELES CO. LF: List of Solid Waste Facilities

Standard Environmental Record Source: State and tribal landfill / solid waste disposal

Solid Waste Facilities in Los Angeles County.

Date of Government Version: 07/21/2014 | Source: La County Department of Public Works
Number of Days to Update: 29 | Telephone: 818-458-5185
Last EDR Contact :07/21/2014

LUST: Geotracker's Leaking Underground Fuel Tank Report

Standard Environmental Record Source: State and tribal leaking storage tank lists

Search Distance: 0.333 Mile

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state. For more information on a particular leaking underground storage tank sites, please contact the appropriate regulatory agency.

Date of Government Version: 07/30/2014 | Source: State Water Resources Control Board
Number of Days to Update: 22 | Telephone: see region list
Last EDR Contact :09/17/2014

LUST REG 1: Active Toxic Site Investigation

Standard Environmental Record Source: State and tribal leaking storage tank lists

Del Norte, Humboldt, Lake, Mendocino, Modoc, Siskiyou, Sonoma, Trinity counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/01/2001 | Source: California Regional Water Quality Control Board North Coast (1)
Number of Days to Update: 29 | Telephone: 707-570-3769
Last EDR Contact :08/01/2011

LUST REG 2: Fuel Leak List

Standard Environmental Record Source: State and tribal leaking storage tank lists

Leaking Underground Storage Tank locations. Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma counties.

Date of Government Version: 09/30/2004 | Source: California Regional Water Quality Control Board San Francisco Bay Region (2)
Number of Days to Update: 30 | Telephone: 510-622-2433
Last EDR Contact :09/19/2011

LUST REG 3: Leaking Underground Storage Tank Database

Standard Environmental Record Source: State and tribal leaking storage tank lists

Leaking Underground Storage Tank locations. Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz counties.

Date of Government Version: 05/19/2003 | Source: California Regional Water Quality Control Board Central Coast Region (3)
Number of Days to Update: 14 | Telephone: 805-542-4786

RECORD SOURCES AND CURRENCY

Last EDR Contact :07/18/2011

LUST REG 4: Underground Storage Tank Leak List

Standard Environmental Record Source: State and tribal leaking storage tank lists

Los Angeles, Ventura counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/07/2004
Source: California Regional Water Quality Control Board Los Angeles Region (4)
Number of Days to Update: 35
Telephone: 213-576-6710
Last EDR Contact :09/06/2011

LUST REG 5: Leaking Underground Storage Tank Database

Standard Environmental Record Source: State and tribal leaking storage tank lists

Leaking Underground Storage Tank locations. Alameda, Alpine, Amador, Butte, Colusa, Contra Costa, Calveras, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Lassen, Madera, Mariposa, Merced, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Joaquin, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba counties.

Date of Government Version: 07/01/2008
Source: California Regional Water Quality Control Board Central Valley Region (5)
Number of Days to Update: 9
Telephone: 916-464-4834
Last EDR Contact :07/01/2011

LUST REG 6L: Leaking Underground Storage Tank Case Listing

Standard Environmental Record Source: State and tribal leaking storage tank lists

For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 09/09/2003
Source: California Regional Water Quality Control Board Lahontan Region (6)
Number of Days to Update: 27
Telephone: 530-542-5572
Last EDR Contact :09/12/2011

LUST REG 6V: Leaking Underground Storage Tank Case Listing

Standard Environmental Record Source: State and tribal leaking storage tank lists

Leaking Underground Storage Tank locations. Inyo, Kern, Los Angeles, Mono, San Bernardino counties.

Date of Government Version: 06/07/2005
Source: California Regional Water Quality Control Board Victorville Branch Office (6)
Number of Days to Update: 22
Telephone: 760-241-7365
Last EDR Contact :09/12/2011

LUST REG 7: Leaking Underground Storage Tank Case Listing

Standard Environmental Record Source: State and tribal leaking storage tank lists

Leaking Underground Storage Tank locations. Imperial, Riverside, San Diego, Santa Barbara counties.

Date of Government Version: 02/26/2004
Source: California Regional Water Quality Control Board Colorado River Basin Region (7)
Number of Days to Update: 27
Telephone: 760-776-8943
Last EDR Contact :08/01/2011

LUST REG 8: Leaking Underground Storage Tanks

Standard Environmental Record Source: State and tribal leaking storage tank lists

California Regional Water Quality Control Board Santa Ana Region (8). For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 02/14/2005
Source: California Regional Water Quality Control Board Santa Ana Region (8)

RECORD SOURCES AND CURRENCY

Number of Days to Update: 41
Telephone: 909-782-4496
Last EDR Contact :08/15/2011

LUST REG 9: Leaking Underground Storage Tank Report

Standard Environmental Record Source: State and tribal leaking storage tank lists

Orange, Riverside, San Diego counties. For more current information, please refer to the State Water Resources Control Board's LUST database.

Date of Government Version: 03/01/2001
Source: California Regional Water Quality Control Board San Diego Region (9)
Number of Days to Update: 28
Telephone: 858-637-5595
Last EDR Contact :09/26/2011

LUST SANTA CLARA: LOP Listing

Standard Environmental Record Source: State and tribal leaking storage tank lists

A listing of leaking underground storage tanks located in Santa Clara county.

Date of Government Version: 03/03/2014
Source: Department of Environmental Health
Number of Days to Update: 13
Telephone: 408-918-3417
Last EDR Contact :09/02/2014

MARIN CO. UST: Underground Storage Tank Sites

Standard Environmental Record Source: State and tribal registered storage tank lists

Currently permitted USTs in Marin County.

Date of Government Version: 07/02/2014
Source: Public Works Department Waste Management
Number of Days to Update: 42
Telephone: 415-499-6647
Last EDR Contact :07/02/2014

MCS: Military Cleanup Sites Listing

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

The State Water Resources Control Board and nine Regional Water Quality Control Boards partner with the Department of Defense (DoD) through the Defense and State Memorandum of Agreement (DSMOA) to oversee the investigation and remediation of water quality issues at military facilities.

Date of Government Version: 07/30/2014
Source: State Water Resources Control Board
Number of Days to Update: 25
Telephone: 866-480-1028
Last EDR Contact :09/17/2014

MED WASTE VENTURA: Medical Waste Program List

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

To protect public health and safety and the environment from potential exposure to disease causing agents, the Environmental Health Division Medical Waste Program regulates the generation, handling, storage, treatment and disposal of medical waste throughout the County.

Date of Government Version: 06/26/2014
Source: Ventura County Resource Management Agency
Number of Days to Update: 46
Telephone: 805-654-2813
Last EDR Contact :07/28/2014

MWMP: Medical Waste Management Program Listing

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

RECORD SOURCES AND CURRENCY

The Medical Waste Management Program (MWMP) ensures the proper handling and disposal of medical waste by permitting and inspecting medical waste Offsite Treatment Facilities (PDF) and Transfer Stations (PDF) throughout the state. MWMP also oversees all Medical Waste Transporters.

Date of Government Version: 05/23/2014
Number of Days to Update: 26
Last EDR Contact :09/10/2014

Source: Department of Public Health
Telephone: 916-558-1784

NAPA CO. LUST: Sites With Reported Contamination

Standard Environmental Record Source: State and tribal leaking storage tank lists

A listing of leaking underground storage tank sites located in Napa county.

Date of Government Version: 12/05/2011
Number of Days to Update: 63
Last EDR Contact :08/28/2014

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269

NAPA CO. UST: Closed and Operating Underground Storage Tank Sites

Standard Environmental Record Source: State and tribal registered storage tank lists

Underground storage tank sites located in Napa county.

Date of Government Version: 01/15/2008
Number of Days to Update: 23
Last EDR Contact :08/28/2014

Source: Napa County Department of Environmental Management
Telephone: 707-253-4269

NOTIFY 65: Proposition 65 Records

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

Listings of all Proposition 65 incidents reported to counties by the State Water Resources Control Board and the Regional Water Quality Control Board. This database is no longer updated by the reporting agency.

Date of Government Version: 10/21/1993
Number of Days to Update: 18
Last EDR Contact :09/22/2014

Source: State Water Resources Control Board
Telephone: 916-445-3846

NPDES: NPDES Permits Listing

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

A listing of NPDES permits, including stormwater.

Date of Government Version: 05/19/2014
Number of Days to Update: 8
Last EDR Contact :08/18/2014

Source: State Water Resources Control Board
Telephone: 916-445-9379

ORANGE CO. LUST: List of Underground Storage Tank Cleanups

Standard Environmental Record Source: State and tribal leaking storage tank lists

Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 08/01/2014
Number of Days to Update: 45
Last EDR Contact :08/07/2014

Source: Health Care Agency
Telephone: 714-834-3446

ORANGE CO. UST: List of Underground Storage Tank Facilities

Standard Environmental Record Source: State and tribal registered storage tank lists

RECORD SOURCES AND CURRENCY

Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 08/01/2014
Number of Days to Update: 8
Last EDR Contact :08/07/2014

Source: Health Care Agency
Telephone: 714-834-3446

Orange Co. Industrial Site: List of Industrial Site Cleanups
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

Petroleum and non-petroleum spills.

Date of Government Version: 05/01/2014
Number of Days to Update: 7
Last EDR Contact :08/07/2014

Source: Health Care Agency
Telephone: 714-834-3446

PLACER CO. MS: Master List of Facilities
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.25 Mile

List includes aboveground tanks, underground tanks and cleanup sites.

Date of Government Version: 06/09/2014
Number of Days to Update: 29
Last EDR Contact :09/22/2014

Source: Placer County Health and Human Services
Telephone: 530-745-2363

PROC: Certified Processors Database
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

A listing of certified processors.

Date of Government Version: 06/16/2014
Number of Days to Update: 23
Last EDR Contact :09/17/2014

Source: Department of Conservation
Telephone: 916-323-3836

RESPONSE: State Response Sites
Standard Environmental Record Source: State and tribal - equivalent NPL
Search Distance: 0.333 Mile

Identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk.

Date of Government Version: 08/05/2014
Number of Days to Update: 51
Last EDR Contact :08/06/2014

Source: Department of Toxic Substances Control
Telephone: 916-323-3400

RIVERSIDE CO. LUST: Listing of Underground Tank Cleanup Sites
Standard Environmental Record Source: State and tribal leaking storage tank lists
Riverside County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 07/08/2014
Number of Days to Update: 17
Last EDR Contact :09/22/2014

Source: Department of Environmental Health
Telephone: 951-358-5055

RIVERSIDE CO. UST: Underground Storage Tank Tank List

RECORD SOURCES AND CURRENCY

Standard Environmental Record Source: State and tribal registered storage tank lists

Underground storage tank sites located in Riverside county.

Date of Government Version: 07/08/2014
Number of Days to Update: 38
Last EDR Contact :09/22/2014

Source: Department of Environmental Health
Telephone: 951-358-5055

SAN DIEGO CO. HMMD: Hazardous Materials Management Division Database

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

The database includes: HE58 - This report contains the business name, site address, business phone number, establishment 'H' permit number, type of permit, and the business status. HE17 - In addition to providing the same information provided in the HE58 listing, HE17 provides inspection dates, violations received by the establishment, hazardous waste generated, the quantity, method of storage, treatment/disposal of waste and the hauler, and information on underground storage tanks. Unauthorized Release List - Includes a summary of environmental contamination cases in San Diego County (underground tank cases, non-tank cases, groundwater contamination, and soil contamination are included.)

Date of Government Version: 09/23/2013
Number of Days to Update: 23
Last EDR Contact :09/22/2014

Source: Hazardous Materials Management Division
Telephone: 619-338-2268

SAN DIEGO CO. LF: Solid Waste Facilities

Standard Environmental Record Source: State and tribal landfill / solid waste disposal

San Diego County Solid Waste Facilities.

Date of Government Version: 10/31/2013
Number of Days to Update: 42
Last EDR Contact :07/22/2014

Source: Department of Health Services
Telephone: 619-338-2209

SAN DIEGO CO. SAM: Environmental Case Listing

Standard Environmental Record Source: State and tribal leaking storage tank lists

Search Distance: 0.333 Mile

The listing contains all underground tank release cases and projects pertaining to properties contaminated with hazardous substances that are actively under review by the Site Assessment and Mitigation Program.

Date of Government Version: 03/23/2010
Number of Days to Update: 24
Last EDR Contact :09/08/2014

Source: San Diego County Department of Environmental Health
Telephone: 619-338-2371

SAN FRANCISCO CO. LUST: Local Oversite Facilities

Standard Environmental Record Source: State and tribal leaking storage tank lists

A listing of leaking underground storage tank sites located in San Francisco county.

Date of Government Version: 09/19/2008
Number of Days to Update: 10
Last EDR Contact :08/07/2014

Source: Department Of Public Health San Francisco County
Telephone: 415-252-3920

SAN FRANCISCO CO. UST: Underground Storage Tank Information

Standard Environmental Record Source: State and tribal registered storage tank lists

Underground storage tank sites located in San Francisco county.

Date of Government Version: 11/29/2010
Number of Days to Update: 5

Source: Department of Public Health
Telephone: 415-252-3920

RECORD SOURCES AND CURRENCY

Last EDR Contact :08/07/2014

SAN JOSE HAZMAT: Hazardous Material Facilities

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

Hazardous material facilities, including underground storage tank sites.

Date of Government Version: 05/12/2014
Number of Days to Update: 9
Last EDR Contact :08/08/2014

Source: City of San Jose Fire Department
Telephone: 408-535-7694

SAN MATEO CO. LUST: Fuel Leak List

Standard Environmental Record Source: State and tribal leaking storage tank lists

A listing of leaking underground storage tank sites located in San Mateo county.

Date of Government Version: 06/16/2014
Number of Days to Update: 21
Last EDR Contact :09/15/2014

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921

SCH: School Property Evaluation Program

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

This category contains proposed and existing school sites that are being evaluated by DTSC for possible hazardous materials contamination. In some cases, these properties may be listed in the CalSites category depending on the level of threat to public health and safety or the environment they pose.

Date of Government Version: 08/05/2014
Number of Days to Update: 51
Last EDR Contact :08/06/2014

Source: Department of Toxic Substances Control
Telephone: 916-323-3400

SLIC: Statewide SLIC Cases

Standard Environmental Record Source: State and tribal leaking storage tank lists

Search Distance: 0.333 Mile

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 07/30/2014
Number of Days to Update: 25
Last EDR Contact :09/17/2014

Source: State Water Resources Control Board
Telephone: 866-480-1028

SLIC REG 1: Active Toxic Site Investigations

Standard Environmental Record Source: State and tribal leaking storage tank lists

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2003
Number of Days to Update: 18
Last EDR Contact :08/01/2011

Source: California Regional Water Quality Control Board, North Coast Region (1)
Telephone: 707-576-2220

SLIC REG 2: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

Standard Environmental Record Source: State and tribal leaking storage tank lists

RECORD SOURCES AND CURRENCY

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/30/2004
Number of Days to Update: 30
Last EDR Contact :09/19/2011

Source: Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457

SLIC REG 3: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

Standard Environmental Record Source: State and tribal leaking storage tank lists

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/18/2006
Number of Days to Update: 28
Last EDR Contact :07/18/2011

Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147

SLIC REG 4: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

Standard Environmental Record Source: State and tribal leaking storage tank lists

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/17/2004
Number of Days to Update: 47
Last EDR Contact :07/01/2011

Source: Region Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6600

SLIC REG 5: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

Standard Environmental Record Source: State and tribal leaking storage tank lists

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/01/2005
Number of Days to Update: 16
Last EDR Contact :09/12/2011

Source: Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-464-3291

SLIC REG 6L: SLIC Sites

Standard Environmental Record Source: State and tribal leaking storage tank lists

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/07/2004
Number of Days to Update: 35
Last EDR Contact :08/15/2011

Source: California Regional Water Quality Control Board, Lahontan Region
Telephone: 530-542-5574

SLIC REG 6V: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

Standard Environmental Record Source: State and tribal leaking storage tank lists

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 05/24/2005
Number of Days to Update: 22
Last EDR Contact :08/15/2011

Source: Regional Water Quality Control Board, Victorville Branch
Telephone: 619-241-6583

RECORD SOURCES AND CURRENCY

SLIC REG 7: SLIC List

Standard Environmental Record Source: State and tribal leaking storage tank lists

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 11/24/2004
Number of Days to Update: 36
Last EDR Contact :08/01/2011

Source: California Regional Quality Control Board, Colorado River Basin Region
Telephone: 760-346-7491

SLIC REG 8: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

Standard Environmental Record Source: State and tribal leaking storage tank lists

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 04/03/2008
Number of Days to Update: 11
Last EDR Contact :09/12/2011

Source: California Region Water Quality Control Board Santa Ana Region (8)
Telephone: 951-782-3298

SLIC REG 9: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing

Standard Environmental Record Source: State and tribal leaking storage tank lists

The SLIC (Spills, Leaks, Investigations and Cleanup) program is designed to protect and restore water quality from spills, leaks, and similar discharges.

Date of Government Version: 09/10/2007
Number of Days to Update: 17
Last EDR Contact :08/08/2011

Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980

SOLANO CO. LUST: Leaking Underground Storage Tanks

Standard Environmental Record Source: State and tribal leaking storage tank lists

A listing of leaking underground storage tank sites located in Solano county.

Date of Government Version: 06/19/2014
Number of Days to Update: 29
Last EDR Contact :09/15/2014

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770

SOLANO CO. UST: Underground Storage Tanks

Standard Environmental Record Source: State and tribal registered storage tank lists

Underground storage tank sites located in Solano county.

Date of Government Version: 06/19/2014
Number of Days to Update: 29
Last EDR Contact :09/15/2014

Source: Solano County Department of Environmental Management
Telephone: 707-784-6770

SONOMA CO. LUST: Leaking Underground Storage Tank Sites

Standard Environmental Record Source: State and tribal leaking storage tank lists

A listing of leaking underground storage tank sites located in Sonoma county.

Date of Government Version: 07/01/2014
Number of Days to Update: 25
Last EDR Contact :09/29/2014

Source: Department of Health Services
Telephone: 707-565-6565

SUTTER CO. UST: Underground Storage Tanks

RECORD SOURCES AND CURRENCY

Standard Environmental Record Source: State and tribal registered storage tank lists
Underground storage tank sites located in Sutter county.

Date of Government Version: 06/09/2014
Number of Days to Update: 36
Last EDR Contact :09/08/2014

Source: Sutter County Department of Agriculture
Telephone: 530-822-7500

SWEEPS UST: SWEEPS UST Listing
Standard Environmental Record Source: State and tribal registered storage tank lists
Search Distance: Property

Statewide Environmental Evaluation and Planning System. This underground storage tank listing was updated and maintained by a company contacted by the SWRCB in the early 1990's. The listing is no longer updated or maintained. The local agency is the contact for more information on a site on the SWEEPS list.

Date of Government Version: 06/01/1994
Number of Days to Update: 35
Last EDR Contact :06/03/2005

Source: State Water Resources Control Board
Telephone: Not Reported

SWF/LF (SWIS): Solid Waste Information System
Standard Environmental Record Source: State and tribal landfill / solid waste disposal
Search Distance: 0.333 Mile

Active, Closed and Inactive Landfills.SWF/LF records typically contain an inventory of solid waste disposal facilities or landfills.These may be active or inactive facilities or open dumps that failed to meet RCRA Section 4004 criteriafor solid waste landfills or disposal sites.

Date of Government Version: 05/19/2014
Number of Days to Update: 2
Last EDR Contact :08/18/2014

Source: Department of Resources Recycling and Recovery
Telephone: 916-341-6320

SWRCY: Recycler Database
Standard Environmental Record Source: State and tribal landfill / solid waste disposal
Search Distance: 0.333 Mile

A listing of recycling facilities in California.

Date of Government Version: 06/16/2014
Number of Days to Update: 24
Last EDR Contact :09/17/2014

Source: Department of Conservation
Telephone: 916-323-3836

Sacramento Co. CS: Toxic Site Clean-Up List
Standard Environmental Record Source: State and tribal leaking storage tank lists
Search Distance: 0.333 Mile

List of sites where unauthorized releases of potentially hazardous materials have occurred.

Date of Government Version: 02/06/2014
Number of Days to Update: 21
Last EDR Contact :07/11/2014

Source: Sacramento County Environmental Management
Telephone: 916-875-8406

Sacramento Co. ML: Master Hazardous Materials Facility List
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.25 Mile

RECORD SOURCES AND CURRENCY

Any business that has hazardous materials on site - hazardous material storage sites, underground storage tanks, waste generators.

Date of Government Version: 05/05/2014
Number of Days to Update: 11
Last EDR Contact :07/08/2014

Source: Sacramento County Environmental Management
Telephone: 916-875-8406

San Bern. Co. Permit: Hazardous Material Permits

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.25 Mile

This listing includes underground storage tanks, medical waste handlers/generators, hazardous materials handlers, hazardous waste generators, and waste oil generators/handlers.

Date of Government Version: 08/06/2014
Number of Days to Update: 54
Last EDR Contact :08/07/2014

Source: San Bernardino County Fire Department Hazardous Materials Division
Telephone: 909-387-3041

San Mateo Co. BI: Business Inventory

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.25 Mile

List includes Hazardous Materials Business Plan, hazardous waste generators, and underground storage tanks.

Date of Government Version: 04/03/2014
Number of Days to Update: 27
Last EDR Contact :09/15/2014

Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921

TORRANCE UST: City of Torrance Underground Storage Tank

Standard Environmental Record Source: State and tribal registered storage tank lists
Underground storage tank sites located in the city of Torrance.

Date of Government Version: 01/13/2014
Number of Days to Update: 32
Last EDR Contact :07/25/2014

Source: City of Torrance Fire Department
Telephone: 310-618-2973

TOXIC PITS: Toxic Pits Cleanup Act Sites

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

Toxic PITS Cleanup Act Sites. TOXIC PITS identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.

Date of Government Version: 07/01/1995
Number of Days to Update: 27
Last EDR Contact :01/26/2009

Source: State Water Resources Control Board
Telephone: 916-227-4364

UIC: UIC Listing

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A listing of wells identified as underground injection wells, in the California Oil and Gas Wells database.

Date of Government Version: 01/15/2014
Number of Days to Update: 37

Source: Deaprtment of Conservation
Telephone: 916-445-2408

RECORD SOURCES AND CURRENCY

Last EDR Contact :09/17/2014

UST: Active UST Facilities
Standard Environmental Record Source: State and tribal registered storage tank lists
Search Distance: Property

Active UST facilities gathered from the local regulatory agencies

Date of Government Version: 07/30/2014
Number of Days to Update: 20
Last EDR Contact :09/19/2014
Source: SWRCB
Telephone: 916-341-5851

UST MENDOCINO: Mendocino County UST Database
Standard Environmental Record Source: State and tribal registered storage tank lists
A listing of underground storage tank locations in Mendocino County.

Date of Government Version: 09/23/2009
Number of Days to Update: 8
Last EDR Contact :08/28/2014
Source: Department of Public Health
Telephone: 707-463-4466

UST SAN JOAQUIN: San Joaquin Co. UST
Standard Environmental Record Source: State and tribal registered storage tank lists
A listing of underground storage tank locations in San Joaquin county.

Date of Government Version: 06/20/2014
Number of Days to Update: 18
Last EDR Contact :09/22/2014
Source: Environmental Health Department
Telephone: Not Reported

VCP: Voluntary Cleanup Program Properties
Standard Environmental Record Source: State and tribal voluntary cleanup sites
Search Distance: 0.333 Mile

Contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have request that DTSC oversee investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs.

Date of Government Version: 08/05/2014
Number of Days to Update: 51
Last EDR Contact :08/06/2014
Source: Department of Toxic Substances Control
Telephone: 916-323-3400

VENTURA CO. BWT: Business Plan, Hazardous Waste Producers, and Operating Underground Tanks
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

The BWT list indicates by site address whether the Environmental Health Division has Business Plan (B), Waste Producer (W), and/or Underground Tank (T) information.

Date of Government Version: 07/28/2014
Number of Days to Update: 39
Last EDR Contact :08/14/2014
Source: Ventura County Environmental Health Division
Telephone: 805-654-2813

VENTURA CO. LF: Inventory of Illegal Abandoned and Inactive Sites
Standard Environmental Record Source: State and tribal landfill / solid waste disposal
Ventura County Inventory of Closed, Illegal Abandoned, and Inactive Sites.

Date of Government Version: 12/01/2011
Number of Days to Update: 49
Source: Environmental Health Division
Telephone: 805-654-2813

RECORD SOURCES AND CURRENCY

Last EDR Contact :07/01/2014

VENTURA CO. LUST: Listing of Underground Tank Cleanup Sites

Standard Environmental Record Source: State and tribal leaking storage tank lists

Ventura County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 05/29/2008
Number of Days to Update: 37
Last EDR Contact :08/13/2014

Source: Environmental Health Division
Telephone: 805-654-2813

VENTURA CO. UST: Underground Tank Closed Sites List

Standard Environmental Record Source: State and tribal registered storage tank lists

Ventura County Operating Underground Storage Tank Sites (UST)/Underground Tank Closed Sites List.

Date of Government Version: 05/27/2014
Number of Days to Update: 24
Last EDR Contact :09/17/2014

Source: Environmental Health Division
Telephone: 805-654-2813

WDS: Waste Discharge System

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

Sites which have been issued waste discharge requirements.

Date of Government Version: 06/19/2007
Number of Days to Update: 9
Last EDR Contact :08/19/2014

Source: State Water Resources Control Board
Telephone: 916-341-5227

WIP: Well Investigation Program Case List

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: 0.25 Mile

Well Investigation Program case in the San Gabriel and San Fernando Valley area.

Date of Government Version: 07/03/2009
Number of Days to Update: 13
Last EDR Contact :09/29/2014

Source: Los Angeles Water Quality Control Board
Telephone: 213-576-6726

WMUDS/SWAT: Waste Management Unit Database

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: 0.333 Mile

Waste Management Unit Database System. WMUDS is used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units. WMUDS is composed of the following databases: Facility Information, Scheduled Inspections Information, Waste Management Unit Information, SWAT Program Information, SWAT Report Summary Information, SWAT Report Summary Data, Chapter 15 (formerly Subchapter 15) Information, Chapter 15 Monitoring Parameters, TPCA Program Information, RCRA Program Information, Closure Information, and Interested Parties Information.

Date of Government Version: 04/01/2000
Number of Days to Update: 30
Last EDR Contact :08/07/2014

Source: State Water Resources Control Board
Telephone: 916-227-4448

YOLO CO. UST: Underground Storage Tank Comprehensive Facility Report

Standard Environmental Record Source: State and tribal registered storage tank lists

Underground storage tank sites located in Yolo county.

RECORD SOURCES AND CURRENCY

Date of Government Version: 06/30/2014
Number of Days to Update: 42
Last EDR Contact :09/22/2014

Source: Yolo County Department of Health
Telephone: 530-666-8646

2020 COR ACTION: 2020 Corrective Action Program List
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.25 Mile

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 11/11/2011
Number of Days to Update: 7
Last EDR Contact :08/15/2014

Source: Environmental Protection Agency
Telephone: 703-308-4044

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System
Standard Environmental Record Source: Federal CERCLIS
Search Distance: 0.333 Mile

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 10/25/2013
Number of Days to Update: 94
Last EDR Contact :08/28/2014

Source: EPA
Telephone: 703-412-9810

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 10/25/2013
Number of Days to Update: 94
Last EDR Contact :08/28/2014

Source: EPA
Telephone: 703-412-9810

COAL ASH DOE: Sleam-Electric Plan Operation Data
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Number of Days to Update: 76
Last EDR Contact :07/18/2014

Source: Department of Energy
Telephone: 202-586-8719

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

RECORD SOURCES AND CURRENCY

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 03/14/2014
Number of Days to Update: 47
Last EDR Contact :09/10/2014

Source: Environmental Protection Agency
Telephone: Not Reported

CONSENT: Superfund (CERCLA) Consent Decrees
Standard Environmental Record Source: Federal NPL
Search Distance: 0.333 Mile

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2013
Number of Days to Update: 31
Last EDR Contact :09/30/2014

Source: Department of Justice, Consent Decree Library
Telephone: Varies

CORRACTS: Corrective Action Report
Standard Environmental Record Source: Federal RCRA CORRACTS facilities list
Search Distance: 0.333 Mile

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 06/10/2014
Number of Days to Update: 78
Last EDR Contact :07/02/2014

Source: EPA
Telephone: 800-424-9346

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
Standard Environmental Record Source: State and tribal landfill / solid waste disposal
Search Distance: 0.333 Mile

A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Number of Days to Update: 137
Last EDR Contact :07/25/2014

Source: EPA, Region 9
Telephone: 415-947-4219

DELISTED NPL: National Priority List Deletions
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 10/25/2013
Number of Days to Update: 78
Last EDR Contact :09/19/2014

Source: EPA
Telephone: Not Reported

DOT OPS: Incident and Accident Data
Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012

Source: Department of Transporation, Office of Pipeline Safety

RECORD SOURCES AND CURRENCY

Number of Days to Update: 42
Telephone: 202-366-4595
Last EDR Contact :08/06/2014

EPA WATCH LIST: EPA WATCH LIST

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Source: Environmental Protection Agency
Number of Days to Update: 88
Telephone: 617-520-3000
Last EDR Contact :08/15/2014

ERNS: Emergency Response Notification System

Standard Environmental Record Source: Federal ERNS list

Search Distance: Property

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 09/30/2013
Source: National Response Center, United States Coast Guard
Number of Days to Update: 66
Telephone: 202-267-2180
Last EDR Contact :09/30/2014

FEMA UST: Underground Storage Tank Listing

Standard Environmental Record Source: State and tribal registered storage tank lists

Search Distance: Property

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Source: FEMA
Number of Days to Update: 55
Telephone: 202-646-5797
Last EDR Contact :07/08/2014

FINDS: Facility Index System/Facility Registry System

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 11/18/2013
Source: EPA
Number of Days to Update: 13
Telephone: Not Reported
Last EDR Contact :09/10/2014

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

RECORD SOURCES AND CURRENCY

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Number of Days to Update: 25
Last EDR Contact :08/19/2014

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

Standard Environmental Record Source: Other Standard Environmental Records

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Number of Days to Update: 25
Last EDR Contact :08/19/2014

Source: EPA
Telephone: 202-566-1667

FUDS: Formerly Used Defense Sites

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 06/06/2014
Number of Days to Update: 8
Last EDR Contact :09/10/2014

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Number of Days to Update: 40
Last EDR Contact :12/17/2007

Source: Environmental Protection Agency
Telephone: 202-564-2501

HMIRS: Hazardous Materials Information Reporting System

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 06/30/2014
Number of Days to Update: 79
Last EDR Contact :07/01/2014

Source: U.S. Department of Transportation
Telephone: 202-366-4555

ICIS: Integrated Compliance Information System

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

RECORD SOURCES AND CURRENCY

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 05/06/2014
Number of Days to Update: 32
Last EDR Contact :10/09/2014

Source: Environmental Protection Agency
Telephone: 202-564-5088

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal leaking storage tank lists
Search Distance: 0.333 Mile

A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 02/01/2013
Number of Days to Update: 184
Last EDR Contact :08/01/2014

Source: EPA Region 1
Telephone: 617-918-1313

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal leaking storage tank lists
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 05/20/2014
Number of Days to Update: 73
Last EDR Contact :04/28/2014

Source: EPA Region 10
Telephone: 206-553-2857

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal leaking storage tank lists
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 07/30/2014
Number of Days to Update: 10
Last EDR Contact :04/22/2014

Source: EPA Region 4
Telephone: 404-562-8677

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal leaking storage tank lists
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 08/04/2014
Number of Days to Update: 17
Last EDR Contact :04/28/2014

Source: EPA, Region 5
Telephone: 312-886-7439

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal leaking storage tank lists
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 05/14/2014
Number of Days to Update: 61
Last EDR Contact :07/22/2014

Source: EPA Region 6
Telephone: 214-665-6597

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
Standard Environmental Record Source: State and tribal leaking storage tank lists
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 05/22/2014

Source: EPA Region 7

RECORD SOURCES AND CURRENCY

Number of Days to Update: 27
Telephone: 913-551-7003
Last EDR Contact :04/28/2014

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal leaking storage tank lists

LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 08/13/2014
Source: EPA Region 8
Number of Days to Update: 7
Telephone: 303-312-6271
Last EDR Contact :07/22/2014

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal leaking storage tank lists

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 03/01/2013
Source: Environmental Protection Agency
Number of Days to Update: 42
Telephone: 415-972-3372
Last EDR Contact :07/22/2014

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: 0.333 Mile

Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Source: Environmental Protection Agency
Number of Days to Update: 52
Telephone: 703-308-8245
Last EDR Contact :08/01/2014

INDIAN UST R1: Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal registered storage tank lists

Search Distance: Property

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 02/01/2013
Source: EPA, Region 1
Number of Days to Update: 271
Telephone: 617-918-1313
Last EDR Contact :08/01/2014

INDIAN UST R10: Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal registered storage tank lists

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 05/20/2014
Source: EPA Region 10
Number of Days to Update: 66
Telephone: 206-553-2857
Last EDR Contact :07/22/2014

INDIAN UST R4: Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal registered storage tank lists

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 07/30/2014
Source: EPA Region 4

RECORD SOURCES AND CURRENCY

Number of Days to Update: 10
Telephone: 404-562-9424
Last EDR Contact :04/22/2014

INDIAN UST R5: Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal registered storage tank lists

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 08/04/2014
Source: EPA Region 5
Number of Days to Update: 17
Telephone: 312-886-6136
Last EDR Contact :04/28/2014

INDIAN UST R6: Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal registered storage tank lists

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 07/25/2014
Source: EPA Region 6
Number of Days to Update: 25
Telephone: 214-665-7591
Last EDR Contact :07/22/2014

INDIAN UST R7: Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal registered storage tank lists

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 08/20/2014
Source: EPA Region 7
Number of Days to Update: 27
Telephone: 913-551-7003
Last EDR Contact :04/28/2014

INDIAN UST R8: Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal registered storage tank lists

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 08/13/2014
Source: EPA Region 8
Number of Days to Update: 7
Telephone: 303-312-6137
Last EDR Contact :07/22/2014

INDIAN UST R9: Underground Storage Tanks on Indian Land

Standard Environmental Record Source: State and tribal registered storage tank lists

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 08/14/2014
Source: EPA Region 9
Number of Days to Update: 7
Telephone: 415-972-3368
Last EDR Contact :07/22/2014

INDIAN VCP R1: Voluntary Cleanup Priority Listing

Standard Environmental Record Source: State and tribal voluntary cleanup sites

Search Distance: 0.333 Mile

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 05/30/2014
Source: EPA, Region 1
Number of Days to Update: 45
Telephone: 617-918-1102

RECORD SOURCES AND CURRENCY

Last EDR Contact :07/01/2014

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

Standard Environmental Record Source: State and tribal voluntary cleanup sites

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Number of Days to Update: 27
Last EDR Contact :04/20/2009

Source: EPA, Region 7
Telephone: 913-551-7365

LEAD SMELTER 1: Lead Smelter Sites

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

A listing of former lead smelter site locations.

Date of Government Version: 06/04/2014
Number of Days to Update: 46
Last EDR Contact :07/01/2014

Source: Environmental Protection Agency
Telephone: 703-603-8787

LEAD SMELTER 2: Lead Smelter Sites

Standard Environmental Record Source: Other Standard Environmental Records

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Number of Days to Update: 36
Last EDR Contact :12/02/2009

Source: American Journal of Public Health
Telephone: 703-305-6451

LIENS 2: CERCLA Lien Information

Standard Environmental Record Source: Federal CERCLIS

Search Distance: Property

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/18/2014
Number of Days to Update: 37
Last EDR Contact :07/22/2014

Source: Environmental Protection Agency
Telephone: 202-564-6023

LUCIS: Land Use Control Information System

Standard Environmental Record Source: Federal institutional controls / engineering controls registries

Search Distance: 0.333 Mile

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 05/28/2014
Number of Days to Update: 18
Last EDR Contact :08/14/2014

Source: Department of the Navy
Telephone: 843-820-7326

MLTS: Material Licensing Tracking System

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

RECORD SOURCES AND CURRENCY

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 07/22/2013
Number of Days to Update: 91
Last EDR Contact :09/08/2014

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169

NPL: National Priority List

Standard Environmental Record Source: Federal NPL

Search Distance: 0.333 Mile

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 10/25/2013
Number of Days to Update: 78
Last EDR Contact :09/19/2014

Source: EPA
Telephone: Not Reported

NPL Site Boundaries

Sources:

EPA"s Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-566-0690

EPA Region 1
Telephone: 617-918-1102

EPA Region 2
Telephone: 212-637-4293

EPA Region 3
Telephone: 215-814-5418

EPA Region 4
Telephone: 404-562-8681

EPA Region 5
Telephone: 312-353-1063

EPA Region 6
Telephone: 214-655-6659

EPA Region 7
Telephone: 913-551-7247

EPA Region 8
Telephone: 303-312-6118

EPA Region 9
Telephone: 415-947-4579

EPA Region 10
Telephone: 206-553-4479

NPL LIENS: Federal Superfund Liens

Standard Environmental Record Source: Federal NPL

Search Distance: Property

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267

RECORD SOURCES AND CURRENCY

Last EDR Contact :08/15/2011

ODI: Open Dump Inventory

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: 0.333 Mile

An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Source: Environmental Protection Agency
Number of Days to Update: 39
Telephone: 800-424-9346
Last EDR Contact :06/09/2004

PADS: PCB Activity Database System

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 06/01/2013
Source: EPA
Number of Days to Update: 107
Telephone: 202-566-0500
Last EDR Contact :07/18/2014

PCB TRANSFORMER: PCB Transformer Registration Database

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 02/01/2011
Source: Environmental Protection Agency
Number of Days to Update: 83
Telephone: 202-566-0517
Last EDR Contact :08/01/2014

Proposed NPL: Proposed National Priority List Sites

Standard Environmental Record Source: Federal NPL

Search Distance: 0.333 Mile

A site that has been proposed for listing on the NationalPriorities List through the issuance of a proposed rule in the Federal Register.EPA then accepts public comments on the site, responds to the comments,and places on the NPL those sites that continue to meet therequirements for listing.

Date of Government Version: 10/25/2013
Source: EPA
Number of Days to Update: 78
Telephone: Not Reported
Last EDR Contact :09/19/2014

RAATS: RCRA Administrative Action Tracking System

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Source: EPA
Number of Days to Update: 35
Telephone: 202-564-4104

RECORD SOURCES AND CURRENCY

Last EDR Contact :06/02/2008

RADINFO: Radiation Information Database

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/07/2014
Number of Days to Update: 18
Last EDR Contact :07/10/2014

Source: Environmental Protection Agency
Telephone: 202-343-9775

RCRA NonGen / NLR: RCRA - Non Generators

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 06/10/2014
Number of Days to Update: 78
Last EDR Contact :07/02/2014

Source: Environmental Protection Agency
Telephone: 703-308-8895

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

Standard Environmental Record Source: Federal RCRA generators list

Search Distance: Property

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/10/2014
Number of Days to Update: 78
Last EDR Contact :07/02/2014

Source: Environmental Protection Agency
Telephone: 703-308-8895

RCRA-LQG: RCRA - Large Quantity Generators

Standard Environmental Record Source: Federal RCRA generators list

Search Distance: Property

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/10/2014
Number of Days to Update: 78
Last EDR Contact :07/02/2014

Source: Environmental Protection Agency
Telephone: 703-308-8895

RCRA-SQG: RCRA - Small Quantity Generators

Standard Environmental Record Source: Federal RCRA generators list

Search Distance: Property

RECORD SOURCES AND CURRENCY

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 06/10/2014
Number of Days to Update: 78
Last EDR Contact :07/02/2014

Source: Environmental Protection Agency
Telephone: 703-308-8895

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

Standard Environmental Record Source: Federal RCRA TSD facilities list
Search Distance: 0.333 Mile

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 06/10/2014
Number of Days to Update: 78
Last EDR Contact :07/02/2014

Source: Environmental Protection Agency
Telephone: 703-308-8895

ROD: Records Of Decision

Standard Environmental Record Source: Federal NPL
Search Distance: 0.333 Mile

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 11/25/2013
Number of Days to Update: 74
Last EDR Contact :09/09/2014

Source: EPA
Telephone: 703-416-0223

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Number of Days to Update: 54
Last EDR Contact :07/25/2014

Source: Environmental Protection Agency
Telephone: 615-532-8599

SSTS: Section 7 Tracking Systems

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203

Attachment: Phase I Environmental Site Assessment (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

RECORD SOURCES AND CURRENCY

Last EDR Contact :07/22/2014

TRIS: Toxic Chemical Release Inventory System

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2011
Number of Days to Update: 44
Last EDR Contact :08/29/2014

Source: EPA
Telephone: 202-566-0250

TSCA: Toxic Substances Control Act

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006
Number of Days to Update: 64
Last EDR Contact :09/26/2014

Source: EPA
Telephone: 202-260-5521

UMTRA: Uranium Mill Tailings Sites

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: 0.333 Mile

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Number of Days to Update: 146
Last EDR Contact :08/20/2014

Source: Department of Energy
Telephone: 505-845-0011

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/23/2013
Number of Days to Update: 30
Last EDR Contact :09/29/2014

Source: EPA
Telephone: 202-564-2496

US AIRS MINOR: Air Facility System Data

Standard Environmental Record Source: Other Standard Environmental Records

A listing of minor source facilities.

Date of Government Version: 10/23/2013
Number of Days to Update: 30

Source: EPA
Telephone: 202-564-2496

RECORD SOURCES AND CURRENCY

Last EDR Contact :09/29/2014

US BROWNFIELDS: A Listing of Brownfields Sites

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: 0.333 Mile

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 07/01/2014
Source: Environmental Protection Agency
Number of Days to Update: 25
Telephone: 202-566-2777
Last EDR Contact :09/23/2014

US CDL: Clandestine Drug Labs

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 05/28/2014
Source: Drug Enforcement Administration
Number of Days to Update: 25
Telephone: 202-307-1000
Last EDR Contact :09/03/2014

US ENG CONTROLS: Engineering Controls Sites List

Standard Environmental Record Source: Federal institutional controls / engineering controls registries

Search Distance: Property

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 06/23/2014
Source: Environmental Protection Agency
Number of Days to Update: 65
Telephone: 703-603-0695
Last EDR Contact :09/08/2014

US FIN ASSUR: Financial Assurance Information

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 06/19/2014
Source: Environmental Protection Agency
Number of Days to Update: 38
Telephone: 202-566-1917
Last EDR Contact :08/14/2014

US HIST CDL: National Clandestine Laboratory Register

Standard Environmental Record Source: Other Standard Environmental Records

Search Distance: Property

RECORD SOURCES AND CURRENCY

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 05/28/2014
Number of Days to Update: 25
Last EDR Contact :09/03/2014

Source: Drug Enforcement Administration
Telephone: 202-307-1000

US INST CONTROL: Sites with Institutional Controls

Standard Environmental Record Source: Federal institutional controls / engineering controls registries
Search Distance: Property

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 06/23/2014
Number of Days to Update: 65
Last EDR Contact :09/08/2014

Source: Environmental Protection Agency
Telephone: 703-603-0695

US MINES: Mines Master Index File

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 01/30/2014
Number of Days to Update: 132
Last EDR Contact :09/04/2014

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959

AOCONCERN: San Gabriel Valley Areas of Concern

Standard Environmental Record Source: State and tribal - equivalent CERCLIS
Search Distance: 0.333 Mile

San Gabriel Valley areas where VOC contamination is at or above the MCL as designated by region 9 EPA office.

Date of Government Version: 03/30/2009
Number of Days to Update: 206
Last EDR Contact :09/22/2014

Source: EPA Region 9
Telephone: 415-972-3178

DOD: Department of Defense Sites

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: 0.333 Mile

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Number of Days to Update: 62
Last EDR Contact :07/18/2014

Source: USGS
Telephone: 888-275-8747

INDIAN RESERV: Indian Reservations

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

RECORD SOURCES AND CURRENCY

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Number of Days to Update: 34
Last EDR Contact :07/18/2014

Source: USGS
Telephone: 202-208-3710

PWS: Public Water System Data

Standard Environmental Record Source: Other Standard Environmental Records
Search Distance: Property

This Safe Drinking Water Information System (SDWIS) file contains public water systems name and address, population served and the primary source of water

Date of Government Version: 04/12/2007
Number of Days to Update: N/A
Last EDR Contact :09/08/2014

Source: EPA
Telephone: Not Reported

RECORD SOURCES AND CURRENCY

HISTORICAL USE RECORDS

RGA LF: Recovered Government Archive Solid Waste Facilities List

Standard Environmental Record Source: Exclusive Recovered Govt. Archives

Search Distance: Property

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Resources Recycling and Recovery in California.

Date of Government Version: Not Reported
Number of Days to Update: 196
Last EDR Contact :06/01/2012

Source: Department of Resources Recycling and Recovery
Telephone: Not Reported

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

Standard Environmental Record Source: Exclusive Recovered Govt. Archives

Search Distance: Property

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the State Water Resources Control Board in California.

Date of Government Version: Not Reported
Number of Days to Update: 182
Last EDR Contact :06/01/2012

Source: State Water Resources Control Board
Telephone: Not Reported

EDR MGP: EDR Proprietary Manufactured Gas Plants

Standard Environmental Record Source: Former manufactured Gas Plants

Search Distance: 0.333 Mile

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: 08/28/2009
Number of Days to Update: 55
Last EDR Contact :11/30/2012

Source: EDR, Inc.
Telephone: Not Reported

EDR US Hist Auto Stat: EDR Exclusive Historic Gas Stations

Standard Environmental Record Source: Historical Gas Stations

Search Distance: 0.25 Mile

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: 02/20/2007
Number of Days to Update: 42
Last EDR Contact :02/21/2007

Source: EDR, Inc.
Telephone: Not Reported

EDR US Hist Cleaners: EDR Exclusive Historic Dry Cleaners

Standard Environmental Record Source: Historical Dry Cleaners

RECORD SOURCES AND CURRENCY

Search Distance: 0.25 Mile

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: 02/20/2007
Number of Days to Update: 42
Last EDR Contact :02/21/2007

Source: EDR, Inc.
Telephone: Not Reported

RECORD SOURCES AND CURRENCY

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5' minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW® Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW® Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services. The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

STREET AND ADDRESS INFORMATION

PRELIMINARY HYDROLOGY AND HYDRAULIC STUDY FOR TENTATIVE TRACT MAP 37001 IRONWOOD

CITY OF MORENO VALLEY
CALIFORNIA

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DATE PREPARED:
SEPTEMBER 29, 2015
REVISED:
JUNE 17, 2016
JULY 6, 2016

PRELIMINARY HYDROLOGY AND HYDRAULIC STUDY FOR TENTATIVE TRACT MAP 37001 – IRONWOOD CITY OF MORENO VALLEY, CALIFORNIA

This report has been prepared by or under the direction of the following registered civil engineer who attests to the technical information contained herein. The registered civil engineer has also judged the qualifications of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

REGISTERED PROFESSIONAL ENGINEER
JOSEPH L. CASTANEDA
NO. 59835
EXP. 12/31/17
CIVIL
STATE OF CALIFORNIA

07/06/2016

Joseph L. Castaneda RCE 59835 Registered Civil Engineer	Date	Seal

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PRELIMINARY HYDROLOGY AND HYDRAULIC STUDY FOR TENTATIVE TRACT MAP 37001 – IRONWOOD CITY OF MORENO VALLEY, CALIFORNIA

I. INTRODUCTION

Tentative Tract Map 37001 is a proposed residential development in the City of Moreno Valley. The purpose of this study is to determine the preliminary drainage improvements required to provide flood protection to the onsite area from the flows emanating from the onsite and offsite areas. Additionally, the study will determine the preliminary drainage improvements required to convey the onsite flows to the two onsite bioretention basins. The scope of this report will include the following:

- Determine the peak 100-year and 10-year flow rates for the existing condition watershed using the Riverside County Flood Control and Water Conservation District (RCFC & WCD) Rational Method.
- Determine the 100-year and 10-year flow rates for the post-project condition onsite and offsite areas using the Riverside County Flood Control and Water Conservation District (RCFC & WCD) Rational Method.
- Determine the 2-year, 24-hour storm duration peak flow rates for the pre-project and post-project areas tributary to each basin using the Riverside County Flood Control and Water Conservation District (RCFC & WCD) Unit Hydrograph Method.
- Determine the 100-year, 1-hour peak flow rate for the onsite and offsite areas tributary to the basins using the Riverside County Flood Control and Water Conservation District (RCFC & WCD) Unit Hydrograph Method.
- Determine the existing condition flow rates tributary to the existing culverts, and perform a HEC-RAS analysis for the existing flooding condition.
- Determine the post-project condition flow rates tributary to the existing culverts and streams based upon the proposed basin mitigation, and perform HEC-RAS analyses for the post-project condition.
- Develop preliminary storm drain alignments and sizes required to flood protect the project site from offsite and onsite flows.
- Determine the required water quality volume to be treated and the required storage volume of the basins to address the hydrologic conditions of concern associated with the Water Quality Management Plan.
- Preparation of a preliminary hydrology and hydraulic report, which consists of hydrological and analytical results and exhibits.

II. PROJECT SITE AND DRAINAGE OVERVIEW

TTM 37001 is a proposed residential development consisting of 181 single family lots, open space area, streets and three bioretention basins. The project is approximately 79 acres located in the City of Moreno Valley, and is roughly bounded by Nason Street to the west, Ironwood Avenue to the South, Oliver Street to the east, and open space area to the north. The project is located within Section 34 of Township 2 South, Range 3 West.

The project site proposes to collect all onsite and offsite flows via subsurface storm drain. A portion of the northerly project boundary will enter the offsite storm drain for the peak 100-year flow rate only. Low-flow pipes will be provided to divert the flow up to the 2-year, 24-hour flow rate into the basin prior to comingling with offsite flows for water quality treatment and mitigation of the hydrologic conditions of concern. The majority of the offsite flows will be conveyed to one of the two downstream culverts located at Ironwood Avenue. Flow-by structures will be utilized within the basins that allow for a certain flow rate to bypass downstream to the existing culvert crossing Ironwood Avenue, and the remaining flow to overtop into the basins for retention. This will ensure that the project does not adversely impact downstream existing properties and streams. Analyses has been performed to demonstrate that flows will not increase, and will actually decrease in the post-project condition. Detailed basin routing analyses will be performed during final engineering.

The majority of the flows westerly offsite area will be conveyed directly to an existing culvert without passing through one of the basins. The flows in excess of the existing downstream culvert capacity will be collected within a storm drain system along Nason Street, that will allow flows to bubble out into Nason Street south of Ironwood Avenue.

The project site is tributary to three existing culverts crossing Ironwood Avenue. Per a meeting with the City of Moreno Valley, the project must mitigate the peak 100-year flow rates tributary to these three existing culverts to a maximum flow rate equal to the existing capacity of these culverts. Therefore, the basins will also serve to mitigate the 100-year storm event so that the existing culvert capacities are not exceeded.

III. HYDROLOGY ANALYSIS

The RCFC & WCD Hydrology Manual (Reference 1) was used to develop the hydrological parameters for the rational method and unit hydrograph method. The calculations were performed using the computer program developed by Civil Cadd/Civil Design.

The existing soil classification for the area consists of Soil “A”, Soil “C” and Soil “D”, as shown on Exhibit G. Exhibit G is a hydrologic soils map that was obtained from the United States Department of Agriculture, Natural Resources Conservation Service (NRCS). As recommended by the County of Riverside, an Antecedent Moisture Condition (AMC) I was utilized for the 2-year storm events, and an AMC II was utilized for the 10-year and 100-year storm events.

The following rainfall depths were obtained from the RCFC & WCD Hydrology Manual’s Isohyetal Maps. The slope of intensity duration of 0.5.

Storm Event	1-hour (in)	24-hour (in)
2-Year	0.50	2.00
100-Year	1.20	5.00

The slope value used for the rational method value is 0.50. The rainfall maps have been included as Exhibit H, and the slope of intensity duration curves have been included as Exhibit I.

Pre-Project Hydrology

The offsite areas were analyzed for the existing land use as undeveloped, poor cover, as recommended by the Riverside County Hydrology Manual. The existing watershed areas were designated as Areas A, B, C, and D, as shown on Exhibit A. Area “A” is tributary to the existing 42” culvert westerly along Ironwood Avenue (Culvert A1), Area “B” is tributary to the existing 42” culvert midway between Nason Street and Oliver Street along Ironwood Avenue (Culvert B1), and Area C is tributary to the easterly 24” culvert along Ironwood Avenue (Culvert C1, see Figure 2 for existing culvert locations). Downstream of Ironwood Avenue, Areas A, B, and C confluence within the natural channel. Area D consists of the most easterly area within the watershed boundary, and is tributary to an existing culvert east of Oliver Street.

The pre-project condition rational method analyses has been included in Appendix A, and the pre-project condition rational method hydrology map has been included as Exhibit A.

Post-Project Hydrology

The post-project condition onsite and offsite rational method hydrology analyses was performed for five watershed areas designated as Areas A, B, C, D and E. Area A is the area tributary to Basin A1 and A2, Area B is tributary to Basin B, Areas C and D are tributary to the west side of Oliver Street, and Area E is tributary to the intersection of Nason Street and Ironwood Avenue. The rational method analysis for Area A was broken down into two separate hydrology models due to the number of confluences required for the models. Area A1 represents Area A up to node 136 (Basin A1), and Area A1 represents the remainder of Area A, with a user defined area utilized for Node 136 to 171. The rational method hydrology calculations for the post-project condition have been included in Appendix B, and the post-project condition hydrology map has been included as Exhibit B.

The unit hydrograph calculations analyzed five different areas (as shown on Exhibit C and Exhibit D):

- Offsite Area “A” – Offsite Area A (30.79 acres) is the area tributary to the flow-by structure located within Basin A1, and discharges into Culvert B1. Offsite Area A was analyzed for the 100-year storm events only.
- Offsite Area “B” – Offsite Area B (73.03 acres) is tributary to the flow-by structure located in Basin A2, and discharges into Culvert B1. Offsite Area B was analyzed for the 100-year storm events only.
- Onsite Area “A1” – Onsite Area A1 (17.86 acres for the 100-year storm event and 25.15 acres for the Water Quality Area and 2-year, 24-hour storm event) is tributary to Basin A1. The areas differ between the 100-year and 2-year storm events due to the low-flow storm drain systems incorporated at Node 118 and node 121. These systems will be designed to by-pass the low-flows up to the 2-year, 24-hour storm duration so that the flows will not enter the offsite storm drain system, and rather be collected by the onsite systems that discharge the entire flow rate directly

into Basin A. This will ensure that the entire onsite area is treated for water quality purposes and mitigated for the hydrologic conditions of concern.

- Onsite Area "A2" - Onsite Area A2 (23.24 acres for the 100-year storm event and 29.70 acres for the Water Quality Area and 2-year, 24-hour storm event) is tributary to Basin A2. The areas differ between the 100-year and 2-year storm events due to the low-flow storm drain systems incorporated at Node 145 and node 148. These systems will be designed to by-pass the low-flows up to the 2-year, 24-hour storm duration so that the flows will not enter the offsite storm drain system, and rather be collected by the onsite systems that discharge the entire flow rate directly into Basin A2. This will ensure that the entire onsite area is treated for water quality purposes and mitigated for the hydrologic conditions of concern.
- Onsite Area "B" – Onsite Area B is the area tributary to Basin B (15.65 acres), and includes the total rational method Area B watershed. This area was used for the water quality analysis for Basin B and for the 2-year, 24-hour unit hydrograph analysis for Basin B. The area for the water quality, 2-year, 24-hour unit hydrograph and the 100-year unit hydrograph are the same.

The unit hydrograph hydrology maps for the 100-year storm events and the 2-year, 24-hour storm duration have been included as Exhibits C and D, respectively. The 100-year unit hydrograph calculations have been included in Appendix D, and the pre-project and post-project 2-year, 24-hour unit hydrograph calculations have been included in Appendix C.

IV. HEC-RAS ANALYSES

HEC-RAS analyses were performed for the existing condition flow rates discussed in Section V and the post-project condition flow rates discussed in Section VI to determine the flooding limits for both conditions. Two streams were identified in the HEC-RAS analysis, and have been designated as the Main Channel and the Westerly Channel. The Main Channel collects flows from Culverts B1 and C1, and the Westerly Channel collects flows from A1. The cross sections for the HEC-RAS analyses were developed using 1' topographic mapping, and the following parameters were utilized in the HEC-RAS analysis:

- Manning's "n" value of 0.030 to represent open brush cover
- Mixed flow regime
- Upstream boundary conditions equal to normal depth, and a downstream boundary condition equal to a known water surface elevation which was determined by performing a Water Surface Profile Gradient Program calculation for the existing double 60" RCP culvert crossing Lantz Lane. The resulting upstream water surface elevation using the existing condition and post-project condition tributary flow rates was utilized for the starting water surface elevation for the main channel.
- Expansion and Contraction coefficients of 0.3 and 0.1, respectively.
- Roadway deck and culvert elevations determined by survey shots

Existing Condition Results

The existing condition HEC-RAS modeled the streams to four sections upstream of Ironwood Avenue to a point where flows enter a culvert at Darlene Drive. The flows were then modeled through the culverts traversing Ironwood Avenue. Based upon the HEC-RAS results, the flows will overtop the roadway at Culvert B1 (with 111.1 ft^3/s overtopping the roadway and the remaining 131.3 ft^3/s passing through Culvert B1). The flows will also overtop the roadway at the culvert crossing Walfred Way (with 149.5 ft^3/s overtopping the roadway and the remaining 167.9 ft^3/s passing through the culvert). Therefore the capacity for Culvert B1 is 131.3 ft^3/s, and will be utilized as the maximum allowable flow rate that can be discharged from the project site into Culvert B1.

The culvert crossing Lantz Lane does not have capacity to convey the tributary flow of 87.2 ft^3/s. Based upon iterations with the HEC-RAS analyses, a total of 46.0 ft^3/s can be conveyed through the culvert, and 41.2 ft^3/s overtops Lantz Lane and is conveyed southerly within Lantz Lane.

The existing condition HEC-RAS flood plain has been delineated on Exhibit K, and the existing condition HEC-RAS calculations has been included in Appendix H.

Post-Project Condition Results

The post-project condition HEC-RAS modeled the streams from Ironwood Avenue to a point where flows enter a culvert at Darlene Drive. The starting flow rates for the post-project condition are equal to the flows discharging from Culverts A1 and B1. A detailed discussion for the post-project flow rates used in the HEC-RAS analyses has been provided in Section VI.

Based upon the HEC-RAS results, the flows at Walfred Lane will overtop the roadway, with 1.1 ft^3/s overtopping the roadway and the remaining 150.5 ft^3/s passing through the culvert.

The HEC-RAS results indicate that flows will break out at the culvert crossing Lantz Lane, as also determined in the existing condition HEC-RAS. The flow rate was decreased from 87.2 ft^3/s until the flows no longer overtopped the roadway. The flow rate that will be conveyed through the culvert and not overtop the roadway is 46.0 ft^3/s, and the remaining 41.2 ft^3/s will be conveyed southerly down Lantz Lane.

The HEC-RAS calculations have been included in Appendix H and the flood plain delineation has been shown on Exhibit L.

V. EXISTING FLOODING ANALYSIS

An existing condition rational method hydrology was performed for the area tributary to the natural streams upstream and downstream of Ironwood Avenue. Currently, there are three culverts crossing Ironwood Avenue, designated as Culvert A1 (the westerly 42" CMP Culvert), Culvert B1 (the easterly 42" CMP Culver) and Culvert C1 (the easterly 24" CMP Culvert). An exhibit has been prepared (see Exhibit J) which summarizes the flow rate analyses, and the following paragraphs provide detailed descriptions of the analyses.

Point 1 is located at the intersection of Ironwood Avenue and Nason Street. The existing condition flow rate is 89.7 ft^3/s per the existing condition rational method calculations at node 104 to 108 (see Exhibit A for Existing Condition Hydrology Map). Capacity calculations were performed for the north and south sides of Ironwood Avenue to determine the amount of flow that would be conveyed to the east within Ironwood Avenue. The north side of Ironwood Avenue would discharge into the natural stream tributary to Culvert A1, and has a capacity of 33.6 ft^3/s. The south side of Ironwood Avenue would discharge at the low-point on the south side of Culvert B1, and has a capacity of 21.6 ft^3/s. The remaining 34.5 ft^3/s, which overtops the Ironwood Avenue Centerline, would be conveyed in a southerly direction along Nason Street.

Point 2 is the upstream end of Culvert A1, and has a flow rate of 75.8 ft^3/s. This flow rate was determined by taking the existing condition flow rate from the rational method calculations at nodes 107 to 108 of 42.2 ft^3/s, and adding the 33.6 ft^3/s from the north side of Ironwood Avenue. This flow rate would be conveyed to the south side of Ironwood, as the capacity of Culvert A1 based upon the nomographs is 78.0 ft^3/s.

Point 3 is located downstream of Culvert A1, and has a flow rate equal to the existing condition flow rate at nodes 109-215 of 142.1 ft^3/s, minus the 21.6 ft^3/s conveyed easterly in the southerly half of Ironwood Avenue to the low-point on Ironwood Avenue and minus the 33.4 ft^3/s splitting to the south along Nason Street, for a total flow rate within this channel of 87.2 ft^3/s.

Point 4 is located downstream of the culvert crossing Lantz Lane. Based upon iterations with the HEC-RAS model, a total of 46.0 ft^3/s can be conveyed through the culvert, and the remaining 41.2 ft^3/s will overtop and split to the south along Lantz Lane.

Point 5 is the upstream point of Cuvert B1 which has a tributary flow rate of 241.6 ft^3/s per the existing condition rational method calculations at Node 212. However, Culvert B1 has a capacity of 131.3 ft^3/s per the HEC-RAS calculations, therefore the remaining flows will overtop the roadway. Since Ironwood Avenue is a low point at the Culvert B1 crossing, all flows overtopping Ironwood Avenue will enter the stream downstream of Culvert B1. Point 6 is the upstream point of Culvert C1, which has an existing condition flow rate of 39.2 ft^3/s at node 303. The capacity of Culvert C1 based upon the nomograph is 40.0 ft^3/s, therefore all 39.2 ft^3/s will be conveyed through the culvert. Both Culverts B1 and C1 are tributary to Point 7.

The flow rate at Point 7, which is the location upstream of the culvert crossing Walfred Way, was determined by taking the flow rate from the existing condition rational method calculations at node 214 of 295.8 ft^3/s (which is the confluence point for Culvert B1 and C1 flows), and adding the flows from the south side of Ironwood Avenue of 21.6 ft^3/s, resulting in a total tributary flow rate of 317.4 ft^3/s. This flow rate is conveyed to Point 8, which is downstream of the culvert crossing Walfred Way. Based upon the HEC-RAS analyses, the flows at this culvert will overtop the roadway, however, the roadway incorporates a low point at this location, and therefore all flows will continue to the south side of the culvert crossing.

Point 9 is the location where Point 4 and Point 8 flows confluence. The flow rate at this location was determined by taking the existing condition flow rate at node 216 of 489.0 ft^3/s, and subtracting the 33.4 ft^3/s that splits southerly along Nason Avenue and the 41.2 ft^3/s that splits southerly along Lantz Lane, resulting in a total flow rate of 414.5 ft^3/s at Point 9.

These flow rates were utilized in the HEC-RAS analyses for the existing condition, which is discussed in the HEC-RAS section. The normal depth calculations for the street capacities of Ironwood Avenue have been included in Appendix I.

VI. POST-PROJECT CONDITION FLOW RATE AND MITIGATION ANALYSES

Since the post-project condition will implement basins and flow-by structures to mitigate runoff, unit hydrograph calculations were required in order to appropriately size the basins. The rational method calculations are utilized for the sizing of storm drain and for the HEC-RAS flood plain analyses.

Based upon the HEC-RAS analyses for the existing condition, the post-project condition sends 75.8 ft^3/s through Culvert A1, which is the existing condition flow rate for Culvert A1 and Culvert B1 can convey a total of 131.3 ft^3/s. These flow rates are based upon the rational method hydrology analyses. In order to determine the rational method flow rate for each storm drain discharging from the splitter structure, the ratio of the two peak flow rates to each basin was determined. The 67.5 ft^3/s tributary to the splitter structure within Basin A1 is 31.4% of the total flow rate tributary to Culvert B1 (67.5 ft^3/s ÷ 215.3 ft^3/s). The Basin A2 splitter structure has 68.6% of the total tributary flow rate. Therefore, each basin will contribute this percentage of the allowable flow rate. Basin A1 will discharge 31.4% of the allowable flow rate tributary to Culvert B1 and Basin A2 will discharge 68.6% of the allowable flow rate tributary to Culvert B1, resulting in 41.2 ft^3/s for Basin A1 and 90.1 ft^3/s for Basin A2.

Offsite Area E has a total flow rate at node 505 of 91.5 ft^3/s in the post-project condition. Since Culvert A1 has an existing condition flow rate of 75.8 ft^3/s, a structure will be designed at Node 505 such that 75.8 ft^3/s will enter the storm drain system and the remaining 15.7 ft^3/s will overtop to inlets provided at the intersection of Nason Street and Ironwood Avenue.

Culvert B1 (Basins A2 an A1) has a total 100-year rational method tributary flow rate of 67.5 ft^3/s from Offsite Area A at node 122 and 147.8 ft^3/s from Offsite Area B at node 149, for a total tributary flow rate of 215.3 ft^3/s, which is greater than the 131.3 ft^3/s allowable for Culvert B1. Therefore, two flow-by structures will be required within Basins A1 and A2 to allow a limited amount of flow to bypass, and the remaining flow and volume to overtop into the basins. To determine the volume required to be stored in order to mitigate the flows, unit hydrograph calculations were required. In order to more appropriately compare the unit hydrograph flow rates and the rational method flow rates for the area, the ratio of the allowable rational method flow rate out (131.3 ft^3/s) compared to the inflow rational method flow rate (215.3 ft^3/s) was determined, and is equal to 61.0%. This percentage was multiplied by the peak unit hydrograph flow rates for the 100-year, 1-hour storm duration to determine the equivalent allowable flow rate to by-pass for the unit hydrograph calculations. The 100-year, 1-hour unit hydrograph for offsite area A resulted in a peak flow rate of 74.7 ft^3/s and offsite area B resulted in a peak flow rate of 159.9 ft^3/s. Taking 61.0% of these flows results in 45.6 ft^3/s allowable to discharge from Basin A1, and 97.5 ft^3/s to discharge from Basin A2. When comparing these allowable flow rates to the different durations for the 100-year storm event, the 1-hour storm duration for Basin A1 and the 1-hour and 3-hour durations for Basin A2 will require storage within Basins.

In order to determine the volume required to be stored for the applicable durations, corresponding flow rates were found within the unit hydrograph calculations on the rising and recess limbs of the hydrograph. The corresponding volumes for these flow rates were subtracted to obtain the volume that must overtop the splitter structure and be stored within the basin. The following tables summarizes the results:

Basin A1 – Area A1 Offsite Unit Hydrograph

100-Year, 1-hour Flow Rate	Maximum Allowable Flow Rate	Corresponding Flow Rates on limbs of hydrograph	Corresponding Volumes	Volume Required to Be Retained
74.7 ft^3/s	45.6 ft^3/s	31.08 ft^3/s	1.0008 ac-ft	1.3661 ac-ft
		27.49 ft^3/s	2.3669 ac-ft	

Basin A2 – Area A2 Offsite Unit Hydrograph

100-Year, 1-hour Flow Rate	Maximum Allowable Flow Rate	Corresponding Flow Rates on limbs of hydrograph	Corresponding Volumes	Volume Required to Be Retained
159.9 ft^3/s	97.5 ft^3/s	66.16 ft^3/s	2.0783 ac-ft	3.1096 ac-ft
		69.92 ft^3/s	5.1879 ac-ft	

100-Year, 3-hour Flow Rate	Maximum Allowable Flow Rate	Corresponding Flow Rates on limbs of hydrograph	Corresponding Volumes	Volume Required to Be Retained
98.6 ft^3/s	97.5 ft^3/s	89.63 ft^3/s	5.3343 ac-ft	1.2671 ac-ft
		85.37 ft^3/s	6.6014 ac-ft	

These additional volumes will be stored within the basin. A discussion and summary table of the basin volumes and outflows has been provided in the following paragraphs.

Basin A1 (Unit Hydrograph Summary)

	100-Year Storm Events			
	1-Hour	**3-Hour**	**6-Hour**	**24-Hour**
Onsite Flow Rate	41.6 ft^3/s	25.5 ft^3/s	21.8 ft^3/s	8.1 ft^3/s
Offsite Flow Rate	74.7 ft^3/s	44.0 ft^3/s	34.4 ft^3/s	16.2 ft^3/s
Allowable Offsite Flow-By	45.6 ft^3/s	45.6 ft^3/s	45.6 ft^3/s	45.6 ft^3/s
Onsite Volume Generated	1.3901 ac-ft	1.8294 ac-ft	2.2213 ac-ft	3.9417 ac-ft
Offsite Volume Generated	2.6284 ac-ft	3.5390 ac-ft	3.828 ac-ft	6.3263 ac-ft
Basin Storage Volume	3.0960 ac-ft	3.0960 ac-ft	3.0960 ac-ft	3.0960 ac-ft
Onsite Volume Retained [1]	1.3901 ac-ft	1.8294 ac-ft	2.2213 ac-ft	3.0960 ac-ft
Offsite Volume Retained [2]	1.3661 ac-ft	0 ac-ft	0 ac-ft	0 ac-ft
Total Volume Retained	2.7892 ac-ft	1.8294 ac-ft	2.2213 ac-ft	3.0960 ac-ft
Maximum Basin Outflow [3]	45.6 ft^3/s	44.0 ft^3/s	34.4 ft^3/s	21.7 ft^3/s

1 – The onsite volume retained equals the total onsite volume generated, with the exception of the 24-hour storm duration. This duration resulted in a larger volume than available to store within the basin, therefore a corresponding flow rate was calculated on the recess limb of the hydrograph where the calculations reached 3.0960 ac-ft of volume generated, equaling 5.53 ft^3/s of outflow.

2 – The offsite Volume retained for the basin was determined in the previous summary tables by taking the delta volume difference between the rising a recess limbs of the hydrograph where approximately 45.6 ft^3/s occurs. The 3-hour, 6-hour and 24-hour durations have peak flows less than the 45.6 ft^3/s allowable, therefore the entire flow rates for these durations will flow-by.
3 – The maximum basin outflow equals the maximum flow-by for the 1-hour storm duration, the peak flow rate for the offsite 3-hour and 6-hour storm duration, and the peak offsite flow rate plus the Basin A1 onsite outflow of 5.5 ft^3/s, which is discussed in detail in the following paragraphs.

Since the onsite 24-hour storm duration volume generates more volume than the proposed basin can store, the corresponding flow rate that would discharge from the basin had to be determined. The basin storage volume is 3.096 ac-ft. The Onsite Area A1 unit hydrograph calculations for the 100-year, 24-hour storm duration have a flow rate of 5.5 ft^3/s at a volume of 3.0646 ac-ft, which is the closest volume to the basin volume without going over. Therefore this is the maximum flow rate that will discharge from the basin for the 100-year, 24-hour storm duration from the onsite area is 5.5 ft^3/s. Adding this to the flow-by for the 100-year, 24-hour storm duration for the offsite area of 16.2 ft^3/s results in a total outflow for the 24-hour storm duration of 21.7 ft^3/s.

Basin A2 and Basin B (Unit Hydrograph Summary)

	100-Year Storm Events			
	1-Hour	**3-Hour**	**6-Hour**	**24-Hour**
Onsite Flow Rate [4]	96.7 ft^3/s	56.5 ft^3/s	48.4 ft^3/s	17.7 ft^3/s
Offsite Flow Rate	159.9 ft^3/s	98.6 ft^3/s	82.6 ft^3/s	36.0 ft^3/s
Allowable Offsite Flow-By	97.5 ft^3/s	97.5 ft^3/s	97.5 ft^3/s	97.5 ft^3/s
Onsite Volume Generated [4]	3.0274 ac-ft	3.9614 ac-ft	4.7718 ac-ft	8.4048 ac-ft
Offsite Volume Generated	6.0253 ac-ft	7.7868 ac-ft	8.0310 ac-ft	12.9052 ac-ft
Basin Storage Volume	7.9900 ac-ft	7.9900 ac-ft	7.9900 ac-ft`	7.9900 ac-ft
Onsite Volume Retained [1]	3.0274 ac-ft	3.9614 ac-ft	4.7718 ac-ft	7.9900 ac-ft
Offsite Volume Retained [2]	3.1096 ac-ft	1.2671 ac-ft	0 ac-ft	0 ac-ft
Total Volume Retained	6.1370 ac-ft	5.2285 ac-ft	4.7718 ac-ft	7.9900 ac-ft
Maximum Basin Outflow [3]	97.5 ft^3/s	97.5 ft^3/s	82.6 ft^3/s	38.9 ft^3/s

1 – The onsite volume retained equals the total onsite volume generated, with the exception of the 24-hour storm duration. This duration resulted in a larger volume than available to store within the basin, therefore a corresponding flow rate was

calculated on the recess limb of the hydrograph where the calculations reached 7.9900 ac-ft of volume generated, equaling 2.9 ft^3/s of outflow. A detailed discussion on this is provided in the following paragraphs.
2 – The offsite volume retained for the basin was determined in the previous summary tables by taking the delta volume difference between the rising and recess limbs of the hydrograph where approximately 97.5 ft^3/s occurs. The 6-hour and 24-hour durations have peak flows less than the 97.5 ft^3/s allowable, therefore the entire flow rates for these durations will flow-by.
3 – The maximum basin outflow equals the maximum flow-by for the 1-hour and 3-hour storm durations, the peak flow rate for the 6-hour storm duration, and the peak offsite flow rate plus the Basin A2 and Basin B onsite outflow of 2.9 ft^3/s, which is discussed in detail in the following paragraphs.
4 – The onsite flow rate and volume is equal to the summation of Onsite Area A1 and Onsite Area B flow rates and volumes.

Since the onsite 24-hour storm duration volume generates more volume than the proposed basin can store, the corresponding flow rate that would discharge from the basin had to be determined. The basin storage volume is 7.9900 ac-ft, and the summation of the volumes generated from both onsite Area A2 and B is 8.4048 ac-ft, resulting in a net excess volume of 0.4148 ft^3/s. Since this basin has two tributary unit hydrographs that will equalize, this value was divided by two (equaling 0.2074 ac-ft) and subtracted from each onsite 100-year, 24-hour storm duration unit hydrograph total generated volume, which was 4.8091 ac-ft for Basin A2 and 3.1809 ac-ft for Basin B. The corresponding flow rates at these volumes for each hydrograph was utilized as the peak flow rate for the onsite areas that would leave the basins, 0.8 ft^3/s and 2.1 ft^3/s, respectively, totaling 2.9 ft^3/s that will discharge into Culvert B1 from the onsite areas. Adding this to the 100-year, 24-hour peak flow rate for the offsite area results in a total flow rate of 38.9 ft^3/s discharging into Culvert B1 for the 100-year, 24-hour storm duration.

At Point 1, the post-project condition flow rate is 91.5 ft^3/s per the post-project rational method hydrology calculations at node 509 (see Exhibit B). A pipe and inlet will be designed to intercept 75.8 ft^3/s of this flow rate, and discharge into Culvert A1. This will ensure that flows discharging from Culvert A1 will not exceed the pre-project flow rates in the post-project condition. The remaining 15.7 ft^3/s will be intercepted on the north side and south sides of Ironwood Avenue on Nason Street, in addition to 1.6 ft^3/s that is generated from Area E5. A special system will be constructed so that the flows intercepted by these catch basins will be allowed to bubble out of a parkway drain within Nason Street south of Ironwood Avenue.

There will be no flows at Point 2 entering the culvert system, since the maximum allowable flow for Culvert A1 will be collected at Nason Street and Ironwood Avenue via the proposed storm drain connecting to Culvert A1. Points 3 and 4 will have the same flow rates in the post-project condition since the same flow rate will be discharging from Culvert A1.

Point 5 will collect the offsite flows from Area A and B. Area A has a 100-year, 1-hour flow rate of 41.2 ft^3/s leaving the splitter structure within Basin A1, and Area B has a 100-year, 1-hour flow rate of 90.1 ft^3/s leaving the splitter structure within Basin A2, which is a total of 131.3 ft^3/s. It should be noted that the storm drain system collecting the flows from Offsite Area A also collects a portion of the onsite areas 100-year flow rate. The storm drain will convey the flows to a structure at Basin A1 in which 41.2 ft^3/s will bypass to Culvert B1, and the remaining 100-year flows will overtop into Basin A1. It should be noted that during the preliminary stages, no flows will be sent to Culvert C1. Should this culvert be required during final engineering, no more than 39.2 ft^3/s will be tributary to this culvert, which is the existing condition tributary flow rate.

By sending a total flow rate of 75.8 ft^3/s to Culvert A1, 131.3 ft^3/s to Culvert B1, and nothing to Culvert C1, the flows leaving TTM 37001 will be less than the pre-project condition and therefore improve the existing flooding downstream of Ironwood Avenue.

Based upon the analyses, Point 7 will have a post-project flow rate of 151.6 ft^3/s, which was determined by taking the 131.3 ft^3/s discharging form Culvert B1, and adding 20.3 ft^3/s generate by the existing Area B12 (node 214 to 215). This flow rate is conveyed to Point 8.

Point 9 has a post-project flow rate of 256.5 ft^3/s, which is the sum of the 151.6 ft^3/s from Point 7, the 46.0 ft^3/s from Point 4, and the existing condition flow rate for Area B13 (node 215 to 216) of 58.9 ft^3/s.

These flow rates were utilized in the Post-Project Condition HEC-RAS analyses discussed previously. Summary tables for the increased runoff mitigation analyses have been provided in Appendix G.

VII. HYDRAULIC ANALYSIS

The proposed project consists of subsurface storm drain systems and bioretention basins. The facilities will be utilized to flood protect the project site, treat onsite flows for water quality purposes, and mitigate flows for increased runoff/address the hydrologic conditions of concern. During the preliminary stages, the storm drain systems were sized using normal depth.

The sizing of the preliminary storm drain systems utilized a minimum 1% slope, since this is the minimum slope of the in-tract streets. The offsite storm drain system Line A1 utilized a minimum slope of 1.5% due to the steepness of the terrain. The offsite systems utilized the adjacent roadway slope where applicable, and a 1%-2% slope in other locations. During final engineering, detailed water surface profile gradient program calculations shall be performed. The normal depth calculations have been included in Appendix F, and the Drainage Facilities Map has been included as Exhibit E.

In order to collect offsite flows tributary to the westerly project boundary, a trapezoidal channel will be constructed adjacent to Nason Street north of Ironwood Avenue. This channel will collect the offsite flows, and discharge 75.8 ft^3/s into Line A1. The remaining flows will be collected within one of two inlets provided at the intersection of Nason Street and Ironwood Avenue. The flows will be conveyed across Ironwood Avenue, and will bubble out of a proposed catch basin and 12" low-flow drain connected to a parkway drain. This modified design was provided at the request of the City of Moreno Valley to alleviate flooding at the intersection of Ironwood Avenue and Nason Street. Details for this design will be provided during final engineering.

Due to the requirement to provide a minimum 12 foot dry travel lane within the private streets for the 100-year storm event per the City of Moreno Valley Design Policy, Standard Plan MVSI-160A-0, catch basins were required in excess of those provided to meet the typical street flooding design criteria of:

- 10-year storm flows contained within the top-of-curb elevation
- 100-year storm flows contained within the right-of-way elevation

Since the hydrology calculations were based upon the 100-year storm event being contained within the top of curb elevation (which is the right-of-way), additional yield calculations and street capacity calculations were performed to determine the limits of storm drain in order to provide the 12 foot dry lane onsite. A map has been provided as Exhibit E which delineates the areas and summaries the yield calculations. A spreadsheet has also been provided in Appendix J which summaries the yield calculations.

VIII. WATER QUALITY AND HYDROLOGIC CONDITIONS OF CONCERN

The project site will utilize 3 bioretention basins to treat for water quality purposes and to address the hydrologic conditions of concern and increased runoff mitigation.

The required water quality volume was determined by using the Santa Ana Watershed BMP Design Volume Spreadsheets. The effective impervious fraction utilized the impervious area determined by the rational method calculations for the onsite area, and multiplied the impervious fraction by 1.0 and the pervious fraction by 0.1 (which corresponds to landscaped area per the LID manual). The results are 0.55 effective impervious fraction for Area A1, 0.55 effective impervious fraction for Area A2, and 0.486 for Area B. Area B resulted in a slightly lower value due to the tributary open space area from the north easterly project boundary.

The water quality volume, per the LID Manual, must be stored within a depth equal to or less than 6" above the surface of the soil media (which includes the voids within the soil media and gravel layer). The table below provides the required water quality volume and the volume provided within 6" of depth above the soil media:

Area	Water Quality Volume	Volume Provided with 6" Above Soil Media
A1	23,805 ft^3/s	45,932 ft^3/s
A2	28,112 ft^3/s	35,159 ft^3/s
B	13,140 ft^3/s	50,949 ft^3/s

Areas A1 and A2 are greater than the maximum allowable tributary area of 25 acres, however, per meetings with the City of Moreno Valley, this additional area (0.15 acres for Area A1 and 4.7 acres for Area A2) is acceptable.

Pre-Project and Post-Project Unit hydrograph calculations were performed for the 2-year, 24-hour storm duration to determine the required storage volume to address the hydrologic conditions of concern. During the preliminary stages, the required volume to address the Hydrologic Conditions of Concern was determined by taking the entire 2-year, 24-hour volume and retaining the volume within the basins. During final engineering, the mitigation will be validated using basin routing calculations. The following tables summarize the unit hydrograph results:

Area	Pre-Project 2-Year, 24-Hour Volume	Post-Project 2-Year, 24-Hour Volume	Basin Volume Provided
A1	0.4191 ac-ft	2.0957 ac-ft	3.0960 ac-ft
A2	0.4950 ac-ft	2.4749 ac-ft	7.9900 ac-ft [1]
B	0.2608 ac-ft	1.1560 ac-ft	7.9900 ac-ft [1]

1 – Area A2 and B will be mitigated within Basins A2 and B, which will function together for addressing the hydrologic conditions of concern and increased runoff mitigation. The total 2-year, 24-hour volume to both basins from Areas A2 and B is 3.6309 ac-ft, and the basin has a total available volume of 7.9900 ac-ft, therefore the basins have sufficient volume to address the hydrologic conditions of concern.

The water quality calculations and the hydrologic conditions of concern mitigation have been included in Appendix G.

IX. CONCLUSIONS

Drainage analyses were prepared for the project site in order to determine the pre-project and post-project conditions, the required storm drain infrastructure to flood protect the project site, and the required mitigation measures for the project site. The following conclusions were derived from the hydrology and hydraulic results:

1. The proposed storm drain alignments will provide flood protection to the project site for the 100-year storm events as well as provide a minimum 12 foot dry lane within the local streets during the 100-year storm event.
2. The proposed bioretention basins will adequately treat for water quality purposes and mitigate the 2-year, 24-hour storm duration post-project condition to pre-project levels.
3. The project will discharge flows equal to the existing culvert capacities or existing tributary flow rates, whichever is less, for the 100-year storm event. During final engineering, detailed basin routing calculations will be performed to validate the basin and flow-by structure designs.
4. The project site will not adversely impact downstream properties by mitigating increased flows to less than or equal to pre-project levels.

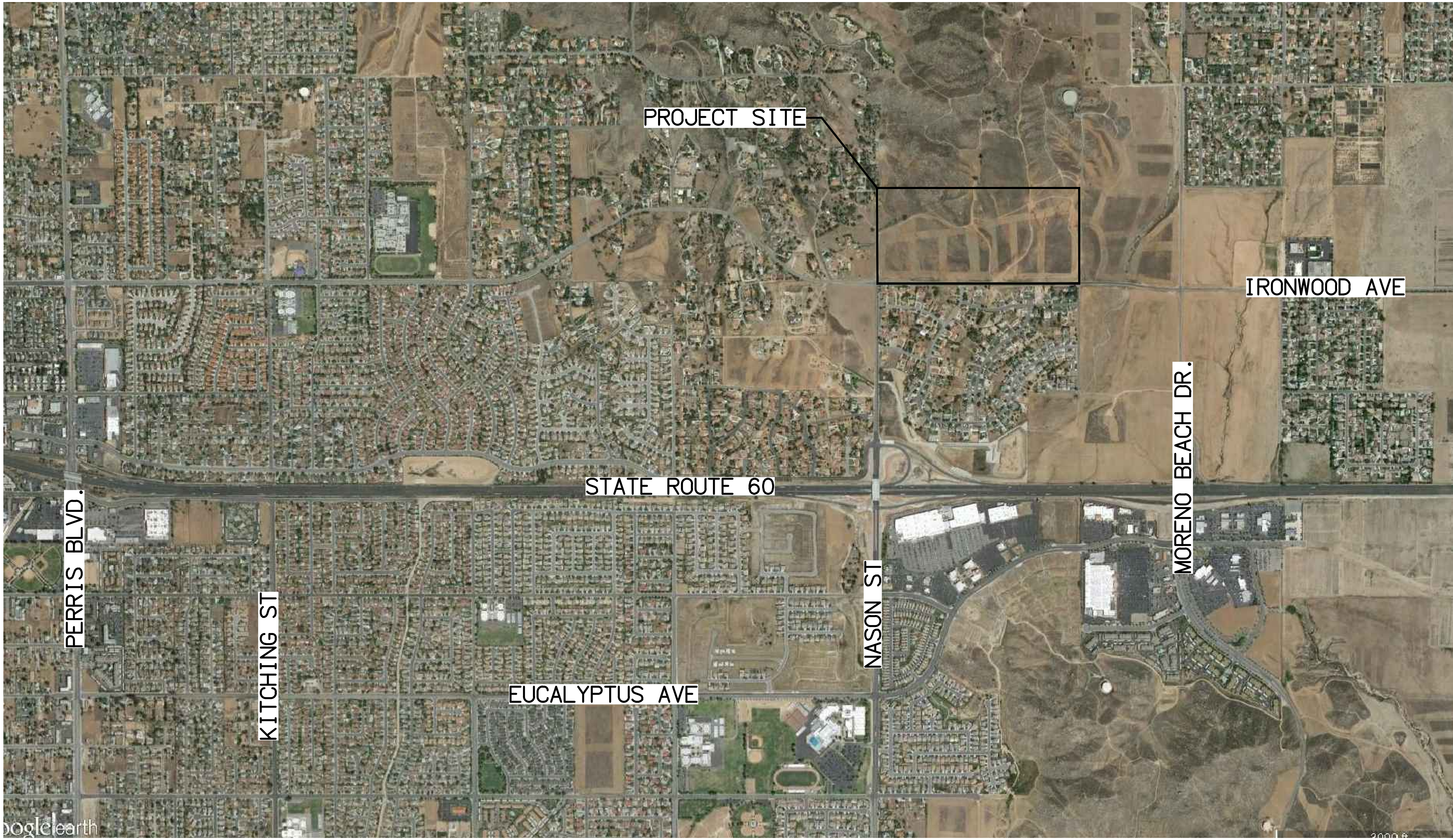
X. REFERENCES

1. Riverside County Flood Control and Water Conservation District Hydrology Manual, April 1978.
2. Los Angeles County Flood Control Design Manual, March 1982
3. Riverside County Stormwater Quality Best Management Practice Design Handbook, July 2006

FIGURES

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

FIGURE 1: VICINITY MAP



N

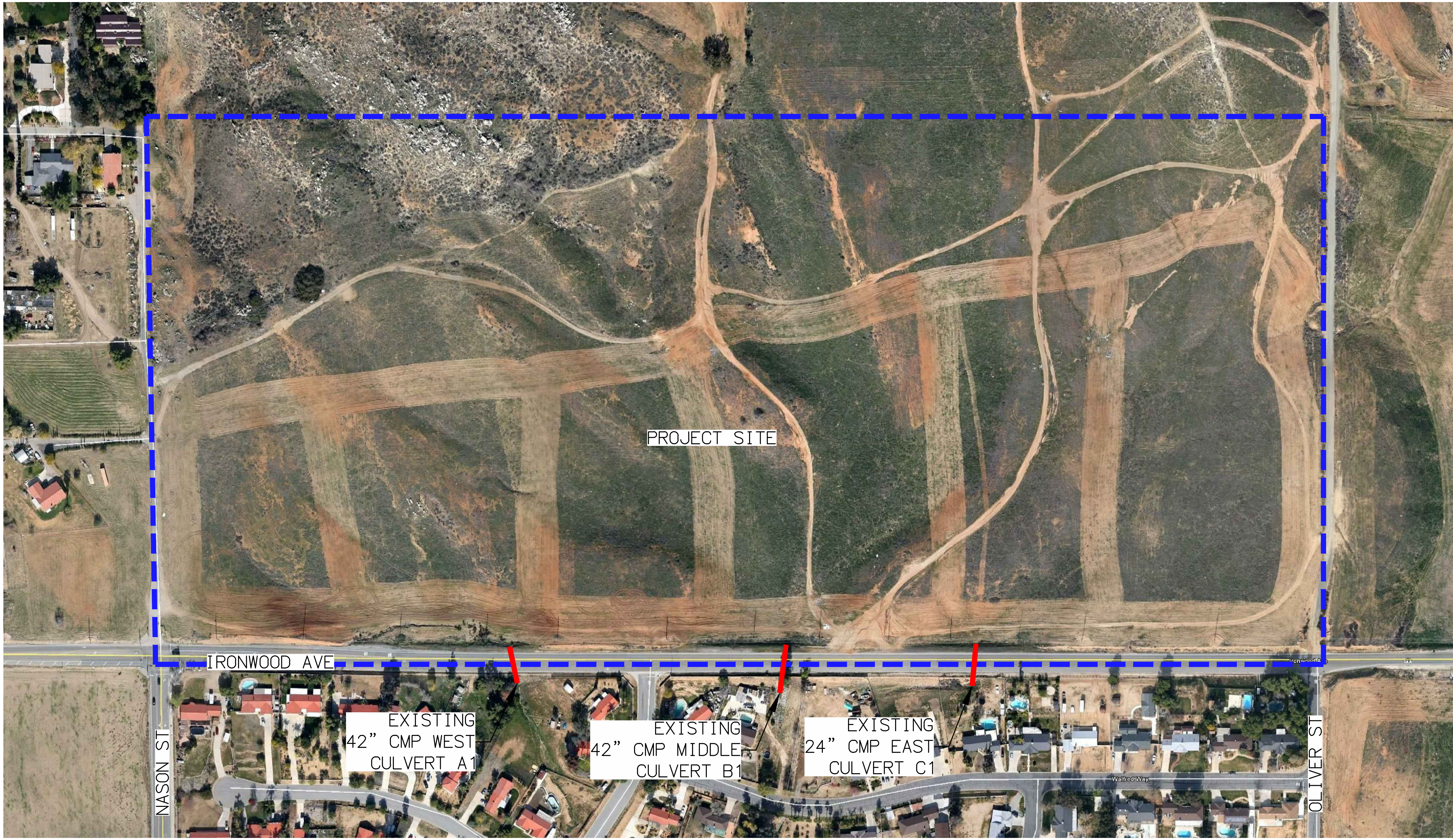
TRACT 37001 VICINITY MAP

JLC Engineering & Consulting, Inc.
36263 CALLE DE LOBO
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

FIGURE 1

Drawing Name: O:\150.06.14\Engineering\WQMP\Appendix 1 - Maps & Site Plan\Receiving waters-San Jacinto and Vicinity.dwg
Last Opened: Oct 05, 2015 - 10:51am by jcarver

FIGURE 2: EXISTING FACILITY LOCATION MAP



TRACT 37001 EXISTING FACILITY LOCATION MAP

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FIGURE 2

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APPENDICES

APPENDIX A: OFFSITE AND ONSITE EXISTING CONDITION RATIONAL METHOD ANALYSIS

APPENDIX A.1: AREA "A"

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                   Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
       Rational Hydrology Study        Date: 07/06/16  File:ARAEX100.out
------------------------------------------------------------------------
IRONWOOD PRE-PROJECT CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARAEX100

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------



Program License Serial Number 6279

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   669.000(Ft.)
Top (of initial area) elevation =  2280.000(Ft.)
Bottom (of initial area) elevation =  2132.000(Ft.)
Difference in elevation =   148.000(Ft.)
Slope =    0.22123  s(percent)=      22.12
TC = k(0.496)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.051 min.
Rainfall intensity =      3.090(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  88.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      6.723(CFS)
Total initial stream area =        2.560(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =   2132.000(Ft.)
End of natural channel elevation =   2072.000(Ft.)
Length of natural channel  =   524.000(Ft.)
```

```
Estimated mean flow rate at midpoint of channel =     16.794(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   9.68(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.1145
Corrected/adjusted channel slope =  0.1145
Travel time =    0.90 min.     TC =    9.95  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  88.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.946(In/Hr) for a   100.0 year storm
Subarea runoff =     19.155(CFS) for      7.670(Ac.)
Total runoff =     25.878(CFS)       Total area =      10.230(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation =   2072.000(Ft.)
End of natural channel elevation =   1980.000(Ft.)
Length of natural channel  =   875.000(Ft.)
Estimated mean flow rate at midpoint of channel =     42.637(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =  11.99(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.1051
Corrected/adjusted channel slope =  0.1051
Travel time =    1.22 min.     TC =   11.17  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.843
Decimal fraction soil group A = 0.010
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.990
RI index for soil(AMC 2)  =  87.69
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.781(In/Hr) for a   100.0 year storm
Subarea runoff =     31.074(CFS) for     13.250(Ac.)
Total runoff =     56.952(CFS)       Total area =      23.480(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      108.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation =   1980.000(Ft.)
End of natural channel elevation =   1860.000(Ft.)
Length of natural channel  =  2380.000(Ft.)
Estimated mean flow rate at midpoint of channel =     78.491(CFS)
```

```
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   9.92(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0504
Corrected/adjusted channel slope =  0.0504
Travel time =    4.00 min.     TC =   15.17  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.772
Decimal fraction soil group A = 0.410
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.540
RI index for soil(AMC 2)  =  77.19
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.386(In/Hr) for a   100.0 year storm
Subarea runoff =     32.740(CFS) for     17.760(Ac.)
Total runoff =     89.692(CFS)       Total area =      41.240(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      108.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     41.240(Ac.)
Runoff from this stream =     89.692(CFS)
Time of concentration =   15.17 min.
Rainfall intensity =     2.386(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   815.000(Ft.)
Top (of initial area) elevation =  2200.000(Ft.)
Bottom (of initial area) elevation =  2004.000(Ft.)
Difference in elevation =   196.000(Ft.)
Slope =    0.24049  s(percent)=      24.05
TC = k(0.496)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.633 min.
Rainfall intensity =      2.995(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  88.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      6.963(CFS)
Total initial stream area =        2.740(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =   2004.000(Ft.)
End of natural channel elevation =   1920.000(Ft.)
Length of natural channel  =   845.000(Ft.)
Estimated mean flow rate at midpoint of channel =     14.256(CFS)
```

```
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   8.63(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0994
Corrected/adjusted channel slope =  0.0994
Travel time =    1.63 min.     TC =   11.26  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.845
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  88.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.770(In/Hr) for a   100.0 year storm
Subarea runoff =     13.426(CFS) for      5.740(Ac.)
Total runoff =     20.389(CFS)       Total area =       8.480(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =   1920.000(Ft.)
End of natural channel elevation =   1860.000(Ft.)
Length of natural channel  =  1170.000(Ft.)
Estimated mean flow rate at midpoint of channel =     33.805(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   7.84(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0513
Corrected/adjusted channel slope =  0.0513
Travel time =    2.49 min.     TC =   13.75  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.781
Decimal fraction soil group A = 0.390
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.030
Decimal fraction soil group D = 0.580
RI index for soil(AMC 2)  =  77.69
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.507(In/Hr) for a   100.0 year storm
Subarea runoff =     21.840(CFS) for     11.160(Ac.)
Total runoff =     42.229(CFS)       Total area =      19.640(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      108.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     19.640(Ac.)
Runoff from this stream =     42.229(CFS)
Time of concentration =   13.75 min.
Rainfall intensity =     2.507(In/Hr)
```

```
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       89.692     15.17                 2.386
2       42.229     13.75                 2.507
Largest stream flow has longer time of concentration
Qp =     89.692 + sum of
         Qb          Ia/Ib
         42.229 *    0.952 =     40.205
Qp =    129.897

Total of 2 streams to confluence:
Flow rates before confluence point:
      89.692      42.229
Area of streams before confluence:
       41.240       19.640
Results of confluence:
Total flow rate =    129.897(CFS)
Time of concentration =    15.171 min.
Effective stream area after confluence =     60.880(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1860.000(Ft.)
Downstream point/station elevation =  1859.000(Ft.)
Pipe length  =    88.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   129.897(CFS)
Nearest computed pipe diameter  =     45.00(In.)
Calculated individual pipe flow  =   129.897(CFS)
Normal flow depth in pipe =   37.22(In.)
Flow top width inside pipe =   34.04(In.)
Critical Depth =   40.68(In.)
Pipe flow velocity =     13.30(Ft/s)
Travel time through pipe =    0.11 min.
Time of concentration (TC) =    15.28 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      215.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =   1859.000(Ft.)
End of natural channel elevation =   1804.000(Ft.)
Length of natural channel  =   776.000(Ft.)
Estimated mean flow rate at midpoint of channel =    136.042(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =  13.87(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0709
Corrected/adjusted channel slope =  0.0709
Travel time =    0.93 min.     TC =   16.21  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.835
Decimal fraction soil group A = 0.250
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.150
Decimal fraction soil group D = 0.600
```

```
RI index for soil(AMC 2)  =  80.89
Pervious area fraction =  0.600; Impervious fraction =  0.400
Rainfall intensity =      2.308(In/Hr) for a   100.0 year storm
Subarea runoff =     11.105(CFS) for      5.760(Ac.)
Total runoff =    141.002(CFS)        Total area =      66.640(Ac.)
End of computations, total study area =           66.64 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.965
Area averaged RI index number =  82.7
```

APPENDIX A.2: AREA "B"

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
       Rational Hydrology Study        Date: 03/23/16  File:ARBEX100.out
------------------------------------------------------------------------
IRONWOOD PRE-PROJECT CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARBEX100

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6279

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   961.000(Ft.)
Top (of initial area) elevation =  2244.000(Ft.)
Bottom (of initial area) elevation =  2016.000(Ft.)
Difference in elevation =   228.000(Ft.)
Slope =    0.23725  s(percent)=      23.73
TC = k(0.496)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.317 min.
Rainfall intensity =      2.894(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.847
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  88.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     11.836(CFS)
Total initial stream area =        4.830(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      205.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =   2016.000(Ft.)
End of natural channel elevation =   1856.000(Ft.)
Length of natural channel  =  1628.000(Ft.)
```

```
Estimated mean flow rate at midpoint of channel =     24.444(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   9.92(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0983
Corrected/adjusted channel slope =  0.0983
Travel time =    2.74 min.     TC =   13.05  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.836
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.210
Decimal fraction soil group D = 0.790
RI index for soil(AMC 2)  =  87.14
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.573(In/Hr) for a   100.0 year storm
Subarea runoff =     22.134(CFS) for     10.290(Ac.)
Total runoff =     33.970(CFS)       Total area =      15.120(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      205.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     15.120(Ac.)
Runoff from this stream =     33.970(CFS)
Time of concentration =   13.05 min.
Rainfall intensity =     2.573(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   652.000(Ft.)
Top (of initial area) elevation =  2036.000(Ft.)
Bottom (of initial area) elevation =  1904.000(Ft.)
Difference in elevation =   132.000(Ft.)
Slope =    0.20245  s(percent)=      20.25
TC = k(0.496)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.119 min.
Rainfall intensity =      3.078(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  88.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      8.868(CFS)
Total initial stream area =        3.390(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      205.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =   1904.000(Ft.)
End of natural channel elevation =   1856.000(Ft.)
Length of natural channel  =   600.000(Ft.)
```

```
Estimated mean flow rate at midpoint of channel =     15.616(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   7.93(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0800
Corrected/adjusted channel slope =  0.0800
Travel time =    1.26 min.     TC =   10.38  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.844
Decimal fraction soil group A = 0.010
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.040
Decimal fraction soil group D = 0.950
RI index for soil(AMC 2)  =  87.50
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.885(In/Hr) for a   100.0 year storm
Subarea runoff =     12.569(CFS) for      5.160(Ac.)
Total runoff =     21.436(CFS)       Total area =       8.550(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      205.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      8.550(Ac.)
Runoff from this stream =     21.436(CFS)
Time of concentration =   10.38 min.
Rainfall intensity =     2.885(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       33.970     13.05                2.573
2       21.436     10.38                2.885
Largest stream flow has longer time of concentration
Qp =     33.970 + sum of
          Qb          Ia/Ib
          21.436 *     0.892 =     19.116
Qp =     53.086

Total of 2 streams to confluence:
Flow rates before confluence point:
      33.970      21.436
Area of streams before confluence:
       15.120       8.550
Results of confluence:
Total flow rate =     53.086(CFS)
Time of concentration =    13.052 min.
Effective stream area after confluence =     23.670(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      212.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =   1856.000(Ft.)
End of natural channel elevation =   1828.000(Ft.)
Length of natural channel  =   694.000(Ft.)
Estimated mean flow rate at midpoint of channel =     68.662(CFS)
```

```
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   8.53(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0403
Corrected/adjusted channel slope =  0.0403
Travel time =    1.36 min.     TC =   14.41  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.799
Decimal fraction soil group A = 0.190
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.450
Decimal fraction soil group D = 0.360
RI index for soil(AMC 2)  =  81.23
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.449(In/Hr) for a   100.0 year storm
Subarea runoff =     27.191(CFS) for     13.890(Ac.)
Total runoff =     80.277(CFS)       Total area =      37.560(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      212.000
**** CONFLUENCE OF MINOR STREAMS ****

______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     37.560(Ac.)
Runoff from this stream =     80.277(CFS)
Time of concentration =   14.41 min.
Rainfall intensity =     2.449(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      207.000
**** INITIAL AREA EVALUATION ****

______________________________________________________________________
Initial area flow distance =   837.000(Ft.)
Top (of initial area) elevation =  2200.000(Ft.)
Bottom (of initial area) elevation =  1980.000(Ft.)
Difference in elevation =   220.000(Ft.)
Slope =    0.26284  s(percent)=      26.28
TC = k(0.496)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.564 min.
Rainfall intensity =      3.006(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.849
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  88.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     13.927(CFS)
Total initial stream area =        5.460(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      207.000 to Point/Station      212.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

______________________________________________________________________
Top of natural channel elevation =   1980.000(Ft.)
End of natural channel elevation =   1828.000(Ft.)
Length of natural channel  =  2154.000(Ft.)
Estimated mean flow rate at midpoint of channel =     31.642(CFS)
```

```
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   9.03(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0706
Corrected/adjusted channel slope =  0.0706
Travel time =    3.98 min.     TC =   13.54  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.797
Decimal fraction soil group A = 0.290
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.710
RI index for soil(AMC 2)  =  80.38
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.526(In/Hr) for a   100.0 year storm
Subarea runoff =     27.974(CFS) for     13.890(Ac.)
Total runoff =     41.901(CFS)       Total area =      19.350(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      207.000 to Point/Station      212.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     19.350(Ac.)
Runoff from this stream =     41.901(CFS)
Time of concentration =   13.54 min.
Rainfall intensity =     2.526(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      208.000 to Point/Station      209.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   911.000(Ft.)
Top (of initial area) elevation =  2248.000(Ft.)
Bottom (of initial area) elevation =  2060.000(Ft.)
Difference in elevation =   188.000(Ft.)
Slope =    0.20637  s(percent)=      20.64
TC = k(0.496)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.385 min.
Rainfall intensity =      2.884(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.847
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  88.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     14.970(CFS)
Total initial stream area =        6.130(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      209.000 to Point/Station      210.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =   2060.000(Ft.)
End of natural channel elevation =   1984.000(Ft.)
Length of natural channel  =   754.000(Ft.)
Estimated mean flow rate at midpoint of channel =     33.041(CFS)
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =  10.92(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.1008
Corrected/adjusted channel slope =  0.1008
Travel time =    1.15 min.     TC =   11.54  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.844
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  88.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.737(In/Hr) for a   100.0 year storm
Subarea runoff =     34.183(CFS) for     14.800(Ac.)
Total runoff =     49.153(CFS)       Total area =      20.930(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =   1984.000(Ft.)
End of natural channel elevation =   1884.000(Ft.)
Length of natural channel  =  1494.000(Ft.)
Estimated mean flow rate at midpoint of channel =     66.990(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =  10.90(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0669
Corrected/adjusted channel slope =  0.0669
Travel time =    2.28 min.     TC =   13.82  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.812
Decimal fraction soil group A = 0.180
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.770
RI index for soil(AMC 2)  =  83.18
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.500(In/Hr) for a   100.0 year storm
Subarea runoff =     30.857(CFS) for     15.190(Ac.)
Total runoff =     80.010(CFS)       Total area =      36.120(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      211.000 to Point/Station      212.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =   1884.000(Ft.)
End of natural channel elevation =   1828.000(Ft.)
Length of natural channel  =  1441.000(Ft.)
Estimated mean flow rate at midpoint of channel =    110.833(CFS)

Natural valley channel type used
```

```
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   9.65(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0389
Corrected/adjusted channel slope =  0.0389
Travel time =    2.49 min.     TC =   16.31  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.748
Decimal fraction soil group A = 0.540
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.010
Decimal fraction soil group D = 0.450
RI index for soil(AMC 2)  =  74.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.302(In/Hr) for a   100.0 year storm
Subarea runoff =     47.903(CFS) for     27.830(Ac.)
Total runoff =    127.913(CFS)       Total area =      63.950(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      211.000 to Point/Station      212.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =     63.950(Ac.)
Runoff from this stream =    127.913(CFS)
Time of concentration =   16.31 min.
Rainfall intensity =     2.302(In/Hr)
Summary of stream data:

Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       80.277     14.41                 2.449
2       41.901     13.54                 2.526
3      127.913     16.31                 2.302
Largest stream flow has longer time of concentration
Qp =    127.913 + sum of
         Qb          Ia/Ib
         80.277 *    0.940 =     75.459
         Qb          Ia/Ib
         41.901 *    0.911 =     38.181
Qp =    241.554

Total of 3 streams to confluence:
Flow rates before confluence point:
      80.277      41.901     127.913
Area of streams before confluence:
       37.560       19.350       63.950
Results of confluence:
Total flow rate =    241.554(CFS)
Time of concentration =    16.307 min.
Effective stream area after confluence =    120.860(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      212.000 to Point/Station      213.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1828.000(Ft.)
Downstream point/station elevation =  1827.000(Ft.)
Pipe length  =    87.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   241.554(CFS)
Nearest computed pipe diameter  =     57.00(In.)
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Calculated individual pipe flow  =   241.554(CFS)
Normal flow depth in pipe =   46.31(In.)
Flow top width inside pipe =   44.50(In.)
Critical Depth =   51.97(In.)
Pipe flow velocity =     15.67(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    16.40 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      213.000 to Point/Station      214.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1827.000(Ft.)
Downstream point elevation =  1820.000(Ft.)
Channel length thru subarea  =   247.000(Ft.)
Channel base width     =   20.000(Ft.)
Slope or 'Z' of left channel bank =   4.000
Slope or 'Z' of right channel bank =   4.000
Manning's 'N'    = 0.035
Maximum depth of channel  =    4.000(Ft.)
Flow(q) thru subarea =    241.554(CFS)
Depth of flow =    1.291(Ft.), Average velocity =   7.432(Ft/s)
Channel flow top width =   30.332(Ft.)
Flow Velocity =    7.43(Ft/s)
Travel time  =    0.55 min.
Time of concentration =   16.95 min.

Sub-Channel No. 1 Critical depth =      1.484(Ft.)
  '     '       '     Critical flow top width =     31.875(Ft.)
  '     '       '     Critical flow velocity=    6.274(Ft/s)
  '     '       '     Critical flow area =     38.501(Sq.Ft)



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      213.000 to Point/Station      214.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =    120.860(Ac.)
Runoff from this stream =    241.554(CFS)
Time of concentration =   16.95 min.
Rainfall intensity =     2.257(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      214.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      2.102(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.796
Decimal fraction soil group A = 0.110
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.560
Decimal fraction soil group D = 0.330
RI index for soil(AMC 2)  =  82.90
Pervious area fraction =  1.000; Impervious fraction =  0.000
User specified values are as follows:
TC =  19.55 min.  Rain intensity =       2.10(In/Hr)
Total area =        20.88(Ac.)  Total runoff =     39.18(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      214.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     20.880(Ac.)
Runoff from this stream =     39.180(CFS)
```

```
Time of concentration =   19.55 min.
Rainfall intensity =     2.102(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1      241.554     16.95                 2.257
2       39.180     19.55                 2.102
Largest stream flow has longer or shorter time of concentration
Qp =    241.554 + sum of
         Qa          Tb/Ta
         39.180 *    0.867 =     33.977
Qp =    275.531

Total of 2 streams to confluence:
Flow rates before confluence point:
     241.554      39.180
Area of streams before confluence:
      120.860       20.880
Results of confluence:
Total flow rate =    275.531(CFS)
Time of concentration =    16.954 min.
Effective stream area after confluence =    141.740(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      214.000 to Point/Station      215.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1820.000(Ft.)
Downstream point elevation =  1804.000(Ft.)
Channel length thru subarea  =   413.000(Ft.)
Channel base width     =   50.000(Ft.)
Slope or 'Z' of left channel bank =   4.000
Slope or 'Z' of right channel bank =   4.000
Estimated mean flow rate at midpoint of channel =    285.725(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =    4.000(Ft.)
Flow(q) thru subarea =    285.725(CFS)
Depth of flow =   0.786(Ft.), Average velocity =   6.836(Ft/s)
Channel flow top width =   56.291(Ft.)
Flow Velocity =    6.84(Ft/s)
Travel time  =    1.01 min.
Time of concentration =   17.96 min.

Sub-Channel No. 1 Critical depth =      0.984(Ft.)
  '     '       '     Critical flow top width =     57.875(Ft.)
  '     '       '     Critical flow velocity=    5.381(Ft/s)
  '     '       '     Critical flow area =     53.095(Sq.Ft)

 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.831
Decimal fraction soil group A = 0.240
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.280
Decimal fraction soil group D = 0.480
RI index for soil(AMC 2)  =  80.59
Pervious area fraction =  0.600; Impervious fraction =  0.400
Rainfall intensity =      2.193(In/Hr) for a   100.0 year storm
Subarea runoff =     20.305(CFS) for     11.140(Ac.)
Total runoff =    295.835(CFS)       Total area =     152.880(Ac.)
Depth of flow =   0.803(Ft.), Average velocity =   6.926(Ft/s)

Sub-Channel No. 1 Critical depth =      1.000(Ft.)
  '     '       '     Critical flow top width =     58.000(Ft.)
  '     '       '     Critical flow velocity=    5.478(Ft/s)
  '     '       '     Critical flow area =     54.000(Sq.Ft)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      214.000 to Point/Station      215.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =    152.880(Ac.)
Runoff from this stream =    295.835(CFS)
Time of concentration =   17.96 min.
Rainfall intensity =     2.193(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      215.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      2.323(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.807
Decimal fraction soil group A = 0.230
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.030
Decimal fraction soil group D = 0.740
RI index for soil(AMC 2)  =  82.70
Pervious area fraction =  0.965; Impervious fraction =  0.035
User specified values are as follows:
TC =  16.01 min.  Rain intensity =       2.32(In/Hr)
Total area =        66.64(Ac.)  Total runoff =    142.15(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      109.000 to Point/Station      215.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     66.640(Ac.)
Runoff from this stream =    142.150(CFS)
Time of concentration =   16.01 min.
Rainfall intensity =     2.323(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1      295.835     17.96                 2.193
2      142.150     16.01                 2.323
Largest stream flow has longer time of concentration
Qp =    295.835 + sum of
         Qb          Ia/Ib
        142.150 *    0.944 =    134.209
Qp =    430.045

Total of 2 streams to confluence:
Flow rates before confluence point:
     295.835     142.150
Area of streams before confluence:
      152.880       66.640
Results of confluence:
Total flow rate =    430.045(CFS)
Time of concentration =    17.961 min.
Effective stream area after confluence =    219.520(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      215.000 to Point/Station      216.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1804.000(Ft.)
Downstream point elevation =  1784.000(Ft.)
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Channel length thru subarea  =  1045.000(Ft.)
Channel base width     =   50.000(Ft.)
Slope or 'Z' of left channel bank =   4.000
Slope or 'Z' of right channel bank =   4.000
Estimated mean flow rate at midpoint of channel =    459.535(CFS)
Manning's 'N'    = 0.035
Maximum depth of channel  =    4.000(Ft.)
Flow(q) thru subarea =    459.535(CFS)
Depth of flow =   1.281(Ft.), Average velocity =   6.507(Ft/s)
Channel flow top width =   60.249(Ft.)
Flow Velocity =    6.51(Ft/s)
Travel time  =    2.68 min.
Time of concentration =   20.64 min.

Sub-Channel No. 1 Critical depth =      1.328(Ft.)
  '     '       '     Critical flow top width =     60.625(Ft.)
  '     '       '     Critical flow velocity=    6.255(Ft/s)
  '     '       '     Critical flow area =     73.462(Sq.Ft)

 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.833
Decimal fraction soil group A = 0.200
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.170
Decimal fraction soil group D = 0.630
RI index for soil(AMC 2)  =  82.23
Pervious area fraction =  0.600; Impervious fraction =  0.400
Rainfall intensity =      2.046(In/Hr) for a   100.0 year storm
Subarea runoff =     58.912(CFS) for     34.550(Ac.)
Total runoff =    488.957(CFS)       Total area =     254.070(Ac.)
Depth of flow =   1.329(Ft.), Average velocity =   6.653(Ft/s)

Sub-Channel No. 1 Critical depth =      1.375(Ft.)
  '     '       '     Critical flow top width =     61.000(Ft.)
  '     '       '     Critical flow velocity=    6.407(Ft/s)
  '     '       '     Critical flow area =     76.313(Sq.Ft)

End of computations, total study area =          254.07 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.919
Area averaged RI index number =  82.4
```

APPENDIX A.3: AREA "C"

```
                 Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
       Rational Hydrology Study        Date: 05/05/15  File:ARCEX100.out
------------------------------------------------------------------------
IRONWOOD PRE-PROJECT CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARCEX100

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6269

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1964.000(Ft.)
Bottom (of initial area) elevation =  1850.000(Ft.)
Difference in elevation =   114.000(Ft.)
Slope =    0.11400  s(percent)=      11.40
TC = k(0.605)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.792 min.
Rainfall intensity =      2.417(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.784
Decimal fraction soil group A = 0.250
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.480
Decimal fraction soil group D = 0.270
RI index for soil(AMC 2)  =  78.80
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     15.777(CFS)
Total initial stream area =        8.330(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      302.000 to Point/Station      303.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****

Top of natural channel elevation =   1850.000(Ft.)
End of natural channel elevation =   1832.000(Ft.)
Length of natural channel  =   626.000(Ft.)
```

```
Estimated mean flow rate at midpoint of channel =     27.662(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.55(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0288
Corrected/adjusted channel slope =  0.0288
Travel time =    1.88 min.     TC =   16.67  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.819
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.610
Decimal fraction soil group D = 0.390
RI index for soil(AMC 2)  =  85.55
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.277(In/Hr) for a   100.0 year storm
Subarea runoff =     23.398(CFS) for     12.550(Ac.)
Total runoff =     39.176(CFS)       Total area =      20.880(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      303.000 to Point/Station      304.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1832.000(Ft.)
Downstream point/station elevation =  1831.000(Ft.)
Pipe length  =   100.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    39.176(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    39.176(CFS)
Normal flow depth in pipe =   23.46(In.)
Flow top width inside pipe =   24.77(In.)
Critical Depth =   25.34(In.)
Pipe flow velocity =      9.51(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    16.85 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      304.000 to Point/Station      214.000
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________
Upstream point elevation =  1831.000(Ft.)
Downstream point elevation =  1820.000(Ft.)
Channel length thru subarea  =   541.000(Ft.)
Channel base width     =  25.000(Ft.)
Slope or 'Z' of left channel bank =   4.000
Slope or 'Z' of right channel bank =   4.000
Manning's 'N'    = 0.035
Maximum depth of channel  =    4.000(Ft.)
Flow(q) thru subarea =     39.176(CFS)
Depth of flow =   0.438(Ft.), Average velocity =   3.340(Ft/s)
Channel flow top width =   28.507(Ft.)
Flow Velocity =    3.34(Ft/s)
Travel time  =    2.70 min.
Time of concentration =   19.55 min.

Sub-Channel No. 1 Critical depth =      0.414(Ft.)
  '     '       '     Critical flow top width =     28.313(Ft.)
  '     '       '     Critical flow velocity=    3.549(Ft/s)
  '     '       '     Critical flow area =     11.037(Sq.Ft)

End of computations, total study area =           20.88 (Ac.)
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  82.9
```

APPENDIX A.4: AREA "D"

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2005 Version 7.1
       Rational Hydrology Study        Date: 05/05/15  File:ARDEX100.out
------------------------------------------------------------------------
IRONWOOD PRE-PROJECT CONDITION HYDROLOGY
RATIONAL METHOD ANALYSIS, 100-YEAR STORM EVENT
FILENAME: ARDEX100

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6269

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   705.000(Ft.)
Top (of initial area) elevation =  1960.000(Ft.)
Bottom (of initial area) elevation =  1856.000(Ft.)
Difference in elevation =   104.000(Ft.)
Slope =    0.14752  s(percent)=      14.75
TC = k(0.501)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.132 min.
Rainfall intensity =      2.920(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.845
Decimal fraction soil group A = 0.020
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.980
RI index for soil(AMC 2)  =  87.50
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      3.849(CFS)
Total initial stream area =        1.560(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      402.000 to Point/Station      403.000
**** NATURAL CHANNEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of natural channel elevation =   1856.000(Ft.)
End of natural channel elevation =   1840.000(Ft.)
Length of natural channel  =   335.000(Ft.)
```

```
Estimated mean flow rate at midpoint of channel =     11.608(CFS)

Natural valley channel type used
L.A. County flood control district formula for channel velocity:
 Velocity(ft/s) = (7 + 8(q(English Units)^.352)(slope^0.5)
Velocity using mean channel flow =   5.67(Ft/s)

Correction to map slope used on extremely rugged channels with
drops and waterfalls (Plate D-6.2)
       Normal channel slope =  0.0478
Corrected/adjusted channel slope =  0.0478
Travel time =    0.98 min.     TC =   11.12  min.


 Adding area flow to channel
USER INPUT of soil data for subarea
Runoff Coefficient = 0.806
Decimal fraction soil group A = 0.260
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.210
Decimal fraction soil group D = 0.530
RI index for soil(AMC 2)  =  80.34
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.788(In/Hr) for a   100.0 year storm
Subarea runoff =     14.129(CFS) for      6.290(Ac.)
Total runoff =     17.978(CFS)       Total area =       7.850(Ac.)
End of computations, total study area =            7.85 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  81.8
```

APPENDIX B: ONSITE AND OFFSITE POST-PROJECT RATIONAL METHOD HYDROLOGY ANALYSIS

APPENDIX B.1: AREA "A"

100-YEAR

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2001 Version 6.4
       Rational Hydrology Study        Date: 05/13/16  File:ARA1100.out
------------------------------------------------------------------------
IRONWOOD
100-YEAR RATIONAL TABLING METHOD
AREA A (PART 1)
FN: ARA1100.RRV
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
TRI-8 Builders - S/N   615
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   692.000(Ft.)
Top (of initial area) elevation =  2009.500(Ft.)
Bottom (of initial area) elevation =  1918.000(Ft.)
Difference in elevation =    91.500(Ft.)
Slope =    0.13223  s(percent)=      13.22
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.866 min.
Rainfall intensity =      2.820(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      7.601(CFS)
Total initial stream area =        3.170(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     10.274(CFS)
Depth of flow =   0.618(Ft.), Average velocity =   3.838(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
```

```
        1              0.00             1.50
        2              4.02             0.50
        3              8.64             0.00
        4             11.11             0.50
        5             17.27             1.50
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     10.274(CFS)
  '     '       flow top width =      8.288(Ft.)
  '     '    velocity=    3.838(Ft/s)
  '     '       area =      2.677(Sq.Ft)
  '     '       Froude number =     1.190

Upstream point elevation =  1918.000(Ft.)
Downstream point elevation =  1905.000(Ft.)
Flow length =   347.000(Ft.)
Travel time  =    1.51 min.
Time of concentration =   12.37 min.
Depth of flow =   0.618(Ft.)
Average velocity =   3.838(Ft/s)
Total irregular channel flow =    10.274(CFS)
Irregular channel normal depth above invert elev. =   0.618(Ft.)
Average velocity of channel(s) =   3.838(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.070
Decimal fraction soil group D = 0.930
RI index for soil(AMC 2)  =  88.79
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.643(In/Hr) for a   100.0 year storm
Subarea runoff =      4.986(CFS) for      2.230(Ac.)
Total runoff =     12.587(CFS)       Total area =       5.400(Ac.)


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Process from Point/Station      103.000 to Point/Station      107.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =  1901.000(Ft.)
Downstream point/station elevation =  1896.000(Ft.)
Pipe length  =   486.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.587(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    12.587(CFS)
Normal flow depth in pipe =   13.99(In.)
Flow top width inside pipe =   19.80(In.)
Critical Depth =   15.86(In.)
Pipe flow velocity =      7.39(Ft/s)
Travel time through pipe =    1.10 min.
Time of concentration (TC) =    13.47 min.


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Process from Point/Station      103.000 to Point/Station      107.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      5.400(Ac.)
Runoff from this stream =     12.587(CFS)
Time of concentration =   13.47 min.
Rainfall intensity =     2.533(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      104.000 to Point/Station      105.000
**** INITIAL AREA EVALUATION ****
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```
Initial area flow distance =   961.000(Ft.)
Top (of initial area) elevation =  2250.000(Ft.)
Bottom (of initial area) elevation =  2016.000(Ft.)
Difference in elevation =   234.000(Ft.)
Slope =    0.24350  s(percent)=      24.35
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.966 min.
Rainfall intensity =      2.807(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     11.525(CFS)
Total initial stream area =        4.830(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      105.000 to Point/Station      106.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel =     21.379(CFS)
Depth of flow =   0.649(Ft.), Average velocity =   7.258(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00             1.50
       2              4.02             0.50
       3              8.64             0.00
       4             11.11             0.50
       5             17.27             1.50
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     21.380(CFS)
  '     '       flow top width =      8.611(Ft.)
  '     '    velocity=    7.258(Ft/s)
  '     '       area =      2.946(Sq.Ft)
  '     '       Froude number =     2.187

Upstream point elevation =  2016.000(Ft.)
Downstream point elevation =  1902.000(Ft.)
Flow length =   918.000(Ft.)
Travel time  =    2.11 min.
Time of concentration =   13.07 min.
Depth of flow =   0.649(Ft.)
Average velocity =   7.258(Ft/s)
Total irregular channel flow =    21.379(CFS)
Irregular channel normal depth above invert elev. =   0.649(Ft.)
Average velocity of channel(s) =   7.258(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.845
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.080
Decimal fraction soil group D = 0.920
RI index for soil(AMC 2)  =  88.76
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.571(In/Hr) for a   100.0 year storm
Subarea runoff =     17.932(CFS) for      8.260(Ac.)
Total runoff =     29.457(CFS)       Total area =      13.090(Ac.)


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Process from Point/Station      106.000 to Point/Station      107.000
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1898.000(Ft.)
Downstream point/station elevation =  1896.000(Ft.)
Pipe length  =   194.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    29.457(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    29.457(CFS)
Normal flow depth in pipe =   20.72(In.)
Flow top width inside pipe =   22.82(In.)
Critical Depth =   22.59(In.)
Pipe flow velocity =      8.99(Ft/s)
Travel time through pipe =    0.36 min.
Time of concentration (TC) =    13.43 min.


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Process from Point/Station      106.000 to Point/Station      107.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     13.090(Ac.)
Runoff from this stream =     29.457(CFS)
Time of concentration =   13.43 min.
Rainfall intensity =     2.536(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       12.587     13.47               2.533
2       29.457     13.43               2.536
Largest stream flow has longer or shorter time of concentration
Qp =     29.457 + sum of
         Qa          Tb/Ta
         12.587 *    0.997 =     12.555
Qp =     42.013

Total of 2 main streams to confluence:
Flow rates before confluence point:
      12.587      29.457
Area of streams before confluence:
        5.400       13.090


Results of confluence:
Total flow rate =     42.013(CFS)
Time of concentration =    13.434 min.
Effective stream area after confluence  =     18.490(Ac.)


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Process from Point/Station      107.000 to Point/Station      110.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1896.000(Ft.)
Downstream point/station elevation =  1886.000(Ft.)
Pipe length  =   412.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    42.013(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    42.013(CFS)
Normal flow depth in pipe =   19.50(In.)
Flow top width inside pipe =   24.19(In.)
Critical Depth =   25.38(In.)
Pipe flow velocity =     13.67(Ft/s)
Travel time through pipe =    0.50 min.
Time of concentration (TC) =    13.94 min.
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      107.000 to Point/Station      110.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     18.490(Ac.)
Runoff from this stream =     42.013(CFS)
Time of concentration =   13.94 min.
Rainfall intensity =     2.490(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      108.000 to Point/Station      109.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   918.000(Ft.)
Top (of initial area) elevation =  2033.000(Ft.)
Bottom (of initial area) elevation =  1908.000(Ft.)
Difference in elevation =   125.000(Ft.)
Slope =    0.13617  s(percent)=      13.62
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.095 min.
Rainfall intensity =      2.673(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.848
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      9.199(CFS)
Total initial stream area =       4.060(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      109.000 to Point/Station      110.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1904.000(Ft.)
Downstream point/station elevation =  1886.000(Ft.)
Pipe length  =   193.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.199(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     9.199(CFS)
Normal flow depth in pipe =    8.46(In.)
Flow top width inside pipe =   10.94(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.54(Ft/s)
Travel time through pipe =    0.21 min.
Time of concentration (TC) =    12.30 min.


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Process from Point/Station      109.000 to Point/Station      110.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      4.060(Ac.)
Runoff from this stream =      9.199(CFS)
Time of concentration =   12.30 min.
Rainfall intensity =     2.650(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)
```

```
1       42.013     13.94               2.490
2        9.199     12.30               2.650
Largest stream flow has longer time of concentration
Qp =     42.013 + sum of
          Qb         Ia/Ib
           9.199 *    0.940 =      8.643
Qp =     50.655

Total of 2 main streams to confluence:
Flow rates before confluence point:
      42.013       9.199
Area of streams before confluence:
       18.490        4.060


Results of confluence:
Total flow rate =     50.655(CFS)
Time of concentration =    13.936 min.
Effective stream area after confluence  =     22.550(Ac.)


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Process from Point/Station      110.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1886.000(Ft.)
Downstream point/station elevation =  1884.000(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    50.655(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    50.655(CFS)
Normal flow depth in pipe =   17.86(In.)
Flow top width inside pipe =   25.55(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.14(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    13.98 min.


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Process from Point/Station      110.000 to Point/Station      116.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     22.550(Ac.)
Runoff from this stream =     50.655(CFS)
Time of concentration =   13.98 min.
Rainfall intensity =     2.486(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      111.000 to Point/Station      112.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   229.000(Ft.)
Top (of initial area) elevation =  1927.000(Ft.)
Bottom (of initial area) elevation =  1896.000(Ft.)
Difference in elevation =    31.000(Ft.)
Slope =    0.13537  s(percent)=      13.54
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.949 min.
Rainfall intensity =      3.526(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.860
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
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RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.425(CFS)
Total initial stream area =        0.470(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      112.000 to Point/Station      115.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1892.000(Ft.)
Downstream point/station elevation =  1886.000(Ft.)
Pipe length  =   102.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.425(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.425(CFS)
Normal flow depth in pipe =    3.71(In.)
Flow top width inside pipe =    8.86(In.)
Critical Depth =    6.60(In.)
Pipe flow velocity =      8.31(Ft/s)
Travel time through pipe =    0.20 min.
Time of concentration (TC) =     7.15 min.


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Process from Point/Station      112.000 to Point/Station      115.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      0.470(Ac.)
Runoff from this stream =      1.425(CFS)
Time of concentration =    7.15 min.
Rainfall intensity =     3.475(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      113.000 to Point/Station      114.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   229.000(Ft.)
Top (of initial area) elevation =  1927.000(Ft.)
Bottom (of initial area) elevation =  1891.000(Ft.)
Difference in elevation =    36.000(Ft.)
Slope =    0.15721  s(percent)=      15.72
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.744 min.
Rainfall intensity =      3.579(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.860
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.478(CFS)
Total initial stream area =        0.480(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      114.000 to Point/Station      115.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1887.000(Ft.)
Downstream point/station elevation =  1886.000(Ft.)
Pipe length  =    11.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.478(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.478(CFS)
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Normal flow depth in pipe =    4.34(In.)
Flow top width inside pipe =    5.37(In.)
Critical depth could not be calculated.
Pipe flow velocity =      9.71(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     6.76 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      115.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.480(Ac.)
Runoff from this stream =      1.478(CFS)
Time of concentration =    6.76 min.
Rainfall intensity =     3.574(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        1.425      7.15                 3.475
2        1.478      6.76                 3.574
Largest stream flow has longer or shorter time of concentration
Qp =      1.478 + sum of
         Qa          Tb/Ta
          1.425 *    0.945 =      1.347
Qp =      2.825

Total of 2 streams to confluence:
Flow rates before confluence point:
       1.425       1.478
Area of streams before confluence:
        0.470        0.480
Results of confluence:
Total flow rate =      2.825(CFS)
Time of concentration =     6.763 min.
Effective stream area after confluence =      0.950(Ac.)


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Process from Point/Station      115.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1886.000(Ft.)
Downstream point/station elevation =  1884.000(Ft.)
Pipe length  =    85.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.825(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.825(CFS)
Normal flow depth in pipe =    6.12(In.)
Flow top width inside pipe =   12.00(In.)
Critical Depth =    8.65(In.)
Pipe flow velocity =      7.02(Ft/s)
Travel time through pipe =    0.20 min.
Time of concentration (TC) =     6.96 min.


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Process from Point/Station      115.000 to Point/Station      116.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.950(Ac.)
Runoff from this stream =      2.825(CFS)
Time of concentration =    6.96 min.
Rainfall intensity =     3.522(In/Hr)
Summary of stream data:
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```
Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       50.655     13.98               2.486
2        2.825      6.96               3.522
Largest stream flow has longer time of concentration
Qp =     50.655 + sum of
          Qb          Ia/Ib
           2.825 *    0.706 =      1.994
Qp =     52.650

Total of 2 main streams to confluence:
Flow rates before confluence point:
      50.655      2.825
Area of streams before confluence:
       22.550        0.950


Results of confluence:
Total flow rate =     52.650(CFS)
Time of concentration =    13.978 min.
Effective stream area after confluence  =     23.500(Ac.)


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Process from Point/Station      116.000 to Point/Station      119.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1884.000(Ft.)
Downstream point/station elevation =  1876.000(Ft.)
Pipe length  =    12.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    52.650(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    52.650(CFS)
Normal flow depth in pipe =   12.28(In.)
Flow top width inside pipe =   11.56(In.)
Critical depth could not be calculated.
Pipe flow velocity =     49.00(Ft/s)
Travel time through pipe =    0.00 min.
Time of concentration (TC) =    13.98 min.


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Process from Point/Station      116.000 to Point/Station      119.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     23.500(Ac.)
Runoff from this stream =     52.650(CFS)
Time of concentration =   13.98 min.
Rainfall intensity =     2.486(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      117.000 to Point/Station      118.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   988.000(Ft.)
Top (of initial area) elevation =  1900.700(Ft.)
Bottom (of initial area) elevation =  1882.000(Ft.)
Difference in elevation =    18.700(Ft.)
Slope =    0.01893  s(percent)=       1.89
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.600 min.
Rainfall intensity =      2.520(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.814
```

```
Decimal fraction soil group A = 0.080
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.420
Decimal fraction soil group D = 0.500
RI index for soil(AMC 2)  =  69.04
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =     10.911(CFS)
Total initial stream area =        5.320(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      118.000 to Point/Station      119.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1878.000(Ft.)
Downstream point/station elevation =  1876.000(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.911(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    10.911(CFS)
Normal flow depth in pipe =    9.56(In.)
Flow top width inside pipe =   14.42(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.20(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    13.65 min.


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Process from Point/Station      118.000 to Point/Station      119.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      5.320(Ac.)
Runoff from this stream =     10.911(CFS)
Time of concentration =   13.65 min.
Rainfall intensity =     2.516(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       52.650     13.98               2.486
2       10.911     13.65               2.516
Largest stream flow has longer time of concentration
Qp =      52.650 + sum of
          Qb          Ia/Ib
          10.911 *    0.988 =     10.780
Qp =      63.430

Total of 2 main streams to confluence:
Flow rates before confluence point:
      52.650      10.911
Area of streams before confluence:
       23.500        5.320


Results of confluence:
Total flow rate =     63.430(CFS)
Time of concentration =    13.982 min.
Effective stream area after confluence  =     28.820(Ac.)


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Process from Point/Station      119.000 to Point/Station      122.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1876.000(Ft.)
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Downstream point/station elevation =  1853.000(Ft.)
Pipe length  =   362.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     63.430(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    63.430(CFS)
Normal flow depth in pipe =   18.47(In.)
Flow top width inside pipe =   25.10(In.)
Critical depth could not be calculated.
Pipe flow velocity =     21.87(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    14.26 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      119.000 to Point/Station      122.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     28.820(Ac.)
Runoff from this stream =     63.430(CFS)
Time of concentration =   14.26 min.
Rainfall intensity =     2.462(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      120.000 to Point/Station      121.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   367.000(Ft.)
Top (of initial area) elevation =  1872.900(Ft.)
Bottom (of initial area) elevation =  1857.000(Ft.)
Difference in elevation =    15.900(Ft.)
Slope =    0.04332  s(percent)=      4.33
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.755 min.
Rainfall intensity =      3.338(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.832
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.468(CFS)
Total initial stream area =        1.970(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      121.000 to Point/Station      122.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1855.000(Ft.)
Downstream point/station elevation =  1853.000(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =      5.468(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     5.468(CFS)
Normal flow depth in pipe =    7.59(In.)
Flow top width inside pipe =   11.57(In.)
Critical Depth =    11.25(In.)
Pipe flow velocity =     10.43(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =     7.83 min.


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Process from Point/Station      121.000 to Point/Station      122.000
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**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.970(Ac.)
Runoff from this stream =      5.468(CFS)
Time of concentration =    7.83 min.
Rainfall intensity =     3.322(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       63.430     14.26               2.462
2        5.468      7.83               3.322
Largest stream flow has longer time of concentration
Qp =     63.430 + sum of
          Qb          Ia/Ib
           5.468 *    0.741 =      4.051
Qp =     67.481

Total of 2 main streams to confluence:
Flow rates before confluence point:
      63.430       5.468
Area of streams before confluence:
       28.820        1.970


Results of confluence:
Total flow rate =     67.481(CFS)
Time of concentration =    14.258 min.
Effective stream area after confluence  =     30.790(Ac.)


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Process from Point/Station      122.000 to Point/Station      136.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1853.000(Ft.)
Downstream point/station elevation =  1833.000(Ft.)
Pipe length  =   573.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    67.481(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    67.481(CFS)
Normal flow depth in pipe =   21.84(In.)
Flow top width inside pipe =   26.70(In.)
Critical depth could not be calculated.
Pipe flow velocity =     17.61(Ft/s)
Travel time through pipe =    0.54 min.
Time of concentration (TC) =    14.80 min.


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Process from Point/Station      122.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     30.790(Ac.)
Runoff from this stream =     67.481(CFS)
Time of concentration =   14.80 min.
Rainfall intensity =     2.416(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      123.000 to Point/Station      124.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   625.000(Ft.)
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Top (of initial area) elevation =  1900.000(Ft.)
Bottom (of initial area) elevation =  1869.000(Ft.)
Difference in elevation =    31.000(Ft.)
Slope =    0.04960  s(percent)=       4.96
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.339 min.
Rainfall intensity =      3.042(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.735
Decimal fraction soil group A = 0.740
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.260
RI index for soil(AMC 2)  =  43.18
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      6.151(CFS)
Total initial stream area =        2.750(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      124.000 to Point/Station      125.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1869.000(Ft.)
End of street segment elevation =  1848.000(Ft.)
Length of street segment  =   695.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  10.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   8.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     11.262(CFS)
Depth of flow =   0.412(Ft.), Average velocity =   5.690(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.000(Ft.)
Flow velocity =   5.69(Ft/s)
Travel time =    2.04 min.     TC =   11.38  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.810
Decimal fraction soil group A = 0.190
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.160
Decimal fraction soil group D = 0.650
RI index for soil(AMC 2)  =  65.87
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.756(In/Hr) for a   100.0 year storm
Subarea runoff =     10.199(CFS) for      4.570(Ac.)
Total runoff =     16.350(CFS)       Total area =       7.320(Ac.)
Street flow at end of street =     16.350(CFS)
Half street flow at end of street =     16.350(CFS)
Depth of flow =   0.462(Ft.), Average velocity =   6.592(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  10.000(Ft.)


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Process from Point/Station      125.000 to Point/Station      129.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1846.000(Ft.)
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Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

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Downstream point/station elevation =  1841.000(Ft.)
Pipe length  =    82.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.350(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    16.350(CFS)
Normal flow depth in pipe =   10.36(In.)
Flow top width inside pipe =   17.79(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.51(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    11.46 min.


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Process from Point/Station      125.000 to Point/Station      129.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      7.320(Ac.)
Runoff from this stream =     16.350(CFS)
Time of concentration =   11.46 min.
Rainfall intensity =     2.745(In/Hr)


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Process from Point/Station      126.000 to Point/Station      127.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   595.000(Ft.)
Top (of initial area) elevation =  1871.800(Ft.)
Bottom (of initial area) elevation =  1859.000(Ft.)
Difference in elevation =    12.800(Ft.)
Slope =    0.02151  s(percent)=       2.15
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.823 min.
Rainfall intensity =      2.825(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.756
Decimal fraction soil group A = 0.570
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.080
Decimal fraction soil group D = 0.350
RI index for soil(AMC 2)  =  50.01
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.566(CFS)
Total initial stream area =        1.670(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      127.000 to Point/Station      128.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1859.000(Ft.)
End of street segment elevation =  1845.000(Ft.)
Length of street segment  =   492.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  10.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   8.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      5.104(CFS)
Depth of flow =   0.339(Ft.), Average velocity =   4.083(Ft/s)
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Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.000(Ft.)
Flow velocity =   4.08(Ft/s)
Travel time =    2.01 min.     TC =   12.83  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.822
Decimal fraction soil group A = 0.090
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.020
Decimal fraction soil group D = 0.890
RI index for soil(AMC 2)  =  71.01
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.595(In/Hr) for a   100.0 year storm
Subarea runoff =      3.071(CFS) for      1.440(Ac.)
Total runoff =      6.638(CFS)       Total area =      3.110(Ac.)
Street flow at end of street =      6.638(CFS)
Half street flow at end of street =      6.638(CFS)
Depth of flow =   0.360(Ft.), Average velocity =   4.532(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  10.000(Ft.)


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Process from Point/Station      128.000 to Point/Station      129.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1843.000(Ft.)
Downstream point/station elevation =  1841.000(Ft.)
Pipe length  =    16.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.638(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     6.638(CFS)
Normal flow depth in pipe =    6.19(In.)
Flow top width inside pipe =   11.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.25(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    12.85 min.


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Process from Point/Station      128.000 to Point/Station      129.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.110(Ac.)
Runoff from this stream =      6.638(CFS)
Time of concentration =   12.85 min.
Rainfall intensity =     2.593(In/Hr)
Summary of stream data:

Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       16.350     11.46                 2.745
2        6.638     12.85                 2.593
Largest stream flow has longer or shorter time of concentration
Qp =     16.350 + sum of
          Qa           Tb/Ta
           6.638 *     0.892 =      5.923
Qp =     22.273

Total of 2 streams to confluence:
Flow rates before confluence point:
      16.350       6.638
Area of streams before confluence:
        7.320        3.110
Results of confluence:
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Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Total flow rate =      22.273(CFS)
Time of concentration =    11.463 min.
Effective stream area after confluence =     10.430(Ac.)


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Process from Point/Station      129.000 to Point/Station      132.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1841.000(Ft.)
Downstream point/station elevation =  1834.000(Ft.)
Pipe length  =    48.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.273(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    22.273(CFS)
Normal flow depth in pipe =   11.16(In.)
Flow top width inside pipe =   13.10(In.)
Critical depth could not be calculated.
Pipe flow velocity =     22.76(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    11.50 min.


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Process from Point/Station      129.000 to Point/Station      132.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     10.430(Ac.)
Runoff from this stream =     22.273(CFS)
Time of concentration =   11.50 min.
Rainfall intensity =     2.741(In/Hr)


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Process from Point/Station      130.000 to Point/Station      131.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   844.000(Ft.)
Top (of initial area) elevation =  1892.000(Ft.)
Bottom (of initial area) elevation =  1840.000(Ft.)
Difference in elevation =    52.000(Ft.)
Slope =    0.06161  s(percent)=       6.16
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.085 min.
Rainfall intensity =      2.927(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.817
Decimal fraction soil group A = 0.130
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.440
Decimal fraction soil group D = 0.430
RI index for soil(AMC 2)  =  66.77
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      6.527(CFS)
Total initial stream area =        2.730(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      131.000 to Point/Station      132.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1836.000(Ft.)
Downstream point/station elevation =  1834.000(Ft.)
Pipe length  =    97.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.527(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     6.527(CFS)
Normal flow depth in pipe =    9.28(In.)
Flow top width inside pipe =   14.57(In.)
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Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

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Critical Depth =   12.34(In.)
Pipe flow velocity =      8.19(Ft/s)
Travel time through pipe =    0.20 min.
Time of concentration (TC) =    10.28 min.


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Process from Point/Station      131.000 to Point/Station      132.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.730(Ac.)
Runoff from this stream =      6.527(CFS)
Time of concentration =   10.28 min.
Rainfall intensity =     2.899(In/Hr)
Summary of stream data:

Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       22.273     11.50                  2.741
2        6.527     10.28                  2.899
Largest stream flow has longer time of concentration
Qp =     22.273 + sum of
          Qb         Ia/Ib
           6.527 *    0.946 =      6.172
Qp =     28.445

Total of 2 streams to confluence:
Flow rates before confluence point:
      22.273       6.527
Area of streams before confluence:
       10.430        2.730
Results of confluence:
Total flow rate =     28.445(CFS)
Time of concentration =    11.498 min.
Effective stream area after confluence =     13.160(Ac.)


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Process from Point/Station      132.000 to Point/Station      136.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1834.000(Ft.)
Downstream point/station elevation =  1833.000(Ft.)
Pipe length  =   184.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    28.445(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    28.445(CFS)
Normal flow depth in pipe =   23.11(In.)
Flow top width inside pipe =   25.24(In.)
Critical Depth =   21.82(In.)
Pipe flow velocity =      7.00(Ft/s)
Travel time through pipe =    0.44 min.
Time of concentration (TC) =    11.94 min.


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Process from Point/Station      132.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     13.160(Ac.)
Runoff from this stream =     28.445(CFS)
Time of concentration =   11.94 min.
Rainfall intensity =     2.690(In/Hr)
Program is now starting with Main Stream No. 3
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Process from Point/Station      133.000 to Point/Station      134.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   526.000(Ft.)
Top (of initial area) elevation =  1920.000(Ft.)
Bottom (of initial area) elevation =  1867.600(Ft.)
Difference in elevation =    52.400(Ft.)
Slope =    0.09962  s(percent)=       9.96
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.582 min.
Rainfall intensity =      3.376(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.730
Decimal fraction soil group A = 0.830
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.170
RI index for soil(AMC 2)  =  39.31
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.182(CFS)
Total initial stream area =        0.480(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      134.000 to Point/Station      135.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1867.600(Ft.)
End of street segment elevation =  1844.000(Ft.)
Length of street segment  =  1195.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  10.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   8.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.509(CFS)
Depth of flow =   0.325(Ft.), Average velocity =   3.163(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   9.914(Ft.)
Flow velocity =   3.16(Ft/s)
Travel time =    6.30 min.     TC =   13.88  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.756
Decimal fraction soil group A = 0.490
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.120
Decimal fraction soil group D = 0.390
RI index for soil(AMC 2)  =  53.21
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.495(In/Hr) for a   100.0 year storm
Subarea runoff =      3.566(CFS) for      1.890(Ac.)
Total runoff =      4.748(CFS)       Total area =       2.370(Ac.)
Street flow at end of street =      4.748(CFS)
Half street flow at end of street =      4.748(CFS)
Depth of flow =   0.348(Ft.), Average velocity =   3.554(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  10.000(Ft.)


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Process from Point/Station      135.000 to Point/Station      136.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1844.000(Ft.)
Downstream point/station elevation =  1833.000(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.748(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     4.748(CFS)
Normal flow depth in pipe =    4.92(In.)
Flow top width inside pipe =    8.96(In.)
Critical depth could not be calculated.
Pipe flow velocity =     19.20(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    13.92 min.


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Process from Point/Station      135.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      2.370(Ac.)
Runoff from this stream =      4.748(CFS)
Time of concentration =   13.92 min.
Rainfall intensity =     2.491(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       67.481     14.80               2.416
2       28.445     11.94               2.690
3        4.748     13.92               2.491
Largest stream flow has longer time of concentration
Qp =     67.481 + sum of
          Qb          Ia/Ib
          28.445 *     0.898 =     25.545
          Qb          Ia/Ib
           4.748 *     0.970 =      4.604
Qp =     97.631

Total of 3 main streams to confluence:
Flow rates before confluence point:
      67.481      28.445       4.748
Area of streams before confluence:
       30.790       13.160        2.370


Results of confluence:
Total flow rate =     97.631(CFS)
Time of concentration =    14.800 min.
Effective stream area after confluence  =     46.320(Ac.)


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Process from Point/Station      136.000 to Point/Station      136.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.780
Decimal fraction soil group A = 0.320
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.140
Decimal fraction soil group D = 0.540
RI index for soil(AMC 2)  =  60.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    14.80 min.
Rainfall intensity =      2.416(In/Hr) for a   100.0 year storm
```

```
Subarea runoff =      4.394(CFS) for      2.330(Ac.)
Total runoff =    102.024(CFS)       Total area =      48.650(Ac.)
End of computations, total study area =          48.65 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.742
Area averaged RI index number =  74.8
```

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
       Rational Hydrology Study        Date: 05/19/16  File:ARA2100.out
------------------------------------------------------------------------
IRONWOOD
100-YEAR RATIONAL TABLING METHOD
AREA A (PART 2)
FN: ARA2100.RRV
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6279

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      137.000 to Point/Station      138.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   911.000(Ft.)
Top (of initial area) elevation =  2256.000(Ft.)
Bottom (of initial area) elevation =  2060.000(Ft.)
Difference in elevation =   196.000(Ft.)
Slope =    0.21515  s(percent)=      21.51
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.004 min.
Rainfall intensity =      2.802(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     14.601(CFS)
Total initial stream area =        6.130(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      138.000 to Point/Station      139.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel =     30.990(CFS)
Depth of flow =   0.779(Ft.), Average velocity =   7.467(Ft/s)
       ******* Irregular Channel Data ***********
```

```
--------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1             0.00              1.50
       2             4.02              0.50
       3             8.64              0.00
       4            11.11              0.50
       5            17.27              1.50
Manning's 'N' friction factor =   0.035
--------------------------------------------------------------
Sub-Channel flow  =     30.990(CFS)
  '     '       flow top width =      9.934(Ft.)
  '     '    velocity=    7.467(Ft/s)
  '     '       area =      4.151(Sq.Ft)
  '     '       Froude number =     2.036

Upstream point elevation =  2060.000(Ft.)
Downstream point elevation =  1984.000(Ft.)
Flow length =   754.000(Ft.)
Travel time  =    1.68 min.
Time of concentration =   12.69 min.
Depth of flow =   0.779(Ft.)
Average velocity =   7.467(Ft/s)
Total irregular channel flow =    30.990(CFS)
Irregular channel normal depth above invert elev. =   0.779(Ft.)
Average velocity of channel(s) =   7.467(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.847
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.610(In/Hr) for a   100.0 year storm
Subarea runoff =     32.696(CFS) for     14.800(Ac.)
Total runoff =     47.297(CFS)       Total area =      20.930(Ac.)
Depth of flow =   0.920(Ft.), Average velocity =   8.376(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      139.000 to Point/Station      143.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     63.581(CFS)
Depth of flow =   1.120(Ft.), Average velocity =   7.830(Ft/s)
       ******* Irregular Channel Data ***********
--------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1             0.00              1.50
       2             4.02              0.50
       3             8.64              0.00
       4            11.11              0.50
       5            17.27              1.50
Manning's 'N' friction factor =   0.035
--------------------------------------------------------------
Sub-Channel flow  =     63.581(CFS)
  '     '       flow top width =     13.398(Ft.)
  '     '    velocity=    7.830(Ft/s)
  '     '       area =      8.120(Sq.Ft)
  '     '       Froude number =     1.772

Upstream point elevation =  1984.000(Ft.)
Downstream point elevation =  1884.000(Ft.)
Flow length =  1478.000(Ft.)
Travel time  =    3.15 min.
Time of concentration =   15.83 min.
Depth of flow =   1.120(Ft.)
Average velocity =   7.830(Ft/s)
```

```
Total irregular channel flow =    63.581(CFS)
Irregular channel normal depth above invert elev. =   1.120(Ft.)
Average velocity of channel(s) =   7.830(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.816
Decimal fraction soil group A = 0.190
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.760
RI index for soil(AMC 2)  =  84.67
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.336(In/Hr) for a   100.0 year storm
Subarea runoff =     32.470(CFS) for     17.040(Ac.)
Total runoff =     79.767(CFS)       Total area =      37.970(Ac.)
Depth of flow =   1.226(Ft.), Average velocity =   8.311(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      139.000 to Point/Station      143.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     37.970(Ac.)
Runoff from this stream =     79.767(CFS)
Time of concentration =   15.83 min.
Rainfall intensity =     2.336(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      140.000 to Point/Station      141.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   837.000(Ft.)
Top (of initial area) elevation =  2228.000(Ft.)
Bottom (of initial area) elevation =  1980.000(Ft.)
Difference in elevation =   248.000(Ft.)
Slope =    0.29630  s(percent)=      29.63
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.977 min.
Rainfall intensity =      2.943(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.852
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     13.694(CFS)
Total initial stream area =       5.460(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      141.000 to Point/Station      142.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     17.443(CFS)
Depth of flow =   0.630(Ft.), Average velocity =   6.276(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1             0.00             1.50
       2             4.02             0.50
       3             8.64             0.00
       4            11.11             0.50
       5            17.27             1.50
```

```
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     17.443(CFS)
  '     '       flow top width =      8.413(Ft.)
  '     '    velocity=    6.276(Ft/s)
  '     '       area =      2.780(Sq.Ft)
  '     '       Froude number =     1.924

Upstream point elevation =  1980.000(Ft.)
Downstream point elevation =  1917.000(Ft.)
Flow length =   648.000(Ft.)
Travel time  =    1.72 min.
Time of concentration =   11.70 min.
Depth of flow =   0.630(Ft.)
Average velocity =   6.276(Ft/s)
Total irregular channel flow =    17.443(CFS)
Irregular channel normal depth above invert elev. =   0.630(Ft.)
Average velocity of channel(s) =   6.276(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.847
Decimal fraction soil group A = 0.010
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.990
RI index for soil(AMC 2)  =  88.78
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.718(In/Hr) for a   100.0 year storm
Subarea runoff =      7.416(CFS) for      3.220(Ac.)
Total runoff =     21.110(CFS)       Total area =       8.680(Ac.)
Depth of flow =   0.677(Ft.), Average velocity =   6.624(Ft/s)


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Process from Point/Station      142.000 to Point/Station      143.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     41.476(CFS)
Depth of flow =   0.996(Ft.), Average velocity =   6.342(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00              1.50
       2              4.02              0.50
       3              8.64              0.00
       4             11.11              0.50
       5             17.27              1.50
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     41.476(CFS)
  '     '       flow top width =     12.138(Ft.)
  '     '    velocity=    6.342(Ft/s)
  '     '       area =      6.540(Sq.Ft)
  '     '       Froude number =     1.523

Upstream point elevation =  1917.000(Ft.)
Downstream point elevation =  1884.000(Ft.)
Flow length =   636.000(Ft.)
Travel time  =    1.67 min.
Time of concentration =   13.37 min.
Depth of flow =   0.996(Ft.)
Average velocity =   6.342(Ft/s)
Total irregular channel flow =    41.476(CFS)
Irregular channel normal depth above invert elev. =   0.996(Ft.)
Average velocity of channel(s) =   6.342(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.803
Decimal fraction soil group A = 0.350
Decimal fraction soil group B = 0.000
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.650
RI index for soil(AMC 2)  =  81.30
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.542(In/Hr) for a   100.0 year storm
Subarea runoff =     40.669(CFS) for     19.920(Ac.)
Total runoff =     61.778(CFS)       Total area =      28.600(Ac.)
Depth of flow =   1.167(Ft.), Average velocity =   7.047(Ft/s)


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Process from Point/Station      142.000 to Point/Station      143.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     28.600(Ac.)
Runoff from this stream =     61.778(CFS)
Time of concentration =   13.37 min.
Rainfall intensity =     2.542(In/Hr)
Summary of stream data:

Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       79.767     15.83               2.336
2       61.778     13.37               2.542
Largest stream flow has longer time of concentration
Qp =     79.767 + sum of
          Qb         Ia/Ib
          61.778 *    0.919 =     56.770
Qp =    136.537

Total of 2 main streams to confluence:
Flow rates before confluence point:
      79.767      61.778
Area of streams before confluence:
       37.970       28.600


Results of confluence:
Total flow rate =    136.537(CFS)
Time of concentration =    15.833 min.
Effective stream area after confluence  =     66.570(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      143.000 to Point/Station      146.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1880.000(Ft.)
Downstream point/station elevation =  1870.000(Ft.)
Pipe length  =   133.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   136.537(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =   136.537(CFS)
Normal flow depth in pipe =   25.45(In.)
Flow top width inside pipe =   27.72(In.)
Critical depth could not be calculated.
Pipe flow velocity =     27.76(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    15.91 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      143.000 to Point/Station      146.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
```

```
Stream flow area =     66.570(Ac.)
Runoff from this stream =    136.537(CFS)
Time of concentration =   15.91 min.
Rainfall intensity =     2.330(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      144.000 to Point/Station      145.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   643.000(Ft.)
Top (of initial area) elevation =  1891.100(Ft.)
Bottom (of initial area) elevation =  1875.000(Ft.)
Difference in elevation =    16.100(Ft.)
Slope =    0.02504  s(percent)=       2.50
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.830 min.
Rainfall intensity =      2.825(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.736
Decimal fraction soil group A = 0.680
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.220
RI index for soil(AMC 2)  =  45.16
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      6.923(CFS)
Total initial stream area =        3.330(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      145.000 to Point/Station      146.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1871.000(Ft.)
Downstream point/station elevation =  1870.000(Ft.)
Pipe length  =     9.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.923(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     6.923(CFS)
Normal flow depth in pipe =    6.58(In.)
Flow top width inside pipe =   11.94(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.70(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    10.84 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      145.000 to Point/Station      146.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.330(Ac.)
Runoff from this stream =      6.923(CFS)
Time of concentration =   10.84 min.
Rainfall intensity =     2.823(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1      136.537     15.91               2.330
2        6.923     10.84               2.823
Largest stream flow has longer time of concentration
Qp =    136.537 + sum of
         Qb         Ia/Ib
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
          6.923 *    0.825 =      5.714
Qp =    142.251

Total of 2 main streams to confluence:
Flow rates before confluence point:
     136.537       6.923
Area of streams before confluence:
       66.570        3.330


Results of confluence:
Total flow rate =    142.251(CFS)
Time of concentration =    15.912 min.
Effective stream area after confluence  =     69.900(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      146.000 to Point/Station      149.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1870.000(Ft.)
Downstream point/station elevation =  1869.000(Ft.)
Pipe length  =     50.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   142.251(CFS)
Nearest computed pipe diameter  =     42.00(In.)
Calculated individual pipe flow  =   142.251(CFS)
Normal flow depth in pipe =   34.41(In.)
Flow top width inside pipe =   32.33(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.86(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    15.96 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      146.000 to Point/Station      149.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     69.900(Ac.)
Runoff from this stream =    142.251(CFS)
Time of concentration =   15.96 min.
Rainfall intensity =     2.327(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      147.000 to Point/Station      148.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   705.000(Ft.)
Top (of initial area) elevation =  1890.300(Ft.)
Bottom (of initial area) elevation =  1875.000(Ft.)
Difference in elevation =    15.300(Ft.)
Slope =    0.02170  s(percent)=      2.17
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.562 min.
Rainfall intensity =      2.734(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.764
Decimal fraction soil group A = 0.480
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.220
Decimal fraction soil group D = 0.300
RI index for soil(AMC 2)  =  53.04
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      6.539(CFS)
Total initial stream area =        3.130(Ac.)
Pervious area fraction = 0.500
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      148.000 to Point/Station      149.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1871.000(Ft.)
Downstream point/station elevation =  1869.000(Ft.)
Pipe length  =     8.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.539(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     6.539(CFS)
Normal flow depth in pipe =    6.04(In.)
Flow top width inside pipe =    8.46(In.)
Critical depth could not be calculated.
Pipe flow velocity =     20.75(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    11.57 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      148.000 to Point/Station      149.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.130(Ac.)
Runoff from this stream =      6.539(CFS)
Time of concentration =   11.57 min.
Rainfall intensity =     2.733(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1      142.251     15.96               2.327
2        6.539     11.57               2.733
Largest stream flow has longer time of concentration
Qp =    142.251 + sum of
          Qb          Ia/Ib
           6.539 *     0.851 =      5.567
Qp =    147.818

Total of 2 main streams to confluence:
Flow rates before confluence point:
     142.251       6.539
Area of streams before confluence:
       69.900        3.130


Results of confluence:
Total flow rate =    147.818(CFS)
Time of concentration =    15.962 min.
Effective stream area after confluence  =     73.030(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      149.000 to Point/Station      171.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1869.000(Ft.)
Downstream point/station elevation =  1826.000(Ft.)
Pipe length  =  1353.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   147.818(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =   147.818(CFS)
Normal flow depth in pipe =   32.11(In.)
Flow top width inside pipe =   29.75(In.)
Critical depth could not be calculated.
Pipe flow velocity =     20.22(Ft/s)
Travel time through pipe =    1.11 min.
```

```
Time of concentration (TC) =    17.08 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      149.000 to Point/Station      171.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     73.030(Ac.)
Runoff from this stream =    147.818(CFS)
Time of concentration =   17.08 min.
Rainfall intensity =     2.249(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      150.000 to Point/Station      151.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   840.000(Ft.)
Top (of initial area) elevation =  1871.900(Ft.)
Bottom (of initial area) elevation =  1847.500(Ft.)
Difference in elevation =    24.400(Ft.)
Slope =    0.02905  s(percent)=       2.90
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.699 min.
Rainfall intensity =      2.718(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.745
Decimal fraction soil group A = 0.600
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.150
Decimal fraction soil group D = 0.250
RI index for soil(AMC 2)  =  48.30
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      9.577(CFS)
Total initial stream area =        4.730(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      151.000 to Point/Station      154.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1843.500(Ft.)
Downstream point/station elevation =  1839.000(Ft.)
Pipe length  =   248.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.577(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     9.577(CFS)
Normal flow depth in pipe =   10.85(In.)
Flow top width inside pipe =   17.61(In.)
Critical Depth =   14.33(In.)
Pipe flow velocity =      8.60(Ft/s)
Travel time through pipe =    0.48 min.
Time of concentration (TC) =    12.18 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      151.000 to Point/Station      154.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      4.730(Ac.)
Runoff from this stream =      9.577(CFS)
Time of concentration =   12.18 min.
Rainfall intensity =     2.663(In/Hr)


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Process from Point/Station      152.000 to Point/Station      153.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   335.000(Ft.)
Top (of initial area) elevation =  1849.300(Ft.)
Bottom (of initial area) elevation =  1844.000(Ft.)
Difference in elevation =     5.300(Ft.)
Slope =    0.01582  s(percent)=      1.58
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.146 min.
Rainfall intensity =      3.074(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.697
Decimal fraction soil group A = 0.940
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.060
RI index for soil(AMC 2)  =  34.58
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =     1.843(CFS)
Total initial stream area =        0.860(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      153.000 to Point/Station      154.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1844.000(Ft.)
Downstream point/station elevation =  1839.000(Ft.)
Pipe length  =     4.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.843(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.843(CFS)
Normal flow depth in pipe =    2.23(In.)
Flow top width inside pipe =    5.80(In.)
Critical depth could not be calculated.
Pipe flow velocity =     27.77(Ft/s)
Travel time through pipe =    0.00 min.
Time of concentration (TC) =     9.15 min.


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Process from Point/Station      153.000 to Point/Station      154.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.860(Ac.)
Runoff from this stream =      1.843(CFS)
Time of concentration =    9.15 min.
Rainfall intensity =     3.073(In/Hr)
Summary of stream data:

Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1        9.577     12.18                 2.663
2        1.843      9.15                 3.073
Largest stream flow has longer time of concentration
Qp =      9.577 + sum of
         Qb         Ia/Ib
          1.843 *    0.867 =      1.597
Qp =     11.174

Total of 2 streams to confluence:
Flow rates before confluence point:
       9.577       1.843
Area of streams before confluence:
        4.730        0.860
Results of confluence:
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Total flow rate =     11.174(CFS)
Time of concentration =    12.180 min.
Effective stream area after confluence =      5.590(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      154.000 to Point/Station      157.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1839.000(Ft.)
Downstream point/station elevation =  1838.500(Ft.)
Pipe length  =    32.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.174(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    11.174(CFS)
Normal flow depth in pipe =   12.75(In.)
Flow top width inside pipe =   16.36(In.)
Critical Depth =   15.34(In.)
Pipe flow velocity =      8.34(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    12.24 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      154.000 to Point/Station      157.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.590(Ac.)
Runoff from this stream =     11.174(CFS)
Time of concentration =   12.24 min.
Rainfall intensity =     2.656(In/Hr)


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Process from Point/Station      155.000 to Point/Station      156.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   960.000(Ft.)
Top (of initial area) elevation =  1869.500(Ft.)
Bottom (of initial area) elevation =  1848.000(Ft.)
Difference in elevation =    21.500(Ft.)
Slope =    0.02240  s(percent)=       2.24
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.000 min.
Rainfall intensity =      2.578(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.747
Decimal fraction soil group A = 0.580
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.420
RI index for soil(AMC 2)  =  50.06
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      6.970(CFS)
Total initial stream area =        3.620(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      156.000 to Point/Station      157.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1844.000(Ft.)
Downstream point/station elevation =  1838.500(Ft.)
Pipe length  =    35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.970(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     6.970(CFS)
Normal flow depth in pipe =    5.95(In.)
Flow top width inside pipe =   12.00(In.)
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Critical depth could not be calculated.
Pipe flow velocity =     17.92(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    13.03 min.


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Process from Point/Station      156.000 to Point/Station      157.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.620(Ac.)
Runoff from this stream =      6.970(CFS)
Time of concentration =   13.03 min.
Rainfall intensity =     2.575(In/Hr)
Summary of stream data:

Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       11.174     12.24                 2.656
2        6.970     13.03                 2.575
Largest stream flow has longer or shorter time of concentration
Qp =     11.174 + sum of
          Qa           Tb/Ta
           6.970 *     0.939 =      6.548
Qp =     17.722

Total of 2 streams to confluence:
Flow rates before confluence point:
      11.174       6.970
Area of streams before confluence:
        5.590        3.620
Results of confluence:
Total flow rate =     17.722(CFS)
Time of concentration =    12.244 min.
Effective stream area after confluence =      9.210(Ac.)


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Process from Point/Station      157.000 to Point/Station      160.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1838.500(Ft.)
Downstream point/station elevation =  1835.500(Ft.)
Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.722(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    17.722(CFS)
Normal flow depth in pipe =   10.69(In.)
Flow top width inside pipe =   17.68(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.22(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    12.29 min.


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Process from Point/Station      157.000 to Point/Station      160.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      9.210(Ac.)
Runoff from this stream =     17.722(CFS)
Time of concentration =   12.29 min.
Rainfall intensity =     2.651(In/Hr)


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Process from Point/Station      158.000 to Point/Station      159.000
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**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   999.000(Ft.)
Top (of initial area) elevation =  1896.600(Ft.)
Bottom (of initial area) elevation =  1843.500(Ft.)
Difference in elevation =    53.100(Ft.)
Slope =    0.05315  s(percent)=      5.32
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.112 min.
Rainfall intensity =      2.788(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.768
Decimal fraction soil group A = 0.500
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.500
RI index for soil(AMC 2)  =  53.50
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =     11.177(CFS)
Total initial stream area =        5.220(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      159.000 to Point/Station      160.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1837.500(Ft.)
Downstream point/station elevation =  1835.500(Ft.)
Pipe length  =    33.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.177(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    11.177(CFS)
Normal flow depth in pipe =    9.27(In.)
Flow top width inside pipe =   14.58(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.03(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    11.15 min.


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Process from Point/Station      159.000 to Point/Station      160.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      5.220(Ac.)
Runoff from this stream =     11.177(CFS)
Time of concentration =   11.15 min.
Rainfall intensity =     2.784(In/Hr)
Summary of stream data:

Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       17.722     12.29                 2.651
2       11.177     11.15                 2.784
Largest stream flow has longer time of concentration
Qp =      17.722 + sum of
         Qb          Ia/Ib
         11.177 *     0.952 =     10.646
Qp =      28.368

Total of 2 streams to confluence:
Flow rates before confluence point:
      17.722      11.177
Area of streams before confluence:
        9.210        5.220
Results of confluence:
Total flow rate =     28.368(CFS)
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Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

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Time of concentration =    12.291 min.
Effective stream area after confluence =     14.430(Ac.)


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Process from Point/Station      160.000 to Point/Station      163.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1835.500(Ft.)
Downstream point/station elevation =  1835.000(Ft.)
Pipe length  =    16.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    28.368(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    28.368(CFS)
Normal flow depth in pipe =   17.48(In.)
Flow top width inside pipe =   15.68(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.27(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    12.31 min.


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Process from Point/Station      160.000 to Point/Station      163.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     14.430(Ac.)
Runoff from this stream =     28.368(CFS)
Time of concentration =   12.31 min.
Rainfall intensity =     2.649(In/Hr)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      160.100 to Point/Station      161.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   452.000(Ft.)
Top (of initial area) elevation =  1855.100(Ft.)
Bottom (of initial area) elevation =  1850.000(Ft.)
Difference in elevation =     5.100(Ft.)
Slope =    0.01128  s(percent)=      1.13
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.031 min.
Rainfall intensity =      2.799(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.825
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.780
Decimal fraction soil group D = 0.220
RI index for soil(AMC 2)  =  70.32
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.654(CFS)
Total initial stream area =        1.150(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      161.000 to Point/Station      162.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1850.000(Ft.)
End of street segment elevation =  1843.500(Ft.)
Length of street segment  =   620.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  10.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
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Distance from curb to property line  =   8.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      5.508(CFS)
Depth of flow =   0.391(Ft.), Average velocity =   3.114(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.000(Ft.)
Flow velocity =   3.11(Ft/s)
Travel time =    3.32 min.     TC =   14.35  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.761
Decimal fraction soil group A = 0.440
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.210
Decimal fraction soil group D = 0.350
RI index for soil(AMC 2)  =  54.82
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.454(In/Hr) for a   100.0 year storm
Subarea runoff =      5.619(CFS) for      3.010(Ac.)
Total runoff =      8.273(CFS)       Total area =       4.160(Ac.)
Street flow at end of street =      8.273(CFS)
Half street flow at end of street =      8.273(CFS)
Depth of flow =   0.440(Ft.), Average velocity =   3.657(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  10.000(Ft.)


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Process from Point/Station      162.000 to Point/Station      163.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1837.500(Ft.)
Downstream point/station elevation =  1835.000(Ft.)
Pipe length  =    18.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.273(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     8.273(CFS)
Normal flow depth in pipe =    6.86(In.)
Flow top width inside pipe =   11.88(In.)
Critical depth could not be calculated.
Pipe flow velocity =     17.83(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    14.37 min.


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Process from Point/Station      162.000 to Point/Station      163.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      4.160(Ac.)
Runoff from this stream =      8.273(CFS)
Time of concentration =   14.37 min.
Rainfall intensity =     2.452(In/Hr)
Summary of stream data:

Stream   Flow rate     TC           Rainfall Intensity
 No.       (CFS)      (min)                (In/Hr)


1       28.368     12.31                2.649
2        8.273     14.37                2.452
Largest stream flow has longer or shorter time of concentration
Qp =      28.368 + sum of
         Qa          Tb/Ta
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         8.273 *    0.857 =      7.090
Qp =     35.458

Total of 2 streams to confluence:
Flow rates before confluence point:
      28.368       8.273
Area of streams before confluence:
       14.430        4.160
Results of confluence:
Total flow rate =     35.458(CFS)
Time of concentration =    12.311 min.
Effective stream area after confluence =     18.590(Ac.)


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Process from Point/Station      163.000 to Point/Station      171.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1835.000(Ft.)
Downstream point/station elevation =  1826.000(Ft.)
Pipe length  =   151.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    35.458(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    35.458(CFS)
Normal flow depth in pipe =   15.82(In.)
Flow top width inside pipe =   18.10(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.24(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =    12.45 min.


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Process from Point/Station      163.000 to Point/Station      171.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     18.590(Ac.)
Runoff from this stream =     35.458(CFS)
Time of concentration =   12.45 min.
Rainfall intensity =     2.634(In/Hr)
Program is now starting with Main Stream No. 3


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Process from Point/Station      164.000 to Point/Station      165.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   354.000(Ft.)
Top (of initial area) elevation =  1854.000(Ft.)
Bottom (of initial area) elevation =  1844.000(Ft.)
Difference in elevation =    10.000(Ft.)
Slope =    0.02825  s(percent)=      2.82
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.327 min.
Rainfall intensity =      3.221(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.830
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.970
Decimal fraction soil group D = 0.030
RI index for soil(AMC 2)  =  69.18
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.101(CFS)
Total initial stream area =       1.160(Ac.)
Pervious area fraction = 0.500


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Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

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Process from Point/Station      165.000 to Point/Station      166.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1844.000(Ft.)
End of street segment elevation =  1831.000(Ft.)
Length of street segment  =   838.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  10.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   8.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      4.921(CFS)
Depth of flow =   0.361(Ft.), Average velocity =   3.352(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.000(Ft.)
Flow velocity =   3.35(Ft/s)
Travel time =    4.17 min.     TC =   12.49  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.815
Decimal fraction soil group A = 0.100
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.350
Decimal fraction soil group D = 0.550
RI index for soil(AMC 2)  =  68.60
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.630(In/Hr) for a   100.0 year storm
Subarea runoff =      3.580(CFS) for      1.670(Ac.)
Total runoff =      6.681(CFS)       Total area =       2.830(Ac.)
Street flow at end of street =      6.681(CFS)
Half street flow at end of street =      6.681(CFS)
Depth of flow =   0.391(Ft.), Average velocity =   3.784(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  10.000(Ft.)


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Process from Point/Station      166.000 to Point/Station      171.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1827.000(Ft.)
Downstream point/station elevation =  1826.000(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.681(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     6.681(CFS)
Normal flow depth in pipe =    8.85(In.)
Flow top width inside pipe =   14.76(In.)
Critical Depth =   12.48(In.)
Pipe flow velocity =      8.87(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    12.57 min.


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Process from Point/Station      166.000 to Point/Station      171.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      2.830(Ac.)
Runoff from this stream =      6.681(CFS)
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Time of concentration =   12.57 min.
Rainfall intensity =     2.622(In/Hr)
Program is now starting with Main Stream No. 4

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Process from Point/Station      167.000 to Point/Station      168.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   232.000(Ft.)
Top (of initial area) elevation =  1847.900(Ft.)
Bottom (of initial area) elevation =  1836.000(Ft.)
Difference in elevation =    11.900(Ft.)
Slope =    0.05129  s(percent)=       5.13
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.241 min.
Rainfall intensity =      3.721(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.820
Decimal fraction soil group A = 0.220
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.520
Decimal fraction soil group D = 0.260
RI index for soil(AMC 2)  =  62.42
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      0.702(CFS)
Total initial stream area =        0.230(Ac.)
Pervious area fraction = 0.500

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      168.000 to Point/Station      170.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1833.000(Ft.)
Downstream point/station elevation =  1832.000(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.702(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.702(CFS)
Normal flow depth in pipe =    4.21(In.)
Flow top width inside pipe =    5.49(In.)
Critical Depth =    5.07(In.)
Pipe flow velocity =      4.77(Ft/s)
Travel time through pipe =    0.16 min.
Time of concentration (TC) =     6.40 min.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      168.000 to Point/Station      170.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 4 in normal stream number 1
Stream flow area =      0.230(Ac.)
Runoff from this stream =      0.702(CFS)
Time of concentration =    6.40 min.
Rainfall intensity =     3.675(In/Hr)

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      169.000 to Point/Station      170.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   228.000(Ft.)
Top (of initial area) elevation =  1847.900(Ft.)
Bottom (of initial area) elevation =  1836.000(Ft.)
Difference in elevation =    11.900(Ft.)
Slope =    0.05219  s(percent)=       5.22
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.176 min.
Rainfall intensity =      3.740(In/Hr) for a   100.0 year storm
```

```
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.830
Decimal fraction soil group A = 0.140
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.360
RI index for soil(AMC 2)  =  65.98
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      0.435(CFS)
Total initial stream area =        0.140(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      169.000 to Point/Station      170.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 4 in normal stream number 2
Stream flow area =      0.140(Ac.)
Runoff from this stream =      0.435(CFS)
Time of concentration =    6.18 min.
Rainfall intensity =     3.740(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.702      6.40                 3.675
2        0.435      6.18                 3.740
Largest stream flow has longer time of concentration
Qp =      0.702 + sum of
         Qb          Ia/Ib
          0.435 *    0.983 =      0.427
Qp =      1.129

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.702       0.435
Area of streams before confluence:
        0.230        0.140
Results of confluence:
Total flow rate =      1.129(CFS)
Time of concentration =     6.398 min.
Effective stream area after confluence =      0.370(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      170.000 to Point/Station      171.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1832.000(Ft.)
Downstream point/station elevation =  1826.000(Ft.)
Pipe length  =    31.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.129(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.129(CFS)
Normal flow depth in pipe =    2.85(In.)
Flow top width inside pipe =    5.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =     12.29(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =     6.44 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      170.000 to Point/Station      171.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 4
```

```
Stream flow area =      0.370(Ac.)
Runoff from this stream =      1.129(CFS)
Time of concentration =    6.44 min.
Rainfall intensity =     3.663(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1      147.818     17.08               2.249
2       35.458     12.45               2.634
3        6.681     12.57               2.622
4        1.129      6.44               3.663
Largest stream flow has longer time of concentration
Qp =    147.818 + sum of
         Qb          Ia/Ib
         35.458 *    0.854 =     30.274
         Qb          Ia/Ib
          6.681 *    0.858 =      5.732
         Qb          Ia/Ib
          1.129 *    0.614 =      0.693
Qp =    184.517

Total of 4 main streams to confluence:
Flow rates before confluence point:
     147.818      35.458       6.681       1.129
Area of streams before confluence:
       73.030       18.590        2.830        0.370


Results of confluence:
Total flow rate =    184.517(CFS)
Time of concentration =    17.077 min.
Effective stream area after confluence  =     94.820(Ac.)


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Process from Point/Station      171.000 to Point/Station      171.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.757
Decimal fraction soil group A = 0.400
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.320
Decimal fraction soil group D = 0.280
RI index for soil(AMC 2)  =  55.88
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    17.08 min.
Rainfall intensity =      2.249(In/Hr) for a   100.0 year storm
Subarea runoff =      2.467(CFS) for      1.450(Ac.)
Total runoff =    186.985(CFS)       Total area =      96.270(Ac.)


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Process from Point/Station      171.000 to Point/Station      172.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1826.000(Ft.)
Downstream point/station elevation =  1820.000(Ft.)
Pipe length  =   173.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   186.985(CFS)
Nearest computed pipe diameter  =     42.00(In.)
Calculated individual pipe flow  =   186.985(CFS)
Normal flow depth in pipe =   34.31(In.)
Flow top width inside pipe =   32.48(In.)
Critical depth could not be calculated.
Pipe flow velocity =     22.20(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =    17.21 min.
```

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Process from Point/Station      171.000 to Point/Station      172.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     96.270(Ac.)
Runoff from this stream =    186.985(CFS)
Time of concentration =   17.21 min.
Rainfall intensity =     2.241(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      136.000 to Point/Station      136.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****

Rainfall intensity =      2.416(In/Hr) for a   100.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.795
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  74.80
Pervious area fraction =  0.742; Impervious fraction =  0.258
User specified values are as follows:
TC =  14.80 min.  Rain intensity =       2.42(In/Hr)
Total area =        48.65(Ac.)  Total runoff =    102.02(CFS)


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Process from Point/Station      136.000 to Point/Station      172.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =  1835.000(Ft.)
Downstream point/station elevation =  1820.000(Ft.)
Pipe length  =   444.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   102.024(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =   102.024(CFS)
Normal flow depth in pipe =   28.78(In.)
Flow top width inside pipe =   22.04(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.55(Ft/s)
Travel time through pipe =    0.40 min.
Time of concentration (TC) =    15.20 min.


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Process from Point/Station      136.000 to Point/Station      172.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     48.650(Ac.)
Runoff from this stream =    102.024(CFS)
Time of concentration =   15.20 min.
Rainfall intensity =     2.384(In/Hr)
Summary of stream data:

Stream   Flow rate      TC             Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)


1      186.985     17.21               2.241
2      102.024     15.20               2.384
Largest stream flow has longer time of concentration
Qp =    186.985 + sum of
```

```
          Qb          Ia/Ib
         102.024 *    0.940 =     95.887
Qp =    282.872

Total of 2 main streams to confluence:
Flow rates before confluence point:
     186.985     102.024
Area of streams before confluence:
       96.270       48.650


Results of confluence:
Total flow rate =    282.872(CFS)
Time of concentration =    17.207 min.
Effective stream area after confluence  =    144.920(Ac.)
End of computations, total study area =          144.92 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.811
Area averaged RI index number =  75.3
```

10-YEAR

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2001 Version 6.4
       Rational Hydrology Study       Date: 05/13/16  File:ARA110.out
------------------------------------------------------------------------
IRONWOOD
10-YEAR RATIONAL TABLING METHOD
AREA A (PART 1)
FN: ARA110.RRV
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
TRI-8 Builders - S/N   615
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.788(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   692.000(Ft.)
Top (of initial area) elevation =  2009.500(Ft.)
Bottom (of initial area) elevation =  1918.000(Ft.)
Difference in elevation =    91.500(Ft.)
Slope =    0.13223  s(percent)=      13.22
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.866 min.
Rainfall intensity =      1.852(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.826
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      4.851(CFS)
Total initial stream area =        3.170(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      102.000 to Point/Station      103.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      6.557(CFS)
Depth of flow =   0.524(Ft.), Average velocity =   3.369(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
```

```
        1              0.00              1.50
        2              4.02              0.50
        3              8.64              0.00
        4             11.11              0.50
        5             17.27              1.50
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =      6.557(CFS)
  '     '       flow top width =      7.336(Ft.)
  '     '    velocity=    3.369(Ft/s)
  '     '       area =      1.947(Sq.Ft)
  '     '       Froude number =     1.152

Upstream point elevation =  1918.000(Ft.)
Downstream point elevation =  1905.000(Ft.)
Flow length =   347.000(Ft.)
Travel time  =    1.72 min.
Time of concentration =   12.58 min.
Depth of flow =   0.524(Ft.)
Average velocity =   3.369(Ft/s)
Total irregular channel flow =     6.557(CFS)
Irregular channel normal depth above invert elev. =   0.524(Ft.)
Average velocity of channel(s) =   3.369(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.820
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.070
Decimal fraction soil group D = 0.930
RI index for soil(AMC 2)  =  88.79
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.721(In/Hr) for a    10.0 year storm
Subarea runoff =      3.146(CFS) for      2.230(Ac.)
Total runoff =      7.997(CFS)       Total area =       5.400(Ac.)


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Process from Point/Station      103.000 to Point/Station      107.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1901.000(Ft.)
Downstream point/station elevation =  1896.000(Ft.)
Pipe length  =   486.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.997(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.997(CFS)
Normal flow depth in pipe =   11.64(In.)
Flow top width inside pipe =   17.21(In.)
Critical Depth =   13.15(In.)
Pipe flow velocity =      6.62(Ft/s)
Travel time through pipe =    1.22 min.
Time of concentration (TC) =    13.81 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      107.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      5.400(Ac.)
Runoff from this stream =      7.997(CFS)
Time of concentration =   13.81 min.
Rainfall intensity =     1.643(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      104.000 to Point/Station      105.000
**** INITIAL AREA EVALUATION ****
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```
Initial area flow distance =   961.000(Ft.)
Top (of initial area) elevation =  2250.000(Ft.)
Bottom (of initial area) elevation =  2016.000(Ft.)
Difference in elevation =   234.000(Ft.)
Slope =    0.24350  s(percent)=      24.35
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.966 min.
Rainfall intensity =      1.843(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.826
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      7.355(CFS)
Total initial stream area =        4.830(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      105.000 to Point/Station      106.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel =     13.643(CFS)
Depth of flow =   0.550(Ft.), Average velocity =   6.378(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00              1.50
       2              4.02              0.50
       3              8.64              0.00
       4             11.11              0.50
       5             17.27              1.50
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     13.643(CFS)
  '     '       flow top width =      7.598(Ft.)
  '     '    velocity=    6.378(Ft/s)
  '     '       area =      2.139(Sq.Ft)
  '     '       Froude number =     2.118

Upstream point elevation =  2016.000(Ft.)
Downstream point elevation =  1902.000(Ft.)
Flow length =   918.000(Ft.)
Travel time  =    2.40 min.
Time of concentration =   13.37 min.
Depth of flow =   0.550(Ft.)
Average velocity =   6.378(Ft/s)
Total irregular channel flow =    13.643(CFS)
Irregular channel normal depth above invert elev. =   0.550(Ft.)
Average velocity of channel(s) =   6.378(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.817
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.080
Decimal fraction soil group D = 0.920
RI index for soil(AMC 2)  =  88.76
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.670(In/Hr) for a    10.0 year storm
Subarea runoff =     11.272(CFS) for      8.260(Ac.)
Total runoff =     18.626(CFS)       Total area =      13.090(Ac.)


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Process from Point/Station      106.000 to Point/Station      107.000
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1898.000(Ft.)
Downstream point/station elevation =  1896.000(Ft.)
Pipe length  =   194.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    18.626(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    18.626(CFS)
Normal flow depth in pipe =   16.41(In.)
Flow top width inside pipe =   22.32(In.)
Critical Depth =   18.64(In.)
Pipe flow velocity =      8.14(Ft/s)
Travel time through pipe =    0.40 min.
Time of concentration (TC) =    13.76 min.


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Process from Point/Station      106.000 to Point/Station      107.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     13.090(Ac.)
Runoff from this stream =     18.626(CFS)
Time of concentration =   13.76 min.
Rainfall intensity =     1.645(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        7.997     13.81               1.643
2       18.626     13.76               1.645
Largest stream flow has longer or shorter time of concentration
Qp =     18.626 + sum of
          Qa          Tb/Ta
           7.997 *    0.997 =      7.971
Qp =     26.598

Total of 2 main streams to confluence:
Flow rates before confluence point:
       7.997      18.626
Area of streams before confluence:
        5.400       13.090


Results of confluence:
Total flow rate =     26.598(CFS)
Time of concentration =    13.762 min.
Effective stream area after confluence  =     18.490(Ac.)


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Process from Point/Station      107.000 to Point/Station      110.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1896.000(Ft.)
Downstream point/station elevation =  1886.000(Ft.)
Pipe length  =   412.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    26.598(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    26.598(CFS)
Normal flow depth in pipe =   15.57(In.)
Flow top width inside pipe =   22.91(In.)
Critical Depth =   21.58(In.)
Pipe flow velocity =     12.33(Ft/s)
Travel time through pipe =    0.56 min.
Time of concentration (TC) =    14.32 min.
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Process from Point/Station      107.000 to Point/Station      110.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     18.490(Ac.)
Runoff from this stream =      26.598(CFS)
Time of concentration =   14.32 min.
Rainfall intensity =     1.613(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      108.000 to Point/Station      109.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   918.000(Ft.)
Top (of initial area) elevation =  2033.000(Ft.)
Bottom (of initial area) elevation =  1908.000(Ft.)
Difference in elevation =   125.000(Ft.)
Slope =    0.13617  s(percent)=      13.62
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.095 min.
Rainfall intensity =      1.755(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.823
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      5.863(CFS)
Total initial stream area =        4.060(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      109.000 to Point/Station      110.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1904.000(Ft.)
Downstream point/station elevation =  1886.000(Ft.)
Pipe length  =   193.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.863(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     5.863(CFS)
Normal flow depth in pipe =    6.27(In.)
Flow top width inside pipe =   11.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.11(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    12.32 min.


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Process from Point/Station      109.000 to Point/Station      110.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      4.060(Ac.)
Runoff from this stream =      5.863(CFS)
Time of concentration =   12.32 min.
Rainfall intensity =     1.739(In/Hr)
Summary of stream data:

Stream    Flow rate      TC             Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)
```

```
1       26.598     14.32              1.613
2        5.863     12.32              1.739
Largest stream flow has longer time of concentration
Qp =     26.598 + sum of
          Qb         Ia/Ib
           5.863 *    0.928 =      5.438
Qp =     32.036

Total of 2 main streams to confluence:
Flow rates before confluence point:
      26.598       5.863
Area of streams before confluence:
       18.490        4.060


Results of confluence:
Total flow rate =     32.036(CFS)
Time of concentration =    14.319 min.
Effective stream area after confluence  =     22.550(Ac.)


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Process from Point/Station      110.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =  1886.000(Ft.)
Downstream point/station elevation =  1884.000(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    32.036(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    32.036(CFS)
Normal flow depth in pipe =   16.50(In.)
Flow top width inside pipe =   17.23(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.82(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    14.37 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      116.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     22.550(Ac.)
Runoff from this stream =     32.036(CFS)
Time of concentration =   14.37 min.
Rainfall intensity =     1.610(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      111.000 to Point/Station      112.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   229.000(Ft.)
Top (of initial area) elevation =  1927.000(Ft.)
Bottom (of initial area) elevation =  1896.000(Ft.)
Difference in elevation =    31.000(Ft.)
Slope =    0.13537  s(percent)=      13.54
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.949 min.
Rainfall intensity =      2.315(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.840
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
```

```
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.914(CFS)
Total initial stream area =        0.470(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      112.000 to Point/Station      115.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1892.000(Ft.)
Downstream point/station elevation =  1886.000(Ft.)
Pipe length  =   102.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.914(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.914(CFS)
Normal flow depth in pipe =    3.60(In.)
Flow top width inside pipe =    5.88(In.)
Critical Depth =    5.55(In.)
Pipe flow velocity =      7.43(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =     7.18 min.


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Process from Point/Station      112.000 to Point/Station      115.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      0.470(Ac.)
Runoff from this stream =      0.914(CFS)
Time of concentration =    7.18 min.
Rainfall intensity =     2.278(In/Hr)


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Process from Point/Station      113.000 to Point/Station      114.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   229.000(Ft.)
Top (of initial area) elevation =  1927.000(Ft.)
Bottom (of initial area) elevation =  1891.000(Ft.)
Difference in elevation =    36.000(Ft.)
Slope =    0.15721  s(percent)=      15.72
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.744 min.
Rainfall intensity =      2.350(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.841
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.949(CFS)
Total initial stream area =        0.480(Ac.)
Pervious area fraction = 1.000


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Process from Point/Station      114.000 to Point/Station      115.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1887.000(Ft.)
Downstream point/station elevation =  1886.000(Ft.)
Pipe length  =    11.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.949(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.949(CFS)
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Normal flow depth in pipe =    3.21(In.)
Flow top width inside pipe =    5.98(In.)
Critical Depth =    5.60(In.)
Pipe flow velocity =      8.86(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =     6.76 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      114.000 to Point/Station      115.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.480(Ac.)
Runoff from this stream =      0.949(CFS)
Time of concentration =    6.76 min.
Rainfall intensity =     2.347(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.914      7.18                 2.278
2        0.949      6.76                 2.347
Largest stream flow has longer or shorter time of concentration
Qp =      0.949 + sum of
         Qa          Tb/Ta
          0.914 *    0.942 =      0.862
Qp =      1.811

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.914       0.949
Area of streams before confluence:
        0.470        0.480
Results of confluence:
Total flow rate =      1.811(CFS)
Time of concentration =     6.765 min.
Effective stream area after confluence =      0.950(Ac.)


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Process from Point/Station      115.000 to Point/Station      116.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1886.000(Ft.)
Downstream point/station elevation =  1884.000(Ft.)
Pipe length  =    85.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.811(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.811(CFS)
Normal flow depth in pipe =    5.62(In.)
Flow top width inside pipe =    8.72(In.)
Critical Depth =    7.39(In.)
Pipe flow velocity =      6.24(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =     6.99 min.


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Process from Point/Station      115.000 to Point/Station      116.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.950(Ac.)
Runoff from this stream =      1.811(CFS)
Time of concentration =    6.99 min.
Rainfall intensity =     2.308(In/Hr)
Summary of stream data:
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```
Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       32.036     14.37               1.610
2        1.811      6.99               2.308
Largest stream flow has longer time of concentration
Qp =     32.036 + sum of
          Qb          Ia/Ib
           1.811 *     0.698 =      1.263
Qp =     33.299

Total of 2 main streams to confluence:
Flow rates before confluence point:
      32.036       1.811
Area of streams before confluence:
       22.550        0.950


Results of confluence:
Total flow rate =     33.299(CFS)
Time of concentration =    14.367 min.
Effective stream area after confluence  =     23.500(Ac.)


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Process from Point/Station      116.000 to Point/Station      119.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1884.000(Ft.)
Downstream point/station elevation =  1876.000(Ft.)
Pipe length  =    12.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    33.299(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    33.299(CFS)
Normal flow depth in pipe =    8.65(In.)
Flow top width inside pipe =   14.82(In.)
Critical depth could not be calculated.
Pipe flow velocity =     45.46(Ft/s)
Travel time through pipe =    0.00 min.
Time of concentration (TC) =    14.37 min.


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Process from Point/Station      116.000 to Point/Station      119.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     23.500(Ac.)
Runoff from this stream =     33.299(CFS)
Time of concentration =   14.37 min.
Rainfall intensity =     1.610(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      117.000 to Point/Station      118.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   988.000(Ft.)
Top (of initial area) elevation =  1900.700(Ft.)
Bottom (of initial area) elevation =  1882.000(Ft.)
Difference in elevation =    18.700(Ft.)
Slope =    0.01893  s(percent)=       1.89
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.600 min.
Rainfall intensity =      1.655(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.781
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Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Decimal fraction soil group A = 0.080
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.420
Decimal fraction soil group D = 0.500
RI index for soil(AMC 2)  =  69.04
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      6.873(CFS)
Total initial stream area =        5.320(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      118.000 to Point/Station      119.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1878.000(Ft.)
Downstream point/station elevation =  1876.000(Ft.)
Pipe length  =    38.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.873(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     6.873(CFS)
Normal flow depth in pipe =    8.43(In.)
Flow top width inside pipe =   10.98(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.66(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    13.65 min.


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Process from Point/Station      118.000 to Point/Station      119.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      5.320(Ac.)
Runoff from this stream =      6.873(CFS)
Time of concentration =   13.65 min.
Rainfall intensity =     1.652(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       33.299     14.37               1.610
2        6.873     13.65               1.652
Largest stream flow has longer time of concentration
Qp =      33.299 + sum of
          Qb          Ia/Ib
           6.873 *    0.975 =      6.699
Qp =      39.999

Total of 2 main streams to confluence:
Flow rates before confluence point:
      33.299       6.873
Area of streams before confluence:
       23.500        5.320


Results of confluence:
Total flow rate =     39.999(CFS)
Time of concentration =    14.371 min.
Effective stream area after confluence  =     28.820(Ac.)


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Process from Point/Station      119.000 to Point/Station      122.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1876.000(Ft.)
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Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Downstream point/station elevation =  1853.000(Ft.)
Pipe length  =   362.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    39.999(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    39.999(CFS)
Normal flow depth in pipe =   17.25(In.)
Flow top width inside pipe =   16.09(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.93(Ft/s)
Travel time through pipe =    0.32 min.
Time of concentration (TC) =    14.69 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      119.000 to Point/Station      122.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     28.820(Ac.)
Runoff from this stream =     39.999(CFS)
Time of concentration =   14.69 min.
Rainfall intensity =     1.593(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      120.000 to Point/Station      121.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   367.000(Ft.)
Top (of initial area) elevation =  1872.900(Ft.)
Bottom (of initial area) elevation =  1857.000(Ft.)
Difference in elevation =    15.900(Ft.)
Slope =    0.04332  s(percent)=      4.33
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.755 min.
Rainfall intensity =      2.192(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.803
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.469(CFS)
Total initial stream area =        1.970(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      121.000 to Point/Station      122.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1855.000(Ft.)
Downstream point/station elevation =  1853.000(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.469(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.469(CFS)
Normal flow depth in pipe =    7.34(In.)
Flow top width inside pipe =    6.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =      9.00(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =     7.84 min.


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Process from Point/Station      121.000 to Point/Station      122.000
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**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.970(Ac.)
Runoff from this stream =      3.469(CFS)
Time of concentration =    7.84 min.
Rainfall intensity =     2.180(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       39.999     14.69               1.593
2        3.469      7.84               2.180
Largest stream flow has longer time of concentration
Qp =     39.999 + sum of
          Qb         Ia/Ib
           3.469 *    0.730 =      2.534
Qp =     42.533

Total of 2 main streams to confluence:
Flow rates before confluence point:
      39.999       3.469
Area of streams before confluence:
       28.820        1.970


Results of confluence:
Total flow rate =     42.533(CFS)
Time of concentration =    14.690 min.
Effective stream area after confluence  =     30.790(Ac.)


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Process from Point/Station      122.000 to Point/Station      136.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  1853.000(Ft.)
Downstream point/station elevation =  1833.000(Ft.)
Pipe length  =   573.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    42.533(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    42.533(CFS)
Normal flow depth in pipe =   19.83(In.)
Flow top width inside pipe =   18.19(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.33(Ft/s)
Travel time through pipe =    0.62 min.
Time of concentration (TC) =    15.31 min.


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Process from Point/Station      122.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     30.790(Ac.)
Runoff from this stream =     42.533(CFS)
Time of concentration =   15.31 min.
Rainfall intensity =     1.560(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      123.000 to Point/Station      124.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Initial area flow distance =   625.000(Ft.)
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Top (of initial area) elevation =  1900.000(Ft.)
Bottom (of initial area) elevation =  1869.000(Ft.)
Difference in elevation =    31.000(Ft.)
Slope =    0.04960  s(percent)=       4.96
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.339 min.
Rainfall intensity =      1.997(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.690
Decimal fraction soil group A = 0.740
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.260
RI index for soil(AMC 2)  =  43.18
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.787(CFS)
Total initial stream area =        2.750(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      124.000 to Point/Station      125.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1869.000(Ft.)
End of street segment elevation =  1848.000(Ft.)
Length of street segment  =   695.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  10.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   8.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      6.934(CFS)
Depth of flow =   0.362(Ft.), Average velocity =   4.696(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.000(Ft.)
Flow velocity =   4.70(Ft/s)
Travel time =    2.47 min.     TC =   11.81  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.774
Decimal fraction soil group A = 0.190
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.160
Decimal fraction soil group D = 0.650
RI index for soil(AMC 2)  =  65.87
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.776(In/Hr) for a    10.0 year storm
Subarea runoff =      6.283(CFS) for     4.570(Ac.)
Total runoff =     10.071(CFS)       Total area =       7.320(Ac.)
Street flow at end of street =     10.071(CFS)
Half street flow at end of street =     10.071(CFS)
Depth of flow =   0.399(Ft.), Average velocity =   5.444(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  10.000(Ft.)


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Process from Point/Station      125.000 to Point/Station      129.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1846.000(Ft.)
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Downstream point/station elevation =  1841.000(Ft.)
Pipe length  =    82.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.071(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    10.071(CFS)
Normal flow depth in pipe =    8.65(In.)
Flow top width inside pipe =   14.82(In.)
Critical Depth =   14.23(In.)
Pipe flow velocity =     13.75(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    11.91 min.


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Process from Point/Station      125.000 to Point/Station      129.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      7.320(Ac.)
Runoff from this stream =     10.071(CFS)
Time of concentration =   11.91 min.
Rainfall intensity =     1.769(In/Hr)


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Process from Point/Station      126.000 to Point/Station      127.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   595.000(Ft.)
Top (of initial area) elevation =  1871.800(Ft.)
Bottom (of initial area) elevation =  1859.000(Ft.)
Difference in elevation =   12.800(Ft.)
Slope =    0.02151  s(percent)=       2.15
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.823 min.
Rainfall intensity =      1.855(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.712
Decimal fraction soil group A = 0.570
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.080
Decimal fraction soil group D = 0.350
RI index for soil(AMC 2)  =  50.01
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.206(CFS)
Total initial stream area =        1.670(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      127.000 to Point/Station      128.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1859.000(Ft.)
End of street segment elevation =  1845.000(Ft.)
Length of street segment  =   492.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  10.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   8.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.157(CFS)
Depth of flow =   0.301(Ft.), Average velocity =   3.558(Ft/s)
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Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   8.721(Ft.)
Flow velocity =   3.56(Ft/s)
Travel time =    2.30 min.     TC =   13.13  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.790
Decimal fraction soil group A = 0.090
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.020
Decimal fraction soil group D = 0.890
RI index for soil(AMC 2)  =  71.01
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.685(In/Hr) for a    10.0 year storm
Subarea runoff =      1.917(CFS) for      1.440(Ac.)
Total runoff =      4.122(CFS)       Total area =       3.110(Ac.)
Street flow at end of street =      4.122(CFS)
Half street flow at end of street =      4.122(CFS)
Depth of flow =   0.323(Ft.), Average velocity =   3.778(Ft/s)
Flow width (from curb towards crown)=   9.821(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      128.000 to Point/Station      129.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1843.000(Ft.)
Downstream point/station elevation =  1841.000(Ft.)
Pipe length  =    16.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.122(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =      4.122(CFS)
Normal flow depth in pipe =    5.57(In.)
Flow top width inside pipe =    8.74(In.)
Critical depth could not be calculated.
Pipe flow velocity =     14.34(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    13.15 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      128.000 to Point/Station      129.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.110(Ac.)
Runoff from this stream =      4.122(CFS)
Time of concentration =   13.15 min.
Rainfall intensity =     1.683(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       10.071     11.91                 1.769
2        4.122     13.15                 1.683
Largest stream flow has longer or shorter time of concentration
Qp =      10.071 + sum of
         Qa          Tb/Ta
          4.122 *    0.906 =      3.733
Qp =      13.804

Total of 2 streams to confluence:
Flow rates before confluence point:
      10.071       4.122
Area of streams before confluence:
        7.320        3.110
Results of confluence:
Total flow rate =     13.804(CFS)
Time of concentration =    11.906 min.
```

```
Effective stream area after confluence =     10.430(Ac.)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      129.000 to Point/Station      132.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_______________________________________________________________________
Upstream point/station elevation =  1841.000(Ft.)
Downstream point/station elevation =  1834.000(Ft.)
Pipe length  =    48.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    13.804(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =    13.804(CFS)
Normal flow depth in pipe =    8.03(In.)
Flow top width inside pipe =   14.96(In.)
Critical depth could not be calculated.
Pipe flow velocity =     20.67(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    11.94 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      129.000 to Point/Station      132.000
**** CONFLUENCE OF MINOR STREAMS ****
_______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     10.430(Ac.)
Runoff from this stream =     13.804(CFS)
Time of concentration =   11.94 min.
Rainfall intensity =     1.766(In/Hr)


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      130.000 to Point/Station      131.000
**** INITIAL AREA EVALUATION ****
_______________________________________________________________________
Initial area flow distance =   844.000(Ft.)
Top (of initial area) elevation =  1892.000(Ft.)
Bottom (of initial area) elevation =  1840.000(Ft.)
Difference in elevation =   52.000(Ft.)
Slope =    0.06161  s(percent)=       6.16
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.085 min.
Rainfall intensity =      1.922(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.785
Decimal fraction soil group A = 0.130
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.440
Decimal fraction soil group D = 0.430
RI index for soil(AMC 2)  =  66.77
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.116(CFS)
Total initial stream area =        2.730(Ac.)
Pervious area fraction = 0.500


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      131.000 to Point/Station      132.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
_______________________________________________________________________
Upstream point/station elevation =  1836.000(Ft.)
Downstream point/station elevation =  1834.000(Ft.)
Pipe length  =    97.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.116(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.116(CFS)
Normal flow depth in pipe =    8.16(In.)
Flow top width inside pipe =   11.20(In.)
Critical Depth =   10.28(In.)
Pipe flow velocity =      7.24(Ft/s)
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Travel time through pipe =    0.22 min.
Time of concentration (TC) =    10.31 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      131.000 to Point/Station      132.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.730(Ac.)
Runoff from this stream =      4.116(CFS)
Time of concentration =   10.31 min.
Rainfall intensity =     1.901(In/Hr)
Summary of stream data:

Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       13.804     11.94                1.766
2        4.116     10.31                1.901
Largest stream flow has longer time of concentration
Qp =      13.804 + sum of
         Qb          Ia/Ib
          4.116 *     0.929 =      3.824
Qp =      17.628

Total of 2 streams to confluence:
Flow rates before confluence point:
      13.804       4.116
Area of streams before confluence:
       10.430        2.730
Results of confluence:
Total flow rate =     17.628(CFS)
Time of concentration =    11.944 min.
Effective stream area after confluence =     13.160(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      132.000 to Point/Station      136.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1834.000(Ft.)
Downstream point/station elevation =  1833.000(Ft.)
Pipe length  =   184.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.628(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    17.628(CFS)
Normal flow depth in pipe =   17.81(In.)
Flow top width inside pipe =   25.59(In.)
Critical Depth =   17.61(In.)
Pipe flow velocity =      6.34(Ft/s)
Travel time through pipe =    0.48 min.
Time of concentration (TC) =    12.43 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      132.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     13.160(Ac.)
Runoff from this stream =     17.628(CFS)
Time of concentration =   12.43 min.
Rainfall intensity =     1.731(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      133.000 to Point/Station      134.000
```

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**** INITIAL AREA EVALUATION ****
____________________________________________________________________
Initial area flow distance =   526.000(Ft.)
Top (of initial area) elevation =  1920.000(Ft.)
Bottom (of initial area) elevation =  1867.600(Ft.)
Difference in elevation =    52.400(Ft.)
Slope =    0.09962  s(percent)=      9.96
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.582 min.
Rainfall intensity =      2.217(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.683
Decimal fraction soil group A = 0.830
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.170
RI index for soil(AMC 2)  =  39.31
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      0.727(CFS)
Total initial stream area =        0.480(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      134.000 to Point/Station      135.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________
Top of street segment elevation =  1867.600(Ft.)
End of street segment elevation =  1844.000(Ft.)
Length of street segment  =  1195.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  10.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   8.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      2.158(CFS)
Depth of flow =   0.286(Ft.), Average velocity =   2.839(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   7.959(Ft.)
Flow velocity =   2.84(Ft/s)
Travel time =    7.01 min.     TC =   14.60  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.710
Decimal fraction soil group A = 0.490
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.120
Decimal fraction soil group D = 0.390
RI index for soil(AMC 2)  =  53.21
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.598(In/Hr) for a    10.0 year storm
Subarea runoff =      2.142(CFS) for     1.890(Ac.)
Total runoff =      2.869(CFS)       Total area =       2.370(Ac.)
Street flow at end of street =      2.869(CFS)
Half street flow at end of street =      2.869(CFS)
Depth of flow =   0.308(Ft.), Average velocity =   3.022(Ft/s)
Flow width (from curb towards crown)=   9.071(Ft.)


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Process from Point/Station      135.000 to Point/Station      136.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________
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Upstream point/station elevation =  1844.000(Ft.)
Downstream point/station elevation =  1833.000(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.869(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.869(CFS)
Normal flow depth in pipe =    3.68(In.)
Flow top width inside pipe =    8.85(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.88(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    14.64 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      135.000 to Point/Station      136.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      2.370(Ac.)
Runoff from this stream =      2.869(CFS)
Time of concentration =   14.64 min.
Rainfall intensity =     1.595(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       42.533     15.31               1.560
2       17.628     12.43               1.731
3        2.869     14.64               1.595
Largest stream flow has longer time of concentration
Qp =     42.533 + sum of
          Qb         Ia/Ib
          17.628 *    0.901 =     15.881
          Qb         Ia/Ib
           2.869 *    0.978 =      2.806
Qp =     61.220

Total of 3 main streams to confluence:
Flow rates before confluence point:
      42.533      17.628       2.869
Area of streams before confluence:
       30.790       13.160        2.370


Results of confluence:
Total flow rate =     61.220(CFS)
Time of concentration =    15.313 min.
Effective stream area after confluence  =     46.320(Ac.)


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Process from Point/Station      136.000 to Point/Station      136.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.738
Decimal fraction soil group A = 0.320
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.140
Decimal fraction soil group D = 0.540
RI index for soil(AMC 2)  =  60.40
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    15.31 min.
Rainfall intensity =      1.560(In/Hr) for a    10.0 year storm
Subarea runoff =      2.684(CFS) for      2.330(Ac.)
Total runoff =     63.903(CFS)       Total area =      48.650(Ac.)
End of computations, total study area =           48.65 (Ac.)
```

```
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.742
Area averaged RI index number =  74.8
```

```
               Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2001 Version 6.4
       Rational Hydrology Study        Date: 05/13/16  File:ARA210.out
------------------------------------------------------------------------
IRONWOOD
10-YEAR RATIONAL TABLING METHOD
AREA A (PART 2)
FN: ARA210.RRV
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
TRI-8 Builders - S/N   615
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.788(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      137.000 to Point/Station      138.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   911.000(Ft.)
Top (of initial area) elevation =  2256.000(Ft.)
Bottom (of initial area) elevation =  2060.000(Ft.)
Difference in elevation =   196.000(Ft.)
Slope =    0.21515  s(percent)=      21.51
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.004 min.
Rainfall intensity =      1.840(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.826
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      9.317(CFS)
Total initial stream area =        6.130(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      138.000 to Point/Station      139.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel =     20.564(CFS)
Depth of flow =   0.666(Ft.), Average velocity =   6.661(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
```

```
        1              0.00              1.50
        2              4.02              0.50
        3              8.64              0.00
        4             11.11              0.50
        5             17.27              1.50
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     20.564(CFS)
  '     '       flow top width =      8.777(Ft.)
  '     '    velocity=    6.661(Ft/s)
  '     '       area =      3.087(Sq.Ft)
  '     '       Froude number =     1.979

Upstream point elevation =  2060.000(Ft.)
Downstream point elevation =  1984.000(Ft.)
Flow length =   754.000(Ft.)
Travel time  =    1.89 min.
Time of concentration =   12.89 min.
Depth of flow =   0.666(Ft.)
Average velocity =   6.661(Ft/s)
Total irregular channel flow =    20.564(CFS)
Irregular channel normal depth above invert elev. =   0.666(Ft.)
Average velocity of channel(s) =   6.661(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.820
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.700(In/Hr) for a    10.0 year storm
Subarea runoff =     20.644(CFS) for     14.800(Ac.)
Total runoff =     29.961(CFS)       Total area =      20.930(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      139.000 to Point/Station      143.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel =     42.157(CFS)
Depth of flow =   0.951(Ft.), Average velocity =   7.020(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.50
        2              4.02              0.50
        3              8.64              0.00
        4             11.11              0.50
        5             17.27              1.50
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     42.157(CFS)
  '     '       flow top width =     11.681(Ft.)
  '     '    velocity=    7.020(Ft/s)
  '     '       area =      6.005(Sq.Ft)
  '     '       Froude number =     1.725

Upstream point elevation =  1984.000(Ft.)
Downstream point elevation =  1884.000(Ft.)
Flow length =  1478.000(Ft.)
Travel time  =    3.51 min.
Time of concentration =   16.40 min.
Depth of flow =   0.951(Ft.)
Average velocity =   7.020(Ft/s)
Total irregular channel flow =    42.157(CFS)
Irregular channel normal depth above invert elev. =   0.951(Ft.)
Average velocity of channel(s) =   7.020(Ft/s)
 Adding area flow to channel
```

```
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.776
Decimal fraction soil group A = 0.190
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.050
Decimal fraction soil group D = 0.760
RI index for soil(AMC 2)  =  84.67
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.507(In/Hr) for a    10.0 year storm
Subarea runoff =     19.924(CFS) for     17.040(Ac.)
Total runoff =     49.884(CFS)       Total area =      37.970(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      139.000 to Point/Station      143.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     37.970(Ac.)
Runoff from this stream =     49.884(CFS)
Time of concentration =   16.40 min.
Rainfall intensity =     1.507(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      140.000 to Point/Station      141.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   837.000(Ft.)
Top (of initial area) elevation =  2228.000(Ft.)
Bottom (of initial area) elevation =  1980.000(Ft.)
Difference in elevation =   248.000(Ft.)
Slope =    0.29630  s(percent)=      29.63
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.977 min.
Rainfall intensity =      1.932(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.829
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      8.749(CFS)
Total initial stream area =        5.460(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      141.000 to Point/Station      142.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     11.329(CFS)
Depth of flow =   0.537(Ft.), Average velocity =   5.539(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1             0.00             1.50
       2             4.02             0.50
       3             8.64             0.00
       4            11.11             0.50
       5            17.27             1.50
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     11.329(CFS)
  '     '     flow top width =      7.471(Ft.)
  '     '    velocity=    5.539(Ft/s)
```

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  '     '       area =      2.045(Sq.Ft)
  '     '       Froude number =     1.866

Upstream point elevation =  1980.000(Ft.)
Downstream point elevation =  1917.000(Ft.)
Flow length =   648.000(Ft.)
Travel time  =    1.95 min.
Time of concentration =   11.93 min.
Depth of flow =   0.537(Ft.)
Average velocity =   5.539(Ft/s)
Total irregular channel flow =    11.329(CFS)
Irregular channel normal depth above invert elev. =   0.537(Ft.)
Average velocity of channel(s) =   5.539(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.822
Decimal fraction soil group A = 0.010
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.990
RI index for soil(AMC 2)  =  88.78
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.767(In/Hr) for a    10.0 year storm
Subarea runoff =      4.676(CFS) for      3.220(Ac.)
Total runoff =     13.425(CFS)       Total area =       8.680(Ac.)


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Process from Point/Station      142.000 to Point/Station      143.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     28.830(CFS)
Depth of flow =   0.863(Ft.), Average velocity =   5.751(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1             0.00              1.50
       2             4.02              0.50
       3             8.64              0.00
       4            11.11              0.50
       5            17.27              1.50
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     28.831(CFS)
  '     '       flow top width =     10.782(Ft.)
  '     '    velocity=    5.751(Ft/s)
  '     '       area =      5.013(Sq.Ft)
  '     '       Froude number =     1.486

Upstream point elevation =  1917.000(Ft.)
Downstream point elevation =  1884.000(Ft.)
Flow length =   636.000(Ft.)
Travel time  =    1.84 min.
Time of concentration =   13.77 min.
Depth of flow =   0.863(Ft.)
Average velocity =   5.751(Ft/s)
Total irregular channel flow =    28.830(CFS)
Irregular channel normal depth above invert elev. =   0.863(Ft.)
Average velocity of channel(s) =   5.751(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.759
Decimal fraction soil group A = 0.350
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.650
RI index for soil(AMC 2)  =  81.30
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.645(In/Hr) for a    10.0 year storm
Subarea runoff =     24.854(CFS) for     19.920(Ac.)
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Total runoff =     38.280(CFS)       Total area =      28.600(Ac.)


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Process from Point/Station      142.000 to Point/Station      143.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     28.600(Ac.)
Runoff from this stream =     38.280(CFS)
Time of concentration =   13.77 min.
Rainfall intensity =     1.645(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       49.884     16.40               1.507
2       38.280     13.77               1.645
Largest stream flow has longer time of concentration
Qp =     49.884 + sum of
          Qb         Ia/Ib
          38.280 *    0.916 =     35.077
Qp =     84.962

Total of 2 main streams to confluence:
Flow rates before confluence point:
      49.884      38.280
Area of streams before confluence:
       37.970       28.600


Results of confluence:
Total flow rate =     84.962(CFS)
Time of concentration =    16.399 min.
Effective stream area after confluence  =     66.570(Ac.)


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Process from Point/Station      143.000 to Point/Station      146.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1880.000(Ft.)
Downstream point/station elevation =  1870.000(Ft.)
Pipe length  =   133.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    84.962(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    84.962(CFS)
Normal flow depth in pipe =   22.13(In.)
Flow top width inside pipe =   20.77(In.)
Critical depth could not be calculated.
Pipe flow velocity =     24.35(Ft/s)
Travel time through pipe =    0.09 min.
Time of concentration (TC) =    16.49 min.


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Process from Point/Station      143.000 to Point/Station      146.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     66.570(Ac.)
Runoff from this stream =     84.962(CFS)
Time of concentration =   16.49 min.
Rainfall intensity =     1.503(In/Hr)
Program is now starting with Main Stream No. 2
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Process from Point/Station      144.000 to Point/Station      145.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   643.000(Ft.)
Top (of initial area) elevation =  1891.100(Ft.)
Bottom (of initial area) elevation =  1875.000(Ft.)
Difference in elevation =    16.100(Ft.)
Slope =    0.02504  s(percent)=       2.50
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.830 min.
Rainfall intensity =      1.855(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.690
Decimal fraction soil group A = 0.680
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.100
Decimal fraction soil group D = 0.220
RI index for soil(AMC 2)  =  45.16
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.263(CFS)
Total initial stream area =        3.330(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      145.000 to Point/Station      146.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1871.000(Ft.)
Downstream point/station elevation =  1870.000(Ft.)
Pipe length  =     9.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.263(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     4.263(CFS)
Normal flow depth in pipe =    5.94(In.)
Flow top width inside pipe =    8.53(In.)
Critical depth could not be calculated.
Pipe flow velocity =     13.78(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    10.84 min.


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Process from Point/Station      145.000 to Point/Station      146.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.330(Ac.)
Runoff from this stream =      4.263(CFS)
Time of concentration =   10.84 min.
Rainfall intensity =     1.854(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       84.962     16.49               1.503
2        4.263     10.84               1.854
Largest stream flow has longer time of concentration
Qp =     84.962 + sum of
         Qb          Ia/Ib
          4.263 *    0.811 =      3.457
Qp =     88.419

Total of 2 main streams to confluence:
Flow rates before confluence point:
      84.962       4.263
Area of streams before confluence:
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       66.570         3.330


Results of confluence:
Total flow rate =     88.419(CFS)
Time of concentration =    16.490 min.
Effective stream area after confluence  =     69.900(Ac.)


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Process from Point/Station      146.000 to Point/Station      149.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1870.000(Ft.)
Downstream point/station elevation =  1869.000(Ft.)
Pipe length  =    50.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    88.419(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =    88.419(CFS)
Normal flow depth in pipe =   27.66(In.)
Flow top width inside pipe =   30.38(In.)
Critical Depth =   34.03(In.)
Pipe flow velocity =     15.17(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =    16.55 min.


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Process from Point/Station      146.000 to Point/Station      149.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     69.900(Ac.)
Runoff from this stream =     88.419(CFS)
Time of concentration =   16.55 min.
Rainfall intensity =     1.501(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      147.000 to Point/Station      148.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =    705.000(Ft.)
Top (of initial area) elevation =  1890.300(Ft.)
Bottom (of initial area) elevation =  1875.000(Ft.)
Difference in elevation =    15.300(Ft.)
Slope =    0.02170  s(percent)=       2.17
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.562 min.
Rainfall intensity =      1.795(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.721
Decimal fraction soil group A = 0.480
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.220
Decimal fraction soil group D = 0.300
RI index for soil(AMC 2)  =  53.04
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.054(CFS)
Total initial stream area =        3.130(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      148.000 to Point/Station      149.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1871.000(Ft.)
Downstream point/station elevation =  1869.000(Ft.)
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Pipe length  =     8.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.054(CFS)
Nearest computed pipe diameter  =     9.00(In.)
Calculated individual pipe flow  =     4.054(CFS)
Normal flow depth in pipe =    4.45(In.)
Flow top width inside pipe =    9.00(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.63(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    11.57 min.


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Process from Point/Station      148.000 to Point/Station      149.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      3.130(Ac.)
Runoff from this stream =      4.054(CFS)
Time of concentration =   11.57 min.
Rainfall intensity =     1.794(In/Hr)
Summary of stream data:

Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                (In/Hr)


1       88.419     16.55               1.501
2        4.054     11.57               1.794
Largest stream flow has longer time of concentration
Qp =     88.419 + sum of
         Qb         Ia/Ib
          4.054 *    0.836 =      3.390
Qp =     91.808

Total of 2 main streams to confluence:
Flow rates before confluence point:
      88.419      4.054
Area of streams before confluence:
       69.900        3.130


Results of confluence:
Total flow rate =     91.808(CFS)
Time of concentration =    16.545 min.
Effective stream area after confluence  =     73.030(Ac.)


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Process from Point/Station      149.000 to Point/Station      171.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1869.000(Ft.)
Downstream point/station elevation =  1826.000(Ft.)
Pipe length  =  1353.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    91.808(CFS)
Nearest computed pipe diameter  =    33.00(In.)
Calculated individual pipe flow  =    91.808(CFS)
Normal flow depth in pipe =   26.30(In.)
Flow top width inside pipe =   26.55(In.)
Critical depth could not be calculated.
Pipe flow velocity =     18.09(Ft/s)
Travel time through pipe =    1.25 min.
Time of concentration (TC) =    17.79 min.


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Process from Point/Station      149.000 to Point/Station      171.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
```

```
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     73.030(Ac.)
Runoff from this stream =     91.808(CFS)
Time of concentration =   17.79 min.
Rainfall intensity =     1.447(In/Hr)
Program is now starting with Main Stream No. 2


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Process from Point/Station      154.000 to Point/Station      155.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   840.000(Ft.)
Top (of initial area) elevation =  1871.900(Ft.)
Bottom (of initial area) elevation =  1847.500(Ft.)
Difference in elevation =    24.400(Ft.)
Slope =    0.02905  s(percent)=       2.90
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.699 min.
Rainfall intensity =      1.785(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.700
Decimal fraction soil group A = 0.600
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.150
Decimal fraction soil group D = 0.250
RI index for soil(AMC 2)  =  48.30
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.909(CFS)
Total initial stream area =        4.730(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      155.000 to Point/Station      158.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1843.500(Ft.)
Downstream point/station elevation =  1839.000(Ft.)
Pipe length  =   248.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.909(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.909(CFS)
Normal flow depth in pipe =    9.06(In.)
Flow top width inside pipe =   14.67(In.)
Critical Depth =   11.80(In.)
Pipe flow velocity =      7.62(Ft/s)
Travel time through pipe =    0.54 min.
Time of concentration (TC) =    12.24 min.


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Process from Point/Station      155.000 to Point/Station      158.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      4.730(Ac.)
Runoff from this stream =      5.909(CFS)
Time of concentration =   12.24 min.
Rainfall intensity =     1.745(In/Hr)


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Process from Point/Station      156.000 to Point/Station      157.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   335.000(Ft.)
Top (of initial area) elevation =  1849.300(Ft.)
Bottom (of initial area) elevation =  1844.000(Ft.)
Difference in elevation =     5.300(Ft.)
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Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Slope =    0.01582  s(percent)=       1.58
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.146 min.
Rainfall intensity =      2.018(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.650
Decimal fraction soil group A = 0.940
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.060
RI index for soil(AMC 2)  =  34.58
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.128(CFS)
Total initial stream area =        0.860(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      157.000 to Point/Station      158.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1844.000(Ft.)
Downstream point/station elevation =  1839.000(Ft.)
Pipe length  =     4.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.128(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     1.128(CFS)
Normal flow depth in pipe =    1.72(In.)
Flow top width inside pipe =    5.43(In.)
Critical depth could not be calculated.
Pipe flow velocity =     24.21(Ft/s)
Travel time through pipe =    0.00 min.
Time of concentration (TC) =     9.15 min.


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Process from Point/Station      157.000 to Point/Station      158.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      0.860(Ac.)
Runoff from this stream =      1.128(CFS)
Time of concentration =    9.15 min.
Rainfall intensity =     2.018(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        5.909     12.24                 1.745
2        1.128      9.15                 2.018
Largest stream flow has longer time of concentration
Qp =      5.909 + sum of
         Qb         Ia/Ib
          1.128 *    0.865 =      0.975
Qp =      6.884

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.909       1.128
Area of streams before confluence:
        4.730        0.860
Results of confluence:
Total flow rate =      6.884(CFS)
Time of concentration =    12.242 min.
Effective stream area after confluence =      5.590(Ac.)


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Process from Point/Station      158.000 to Point/Station      159.000
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**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1839.000(Ft.)
Downstream point/station elevation =  1835.500(Ft.)
Pipe length  =    67.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.884(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     6.884(CFS)
Normal flow depth in pipe =    8.46(In.)
Flow top width inside pipe =   10.94(In.)
Critical depth could not be calculated.
Pipe flow velocity =     11.63(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =    12.34 min.


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Process from Point/Station      158.000 to Point/Station      159.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.590(Ac.)
Runoff from this stream =      6.884(CFS)
Time of concentration =   12.34 min.
Rainfall intensity =     1.738(In/Hr)


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Process from Point/Station      150.000 to Point/Station      151.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   960.000(Ft.)
Top (of initial area) elevation =  1869.500(Ft.)
Bottom (of initial area) elevation =  1848.000(Ft.)
Difference in elevation =    21.500(Ft.)
Slope =    0.02240  s(percent)=       2.24
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.000 min.
Rainfall intensity =      1.693(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.702
Decimal fraction soil group A = 0.580
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.420
RI index for soil(AMC 2)  =  50.06
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.302(CFS)
Total initial stream area =        3.620(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      151.000 to Point/Station      159.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1844.000(Ft.)
Downstream point/station elevation =  1835.500(Ft.)
Pipe length  =    53.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.302(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     4.302(CFS)
Normal flow depth in pipe =    5.29(In.)
Flow top width inside pipe =    8.86(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.96(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =    13.06 min.


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Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

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Process from Point/Station      151.000 to Point/Station      159.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      3.620(Ac.)
Runoff from this stream =      4.302(CFS)
Time of concentration =   13.06 min.
Rainfall intensity =     1.689(In/Hr)


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Process from Point/Station      152.000 to Point/Station      153.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   999.000(Ft.)
Top (of initial area) elevation =  1896.600(Ft.)
Bottom (of initial area) elevation =  1843.500(Ft.)
Difference in elevation =    53.100(Ft.)
Slope =    0.05315  s(percent)=       5.32
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.112 min.
Rainfall intensity =      1.831(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.726
Decimal fraction soil group A = 0.500
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.500
RI index for soil(AMC 2)  =  53.50
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      6.935(CFS)
Total initial stream area =        5.220(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      153.000 to Point/Station      159.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1837.500(Ft.)
Downstream point/station elevation =  1835.500(Ft.)
Pipe length  =     33.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.935(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     6.935(CFS)
Normal flow depth in pipe =    8.05(In.)
Flow top width inside pipe =   11.28(In.)
Critical depth could not be calculated.
Pipe flow velocity =     12.38(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    11.16 min.


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Process from Point/Station      153.000 to Point/Station      159.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 3
Stream flow area =      5.220(Ac.)
Runoff from this stream =      6.935(CFS)
Time of concentration =   11.16 min.
Rainfall intensity =     1.827(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        6.884     12.34                  1.738
2        4.302     13.06                  1.689
3        6.935     11.16                  1.827
```

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Largest stream flow has longer or shorter time of concentration
Qp =      6.935 + sum of
         Qa          Tb/Ta
          6.884 *    0.904 =      6.225
         Qa          Tb/Ta
          4.302 *    0.855 =      3.676
Qp =     16.836

Total of 3 streams to confluence:
Flow rates before confluence point:
       6.884       4.302       6.935
Area of streams before confluence:
        5.590        3.620        5.220
Results of confluence:
Total flow rate =     16.836(CFS)
Time of concentration =    11.156 min.
Effective stream area after confluence =     14.430(Ac.)


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Process from Point/Station      159.000 to Point/Station      163.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1835.500(Ft.)
Downstream point/station elevation =  1835.000(Ft.)
Pipe length  =    35.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.836(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    16.836(CFS)
Normal flow depth in pipe =   15.42(In.)
Flow top width inside pipe =   18.55(In.)
Critical Depth =   18.06(In.)
Pipe flow velocity =      8.90(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    11.22 min.


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Process from Point/Station      159.000 to Point/Station      163.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =     14.430(Ac.)
Runoff from this stream =     16.836(CFS)
Time of concentration =   11.22 min.
Rainfall intensity =     1.822(In/Hr)


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Process from Point/Station      160.000 to Point/Station      161.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   452.000(Ft.)
Top (of initial area) elevation =  1855.100(Ft.)
Bottom (of initial area) elevation =  1850.000(Ft.)
Difference in elevation =     5.100(Ft.)
Slope =    0.01128  s(percent)=       1.13
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.031 min.
Rainfall intensity =      1.838(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.795
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.780
Decimal fraction soil group D = 0.220
RI index for soil(AMC 2)  =  70.32
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.679(CFS)
Total initial stream area =        1.150(Ac.)
Pervious area fraction = 0.500
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      161.000 to Point/Station      162.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1850.000(Ft.)
End of street segment elevation =  1843.500(Ft.)
Length of street segment  =   620.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  10.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   8.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.876(CFS)
Depth of flow =   0.357(Ft.), Average velocity =   2.709(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.000(Ft.)
Flow velocity =   2.71(Ft/s)
Travel time =    3.81 min.     TC =   14.85  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.716
Decimal fraction soil group A = 0.440
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.210
Decimal fraction soil group D = 0.350
RI index for soil(AMC 2)  =  54.82
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.584(In/Hr) for a    10.0 year storm
Subarea runoff =      3.413(CFS) for      3.010(Ac.)
Total runoff =      5.092(CFS)       Total area =       4.160(Ac.)
Street flow at end of street =      5.092(CFS)
Half street flow at end of street =      5.092(CFS)
Depth of flow =   0.383(Ft.), Average velocity =   3.018(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  10.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      162.000 to Point/Station      163.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1837.500(Ft.)
Downstream point/station elevation =  1835.000(Ft.)
Pipe length  =    18.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.092(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     5.092(CFS)
Normal flow depth in pipe =    6.23(In.)
Flow top width inside pipe =    8.30(In.)
Critical depth could not be calculated.
Pipe flow velocity =     15.59(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    14.86 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      162.000 to Point/Station      163.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Stream flow area =      4.160(Ac.)
Runoff from this stream =      5.092(CFS)
Time of concentration =   14.86 min.
Rainfall intensity =     1.583(In/Hr)
Summary of stream data:

Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       16.836     11.22                 1.822
2        5.092     14.86                 1.583
Largest stream flow has longer or shorter time of concentration
Qp =     16.836 + sum of
          Qa           Tb/Ta
           5.092 *    0.755 =      3.844
Qp =     20.680

Total of 2 streams to confluence:
Flow rates before confluence point:
      16.836       5.092
Area of streams before confluence:
       14.430        4.160
Results of confluence:
Total flow rate =     20.680(CFS)
Time of concentration =    11.222 min.
Effective stream area after confluence =     18.590(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      163.000 to Point/Station      171.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1835.000(Ft.)
Downstream point/station elevation =  1826.000(Ft.)
Pipe length  =   151.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    20.680(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    20.680(CFS)
Normal flow depth in pipe =   12.26(In.)
Flow top width inside pipe =   16.78(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.15(Ft/s)
Travel time through pipe =    0.16 min.
Time of concentration (TC) =    11.38 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      163.000 to Point/Station      171.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     18.590(Ac.)
Runoff from this stream =     20.680(CFS)
Time of concentration =   11.38 min.
Rainfall intensity =     1.810(In/Hr)
Program is now starting with Main Stream No. 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      164.000 to Point/Station      165.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   354.000(Ft.)
Top (of initial area) elevation =  1854.000(Ft.)
Bottom (of initial area) elevation =  1844.000(Ft.)
Difference in elevation =    10.000(Ft.)
Slope =    0.02825  s(percent)=       2.82
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.327 min.
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Rainfall intensity =      2.115(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.801
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.970
Decimal fraction soil group D = 0.030
RI index for soil(AMC 2)  =  69.18
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.966(CFS)
Total initial stream area =        1.160(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      165.000 to Point/Station      166.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1844.000(Ft.)
End of street segment elevation =  1831.000(Ft.)
Length of street segment  =   838.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  10.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.083
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   8.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.382(CFS)
Depth of flow =   0.331(Ft.), Average velocity =   2.888(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.000(Ft.)
Flow velocity =   2.89(Ft/s)
Travel time =    4.84 min.     TC =   13.16  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.780
Decimal fraction soil group A = 0.100
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.350
Decimal fraction soil group D = 0.550
RI index for soil(AMC 2)  =  68.60
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.682(In/Hr) for a    10.0 year storm
Subarea runoff =      2.192(CFS) for      1.670(Ac.)
Total runoff =      4.158(CFS)       Total area =      2.830(Ac.)
Street flow at end of street =      4.158(CFS)
Half street flow at end of street =      4.158(CFS)
Depth of flow =   0.347(Ft.), Average velocity =   3.135(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  10.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      166.000 to Point/Station      171.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1827.000(Ft.)
Downstream point/station elevation =  1826.000(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.158(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.158(CFS)
Normal flow depth in pipe =    7.66(In.)
```

```
Flow top width inside pipe =   11.53(In.)
Critical Depth =   10.32(In.)
Pipe flow velocity =      7.85(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    13.25 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      166.000 to Point/Station      171.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 3
Stream flow area =      2.830(Ac.)
Runoff from this stream =      4.158(CFS)
Time of concentration =   13.25 min.
Rainfall intensity =     1.677(In/Hr)
Program is now starting with Main Stream No. 4


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      167.000 to Point/Station      168.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   232.000(Ft.)
Top (of initial area) elevation =  1847.900(Ft.)
Bottom (of initial area) elevation =  1836.000(Ft.)
Difference in elevation =    11.900(Ft.)
Slope =    0.05129  s(percent)=       5.13
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.241 min.
Rainfall intensity =      2.443(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.789
Decimal fraction soil group A = 0.220
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.520
Decimal fraction soil group D = 0.260
RI index for soil(AMC 2)  =  62.42
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      0.443(CFS)
Total initial stream area =        0.230(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      168.000 to Point/Station      170.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1833.000(Ft.)
Downstream point/station elevation =  1832.000(Ft.)
Pipe length  =    45.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.443(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.443(CFS)
Normal flow depth in pipe =    3.11(In.)
Flow top width inside pipe =    6.00(In.)
Critical Depth =    4.07(In.)
Pipe flow velocity =      4.32(Ft/s)
Travel time through pipe =    0.17 min.
Time of concentration (TC) =     6.41 min.


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Process from Point/Station      168.000 to Point/Station      170.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 4 in normal stream number 1
Stream flow area =      0.230(Ac.)
Runoff from this stream =      0.443(CFS)
Time of concentration =    6.41 min.
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```
Rainfall intensity =     2.410(In/Hr)


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Process from Point/Station      169.000 to Point/Station      170.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   228.000(Ft.)
Top (of initial area) elevation =  1847.900(Ft.)
Bottom (of initial area) elevation =  1836.000(Ft.)
Difference in elevation =    11.900(Ft.)
Slope =    0.05219  s(percent)=       5.22
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    6.176 min.
Rainfall intensity =      2.456(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.802
Decimal fraction soil group A = 0.140
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.500
Decimal fraction soil group D = 0.360
RI index for soil(AMC 2)  =  65.98
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      0.276(CFS)
Total initial stream area =        0.140(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      169.000 to Point/Station      170.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 4 in normal stream number 2
Stream flow area =      0.140(Ac.)
Runoff from this stream =      0.276(CFS)
Time of concentration =    6.18 min.
Rainfall intensity =     2.456(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        0.443      6.41                 2.410
2        0.276      6.18                 2.456
Largest stream flow has longer time of concentration
Qp =      0.443 + sum of
         Qb          Ia/Ib
          0.276 *    0.981 =      0.270
Qp =      0.714

Total of 2 streams to confluence:
Flow rates before confluence point:
       0.443       0.276
Area of streams before confluence:
        0.230        0.140
Results of confluence:
Total flow rate =      0.714(CFS)
Time of concentration =     6.414 min.
Effective stream area after confluence =      0.370(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      170.000 to Point/Station      171.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1832.000(Ft.)
Downstream point/station elevation =  1826.000(Ft.)
Pipe length  =    31.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.714(CFS)
Nearest computed pipe diameter  =      6.00(In.)
```

```
Calculated individual pipe flow  =     0.714(CFS)
Normal flow depth in pipe =    2.21(In.)
Flow top width inside pipe =    5.79(In.)
Critical Depth =    5.10(In.)
Pipe flow velocity =     10.88(Ft/s)
Travel time through pipe =    0.05 min.
Time of concentration (TC) =     6.46 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      170.000 to Point/Station      171.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 4
Stream flow area =      0.370(Ac.)
Runoff from this stream =      0.714(CFS)
Time of concentration =    6.46 min.
Rainfall intensity =     2.401(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       91.808     17.79               1.447
2       20.680     11.38               1.810
3        4.158     13.25               1.677
4        0.714      6.46               2.401
Largest stream flow has longer time of concentration
Qp =     91.808 + sum of
         Qb          Ia/Ib
         20.680 *    0.800 =     16.538
         Qb          Ia/Ib
          4.158 *    0.863 =      3.588
         Qb          Ia/Ib
          0.714 *    0.603 =      0.430
Qp =    112.364

Total of 4 main streams to confluence:
Flow rates before confluence point:
      91.808      20.680       4.158       0.714
Area of streams before confluence:
       73.030       18.590        2.830        0.370


Results of confluence:
Total flow rate =    112.364(CFS)
Time of concentration =    17.792 min.
Effective stream area after confluence  =     94.820(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      171.000 to Point/Station      171.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.710
Decimal fraction soil group A = 0.400
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.320
Decimal fraction soil group D = 0.280
RI index for soil(AMC 2)  =  55.88
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    17.79 min.
Rainfall intensity =      1.447(In/Hr) for a    10.0 year storm
Subarea runoff =      1.491(CFS) for      1.450(Ac.)
Total runoff =    113.855(CFS)       Total area =      96.270(Ac.)


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Process from Point/Station      171.000 to Point/Station      172.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1826.000(Ft.)
Downstream point/station elevation =  1820.000(Ft.)
Pipe length  =   173.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   113.855(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =   113.855(CFS)
Normal flow depth in pipe =   27.14(In.)
Flow top width inside pipe =   31.01(In.)
Critical depth could not be calculated.
Pipe flow velocity =     19.93(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =    17.94 min.


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Process from Point/Station      171.000 to Point/Station      172.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     96.270(Ac.)
Runoff from this stream =    113.855(CFS)
Time of concentration =   17.94 min.
Rainfall intensity =     1.441(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      136.000 to Point/Station      136.000
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________
Rainfall intensity =      1.560(In/Hr) for a    10.0 year storm
USER INPUT of soil data for subarea
Runoff Coefficient = 0.751
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  74.80
Pervious area fraction =  0.742; Impervious fraction =  0.258
User specified values are as follows:
TC =  15.31 min.  Rain intensity =       1.56(In/Hr)
Total area =        48.65(Ac.)  Total runoff =     63.90(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      136.000 to Point/Station      172.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1835.000(Ft.)
Downstream point/station elevation =  1820.000(Ft.)
Pipe length  =   444.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    63.903(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    63.903(CFS)
Normal flow depth in pipe =   21.19(In.)
Flow top width inside pipe =   27.33(In.)
Critical depth could not be calculated.
Pipe flow velocity =     17.23(Ft/s)
Travel time through pipe =    0.43 min.
Time of concentration (TC) =    15.74 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      136.000 to Point/Station      172.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
```

```
In Main Stream number: 2
Stream flow area =      48.650(Ac.)
Runoff from this stream =      63.903(CFS)
Time of concentration =    15.74 min.
Rainfall intensity =      1.539(In/Hr)
Summary of stream data:

Stream    Flow rate      TC             Rainfall Intensity
 No.        (CFS)       (min)                  (In/Hr)


1       113.855     17.94                1.441
2        63.903     15.74                1.539
Largest stream flow has longer time of concentration
Qp =     113.855 + sum of
          Qb          Ia/Ib
          63.903 *     0.937 =      59.861
Qp =     173.716

Total of 2 main streams to confluence:
Flow rates before confluence point:
     113.855      63.903
Area of streams before confluence:
       96.270       48.650


Results of confluence:
Total flow rate =     173.716(CFS)
Time of concentration =    17.937 min.
Effective stream area after confluence  =    144.920(Ac.)
End of computations, total study area =          144.92 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 0.811
Area averaged RI index number =  75.3
```

APPENDIX B.2: AREA "B"

100-YEAR

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
       Rational Hydrology Study        Date: 05/18/16  File:ARB100.out
------------------------------------------------------------------------
IRONWOOD
100-YEAR RATIONAL TABLING METHOD
AREA B
FN: ARB100.RRV
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6279

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.500(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.500(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   639.000(Ft.)
Top (of initial area) elevation =  1873.000(Ft.)
Bottom (of initial area) elevation =  1851.000(Ft.)
Difference in elevation =    22.000(Ft.)
Slope =    0.03443  s(percent)=       3.44
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.136 min.
Rainfall intensity =      3.649(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.844
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.480
Decimal fraction soil group D = 0.520
RI index for soil(AMC 2)  =  72.12
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      6.902(CFS)
Total initial stream area =        2.240(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      202.000 to Point/Station      205.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =  1847.000(Ft.)
Downstream point/station elevation =  1825.700(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.013
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
No. of pipes = 1  Required pipe flow  =     6.902(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     6.902(CFS)
Normal flow depth in pipe =    4.88(In.)
Flow top width inside pipe =    8.97(In.)
Critical depth could not be calculated.
Pipe flow velocity =     28.23(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    10.16 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      205.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.240(Ac.)
Runoff from this stream =      6.902(CFS)
Time of concentration =   10.16 min.
Rainfall intensity =     3.645(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   702.000(Ft.)
Top (of initial area) elevation =  1871.900(Ft.)
Bottom (of initial area) elevation =  1851.000(Ft.)
Difference in elevation =    20.900(Ft.)
Slope =    0.02977  s(percent)=      2.98
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.835 min.
Rainfall intensity =      3.530(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.840
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.670
Decimal fraction soil group D = 0.330
RI index for soil(AMC 2)  =  70.98
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      5.810(CFS)
Total initial stream area =       1.960(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      205.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =  1847.000(Ft.)
Downstream point/station elevation =  1825.700(Ft.)
Pipe length  =    24.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.810(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     5.810(CFS)
Normal flow depth in pipe =    3.81(In.)
Flow top width inside pipe =    8.89(In.)
Critical depth could not be calculated.
Pipe flow velocity =     32.70(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    10.85 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      205.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.960(Ac.)
```

```
Runoff from this stream =      5.810(CFS)
Time of concentration =   10.85 min.
Rainfall intensity =     3.528(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        6.902     10.16                 3.645
2        5.810     10.85                 3.528
Largest stream flow has longer or shorter time of concentration
Qp =      6.902 + sum of
         Qa           Tb/Ta
          5.810 *     0.937 =      5.442
Qp =     12.344

Total of 2 streams to confluence:
Flow rates before confluence point:
       6.902       5.810
Area of streams before confluence:
        2.240        1.960
Results of confluence:
Total flow rate =     12.344(CFS)
Time of concentration =    10.160 min.
Effective stream area after confluence =      4.200(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      213.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation =  1825.700(Ft.)
Downstream point/station elevation =  1824.400(Ft.)
Pipe length  =    67.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.344(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    12.344(CFS)
Normal flow depth in pipe =   12.68(In.)
Flow top width inside pipe =   16.43(In.)
Critical Depth =   15.93(In.)
Pipe flow velocity =      9.28(Ft/s)
Travel time through pipe =    0.12 min.
Time of concentration (TC) =    10.28 min.


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Process from Point/Station      205.000 to Point/Station      213.000
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.200(Ac.)
Runoff from this stream =     12.344(CFS)
Time of concentration =   10.28 min.
Rainfall intensity =     3.624(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      207.000
**** INITIAL AREA EVALUATION ****

Initial area flow distance =   317.000(Ft.)
Top (of initial area) elevation =  1956.000(Ft.)
Bottom (of initial area) elevation =  1897.500(Ft.)
Difference in elevation =    58.500(Ft.)
Slope =    0.18454  s(percent)=      18.45
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.438 min.
Rainfall intensity =      4.260(In/Hr) for a   100.0 year storm
```

```
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.846
Decimal fraction soil group A = 0.270
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.730
RI index for soil(AMC 2)  =  83.06
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      8.001(CFS)
Total initial stream area =        2.220(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      207.000 to Point/Station      208.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1897.500(Ft.)
End of street segment elevation =  1854.500(Ft.)
Length of street segment  =   989.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  10.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   8.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     12.484(CFS)
Depth of flow =   0.403(Ft.), Average velocity =   6.616(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.000(Ft.)
Flow velocity =   6.62(Ft/s)
Travel time =    2.49 min.     TC =    9.93  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.813
Decimal fraction soil group A = 0.270
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.530
Decimal fraction soil group D = 0.200
RI index for soil(AMC 2)  =  60.21
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      3.687(In/Hr) for a    100.0 year storm
Subarea runoff =      8.905(CFS) for      2.970(Ac.)
Total runoff =     16.906(CFS)        Total area =       5.190(Ac.)
Street flow at end of street =     16.906(CFS)
Half street flow at end of street =     16.906(CFS)
Depth of flow =   0.441(Ft.), Average velocity =   7.458(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  10.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      208.000 to Point/Station      211.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1848.500(Ft.)
Downstream point/station elevation =  1831.900(Ft.)
Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    16.906(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     16.906(CFS)
Normal flow depth in pipe =    8.04(In.)
Flow top width inside pipe =   11.29(In.)
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Critical depth could not be calculated.
Pipe flow velocity =     30.20(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =     9.96 min.


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Process from Point/Station      208.000 to Point/Station      211.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.190(Ac.)
Runoff from this stream =     16.906(CFS)
Time of concentration =    9.96 min.
Rainfall intensity =     3.682(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      209.000 to Point/Station      210.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   878.000(Ft.)
Top (of initial area) elevation =  1873.000(Ft.)
Bottom (of initial area) elevation =  1854.500(Ft.)
Difference in elevation =    18.500(Ft.)
Slope =    0.02107  s(percent)=      2.11
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.698 min.
Rainfall intensity =      3.261(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.804
Decimal fraction soil group A = 0.270
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.530
Decimal fraction soil group D = 0.200
RI index for soil(AMC 2)  =  60.21
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      6.110(CFS)
Total initial stream area =        2.330(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1848.500(Ft.)
Downstream point/station elevation =  1831.900(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     6.110(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     6.110(CFS)
Normal flow depth in pipe =    4.25(In.)
Flow top width inside pipe =    8.99(In.)
Critical depth could not be calculated.
Pipe flow velocity =     29.76(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    12.71 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.330(Ac.)
Runoff from this stream =      6.110(CFS)
Time of concentration =   12.71 min.
Rainfall intensity =     3.259(In/Hr)
Summary of stream data:
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Stream   Flow rate      TC           Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       16.906      9.96                3.682
2        6.110     12.71                3.259
Largest stream flow has longer or shorter time of concentration
Qp =     16.906 + sum of
          Qa          Tb/Ta
           6.110 *     0.783 =      4.785
Qp =     21.692

Total of 2 streams to confluence:
Flow rates before confluence point:
      16.906       6.110
Area of streams before confluence:
        5.190        2.330
Results of confluence:
Total flow rate =     21.692(CFS)
Time of concentration =     9.955 min.
Effective stream area after confluence =      7.520(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      211.000 to Point/Station      212.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1831.900(Ft.)
Downstream point/station elevation =  1825.400(Ft.)
Pipe length  =   262.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    21.692(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    21.692(CFS)
Normal flow depth in pipe =   15.14(In.)
Flow top width inside pipe =   18.84(In.)
Critical Depth =   19.61(In.)
Pipe flow velocity =     11.69(Ft/s)
Travel time through pipe =    0.37 min.
Time of concentration (TC) =    10.33 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      211.000 to Point/Station      212.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.812
Decimal fraction soil group A = 0.270
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.530
Decimal fraction soil group D = 0.200
RI index for soil(AMC 2)  =  60.21
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    10.33 min.
Rainfall intensity =      3.615(In/Hr) for a   100.0 year storm
Subarea runoff =      0.675(CFS) for      0.230(Ac.)
Total runoff =     22.367(CFS)       Total area =       7.750(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      212.000 to Point/Station      213.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1825.400(Ft.)
Downstream point/station elevation =  1824.400(Ft.)
Pipe length  =    48.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.367(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    22.367(CFS)
Normal flow depth in pipe =   16.80(In.)
Flow top width inside pipe =   16.79(In.)
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Critical Depth =   19.74(In.)
Pipe flow velocity =     10.84(Ft/s)
Travel time through pipe =    0.07 min.
Time of concentration (TC) =    10.40 min.


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Process from Point/Station      212.000 to Point/Station      213.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      7.750(Ac.)
Runoff from this stream =     22.367(CFS)
Time of concentration =   10.40 min.
Rainfall intensity =     3.602(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       12.344     10.28               3.624
2       22.367     10.40               3.602
Largest stream flow has longer time of concentration
Qp =      22.367 + sum of
          Qb          Ia/Ib
          12.344 *    0.994 =     12.271
Qp =      34.638

Total of 2 main streams to confluence:
Flow rates before confluence point:
      12.344      22.367
Area of streams before confluence:
        4.200        7.750


Results of confluence:
Total flow rate =     34.638(CFS)
Time of concentration =    10.403 min.
Effective stream area after confluence  =     11.950(Ac.)


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Process from Point/Station      213.000 to Point/Station      217.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1824.400(Ft.)
Downstream point/station elevation =  1820.000(Ft.)
Pipe length  =    220.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    34.638(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    34.638(CFS)
Normal flow depth in pipe =   18.12(In.)
Flow top width inside pipe =   25.37(In.)
Critical Depth =   24.05(In.)
Pipe flow velocity =     12.21(Ft/s)
Travel time through pipe =    0.30 min.
Time of concentration (TC) =    10.70 min.


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Process from Point/Station      213.000 to Point/Station      217.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     11.950(Ac.)
Runoff from this stream =     34.638(CFS)
Time of concentration =   10.70 min.
Rainfall intensity =     3.552(In/Hr)
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Process from Point/Station      214.000 to Point/Station      215.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1892.000(Ft.)
Bottom (of initial area) elevation =  1851.800(Ft.)
Difference in elevation =    40.200(Ft.)
Slope =    0.04020  s(percent)=       4.02
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.755 min.
Rainfall intensity =      3.389(In/Hr) for a   100.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.832
Decimal fraction soil group A = 0.070
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.510
Decimal fraction soil group D = 0.420
RI index for soil(AMC 2)  =  68.93
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      2.990(CFS)
Total initial stream area =        1.060(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      215.000 to Point/Station      216.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1851.800(Ft.)
End of street segment elevation =  1839.900(Ft.)
Length of street segment  =   216.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  10.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   8.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      3.821(CFS)
Depth of flow =   0.290(Ft.), Average velocity =   4.802(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   8.180(Ft.)
Flow velocity =   4.80(Ft/s)
Travel time =    0.75 min.     TC =   12.50  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.831
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      3.286(In/Hr) for a   100.0 year storm
Subarea runoff =      1.610(CFS) for      0.590(Ac.)
Total runoff =      4.600(CFS)       Total area =      1.650(Ac.)
Street flow at end of street =      4.600(CFS)
Half street flow at end of street =      4.600(CFS)
Depth of flow =   0.305(Ft.), Average velocity =   5.002(Ft/s)
Flow width (from curb towards crown)=   8.905(Ft.)


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Process from Point/Station      216.000 to Point/Station      217.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1835.500(Ft.)
Downstream point/station elevation =  1820.000(Ft.)
Pipe length  =   617.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.600(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.600(CFS)
Normal flow depth in pipe =    8.23(In.)
Flow top width inside pipe =   11.14(In.)
Critical Depth =   10.72(In.)
Pipe flow velocity =      8.01(Ft/s)
Travel time through pipe =    1.28 min.
Time of concentration (TC) =    13.79 min.


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Process from Point/Station      216.000 to Point/Station      217.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.650(Ac.)
Runoff from this stream =      4.600(CFS)
Time of concentration =   13.79 min.
Rainfall intensity =     3.129(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       34.638     10.70                 3.552
2        4.600     13.79                 3.129
Largest stream flow has longer or shorter time of concentration
Qp =     34.638 + sum of
          Qa           Tb/Ta
           4.600 *     0.776 =      3.571
Qp =     38.208

Total of 2 streams to confluence:
Flow rates before confluence point:
      34.638       4.600
Area of streams before confluence:
       11.950        1.650
Results of confluence:
Total flow rate =     38.208(CFS)
Time of concentration =    10.703 min.
Effective stream area after confluence =     13.600(Ac.)


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Process from Point/Station      216.000 to Point/Station      217.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.842
Decimal fraction soil group A = 0.050
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.210
Decimal fraction soil group D = 0.740
RI index for soil(AMC 2)  =  71.59
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    10.70 min.
Rainfall intensity =      3.552(In/Hr) for a   100.0 year storm
Subarea runoff =      6.128(CFS) for      2.050(Ac.)
Total runoff =     44.336(CFS)       Total area =      15.650(Ac.)
End of computations, total study area =          15.65 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
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Area averaged pervious area fraction(Ap) = 0.571
Area averaged RI index number =  68.9
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10-YEAR

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                 Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2014 Version 9.0
       Rational Hydrology Study        Date: 05/18/16  File:ARB10.out
------------------------------------------------------------------------
IRONWOOD
10-YEAR RATIONAL TABLING METHOD
AREA B
FN: ARB10.RRV
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------


Program License Serial Number 6279

------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.500(In.)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.911(In/Hr)
Slope of intensity duration curve = 0.5000




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Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****

______________________________________________________________________
Initial area flow distance =   639.000(Ft.)
Top (of initial area) elevation =  1873.000(Ft.)
Bottom (of initial area) elevation =  1851.000(Ft.)
Difference in elevation =    22.000(Ft.)
Slope =    0.03443  s(percent)=       3.44
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.136 min.
Rainfall intensity =      2.217(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.815
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.480
Decimal fraction soil group D = 0.520
RI index for soil(AMC 2)  =  72.12
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      4.049(CFS)
Total initial stream area =        2.240(Ac.)
Pervious area fraction = 0.500


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Process from Point/Station      202.000 to Point/Station      205.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

______________________________________________________________________
Upstream point/station elevation =  1847.000(Ft.)
Downstream point/station elevation =  1825.700(Ft.)
Pipe length  =    40.00(Ft.)   Manning's N = 0.013
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```
No. of pipes = 1  Required pipe flow  =     4.049(CFS)
Nearest computed pipe diameter  =     6.00(In.)
Calculated individual pipe flow  =     4.049(CFS)
Normal flow depth in pipe =    4.86(In.)
Flow top width inside pipe =    4.71(In.)
Critical depth could not be calculated.
Pipe flow velocity =     23.77(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    10.16 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      205.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.240(Ac.)
Runoff from this stream =      4.049(CFS)
Time of concentration =   10.16 min.
Rainfall intensity =     2.214(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   702.000(Ft.)
Top (of initial area) elevation =  1871.900(Ft.)
Bottom (of initial area) elevation =  1851.000(Ft.)
Difference in elevation =    20.900(Ft.)
Slope =    0.02977  s(percent)=       2.98
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.835 min.
Rainfall intensity =      2.145(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.809
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.670
Decimal fraction soil group D = 0.330
RI index for soil(AMC 2)  =  70.98
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.400(CFS)
Total initial stream area =       1.960(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      205.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1847.000(Ft.)
Downstream point/station elevation =  1825.700(Ft.)
Pipe length  =    24.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.400(CFS)
Nearest computed pipe diameter  =     6.00(In.)
Calculated individual pipe flow  =     3.400(CFS)
Normal flow depth in pipe =    3.50(In.)
Flow top width inside pipe =    5.92(In.)
Critical depth could not be calculated.
Pipe flow velocity =     28.59(Ft/s)
Travel time through pipe =    0.01 min.
Time of concentration (TC) =    10.85 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      204.000 to Point/Station      205.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.960(Ac.)
```

```
Runoff from this stream =      3.400(CFS)
Time of concentration =   10.85 min.
Rainfall intensity =     2.143(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        4.049     10.16                 2.214
2        3.400     10.85                 2.143
Largest stream flow has longer or shorter time of concentration
Qp =      4.049 + sum of
         Qa           Tb/Ta
          3.400 *     0.937 =      3.185
Qp =      7.234

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.049       3.400
Area of streams before confluence:
        2.240        1.960
Results of confluence:
Total flow rate =      7.234(CFS)
Time of concentration =    10.164 min.
Effective stream area after confluence =      4.200(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      213.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1825.700(Ft.)
Downstream point/station elevation =  1824.400(Ft.)
Pipe length  =    67.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.234(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     7.234(CFS)
Normal flow depth in pipe =   10.18(In.)
Flow top width inside pipe =   14.01(In.)
Critical Depth =   12.89(In.)
Pipe flow velocity =      8.15(Ft/s)
Travel time through pipe =    0.14 min.
Time of concentration (TC) =    10.30 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      213.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      4.200(Ac.)
Runoff from this stream =      7.234(CFS)
Time of concentration =   10.30 min.
Rainfall intensity =     2.200(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      207.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   317.000(Ft.)
Top (of initial area) elevation =  1956.000(Ft.)
Bottom (of initial area) elevation =  1897.500(Ft.)
Difference in elevation =    58.500(Ft.)
Slope =    0.18454  s(percent)=      18.45
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.438 min.
Rainfall intensity =      2.589(In/Hr) for a    10.0 year storm
```

```
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.814
Decimal fraction soil group A = 0.270
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.730
RI index for soil(AMC 2)  =  83.06
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      4.680(CFS)
Total initial stream area =        2.220(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      207.000 to Point/Station      208.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1897.500(Ft.)
End of street segment elevation =  1854.500(Ft.)
Length of street segment  =   989.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  10.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   8.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      7.211(CFS)
Depth of flow =  0.349(Ft.), Average velocity =   5.323(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.000(Ft.)
Flow velocity =   5.32(Ft/s)
Travel time =    3.10 min.     TC =   10.54  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.770
Decimal fraction soil group A = 0.270
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.530
Decimal fraction soil group D = 0.200
RI index for soil(AMC 2)  =  60.21
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      2.175(In/Hr) for a    10.0 year storm
Subarea runoff =      4.976(CFS) for      2.970(Ac.)
Total runoff =      9.656(CFS)        Total area =       5.190(Ac.)
Street flow at end of street =      9.656(CFS)
Half street flow at end of street =      9.656(CFS)
Depth of flow =  0.376(Ft.), Average velocity =   5.976(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  10.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      208.000 to Point/Station      211.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1848.500(Ft.)
Downstream point/station elevation =  1831.900(Ft.)
Pipe length  =    46.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.656(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     9.656(CFS)
Normal flow depth in pipe =    7.16(In.)
Flow top width inside pipe =    7.26(In.)
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Critical depth could not be calculated.
Pipe flow velocity =     25.63(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    10.57 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      208.000 to Point/Station      211.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      5.190(Ac.)
Runoff from this stream =      9.656(CFS)
Time of concentration =   10.57 min.
Rainfall intensity =     2.172(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      209.000 to Point/Station      210.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   878.000(Ft.)
Top (of initial area) elevation =  1873.000(Ft.)
Bottom (of initial area) elevation =  1854.500(Ft.)
Difference in elevation =    18.500(Ft.)
Slope =    0.02107  s(percent)=       2.11
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.698 min.
Rainfall intensity =      1.981(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.761
Decimal fraction soil group A = 0.270
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.530
Decimal fraction soil group D = 0.200
RI index for soil(AMC 2)  =  60.21
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      3.515(CFS)
Total initial stream area =        2.330(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1848.500(Ft.)
Downstream point/station elevation =  1831.900(Ft.)
Pipe length  =    25.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.515(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     3.515(CFS)
Normal flow depth in pipe =    3.94(In.)
Flow top width inside pipe =    5.70(In.)
Critical depth could not be calculated.
Pipe flow velocity =     25.68(Ft/s)
Travel time through pipe =    0.02 min.
Time of concentration (TC) =    12.71 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      2.330(Ac.)
Runoff from this stream =      3.515(CFS)
Time of concentration =   12.71 min.
Rainfall intensity =     1.980(In/Hr)
Summary of stream data:
```

```
Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        9.656     10.57                 2.172
2        3.515     12.71                 1.980
Largest stream flow has longer or shorter time of concentration
Qp =      9.656 + sum of
         Qa          Tb/Ta
          3.515 *    0.831 =      2.921
Qp =     12.577

Total of 2 streams to confluence:
Flow rates before confluence point:
       9.656       3.515
Area of streams before confluence:
        5.190        2.330
Results of confluence:
Total flow rate =     12.577(CFS)
Time of concentration =    10.565 min.
Effective stream area after confluence =      7.520(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      211.000 to Point/Station      212.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1831.900(Ft.)
Downstream point/station elevation =  1825.400(Ft.)
Pipe length  =   262.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.577(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    12.577(CFS)
Normal flow depth in pipe =   11.74(In.)
Flow top width inside pipe =   17.14(In.)
Critical Depth =   16.05(In.)
Pipe flow velocity =     10.30(Ft/s)
Travel time through pipe =    0.42 min.
Time of concentration (TC) =    10.99 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      211.000 to Point/Station      212.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.768
Decimal fraction soil group A = 0.270
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.530
Decimal fraction soil group D = 0.200
RI index for soil(AMC 2)  =  60.21
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    10.99 min.
Rainfall intensity =      2.130(In/Hr) for a    10.0 year storm
Subarea runoff =      0.376(CFS) for      0.230(Ac.)
Total runoff =     12.953(CFS)       Total area =       7.750(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      212.000 to Point/Station      213.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1825.400(Ft.)
Downstream point/station elevation =  1824.400(Ft.)
Pipe length  =    48.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    12.953(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    12.953(CFS)
Normal flow depth in pipe =   12.80(In.)
Flow top width inside pipe =   16.32(In.)
```

```
Critical Depth =   16.19(In.)
Pipe flow velocity =      9.64(Ft/s)
Travel time through pipe =    0.08 min.
Time of concentration (TC) =    11.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      212.000 to Point/Station      213.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      7.750(Ac.)
Runoff from this stream =     12.953(CFS)
Time of concentration =   11.07 min.
Rainfall intensity =     2.122(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1        7.234     10.30               2.200
2       12.953     11.07               2.122
Largest stream flow has longer time of concentration
Qp =     12.953 + sum of
         Qb          Ia/Ib
          7.234 *    0.965 =      6.978
Qp =     19.931

Total of 2 main streams to confluence:
Flow rates before confluence point:
       7.234      12.953
Area of streams before confluence:
        4.200        7.750


Results of confluence:
Total flow rate =     19.931(CFS)
Time of concentration =    11.072 min.
Effective stream area after confluence  =     11.950(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      213.000 to Point/Station      217.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1824.400(Ft.)
Downstream point/station elevation =  1820.000(Ft.)
Pipe length  =    220.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.931(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    19.931(CFS)
Normal flow depth in pipe =   15.42(In.)
Flow top width inside pipe =   18.55(In.)
Critical Depth =   19.16(In.)
Pipe flow velocity =     10.53(Ft/s)
Travel time through pipe =    0.35 min.
Time of concentration (TC) =    11.42 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      213.000 to Point/Station      217.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     11.950(Ac.)
Runoff from this stream =     19.931(CFS)
Time of concentration =   11.42 min.
Rainfall intensity =     2.089(In/Hr)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      214.000 to Point/Station      215.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  1892.000(Ft.)
Bottom (of initial area) elevation =  1851.800(Ft.)
Difference in elevation =    40.200(Ft.)
Slope =    0.04020  s(percent)=       4.02
TC = k(0.390)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.755 min.
Rainfall intensity =      2.059(In/Hr) for a    10.0 year storm
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.798
Decimal fraction soil group A = 0.070
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.510
Decimal fraction soil group D = 0.420
RI index for soil(AMC 2)  =  68.93
Pervious area fraction =  0.500; Impervious fraction =  0.500
Initial subarea runoff =      1.742(CFS)
Total initial stream area =        1.060(Ac.)
Pervious area fraction = 0.500


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      215.000 to Point/Station      216.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =  1851.800(Ft.)
End of street segment elevation =  1839.900(Ft.)
Length of street segment  =   216.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  10.000(Ft.)
Distance from crown to crossfall grade break  =   8.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [1] side(s) of the street
Distance from curb to property line  =   8.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      2.227(CFS)
Depth of flow =   0.252(Ft.), Average velocity =   4.299(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   6.256(Ft.)
Flow velocity =   4.30(Ft/s)
Travel time =    0.84 min.     TC =   12.59  min.
 Adding area flow to street
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.796
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  69.00
Pervious area fraction =  0.500; Impervious fraction =  0.500
Rainfall intensity =      1.989(In/Hr) for a    10.0 year storm
Subarea runoff =      0.934(CFS) for      0.590(Ac.)
Total runoff =      2.677(CFS)       Total area =       1.650(Ac.)
Street flow at end of street =      2.677(CFS)
Half street flow at end of street =      2.677(CFS)
Depth of flow =   0.264(Ft.), Average velocity =   4.457(Ft/s)
Flow width (from curb towards crown)=   6.884(Ft.)


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Process from Point/Station      216.000 to Point/Station      217.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1835.500(Ft.)
Downstream point/station elevation =  1820.000(Ft.)
Pipe length  =   617.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.677(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.677(CFS)
Normal flow depth in pipe =    5.81(In.)
Flow top width inside pipe =   11.99(In.)
Critical Depth =    8.41(In.)
Pipe flow velocity =      7.09(Ft/s)
Travel time through pipe =    1.45 min.
Time of concentration (TC) =    14.04 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      216.000 to Point/Station      217.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      1.650(Ac.)
Runoff from this stream =      2.677(CFS)
Time of concentration =   14.04 min.
Rainfall intensity =     1.884(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       19.931     11.42                 2.089
2        2.677     14.04                 1.884
Largest stream flow has longer or shorter time of concentration
Qp =     19.931 + sum of
          Qa           Tb/Ta
           2.677 *    0.813 =      2.177
Qp =     22.108

Total of 2 streams to confluence:
Flow rates before confluence point:
      19.931       2.677
Area of streams before confluence:
       11.950        1.650
Results of confluence:
Total flow rate =     22.108(CFS)
Time of concentration =    11.420 min.
Effective stream area after confluence =     13.600(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      216.000 to Point/Station      217.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
SINGLE FAMILY (1/4 Acre Lot)
Runoff Coefficient = 0.809
Decimal fraction soil group A = 0.050
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.210
Decimal fraction soil group D = 0.740
RI index for soil(AMC 2)  =  71.59
Pervious area fraction =  0.500; Impervious fraction =  0.500
Time of concentration =    11.42 min.
Rainfall intensity =      2.089(In/Hr) for a    10.0 year storm
Subarea runoff =      3.465(CFS) for      2.050(Ac.)
Total runoff =     25.573(CFS)       Total area =      15.650(Ac.)
End of computations, total study area =           15.65 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
```

```
Area averaged pervious area fraction(Ap) = 0.571
Area averaged RI index number =  68.9
```

APPENDIX B.3: AREA "C"

100-YEAR

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                 Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2001 Version 6.4
       Rational Hydrology Study        Date: 05/12/16  File:ARC100.out
------------------------------------------------------------------------
IRONWOOD
100-YEAR RATIONAL TABLING METHOD
AREA C
FN: ARC100.RRV
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
TRI-8 Builders - S/N   615
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   745.000(Ft.)
Top (of initial area) elevation =  1892.000(Ft.)
Bottom (of initial area) elevation =  1837.000(Ft.)
Difference in elevation =    55.000(Ft.)
Slope =    0.07383  s(percent)=       7.38
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.575 min.
Rainfall intensity =      2.621(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.813
Decimal fraction soil group A = 0.270
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.140
Decimal fraction soil group D = 0.590
RI index for soil(AMC 2)  =  82.64
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =     10.614(CFS)
Total initial stream area =        4.980(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            4.98 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  82.6
```

10-YEAR

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2001 Version 6.4
       Rational Hydrology Study        Date: 05/13/16  File:ARC10.out
------------------------------------------------------------------------
IRONWOOD
10-YEAR RATIONAL TABLING METHOD
AREA C
FN: ARC10.RRV
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
TRI-8 Builders - S/N   615
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.788(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      301.000 to Point/Station      302.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   745.000(Ft.)
Top (of initial area) elevation =  1892.000(Ft.)
Bottom (of initial area) elevation =  1837.000(Ft.)
Difference in elevation =    55.000(Ft.)
Slope =    0.07383  s(percent)=      7.38
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.575 min.
Rainfall intensity =      1.721(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.774
Decimal fraction soil group A = 0.270
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.140
Decimal fraction soil group D = 0.590
RI index for soil(AMC 2)  =  82.64
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      6.635(CFS)
Total initial stream area =        4.980(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            4.98 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  82.6
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

APPENDIX B.4: AREA "D"

100-YEAR

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2001 Version 6.4
       Rational Hydrology Study        Date: 05/12/16  File:ARD100.out
------------------------------------------------------------------------
IRONWOOD
100-YEAR RATIONAL TABLING METHOD
AREA D
FN: ARD100.RRV
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
TRI-8 Builders - S/N   615
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   536.000(Ft.)
Top (of initial area) elevation =  1861.700(Ft.)
Bottom (of initial area) elevation =  1842.000(Ft.)
Difference in elevation =    19.700(Ft.)
Slope =    0.03675  s(percent)=       3.68
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.673 min.
Rainfall intensity =      2.611(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.831
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  86.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      2.625(CFS)
Total initial stream area =        1.210(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            1.21 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  86.0
```

10-YEAR

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2001 Version 6.4
       Rational Hydrology Study        Date: 05/13/16  File:ARD10.out
------------------------------------------------------------------------
IRONWOOD
10-YEAR RATIONAL TABLING METHOD
AREA D
FN: ARD10.RRV
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
TRI-8 Builders - S/N   615
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.788(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      401.000 to Point/Station      402.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   536.000(Ft.)
Top (of initial area) elevation =  1861.700(Ft.)
Bottom (of initial area) elevation =  1842.000(Ft.)
Difference in elevation =    19.700(Ft.)
Slope =    0.03675  s(percent)=       3.68
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.673 min.
Rainfall intensity =      1.715(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.799
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 1.000
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  86.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.657(CFS)
Total initial stream area =        1.210(Ac.)
Pervious area fraction = 1.000
End of computations, total study area =            1.21 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  86.0
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

APPENDIX B.5: AREA "E"

100-YEAR

```
                 Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2001 Version 6.4
       Rational Hydrology Study        Date: 05/12/16  File:ARE100.out
------------------------------------------------------------------------
IRONWOOD
100-YEAR RATIONAL TABLING METHOD
AREA E
FN: ARE100.RRV
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
TRI-8 Builders - S/N   615
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =  100.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year = 100.0
Calculated rainfall intensity data:
1 hour intensity =  1.200(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   669.000(Ft.)
Top (of initial area) elevation =  2280.000(Ft.)
Bottom (of initial area) elevation =  2132.000(Ft.)
Difference in elevation =   148.000(Ft.)
Slope =    0.22123  s(percent)=      22.12
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.671 min.
Rainfall intensity =      2.989(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.853
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      6.527(CFS)
Total initial stream area =        2.560(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      503.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     16.304(CFS)
Depth of flow =   0.596(Ft.), Average velocity =   6.526(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
```

```
        1              0.00              1.50
        2              4.02              0.50
        3              8.64              0.00
        4             11.11              0.50
        5             17.27              1.50
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     16.304(CFS)
  '     '       flow top width =      8.065(Ft.)
  '     '    velocity=    6.526(Ft/s)
  '     '       area =      2.498(Sq.Ft)
  '     '       Froude number =     2.066

Upstream point elevation =  2132.000(Ft.)
Downstream point elevation =  2072.000(Ft.)
Flow length =   524.000(Ft.)
Travel time  =    1.34 min.
Time of concentration =   11.01 min.
Depth of flow =   0.596(Ft.)
Average velocity =   6.526(Ft/s)
Total irregular channel flow =    16.304(CFS)
Irregular channel normal depth above invert elev. =   0.596(Ft.)
Average velocity of channel(s) =   6.526(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.850
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.801(In/Hr) for a   100.0 year storm
Subarea runoff =     18.264(CFS) for      7.670(Ac.)
Total runoff =     24.790(CFS)       Total area =      10.230(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      503.000 to Point/Station      504.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     40.832(CFS)
Depth of flow =   0.861(Ft.), Average velocity =   8.175(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.50
        2              4.02              0.50
        3              8.64              0.00
        4             11.11              0.50
        5             17.27              1.50
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     40.833(CFS)
  '     '       flow top width =     10.764(Ft.)
  '     '    velocity=    8.175(Ft/s)
  '     '       area =      4.995(Sq.Ft)
  '     '       Froude number =     2.115

Upstream point elevation =  2072.000(Ft.)
Downstream point elevation =  1980.000(Ft.)
Flow length =   875.000(Ft.)
Travel time  =    1.78 min.
Time of concentration =   12.79 min.
Depth of flow =   0.861(Ft.)
Average velocity =   8.175(Ft/s)
Total irregular channel flow =    40.832(CFS)
Irregular channel normal depth above invert elev. =   0.861(Ft.)
Average velocity of channel(s) =   8.175(Ft/s)
 Adding area flow to channel
```

```
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.845
Decimal fraction soil group A = 0.010
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.990
RI index for soil(AMC 2)  =  88.78
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.599(In/Hr) for a   100.0 year storm
Subarea runoff =     29.081(CFS) for     13.240(Ac.)
Total runoff =     53.871(CFS)       Total area =      23.470(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      504.000 to Point/Station      505.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     76.503(CFS)
Depth of flow =   1.176(Ft.), Average velocity =   8.605(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00              1.50
       2              4.02              0.50
       3              8.64              0.00
       4             11.11              0.50
       5             17.27              1.50
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     76.503(CFS)
  '     '       flow top width =     13.971(Ft.)
  '     '    velocity=    8.605(Ft/s)
  '     '       area =      8.890(Sq.Ft)
  '     '       Froude number =     1.901

Upstream point elevation =  1980.000(Ft.)
Downstream point elevation =  1890.000(Ft.)
Flow length =  1175.000(Ft.)
Travel time  =    2.28 min.
Time of concentration =   15.07 min.
Depth of flow =   1.176(Ft.)
Average velocity =   8.605(Ft/s)
Total irregular channel flow =    76.503(CFS)
Irregular channel normal depth above invert elev. =   1.176(Ft.)
Average velocity of channel(s) =   8.605(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.797
Decimal fraction soil group A = 0.350
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.040
Decimal fraction soil group D = 0.610
RI index for soil(AMC 2)  =  81.18
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      2.394(In/Hr) for a   100.0 year storm
Subarea runoff =     37.639(CFS) for     19.720(Ac.)
Total runoff =     91.510(CFS)       Total area =      43.190(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      505.000 to Point/Station      508.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1890.000(Ft.)
Downstream point/station elevation =  1856.000(Ft.)
Pipe length  =   438.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    91.510(CFS)
Nearest computed pipe diameter   =     27.00(In.)
Calculated individual pipe flow  =     91.510(CFS)
Normal flow depth in pipe =   24.00(In.)
```

```
Flow top width inside pipe =   16.97(In.)
Critical depth could not be calculated.
Pipe flow velocity =     24.49(Ft/s)
Travel time through pipe =    0.30 min.
Time of concentration (TC) =    15.37 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      505.000 to Point/Station      508.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     43.190(Ac.)
Runoff from this stream =     91.510(CFS)
Time of concentration =   15.37 min.
Rainfall intensity =     2.371(In/Hr)
Program is now starting with Main Stream No. 2


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      506.000 to Point/Station      507.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =  1889.000(Ft.)
Bottom (of initial area) elevation =  1862.000(Ft.)
Difference in elevation =    27.000(Ft.)
Slope =    0.09000  s(percent)=       9.00
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.400 min.
Rainfall intensity =      3.207(In/Hr) for a   100.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.774
Decimal fraction soil group A = 0.740
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.260
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  71.94
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      1.614(CFS)
Total initial stream area =        0.650(Ac.)
Pervious area fraction = 1.000


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      507.000 to Point/Station      508.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1858.000(Ft.)
Downstream point/station elevation =  1856.000(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.614(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.614(CFS)
Normal flow depth in pipe =    3.83(In.)
Flow top width inside pipe =    8.90(In.)
Critical Depth =    7.01(In.)
Pipe flow velocity =      8.99(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     8.46 min.


+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      507.000 to Point/Station      508.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.650(Ac.)
Runoff from this stream =      1.614(CFS)
```

```
Time of concentration =    8.46 min.
Rainfall intensity =     3.197(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                  (In/Hr)


1       91.510     15.37               2.371
2        1.614      8.46               3.197
Largest stream flow has longer time of concentration
Qp =     91.510 + sum of
          Qb          Ia/Ib
           1.614 *    0.742 =      1.198
Qp =     92.708

Total of 2 main streams to confluence:
Flow rates before confluence point:
      91.510       1.614
Area of streams before confluence:
       43.190        0.650


Results of confluence:
Total flow rate =     92.708(CFS)
Time of concentration =    15.367 min.
Effective stream area after confluence  =     43.840(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      508.000 to Point/Station      509.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1856.000(Ft.)
Downstream point/station elevation =  1836.000(Ft.)
Pipe length  =   828.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    92.708(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =    92.708(CFS)
Normal flow depth in pipe =   26.58(In.)
Flow top width inside pipe =   31.65(In.)
Critical depth could not be calculated.
Pipe flow velocity =     16.58(Ft/s)
Travel time through pipe =    0.83 min.
Time of concentration (TC) =    16.20 min.
End of computations, total study area =           43.84 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  85.2
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

10-YEAR

```
                Riverside County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c) 1989 - 2001 Version 6.4
       Rational Hydrology Study        Date: 05/13/16  File:ARE10.out
------------------------------------------------------------------------
IRONWOOD
10-YEAR RATIONAL TABLING METHOD
AREA E
FN: ARE10.RRV
------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

 English (in-lb) Units used in input data file

------------------------------------------------------------------------
TRI-8 Builders - S/N   615
------------------------------------------------------------------------
Rational Method Hydrology Program based on
Riverside County Flood Control & Water Conservation District
1978 hydrology manual

Storm event (year) =   10.00 Antecedent Moisture Condition = 2

2 year, 1 hour precipitation =  0.500(In.)
100 year, 1 hour precipitation =  1.200(In.)

Storm event year =  10.0
Calculated rainfall intensity data:
1 hour intensity =  0.788(In/Hr)
Slope of intensity duration curve = 0.5000




++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      501.000 to Point/Station      502.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   669.000(Ft.)
Top (of initial area) elevation =  2280.000(Ft.)
Bottom (of initial area) elevation =  2132.000(Ft.)
Difference in elevation =   148.000(Ft.)
Slope =    0.22123  s(percent)=      22.12
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.671 min.
Rainfall intensity =      1.963(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.830
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      4.172(CFS)
Total initial stream area =        2.560(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      502.000 to Point/Station      503.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     10.421(CFS)
Depth of flow =   0.507(Ft.), Average velocity =   5.725(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
        1              0.00              1.50
        2              4.02              0.50
        3              8.64              0.00
        4             11.11              0.50
        5             17.27              1.50
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     10.421(CFS)
  '     '       flow top width =      7.158(Ft.)
  '     '    velocity=    5.725(Ft/s)
  '     '       area =      1.820(Sq.Ft)
  '     '       Froude number =     2.001

Upstream point elevation =  2132.000(Ft.)
Downstream point elevation =  2072.000(Ft.)
Flow length =   524.000(Ft.)
Travel time  =    1.53 min.
Time of concentration =   11.20 min.
Depth of flow =   0.507(Ft.)
Average velocity =   5.725(Ft/s)
Total irregular channel flow =    10.421(CFS)
Irregular channel normal depth above invert elev. =   0.507(Ft.)
Average velocity of channel(s) =   5.725(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.825
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
RI index for soil(AMC 2)  =  89.00
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.824(In/Hr) for a    10.0 year storm
Subarea runoff =     11.548(CFS) for      7.670(Ac.)
Total runoff =     15.720(CFS)       Total area =      10.230(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      503.000 to Point/Station      504.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     25.893(CFS)
Depth of flow =   0.721(Ft.), Average velocity =   7.214(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              1.50
        2              4.02              0.50
        3              8.64              0.00
        4             11.11              0.50
        5             17.27              1.50
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     25.893(CFS)
  '     '       flow top width =      9.341(Ft.)
  '     '    velocity=    7.214(Ft/s)
  '     '       area =      3.589(Sq.Ft)
  '     '       Froude number =     2.051

Upstream point elevation =  2072.000(Ft.)
Downstream point elevation =  1980.000(Ft.)
Flow length =   875.000(Ft.)
Travel time  =    2.02 min.
Time of concentration =   13.22 min.
Depth of flow =   0.721(Ft.)
Average velocity =   7.214(Ft/s)
Total irregular channel flow =    25.893(CFS)
Irregular channel normal depth above invert elev. =   0.721(Ft.)
Average velocity of channel(s) =   7.214(Ft/s)
 Adding area flow to channel
```

```
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.818
Decimal fraction soil group A = 0.010
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.990
RI index for soil(AMC 2)  =  88.78
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.679(In/Hr) for a    10.0 year storm
Subarea runoff =     18.180(CFS) for     13.240(Ac.)
Total runoff =     33.900(CFS)       Total area =      23.470(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      504.000 to Point/Station      505.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =     48.142(CFS)
Depth of flow =   0.978(Ft.), Average velocity =   7.612(Ft/s)
       ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
       1              0.00              1.50
       2              4.02              0.50
       3              8.64              0.00
       4             11.11              0.50
       5             17.27              1.50
Manning's 'N' friction factor =   0.035
-----------------------------------------------------------------
Sub-Channel flow  =     48.142(CFS)
  '     '       flow top width =     11.956(Ft.)
  '     '    velocity=    7.612(Ft/s)
  '     '       area =      6.325(Sq.Ft)
  '     '       Froude number =     1.844

Upstream point elevation =  1980.000(Ft.)
Downstream point elevation =  1890.000(Ft.)
Flow length =  1175.000(Ft.)
Travel time  =    2.57 min.
Time of concentration =   15.79 min.
Depth of flow =   0.978(Ft.)
Average velocity =   7.612(Ft/s)
Total irregular channel flow =    48.142(CFS)
Irregular channel normal depth above invert elev. =   0.978(Ft.)
Average velocity of channel(s) =   7.612(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.749
Decimal fraction soil group A = 0.350
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.040
Decimal fraction soil group D = 0.610
RI index for soil(AMC 2)  =  81.18
Pervious area fraction =  1.000; Impervious fraction =  0.000
Rainfall intensity =      1.536(In/Hr) for a    10.0 year storm
Subarea runoff =     22.694(CFS) for     19.720(Ac.)
Total runoff =     56.594(CFS)       Total area =      43.190(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      505.000 to Point/Station      508.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1890.000(Ft.)
Downstream point/station elevation =  1856.000(Ft.)
Pipe length  =   438.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    56.594(CFS)
Nearest computed pipe diameter   =     24.00(In.)
Calculated individual pipe flow   =    56.594(CFS)
Normal flow depth in pipe =   17.77(In.)
```

```
Flow top width inside pipe =   21.05(In.)
Critical depth could not be calculated.
Pipe flow velocity =     22.70(Ft/s)
Travel time through pipe =    0.32 min.
Time of concentration (TC) =    16.11 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      505.000 to Point/Station      508.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     43.190(Ac.)
Runoff from this stream =     56.594(CFS)
Time of concentration =   16.11 min.
Rainfall intensity =     1.521(In/Hr)
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      506.000 to Point/Station      507.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
Initial area flow distance =   300.000(Ft.)
Top (of initial area) elevation =  1889.000(Ft.)
Bottom (of initial area) elevation =  1862.000(Ft.)
Difference in elevation =    27.000(Ft.)
Slope =    0.09000  s(percent)=       9.00
TC = k(0.530)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.400 min.
Rainfall intensity =      2.106(In/Hr) for a    10.0 year storm
UNDEVELOPED (poor cover) subarea
Runoff Coefficient = 0.722
Decimal fraction soil group A = 0.740
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.260
Decimal fraction soil group D = 0.000
RI index for soil(AMC 2)  =  71.94
Pervious area fraction =  1.000; Impervious fraction =  0.000
Initial subarea runoff =      0.988(CFS)
Total initial stream area =        0.650(Ac.)
Pervious area fraction = 1.000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      507.000 to Point/Station      508.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1858.000(Ft.)
Downstream point/station elevation =  1856.000(Ft.)
Pipe length  =    30.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     0.988(CFS)
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.988(CFS)
Normal flow depth in pipe =    3.64(In.)
Flow top width inside pipe =    5.86(In.)
Critical Depth =    5.66(In.)
Pipe flow velocity =      7.94(Ft/s)
Travel time through pipe =    0.06 min.
Time of concentration (TC) =     8.46 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      507.000 to Point/Station      508.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.650(Ac.)
Runoff from this stream =      0.988(CFS)
```

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Time of concentration =    8.46 min.
Rainfall intensity =     2.098(In/Hr)
Summary of stream data:

Stream   Flow rate      TC            Rainfall Intensity
 No.       (CFS)       (min)                 (In/Hr)


1       56.594     16.11               1.521
2        0.988      8.46               2.098
Largest stream flow has longer time of concentration
Qp =     56.594 + sum of
          Qb          Ia/Ib
           0.988 *    0.725 =      0.716
Qp =     57.310

Total of 2 main streams to confluence:
Flow rates before confluence point:
      56.594       0.988
Area of streams before confluence:
       43.190        0.650


Results of confluence:
Total flow rate =     57.310(CFS)
Time of concentration =    16.113 min.
Effective stream area after confluence  =     43.840(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      508.000 to Point/Station      509.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________
Upstream point/station elevation =  1856.000(Ft.)
Downstream point/station elevation =  1836.000(Ft.)
Pipe length  =   828.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    57.310(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    57.310(CFS)
Normal flow depth in pipe =   22.22(In.)
Flow top width inside pipe =   26.30(In.)
Critical Depth =   28.48(In.)
Pipe flow velocity =     14.69(Ft/s)
Travel time through pipe =    0.94 min.
Time of concentration (TC) =    17.05 min.
End of computations, total study area =           43.84 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged RI index number =  85.2
```

APPENDIX C: UNIT HYDROGRAPH ANALYSES – 2-YEAR, 24-HOUR STORM DURATION

APPENDIX C.1: AREA "A1" – PRE-PROJECT CONDITION

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 06/10/16 File: ARA1EXONSITE242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD PRE-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 2-YEAR, 24-HOUR STORM DURATION
ONSITE AREA "A1"
FILENAME: ARA1EXONSITE

Drainage Area = 25.15(Ac.) = 0.039 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 25.15(Ac.) = 0.039 Sq. Mi.
Length along longest watercourse = 2035.36(Ft.)
Length along longest watercourse measured to centroid = 415.18(Ft.)
Length along longest watercourse = 0.385 Mi.
Length along longest watercourse measured to centroid = 0.079 Mi.
Difference in elevation = 65.70(Ft.)
Slope along watercourse = 170.4347 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.072 Hr.
Lag time = 4.31 Min.
25% of lag time = 1.08 Min.
40% of lag time = 1.72 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
25.15	2.00	50.30

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
25.15	5.00	125.75

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.000(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 2.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
25.150	79.13	0.000

Total Area Entered = 25.15(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
79.1	62.0	0.449	0.000	0.449	1.000	0.449
					Sum (F) =	0.449

Area averaged mean soil loss (F) (In/Hr) = 0.449
Minimum soil loss rate ((In/Hr)) = 0.224
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	116.003	24.030	6.091
2	0.167	232.007	48.815	12.373
3	0.250	348.010	13.673	3.466
4	0.333	464.013	6.233	1.580
5	0.417	580.017	3.474	0.880
6	0.500	696.020	2.065	0.523
7	0.583	812.024	1.711	0.434
			Sum = 100.000	Sum= 25.346

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.016	(0.796)	0.014	0.002
2	0.17	0.07	0.016	(0.793)	0.014	0.002
3	0.25	0.07	0.016	(0.790)	0.014	0.002
4	0.33	0.10	0.024	(0.787)	0.022	0.002
5	0.42	0.10	0.024	(0.783)	0.022	0.002
6	0.50	0.10	0.024	(0.780)	0.022	0.002
7	0.58	0.10	0.024	(0.777)	0.022	0.002
8	0.67	0.10	0.024	(0.774)	0.022	0.002
9	0.75	0.10	0.024	(0.771)	0.022	0.002
10	0.83	0.13	0.032	(0.768)	0.029	0.003
11	0.92	0.13	0.032	(0.765)	0.029	0.003
12	1.00	0.13	0.032	(0.762)	0.029	0.003
13	1.08	0.10	0.024	(0.759)	0.022	0.002
14	1.17	0.10	0.024	(0.756)	0.022	0.002
15	1.25	0.10	0.024	(0.753)	0.022	0.002
16	1.33	0.10	0.024	(0.750)	0.022	0.002
17	1.42	0.10	0.024	(0.747)	0.022	0.002
18	1.50	0.10	0.024	(0.744)	0.022	0.002
19	1.58	0.10	0.024	(0.741)	0.022	0.002
20	1.67	0.10	0.024	(0.738)	0.022	0.002
21	1.75	0.10	0.024	(0.735)	0.022	0.002
22	1.83	0.13	0.032	(0.732)	0.029	0.003
23	1.92	0.13	0.032	(0.729)	0.029	0.003
24	2.00	0.13	0.032	(0.726)	0.029	0.003
25	2.08	0.13	0.032	(0.724)	0.029	0.003
26	2.17	0.13	0.032	(0.721)	0.029	0.003
27	2.25	0.13	0.032	(0.718)	0.029	0.003
28	2.33	0.13	0.032	(0.715)	0.029	0.003
29	2.42	0.13	0.032	(0.712)	0.029	0.003
30	2.50	0.13	0.032	(0.709)	0.029	0.003
31	2.58	0.17	0.040	(0.706)	0.036	0.004
32	2.67	0.17	0.040	(0.703)	0.036	0.004
33	2.75	0.17	0.040	(0.700)	0.036	0.004
34	2.83	0.17	0.040	(0.697)	0.036	0.004
35	2.92	0.17	0.040	(0.694)	0.036	0.004

36	3.00	0.17	0.040	(0.692)	0.036	0.004
37	3.08	0.17	0.040	(0.689)	0.036	0.004
38	3.17	0.17	0.040	(0.686)	0.036	0.004
39	3.25	0.17	0.040	(0.683)	0.036	0.004
40	3.33	0.17	0.040	(0.680)	0.036	0.004
41	3.42	0.17	0.040	(0.677)	0.036	0.004
42	3.50	0.17	0.040	(0.675)	0.036	0.004
43	3.58	0.17	0.040	(0.672)	0.036	0.004
44	3.67	0.17	0.040	(0.669)	0.036	0.004
45	3.75	0.17	0.040	(0.666)	0.036	0.004
46	3.83	0.20	0.048	(0.663)	0.043	0.005
47	3.92	0.20	0.048	(0.660)	0.043	0.005
48	4.00	0.20	0.048	(0.658)	0.043	0.005
49	4.08	0.20	0.048	(0.655)	0.043	0.005
50	4.17	0.20	0.048	(0.652)	0.043	0.005
51	4.25	0.20	0.048	(0.649)	0.043	0.005
52	4.33	0.23	0.056	(0.647)	0.050	0.006
53	4.42	0.23	0.056	(0.644)	0.050	0.006
54	4.50	0.23	0.056	(0.641)	0.050	0.006
55	4.58	0.23	0.056	(0.638)	0.050	0.006
56	4.67	0.23	0.056	(0.636)	0.050	0.006
57	4.75	0.23	0.056	(0.633)	0.050	0.006
58	4.83	0.27	0.064	(0.630)	0.058	0.006
59	4.92	0.27	0.064	(0.627)	0.058	0.006
60	5.00	0.27	0.064	(0.625)	0.058	0.006
61	5.08	0.20	0.048	(0.622)	0.043	0.005
62	5.17	0.20	0.048	(0.619)	0.043	0.005
63	5.25	0.20	0.048	(0.616)	0.043	0.005
64	5.33	0.23	0.056	(0.614)	0.050	0.006
65	5.42	0.23	0.056	(0.611)	0.050	0.006
66	5.50	0.23	0.056	(0.608)	0.050	0.006
67	5.58	0.27	0.064	(0.606)	0.058	0.006
68	5.67	0.27	0.064	(0.603)	0.058	0.006
69	5.75	0.27	0.064	(0.600)	0.058	0.006
70	5.83	0.27	0.064	(0.598)	0.058	0.006
71	5.92	0.27	0.064	(0.595)	0.058	0.006
72	6.00	0.27	0.064	(0.593)	0.058	0.006
73	6.08	0.30	0.072	(0.590)	0.065	0.007
74	6.17	0.30	0.072	(0.587)	0.065	0.007
75	6.25	0.30	0.072	(0.585)	0.065	0.007
76	6.33	0.30	0.072	(0.582)	0.065	0.007
77	6.42	0.30	0.072	(0.579)	0.065	0.007
78	6.50	0.30	0.072	(0.577)	0.065	0.007
79	6.58	0.33	0.080	(0.574)	0.072	0.008
80	6.67	0.33	0.080	(0.572)	0.072	0.008
81	6.75	0.33	0.080	(0.569)	0.072	0.008
82	6.83	0.33	0.080	(0.566)	0.072	0.008
83	6.92	0.33	0.080	(0.564)	0.072	0.008
84	7.00	0.33	0.080	(0.561)	0.072	0.008
85	7.08	0.33	0.080	(0.559)	0.072	0.008
86	7.17	0.33	0.080	(0.556)	0.072	0.008
87	7.25	0.33	0.080	(0.554)	0.072	0.008
88	7.33	0.37	0.088	(0.551)	0.079	0.009
89	7.42	0.37	0.088	(0.549)	0.079	0.009
90	7.50	0.37	0.088	(0.546)	0.079	0.009
91	7.58	0.40	0.096	(0.544)	0.086	0.010
92	7.67	0.40	0.096	(0.541)	0.086	0.010
93	7.75	0.40	0.096	(0.539)	0.086	0.010
94	7.83	0.43	0.104	(0.536)	0.094	0.010
95	7.92	0.43	0.104	(0.534)	0.094	0.010
96	8.00	0.43	0.104	(0.531)	0.094	0.010
97	8.08	0.50	0.120	(0.529)	0.108	0.012
98	8.17	0.50	0.120	(0.526)	0.108	0.012
99	8.25	0.50	0.120	(0.524)	0.108	0.012
100	8.33	0.50	0.120	(0.521)	0.108	0.012
101	8.42	0.50	0.120	(0.519)	0.108	0.012
102	8.50	0.50	0.120	(0.517)	0.108	0.012
103	8.58	0.53	0.128	(0.514)	0.115	0.013
104	8.67	0.53	0.128	(0.512)	0.115	0.013
105	8.75	0.53	0.128	(0.509)	0.115	0.013
106	8.83	0.57	0.136	(0.507)	0.122	0.014

107	8.92	0.57	0.136	(0.504)	0.122	0.014
108	9.00	0.57	0.136	(0.502)	0.122	0.014
109	9.08	0.63	0.152	(0.500)	0.137	0.015
110	9.17	0.63	0.152	(0.497)	0.137	0.015
111	9.25	0.63	0.152	(0.495)	0.137	0.015
112	9.33	0.67	0.160	(0.493)	0.144	0.016
113	9.42	0.67	0.160	(0.490)	0.144	0.016
114	9.50	0.67	0.160	(0.488)	0.144	0.016
115	9.58	0.70	0.168	(0.486)	0.151	0.017
116	9.67	0.70	0.168	(0.483)	0.151	0.017
117	9.75	0.70	0.168	(0.481)	0.151	0.017
118	9.83	0.73	0.176	(0.479)	0.158	0.018
119	9.92	0.73	0.176	(0.476)	0.158	0.018
120	10.00	0.73	0.176	(0.474)	0.158	0.018
121	10.08	0.50	0.120	(0.472)	0.108	0.012
122	10.17	0.50	0.120	(0.469)	0.108	0.012
123	10.25	0.50	0.120	(0.467)	0.108	0.012
124	10.33	0.50	0.120	(0.465)	0.108	0.012
125	10.42	0.50	0.120	(0.463)	0.108	0.012
126	10.50	0.50	0.120	(0.460)	0.108	0.012
127	10.58	0.67	0.160	(0.458)	0.144	0.016
128	10.67	0.67	0.160	(0.456)	0.144	0.016
129	10.75	0.67	0.160	(0.454)	0.144	0.016
130	10.83	0.67	0.160	(0.451)	0.144	0.016
131	10.92	0.67	0.160	(0.449)	0.144	0.016
132	11.00	0.67	0.160	(0.447)	0.144	0.016
133	11.08	0.63	0.152	(0.445)	0.137	0.015
134	11.17	0.63	0.152	(0.443)	0.137	0.015
135	11.25	0.63	0.152	(0.440)	0.137	0.015
136	11.33	0.63	0.152	(0.438)	0.137	0.015
137	11.42	0.63	0.152	(0.436)	0.137	0.015
138	11.50	0.63	0.152	(0.434)	0.137	0.015
139	11.58	0.57	0.136	(0.432)	0.122	0.014
140	11.67	0.57	0.136	(0.430)	0.122	0.014
141	11.75	0.57	0.136	(0.427)	0.122	0.014
142	11.83	0.60	0.144	(0.425)	0.130	0.014
143	11.92	0.60	0.144	(0.423)	0.130	0.014
144	12.00	0.60	0.144	(0.421)	0.130	0.014
145	12.08	0.83	0.200	(0.419)	0.180	0.020
146	12.17	0.83	0.200	(0.417)	0.180	0.020
147	12.25	0.83	0.200	(0.415)	0.180	0.020
148	12.33	0.87	0.208	(0.413)	0.187	0.021
149	12.42	0.87	0.208	(0.411)	0.187	0.021
150	12.50	0.87	0.208	(0.409)	0.187	0.021
151	12.58	0.93	0.224	(0.407)	0.202	0.022
152	12.67	0.93	0.224	(0.405)	0.202	0.022
153	12.75	0.93	0.224	(0.402)	0.202	0.022
154	12.83	0.97	0.232	(0.400)	0.209	0.023
155	12.92	0.97	0.232	(0.398)	0.209	0.023
156	13.00	0.97	0.232	(0.396)	0.209	0.023
157	13.08	1.13	0.272	(0.394)	0.245	0.027
158	13.17	1.13	0.272	(0.392)	0.245	0.027
159	13.25	1.13	0.272	(0.390)	0.245	0.027
160	13.33	1.13	0.272	(0.388)	0.245	0.027
161	13.42	1.13	0.272	(0.386)	0.245	0.027
162	13.50	1.13	0.272	(0.384)	0.245	0.027
163	13.58	0.77	0.184	(0.383)	0.166	0.018
164	13.67	0.77	0.184	(0.381)	0.166	0.018
165	13.75	0.77	0.184	(0.379)	0.166	0.018
166	13.83	0.77	0.184	(0.377)	0.166	0.018
167	13.92	0.77	0.184	(0.375)	0.166	0.018
168	14.00	0.77	0.184	(0.373)	0.166	0.018
169	14.08	0.90	0.216	(0.371)	0.194	0.022
170	14.17	0.90	0.216	(0.369)	0.194	0.022
171	14.25	0.90	0.216	(0.367)	0.194	0.022
172	14.33	0.87	0.208	(0.365)	0.187	0.021
173	14.42	0.87	0.208	(0.363)	0.187	0.021
174	14.50	0.87	0.208	(0.362)	0.187	0.021
175	14.58	0.87	0.208	(0.360)	0.187	0.021
176	14.67	0.87	0.208	(0.358)	0.187	0.021
177	14.75	0.87	0.208	(0.356)	0.187	0.021

178	14.83	0.83	0.200	(0.354)	0.180	0.020
179	14.92	0.83	0.200	(0.352)	0.180	0.020
180	15.00	0.83	0.200	(0.351)	0.180	0.020
181	15.08	0.80	0.192	(0.349)	0.173	0.019
182	15.17	0.80	0.192	(0.347)	0.173	0.019
183	15.25	0.80	0.192	(0.345)	0.173	0.019
184	15.33	0.77	0.184	(0.343)	0.166	0.018
185	15.42	0.77	0.184	(0.342)	0.166	0.018
186	15.50	0.77	0.184	(0.340)	0.166	0.018
187	15.58	0.63	0.152	(0.338)	0.137	0.015
188	15.67	0.63	0.152	(0.336)	0.137	0.015
189	15.75	0.63	0.152	(0.335)	0.137	0.015
190	15.83	0.63	0.152	(0.333)	0.137	0.015
191	15.92	0.63	0.152	(0.331)	0.137	0.015
192	16.00	0.63	0.152	(0.330)	0.137	0.015
193	16.08	0.13	0.032	(0.328)	0.029	0.003
194	16.17	0.13	0.032	(0.326)	0.029	0.003
195	16.25	0.13	0.032	(0.325)	0.029	0.003
196	16.33	0.13	0.032	(0.323)	0.029	0.003
197	16.42	0.13	0.032	(0.321)	0.029	0.003
198	16.50	0.13	0.032	(0.320)	0.029	0.003
199	16.58	0.10	0.024	(0.318)	0.022	0.002
200	16.67	0.10	0.024	(0.316)	0.022	0.002
201	16.75	0.10	0.024	(0.315)	0.022	0.002
202	16.83	0.10	0.024	(0.313)	0.022	0.002
203	16.92	0.10	0.024	(0.312)	0.022	0.002
204	17.00	0.10	0.024	(0.310)	0.022	0.002
205	17.08	0.17	0.040	(0.308)	0.036	0.004
206	17.17	0.17	0.040	(0.307)	0.036	0.004
207	17.25	0.17	0.040	(0.305)	0.036	0.004
208	17.33	0.17	0.040	(0.304)	0.036	0.004
209	17.42	0.17	0.040	(0.302)	0.036	0.004
210	17.50	0.17	0.040	(0.301)	0.036	0.004
211	17.58	0.17	0.040	(0.299)	0.036	0.004
212	17.67	0.17	0.040	(0.298)	0.036	0.004
213	17.75	0.17	0.040	(0.296)	0.036	0.004
214	17.83	0.13	0.032	(0.295)	0.029	0.003
215	17.92	0.13	0.032	(0.293)	0.029	0.003
216	18.00	0.13	0.032	(0.292)	0.029	0.003
217	18.08	0.13	0.032	(0.291)	0.029	0.003
218	18.17	0.13	0.032	(0.289)	0.029	0.003
219	18.25	0.13	0.032	(0.288)	0.029	0.003
220	18.33	0.13	0.032	(0.286)	0.029	0.003
221	18.42	0.13	0.032	(0.285)	0.029	0.003
222	18.50	0.13	0.032	(0.284)	0.029	0.003
223	18.58	0.10	0.024	(0.282)	0.022	0.002
224	18.67	0.10	0.024	(0.281)	0.022	0.002
225	18.75	0.10	0.024	(0.279)	0.022	0.002
226	18.83	0.07	0.016	(0.278)	0.014	0.002
227	18.92	0.07	0.016	(0.277)	0.014	0.002
228	19.00	0.07	0.016	(0.275)	0.014	0.002
229	19.08	0.10	0.024	(0.274)	0.022	0.002
230	19.17	0.10	0.024	(0.273)	0.022	0.002
231	19.25	0.10	0.024	(0.272)	0.022	0.002
232	19.33	0.13	0.032	(0.270)	0.029	0.003
233	19.42	0.13	0.032	(0.269)	0.029	0.003
234	19.50	0.13	0.032	(0.268)	0.029	0.003
235	19.58	0.10	0.024	(0.267)	0.022	0.002
236	19.67	0.10	0.024	(0.265)	0.022	0.002
237	19.75	0.10	0.024	(0.264)	0.022	0.002
238	19.83	0.07	0.016	(0.263)	0.014	0.002
239	19.92	0.07	0.016	(0.262)	0.014	0.002
240	20.00	0.07	0.016	(0.261)	0.014	0.002
241	20.08	0.10	0.024	(0.260)	0.022	0.002
242	20.17	0.10	0.024	(0.258)	0.022	0.002
243	20.25	0.10	0.024	(0.257)	0.022	0.002
244	20.33	0.10	0.024	(0.256)	0.022	0.002
245	20.42	0.10	0.024	(0.255)	0.022	0.002
246	20.50	0.10	0.024	(0.254)	0.022	0.002
247	20.58	0.10	0.024	(0.253)	0.022	0.002
248	20.67	0.10	0.024	(0.252)	0.022	0.002

249	20.75	0.10	0.024	(0.251)	0.022	0.002
250	20.83	0.07	0.016	(0.250)	0.014	0.002
251	20.92	0.07	0.016	(0.249)	0.014	0.002
252	21.00	0.07	0.016	(0.248)	0.014	0.002
253	21.08	0.10	0.024	(0.247)	0.022	0.002
254	21.17	0.10	0.024	(0.246)	0.022	0.002
255	21.25	0.10	0.024	(0.245)	0.022	0.002
256	21.33	0.07	0.016	(0.244)	0.014	0.002
257	21.42	0.07	0.016	(0.243)	0.014	0.002
258	21.50	0.07	0.016	(0.242)	0.014	0.002
259	21.58	0.10	0.024	(0.241)	0.022	0.002
260	21.67	0.10	0.024	(0.240)	0.022	0.002
261	21.75	0.10	0.024	(0.239)	0.022	0.002
262	21.83	0.07	0.016	(0.239)	0.014	0.002
263	21.92	0.07	0.016	(0.238)	0.014	0.002
264	22.00	0.07	0.016	(0.237)	0.014	0.002
265	22.08	0.10	0.024	(0.236)	0.022	0.002
266	22.17	0.10	0.024	(0.235)	0.022	0.002
267	22.25	0.10	0.024	(0.235)	0.022	0.002
268	22.33	0.07	0.016	(0.234)	0.014	0.002
269	22.42	0.07	0.016	(0.233)	0.014	0.002
270	22.50	0.07	0.016	(0.233)	0.014	0.002
271	22.58	0.07	0.016	(0.232)	0.014	0.002
272	22.67	0.07	0.016	(0.231)	0.014	0.002
273	22.75	0.07	0.016	(0.231)	0.014	0.002
274	22.83	0.07	0.016	(0.230)	0.014	0.002
275	22.92	0.07	0.016	(0.229)	0.014	0.002
276	23.00	0.07	0.016	(0.229)	0.014	0.002
277	23.08	0.07	0.016	(0.228)	0.014	0.002
278	23.17	0.07	0.016	(0.228)	0.014	0.002
279	23.25	0.07	0.016	(0.227)	0.014	0.002
280	23.33	0.07	0.016	(0.227)	0.014	0.002
281	23.42	0.07	0.016	(0.226)	0.014	0.002
282	23.50	0.07	0.016	(0.226)	0.014	0.002
283	23.58	0.07	0.016	(0.226)	0.014	0.002
284	23.67	0.07	0.016	(0.225)	0.014	0.002
285	23.75	0.07	0.016	(0.225)	0.014	0.002
286	23.83	0.07	0.016	(0.225)	0.014	0.002
287	23.92	0.07	0.016	(0.225)	0.014	0.002
288	24.00	0.07	0.016	(0.224)	0.014	0.002

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              (Loss Rate Not Used)
   Sum =    100.0                                  Sum =     2.4
      Flood volume = Effective rainfall      0.20(In)
       times area      25.1(Ac.)/[(In)/(Ft.)] =       0.4(Ac.Ft)
      Total soil loss =      1.80(In)
      Total soil loss =     3.772(Ac.Ft)
      Total rainfall =      2.00(In)
      Flood volume =      18258.0 Cubic Feet
      Total soil loss =      164322.0 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.688(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in  5  Minute intervals ((CFS))
      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0       2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
   0+ 5      0.0001      0.01  Q         |         |         |         |
   0+10      0.0003      0.03  Q         |         |         |         |
   0+15      0.0005      0.04  Q         |         |         |         |
   0+20      0.0008      0.04  Q         |         |         |         |
   0+25      0.0012      0.05  Q         |         |         |         |
   0+30      0.0016      0.06  Q         |         |         |         |
   0+35      0.0020      0.06  Q         |         |         |         |
   0+40      0.0024      0.06  Q         |         |         |         |
   0+45      0.0028      0.06  Q         |         |         |         |
   0+50      0.0033      0.07  Q         |         |         |         |
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0+55    0.0038    0.08  Q         |         |         |         |
1+ 0    0.0043    0.08  Q         |         |         |         |
1+ 5    0.0048    0.07  Q         |         |         |         |
1+10    0.0053    0.07  Q         |         |         |         |
1+15    0.0057    0.06  Q         |         |         |         |
1+20    0.0062    0.06  Q         |         |         |         |
1+25    0.0066    0.06  Q         |         |         |         |
1+30    0.0070    0.06  Q         |         |         |         |
1+35    0.0074    0.06  Q         |         |         |         |
1+40    0.0078    0.06  Q         |         |         |         |
1+45    0.0083    0.06  Q         |         |         |         |
1+50    0.0087    0.07  Q         |         |         |         |
1+55    0.0092    0.08  Q         |         |         |         |
2+ 0    0.0098    0.08  Q         |         |         |         |
2+ 5    0.0103    0.08  Q         |         |         |         |
2+10    0.0109    0.08  QV        |         |         |         |
2+15    0.0114    0.08  QV        |         |         |         |
2+20    0.0120    0.08  QV        |         |         |         |
2+25    0.0126    0.08  QV        |         |         |         |
2+30    0.0131    0.08  QV        |         |         |         |
2+35    0.0137    0.09  QV        |         |         |         |
2+40    0.0144    0.10  QV        |         |         |         |
2+45    0.0150    0.10  QV        |         |         |         |
2+50    0.0157    0.10  QV        |         |         |         |
2+55    0.0164    0.10  QV        |         |         |         |
3+ 0    0.0171    0.10  QV        |         |         |         |
3+ 5    0.0178    0.10  QV        |         |         |         |
3+10    0.0185    0.10  QV        |         |         |         |
3+15    0.0192    0.10  QV        |         |         |         |
3+20    0.0199    0.10  QV        |         |         |         |
3+25    0.0206    0.10  QV        |         |         |         |
3+30    0.0213    0.10  Q V       |         |         |         |
3+35    0.0220    0.10  Q V       |         |         |         |
3+40    0.0227    0.10  Q V       |         |         |         |
3+45    0.0234    0.10  Q V       |         |         |         |
3+50    0.0241    0.11  Q V       |         |         |         |
3+55    0.0249    0.12  Q V       |         |         |         |
4+ 0    0.0258    0.12  Q V       |         |         |         |
4+ 5    0.0266    0.12  Q V       |         |         |         |
4+10    0.0274    0.12  Q V       |         |         |         |
4+15    0.0283    0.12  Q V       |         |         |         |
4+20    0.0291    0.13  Q V       |         |         |         |
4+25    0.0301    0.14  Q V       |         |         |         |
4+30    0.0310    0.14  Q V       |         |         |         |
4+35    0.0320    0.14  Q  V      |         |         |         |
4+40    0.0330    0.14  Q  V      |         |         |         |
4+45    0.0339    0.14  Q  V      |         |         |         |
4+50    0.0350    0.15  Q  V      |         |         |         |
4+55    0.0360    0.16  Q  V      |         |         |         |
5+ 0    0.0371    0.16  Q  V      |         |         |         |
5+ 5    0.0382    0.15  Q  V      |         |         |         |
5+10    0.0391    0.13  Q  V      |         |         |         |
5+15    0.0400    0.13  Q  V      |         |         |         |
5+20    0.0408    0.13  Q  V      |         |         |         |
5+25    0.0418    0.14  Q  V      |         |         |         |
5+30    0.0428    0.14  Q   V     |         |         |         |
5+35    0.0438    0.15  Q   V     |         |         |         |
5+40    0.0448    0.16  Q   V     |         |         |         |
5+45    0.0459    0.16  Q   V     |         |         |         |
5+50    0.0470    0.16  Q   V     |         |         |         |
5+55    0.0482    0.16  Q   V     |         |         |         |
6+ 0    0.0493    0.16  Q   V     |         |         |         |
6+ 5    0.0504    0.17  Q   V     |         |         |         |
6+10    0.0516    0.18  Q   V     |         |         |         |
6+15    0.0529    0.18  Q    V    |         |         |         |
6+20    0.0541    0.18  Q    V    |         |         |         |
6+25    0.0554    0.18  Q    V    |         |         |         |
6+30    0.0566    0.18  Q    V    |         |         |         |
6+35    0.0579    0.19  Q    V    |         |         |         |
6+40    0.0593    0.20  Q    V    |         |         |         |
6+45    0.0607    0.20  Q    V    |         |         |         |
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6+50    0.0621    0.20  Q    V    |         |         |         |
6+55    0.0634    0.20  Q     V   |         |         |         |
7+ 0    0.0648    0.20  Q     V   |         |         |         |
7+ 5    0.0662    0.20  Q     V   |         |         |         |
7+10    0.0676    0.20  Q     V   |         |         |         |
7+15    0.0690    0.20  Q     V   |         |         |         |
7+20    0.0705    0.21  Q     V   |         |         |         |
7+25    0.0720    0.22  Q     V   |         |         |         |
7+30    0.0735    0.22  Q      V  |         |         |         |
7+35    0.0750    0.23  Q      V  |         |         |         |
7+40    0.0767    0.24  Q      V  |         |         |         |
7+45    0.0783    0.24  Q      V  |         |         |         |
7+50    0.0800    0.25  Q      V  |         |         |         |
7+55    0.0818    0.26  |Q     V  |         |         |         |
8+ 0    0.0836    0.26  |Q     V  |         |         |         |
8+ 5    0.0855    0.27  |Q      V |         |         |         |
8+10    0.0875    0.29  |Q      V |         |         |         |
8+15    0.0895    0.30  |Q      V |         |         |         |
8+20    0.0916    0.30  |Q      V |         |         |         |
8+25    0.0937    0.30  |Q      V |         |         |         |
8+30    0.0958    0.30  |Q       V|         |         |         |
8+35    0.0979    0.31  |Q       V|         |         |         |
8+40    0.1001    0.32  |Q       V|         |         |         |
8+45    0.1023    0.32  |Q       V|         |         |         |
8+50    0.1046    0.33  |Q       V|         |         |         |
8+55    0.1069    0.34  |Q        V         |         |         |
9+ 0    0.1093    0.34  |Q        V         |         |         |
9+ 5    0.1117    0.35  |Q        V         |         |         |
9+10    0.1143    0.37  |Q        V         |         |         |
9+15    0.1169    0.38  |Q        |V        |         |         |
9+20    0.1196    0.39  |Q        |V        |         |         |
9+25    0.1223    0.40  |Q        |V        |         |         |
9+30    0.1251    0.40  |Q        |V        |         |         |
9+35    0.1279    0.41  |Q        | V       |         |         |
9+40    0.1308    0.42  |Q        | V       |         |         |
9+45    0.1337    0.42  |Q        | V       |         |         |
9+50    0.1367    0.43  |Q        |  V      |         |         |
9+55    0.1397    0.44  |Q        |  V      |         |         |
10+ 0   0.1427    0.44  |Q        |  V      |         |         |
10+ 5   0.1456    0.41  |Q        |  V      |         |         |
10+10   0.1479    0.34  |Q        |   V     |         |         |
10+15   0.1502    0.32  |Q        |   V     |         |         |
10+20   0.1523    0.31  |Q        |   V     |         |         |
10+25   0.1545    0.31  |Q        |   V     |         |         |
10+30   0.1566    0.31  |Q        |   V     |         |         |
10+35   0.1588    0.33  |Q        |    V    |         |         |
10+40   0.1614    0.38  |Q        |    V    |         |         |
10+45   0.1641    0.39  |Q        |    V    |         |         |
10+50   0.1669    0.40  |Q        |    V    |         |         |
10+55   0.1696    0.40  |Q        |     V   |         |         |
11+ 0   0.1724    0.40  |Q        |     V   |         |         |
11+ 5   0.1752    0.40  |Q        |     V   |         |         |
11+10   0.1779    0.39  |Q        |     V   |         |         |
11+15   0.1806    0.39  |Q        |      V  |         |         |
11+20   0.1832    0.39  |Q        |      V  |         |         |
11+25   0.1859    0.39  |Q        |      V  |         |         |
11+30   0.1885    0.39  |Q        |      V  |         |         |
11+35   0.1911    0.38  |Q        |       V |         |         |
11+40   0.1936    0.36  |Q        |       V |         |         |
11+45   0.1960    0.35  |Q        |       V |         |         |
11+50   0.1984    0.35  |Q        |       V |         |         |
11+55   0.2009    0.36  |Q        |        V|         |         |
12+ 0   0.2034    0.36  |Q        |        V|         |         |
12+ 5   0.2061    0.40  |Q        |        V|         |         |
12+10   0.2094    0.47  |Q        |        V|         |         |
12+15   0.2127    0.49  |Q        |         V         |         |
12+20   0.2162    0.50  | Q       |         V         |         |
12+25   0.2197    0.52  | Q       |         V         |         |
12+30   0.2233    0.52  | Q       |         |V        |         |
12+35   0.2270    0.54  | Q       |         |V        |         |
12+40   0.2309    0.56  | Q       |         | V       |         |
```

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12+45       0.2347      0.56  | Q       |         | V       |         |
12+50       0.2387      0.57  | Q       |         | V       |         |
12+55       0.2427      0.58  | Q       |         |  V      |         |
13+ 0       0.2467      0.58  | Q       |         |  V      |         |
13+ 5       0.2509      0.61  | Q       |         |  V      |         |
13+10       0.2554      0.66  | Q       |         |   V     |         |
13+15       0.2601      0.68  | Q       |         |   V     |         |
13+20       0.2648      0.68  | Q       |         |    V    |         |
13+25       0.2695      0.69  | Q       |         |    V    |         |
13+30       0.2743      0.69  | Q       |         |     V   |         |
13+35       0.2786      0.64  | Q       |         |     V   |         |
13+40       0.2823      0.53  | Q       |         |     V   |         |
13+45       0.2857      0.50  |Q        |         |      V  |         |
13+50       0.2890      0.48  |Q        |         |      V  |         |
13+55       0.2923      0.48  |Q        |         |      V  |         |
14+ 0       0.2955      0.47  |Q        |         |       V |         |
14+ 5       0.2989      0.49  |Q        |         |       V |         |
14+10       0.3025      0.53  | Q       |         |       V |         |
14+15       0.3062      0.54  | Q       |         |        V|         |
14+20       0.3099      0.54  | Q       |         |        V|         |
14+25       0.3135      0.53  | Q       |         |        V|         |
14+30       0.3172      0.53  | Q       |         |         V         |
14+35       0.3208      0.53  | Q       |         |         V         |
14+40       0.3245      0.53  | Q       |         |         V         |
14+45       0.3281      0.53  | Q       |         |         |V        |
14+50       0.3317      0.52  | Q       |         |         |V        |
14+55       0.3352      0.51  | Q       |         |         |V        |
15+ 0       0.3387      0.51  | Q       |         |         | V       |
15+ 5       0.3422      0.50  | Q       |         |         | V       |
15+10       0.3456      0.49  |Q        |         |         | V       |
15+15       0.3490      0.49  |Q        |         |         |  V      |
15+20       0.3523      0.48  |Q        |         |         |  V      |
15+25       0.3556      0.47  |Q        |         |         |  V      |
15+30       0.3588      0.47  |Q        |         |         |   V     |
15+35       0.3619      0.45  |Q        |         |         |   V     |
15+40       0.3647      0.41  |Q        |         |         |   V     |
15+45       0.3674      0.40  |Q        |         |         |    V    |
15+50       0.3701      0.39  |Q        |         |         |    V    |
15+55       0.3728      0.39  |Q        |         |         |    V    |
16+ 0       0.3755      0.39  |Q        |         |         |    V    |
16+ 5       0.3776      0.31  |Q        |         |         |     V   |
16+10       0.3788      0.16  Q         |         |         |     V   |
16+15       0.3796      0.12  Q         |         |         |     V   |
16+20       0.3803      0.10  Q         |         |         |     V   |
16+25       0.3809      0.09  Q         |         |         |     V   |
16+30       0.3815      0.09  Q         |         |         |     V   |
16+35       0.3821      0.08  Q         |         |         |     V   |
16+40       0.3825      0.07  Q         |         |         |     V   |
16+45       0.3830      0.06  Q         |         |         |     V   |
16+50       0.3834      0.06  Q         |         |         |     V   |
16+55       0.3838      0.06  Q         |         |         |     V   |
17+ 0       0.3842      0.06  Q         |         |         |     V   |
17+ 5       0.3847      0.07  Q         |         |         |     V   |
17+10       0.3853      0.09  Q         |         |         |     V   |
17+15       0.3860      0.10  Q         |         |         |     V   |
17+20       0.3867      0.10  Q         |         |         |     V   |
17+25       0.3874      0.10  Q         |         |         |     V   |
17+30       0.3881      0.10  Q         |         |         |      V  |
17+35       0.3888      0.10  Q         |         |         |      V  |
17+40       0.3895      0.10  Q         |         |         |      V  |
17+45       0.3902      0.10  Q         |         |         |      V  |
17+50       0.3908      0.10  Q         |         |         |      V  |
17+55       0.3914      0.09  Q         |         |         |      V  |
18+ 0       0.3920      0.08  Q         |         |         |      V  |
18+ 5       0.3926      0.08  Q         |         |         |      V  |
18+10       0.3931      0.08  Q         |         |         |      V  |
18+15       0.3937      0.08  Q         |         |         |      V  |
18+20       0.3943      0.08  Q         |         |         |      V  |
18+25       0.3948      0.08  Q         |         |         |      V  |
18+30       0.3954      0.08  Q         |         |         |      V  |
18+35       0.3959      0.08  Q         |         |         |      V  |
```



```
18+40       0.3964      0.07  Q         |         |         |      V  |
18+45       0.3968      0.06  Q         |         |         |      V  |
18+50       0.3972      0.06  Q         |         |         |      V  |
18+55       0.3975      0.05  Q         |         |         |      V  |
19+ 0       0.3978      0.04  Q         |         |         |      V  |
19+ 5       0.3981      0.05  Q         |         |         |      V  |
19+10       0.3985      0.06  Q         |         |         |       V |
19+15       0.3989      0.06  Q         |         |         |       V |
19+20       0.3994      0.06  Q         |         |         |       V |
19+25       0.3999      0.07  Q         |         |         |       V |
19+30       0.4004      0.08  Q         |         |         |       V |
19+35       0.4009      0.07  Q         |         |         |       V |
19+40       0.4014      0.07  Q         |         |         |       V |
19+45       0.4018      0.06  Q         |         |         |       V |
19+50       0.4022      0.06  Q         |         |         |       V |
19+55       0.4025      0.05  Q         |         |         |       V |
20+ 0       0.4028      0.04  Q         |         |         |       V |
20+ 5       0.4032      0.05  Q         |         |         |       V |
20+10       0.4035      0.06  Q         |         |         |       V |
20+15       0.4040      0.06  Q         |         |         |       V |
20+20       0.4044      0.06  Q         |         |         |       V |
20+25       0.4048      0.06  Q         |         |         |       V |
20+30       0.4052      0.06  Q         |         |         |       V |
20+35       0.4056      0.06  Q         |         |         |       V |
20+40       0.4060      0.06  Q         |         |         |       V |
20+45       0.4064      0.06  Q         |         |         |       V |
20+50       0.4068      0.06  Q         |         |         |       V |
20+55       0.4072      0.05  Q         |         |         |       V |
21+ 0       0.4074      0.04  Q         |         |         |       V |
21+ 5       0.4078      0.05  Q         |         |         |       V |
21+10       0.4082      0.06  Q         |         |         |       V |
21+15       0.4086      0.06  Q         |         |         |       V |
21+20       0.4089      0.05  Q         |         |         |        V|
21+25       0.4092      0.05  Q         |         |         |        V|
21+30       0.4095      0.04  Q         |         |         |        V|
21+35       0.4099      0.05  Q         |         |         |        V|
21+40       0.4103      0.06  Q         |         |         |        V|
21+45       0.4107      0.06  Q         |         |         |        V|
21+50       0.4110      0.05  Q         |         |         |        V|
21+55       0.4113      0.05  Q         |         |         |        V|
22+ 0       0.4116      0.04  Q         |         |         |        V|
22+ 5       0.4120      0.05  Q         |         |         |        V|
22+10       0.4124      0.06  Q         |         |         |        V|
22+15       0.4128      0.06  Q         |         |         |        V|
22+20       0.4131      0.05  Q         |         |         |        V|
22+25       0.4134      0.05  Q         |         |         |        V|
22+30       0.4137      0.04  Q         |         |         |        V|
22+35       0.4140      0.04  Q         |         |         |        V|
22+40       0.4143      0.04  Q         |         |         |        V|
22+45       0.4146      0.04  Q         |         |         |        V|
22+50       0.4149      0.04  Q         |         |         |        V|
22+55       0.4152      0.04  Q         |         |         |        V|
23+ 0       0.4154      0.04  Q         |         |         |        V|
23+ 5       0.4157      0.04  Q         |         |         |        V|
23+10       0.4160      0.04  Q         |         |         |        V|
23+15       0.4163      0.04  Q         |         |         |        V|
23+20       0.4165      0.04  Q         |         |         |        V|
23+25       0.4168      0.04  Q         |         |         |        V|
23+30       0.4171      0.04  Q         |         |         |        V|
23+35       0.4174      0.04  Q         |         |         |        V|
23+40       0.4177      0.04  Q         |         |         |        V|
23+45       0.4179      0.04  Q         |         |         |        V|
23+50       0.4182      0.04  Q         |         |         |        V|
23+55       0.4185      0.04  Q         |         |         |        V|
24+ 0       0.4188      0.04  Q         |         |         |        V|
24+ 5       0.4190      0.03  Q         |         |         |        V|
24+10       0.4191      0.01  Q         |         |         |        V|
24+15       0.4191      0.01  Q         |         |         |        V|
24+20       0.4191      0.00  Q         |         |         |        V|
24+25       0.4191      0.00  Q         |         |         |        V|
24+30       0.4191      0.00  Q         |         |         |         V
```

APPENDIX C.2: AREA "A1" – POST-PROJECT CONDITION

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
             Study date  06/10/16 File: ARA1ONSITE242.out

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6279

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format




---------------------------------------------------------------------
IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 2-YEAR, 24-HOUR STORM DURATION
ONSITE AREA "A1"
FILENAME: ARA1ONSITE
--------------------------------------------------------------------
Drainage Area =      25.15(Ac.)  =      0.039 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      25.15(Ac.)  =      0.039 Sq. Mi.
Length along longest watercourse =    2035.36(Ft.)
Length along longest watercourse measured to centroid =     415.18(Ft.)
Length along longest watercourse =      0.385 Mi.
Length along longest watercourse measured to centroid =      0.079 Mi.
Difference in elevation =      65.70(Ft.)
Slope along watercourse =    170.4347 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.036 Hr.
Lag time =     2.16 Min.
25% of lag time =     0.54 Min.
40% of lag time =     0.86 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       25.15           2.00                 50.30

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       25.15           5.00                125.75

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.000(In)
Area Averaged 100-Year Rainfall =    5.000(In)

Point rain (area averaged) =    2.000(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    2.000(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    25.150           61.70         0.500
 Total Area Entered =     25.15(Ac.)
```



```
RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
61.7  41.7      0.653     0.500       0.359      1.000      0.359
                                                 Sum (F) =   0.359
Area averaged mean soil loss (F) (In/Hr) =  0.359
Minimum soil loss rate ((In/Hr)) =  0.180
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.500
--------------------------------------------------------------------

               U n i t   H y d r o g r a p h
                       VALLEY S-Curve
-------------------------------------------------------------------
               Unit Hydrograph Data
--------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                             Graph %           (CFS)
--------------------------------------------------------------------
    1  0.083        232.007         48.437              12.277
    2  0.167        464.013         41.197              10.442
    3  0.250        696.020          7.623               1.932
    4  0.333        928.027          2.743               0.695
                                 Sum = 100.000   Sum=      25.346
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)          Max   |   Low       (In/Hr)
   1  0.08     0.07      0.016       (  0.637)      0.008        0.008
   2  0.17     0.07      0.016       (  0.635)      0.008        0.008
   3  0.25     0.07      0.016       (  0.632)      0.008        0.008
   4  0.33     0.10      0.024       (  0.630)      0.012        0.012
   5  0.42     0.10      0.024       (  0.627)      0.012        0.012
   6  0.50     0.10      0.024       (  0.625)      0.012        0.012
   7  0.58     0.10      0.024       (  0.622)      0.012        0.012
   8  0.67     0.10      0.024       (  0.620)      0.012        0.012
   9  0.75     0.10      0.024       (  0.617)      0.012        0.012
  10  0.83     0.13      0.032       (  0.615)      0.016        0.016
  11  0.92     0.13      0.032       (  0.613)      0.016        0.016
  12  1.00     0.13      0.032       (  0.610)      0.016        0.016
  13  1.08     0.10      0.024       (  0.608)      0.012        0.012
  14  1.17     0.10      0.024       (  0.605)      0.012        0.012
  15  1.25     0.10      0.024       (  0.603)      0.012        0.012
  16  1.33     0.10      0.024       (  0.601)      0.012        0.012
  17  1.42     0.10      0.024       (  0.598)      0.012        0.012
  18  1.50     0.10      0.024       (  0.596)      0.012        0.012
  19  1.58     0.10      0.024       (  0.593)      0.012        0.012
  20  1.67     0.10      0.024       (  0.591)      0.012        0.012
  21  1.75     0.10      0.024       (  0.589)      0.012        0.012
  22  1.83     0.13      0.032       (  0.586)      0.016        0.016
  23  1.92     0.13      0.032       (  0.584)      0.016        0.016
  24  2.00     0.13      0.032       (  0.582)      0.016        0.016
  25  2.08     0.13      0.032       (  0.579)      0.016        0.016
  26  2.17     0.13      0.032       (  0.577)      0.016        0.016
  27  2.25     0.13      0.032       (  0.575)      0.016        0.016
  28  2.33     0.13      0.032       (  0.572)      0.016        0.016
  29  2.42     0.13      0.032       (  0.570)      0.016        0.016
  30  2.50     0.13      0.032       (  0.568)      0.016        0.016
  31  2.58     0.17      0.040       (  0.565)      0.020        0.020
  32  2.67     0.17      0.040       (  0.563)      0.020        0.020
  33  2.75     0.17      0.040       (  0.561)      0.020        0.020
  34  2.83     0.17      0.040       (  0.558)      0.020        0.020
  35  2.92     0.17      0.040       (  0.556)      0.020        0.020
  36  3.00     0.17      0.040       (  0.554)      0.020        0.020
  37  3.08     0.17      0.040       (  0.551)      0.020        0.020
  38  3.17     0.17      0.040       (  0.549)      0.020        0.020
```

39	3.25	0.17	0.040	(0.547)	0.020	0.020
40	3.33	0.17	0.040	(0.545)	0.020	0.020
41	3.42	0.17	0.040	(0.542)	0.020	0.020
42	3.50	0.17	0.040	(0.540)	0.020	0.020
43	3.58	0.17	0.040	(0.538)	0.020	0.020
44	3.67	0.17	0.040	(0.535)	0.020	0.020
45	3.75	0.17	0.040	(0.533)	0.020	0.020
46	3.83	0.20	0.048	(0.531)	0.024	0.024
47	3.92	0.20	0.048	(0.529)	0.024	0.024
48	4.00	0.20	0.048	(0.526)	0.024	0.024
49	4.08	0.20	0.048	(0.524)	0.024	0.024
50	4.17	0.20	0.048	(0.522)	0.024	0.024
51	4.25	0.20	0.048	(0.520)	0.024	0.024
52	4.33	0.23	0.056	(0.518)	0.028	0.028
53	4.42	0.23	0.056	(0.515)	0.028	0.028
54	4.50	0.23	0.056	(0.513)	0.028	0.028
55	4.58	0.23	0.056	(0.511)	0.028	0.028
56	4.67	0.23	0.056	(0.509)	0.028	0.028
57	4.75	0.23	0.056	(0.507)	0.028	0.028
58	4.83	0.27	0.064	(0.504)	0.032	0.032
59	4.92	0.27	0.064	(0.502)	0.032	0.032
60	5.00	0.27	0.064	(0.500)	0.032	0.032
61	5.08	0.20	0.048	(0.498)	0.024	0.024
62	5.17	0.20	0.048	(0.496)	0.024	0.024
63	5.25	0.20	0.048	(0.494)	0.024	0.024
64	5.33	0.23	0.056	(0.491)	0.028	0.028
65	5.42	0.23	0.056	(0.489)	0.028	0.028
66	5.50	0.23	0.056	(0.487)	0.028	0.028
67	5.58	0.27	0.064	(0.485)	0.032	0.032
68	5.67	0.27	0.064	(0.483)	0.032	0.032
69	5.75	0.27	0.064	(0.481)	0.032	0.032
70	5.83	0.27	0.064	(0.479)	0.032	0.032
71	5.92	0.27	0.064	(0.476)	0.032	0.032
72	6.00	0.27	0.064	(0.474)	0.032	0.032
73	6.08	0.30	0.072	(0.472)	0.036	0.036
74	6.17	0.30	0.072	(0.470)	0.036	0.036
75	6.25	0.30	0.072	(0.468)	0.036	0.036
76	6.33	0.30	0.072	(0.466)	0.036	0.036
77	6.42	0.30	0.072	(0.464)	0.036	0.036
78	6.50	0.30	0.072	(0.462)	0.036	0.036
79	6.58	0.33	0.080	(0.460)	0.040	0.040
80	6.67	0.33	0.080	(0.458)	0.040	0.040
81	6.75	0.33	0.080	(0.456)	0.040	0.040
82	6.83	0.33	0.080	(0.453)	0.040	0.040
83	6.92	0.33	0.080	(0.451)	0.040	0.040
84	7.00	0.33	0.080	(0.449)	0.040	0.040
85	7.08	0.33	0.080	(0.447)	0.040	0.040
86	7.17	0.33	0.080	(0.445)	0.040	0.040
87	7.25	0.33	0.080	(0.443)	0.040	0.040
88	7.33	0.37	0.088	(0.441)	0.044	0.044
89	7.42	0.37	0.088	(0.439)	0.044	0.044
90	7.50	0.37	0.088	(0.437)	0.044	0.044
91	7.58	0.40	0.096	(0.435)	0.048	0.048
92	7.67	0.40	0.096	(0.433)	0.048	0.048
93	7.75	0.40	0.096	(0.431)	0.048	0.048
94	7.83	0.43	0.104	(0.429)	0.052	0.052
95	7.92	0.43	0.104	(0.427)	0.052	0.052
96	8.00	0.43	0.104	(0.425)	0.052	0.052
97	8.08	0.50	0.120	(0.423)	0.060	0.060
98	8.17	0.50	0.120	(0.421)	0.060	0.060
99	8.25	0.50	0.120	(0.419)	0.060	0.060
100	8.33	0.50	0.120	(0.417)	0.060	0.060
101	8.42	0.50	0.120	(0.415)	0.060	0.060
102	8.50	0.50	0.120	(0.413)	0.060	0.060
103	8.58	0.53	0.128	(0.412)	0.064	0.064
104	8.67	0.53	0.128	(0.410)	0.064	0.064
105	8.75	0.53	0.128	(0.408)	0.064	0.064
106	8.83	0.57	0.136	(0.406)	0.068	0.068
107	8.92	0.57	0.136	(0.404)	0.068	0.068
108	9.00	0.57	0.136	(0.402)	0.068	0.068
109	9.08	0.63	0.152	(0.400)	0.076	0.076

110	9.17	0.63	0.152	(0.398)	0.076	0.076
111	9.25	0.63	0.152	(0.396)	0.076	0.076
112	9.33	0.67	0.160	(0.394)	0.080	0.080
113	9.42	0.67	0.160	(0.392)	0.080	0.080
114	9.50	0.67	0.160	(0.391)	0.080	0.080
115	9.58	0.70	0.168	(0.389)	0.084	0.084
116	9.67	0.70	0.168	(0.387)	0.084	0.084
117	9.75	0.70	0.168	(0.385)	0.084	0.084
118	9.83	0.73	0.176	(0.383)	0.088	0.088
119	9.92	0.73	0.176	(0.381)	0.088	0.088
120	10.00	0.73	0.176	(0.379)	0.088	0.088
121	10.08	0.50	0.120	(0.378)	0.060	0.060
122	10.17	0.50	0.120	(0.376)	0.060	0.060
123	10.25	0.50	0.120	(0.374)	0.060	0.060
124	10.33	0.50	0.120	(0.372)	0.060	0.060
125	10.42	0.50	0.120	(0.370)	0.060	0.060
126	10.50	0.50	0.120	(0.369)	0.060	0.060
127	10.58	0.67	0.160	(0.367)	0.080	0.080
128	10.67	0.67	0.160	(0.365)	0.080	0.080
129	10.75	0.67	0.160	(0.363)	0.080	0.080
130	10.83	0.67	0.160	(0.361)	0.080	0.080
131	10.92	0.67	0.160	(0.360)	0.080	0.080
132	11.00	0.67	0.160	(0.358)	0.080	0.080
133	11.08	0.63	0.152	(0.356)	0.076	0.076
134	11.17	0.63	0.152	(0.354)	0.076	0.076
135	11.25	0.63	0.152	(0.353)	0.076	0.076
136	11.33	0.63	0.152	(0.351)	0.076	0.076
137	11.42	0.63	0.152	(0.349)	0.076	0.076
138	11.50	0.63	0.152	(0.347)	0.076	0.076
139	11.58	0.57	0.136	(0.346)	0.068	0.068
140	11.67	0.57	0.136	(0.344)	0.068	0.068
141	11.75	0.57	0.136	(0.342)	0.068	0.068
142	11.83	0.60	0.144	(0.341)	0.072	0.072
143	11.92	0.60	0.144	(0.339)	0.072	0.072
144	12.00	0.60	0.144	(0.337)	0.072	0.072
145	12.08	0.83	0.200	(0.335)	0.100	0.100
146	12.17	0.83	0.200	(0.334)	0.100	0.100
147	12.25	0.83	0.200	(0.332)	0.100	0.100
148	12.33	0.87	0.208	(0.330)	0.104	0.104
149	12.42	0.87	0.208	(0.329)	0.104	0.104
150	12.50	0.87	0.208	(0.327)	0.104	0.104
151	12.58	0.93	0.224	(0.325)	0.112	0.112
152	12.67	0.93	0.224	(0.324)	0.112	0.112
153	12.75	0.93	0.224	(0.322)	0.112	0.112
154	12.83	0.97	0.232	(0.321)	0.116	0.116
155	12.92	0.97	0.232	(0.319)	0.116	0.116
156	13.00	0.97	0.232	(0.317)	0.116	0.116
157	13.08	1.13	0.272	(0.316)	0.136	0.136
158	13.17	1.13	0.272	(0.314)	0.136	0.136
159	13.25	1.13	0.272	(0.313)	0.136	0.136
160	13.33	1.13	0.272	(0.311)	0.136	0.136
161	13.42	1.13	0.272	(0.309)	0.136	0.136
162	13.50	1.13	0.272	(0.308)	0.136	0.136
163	13.58	0.77	0.184	(0.306)	0.092	0.092
164	13.67	0.77	0.184	(0.305)	0.092	0.092
165	13.75	0.77	0.184	(0.303)	0.092	0.092
166	13.83	0.77	0.184	(0.302)	0.092	0.092
167	13.92	0.77	0.184	(0.300)	0.092	0.092
168	14.00	0.77	0.184	(0.298)	0.092	0.092
169	14.08	0.90	0.216	(0.297)	0.108	0.108
170	14.17	0.90	0.216	(0.295)	0.108	0.108
171	14.25	0.90	0.216	(0.294)	0.108	0.108
172	14.33	0.87	0.208	(0.292)	0.104	0.104
173	14.42	0.87	0.208	(0.291)	0.104	0.104
174	14.50	0.87	0.208	(0.289)	0.104	0.104
175	14.58	0.87	0.208	(0.288)	0.104	0.104
176	14.67	0.87	0.208	(0.286)	0.104	0.104
177	14.75	0.87	0.208	(0.285)	0.104	0.104
178	14.83	0.83	0.200	(0.284)	0.100	0.100
179	14.92	0.83	0.200	(0.282)	0.100	0.100
180	15.00	0.83	0.200	(0.281)	0.100	0.100

181	15.08	0.80	0.192	(0.279)	0.096	0.096
182	15.17	0.80	0.192	(0.278)	0.096	0.096
183	15.25	0.80	0.192	(0.276)	0.096	0.096
184	15.33	0.77	0.184	(0.275)	0.092	0.092
185	15.42	0.77	0.184	(0.274)	0.092	0.092
186	15.50	0.77	0.184	(0.272)	0.092	0.092
187	15.58	0.63	0.152	(0.271)	0.076	0.076
188	15.67	0.63	0.152	(0.269)	0.076	0.076
189	15.75	0.63	0.152	(0.268)	0.076	0.076
190	15.83	0.63	0.152	(0.267)	0.076	0.076
191	15.92	0.63	0.152	(0.265)	0.076	0.076
192	16.00	0.63	0.152	(0.264)	0.076	0.076
193	16.08	0.13	0.032	(0.263)	0.016	0.016
194	16.17	0.13	0.032	(0.261)	0.016	0.016
195	16.25	0.13	0.032	(0.260)	0.016	0.016
196	16.33	0.13	0.032	(0.259)	0.016	0.016
197	16.42	0.13	0.032	(0.257)	0.016	0.016
198	16.50	0.13	0.032	(0.256)	0.016	0.016
199	16.58	0.10	0.024	(0.255)	0.012	0.012
200	16.67	0.10	0.024	(0.253)	0.012	0.012
201	16.75	0.10	0.024	(0.252)	0.012	0.012
202	16.83	0.10	0.024	(0.251)	0.012	0.012
203	16.92	0.10	0.024	(0.249)	0.012	0.012
204	17.00	0.10	0.024	(0.248)	0.012	0.012
205	17.08	0.17	0.040	(0.247)	0.020	0.020
206	17.17	0.17	0.040	(0.246)	0.020	0.020
207	17.25	0.17	0.040	(0.244)	0.020	0.020
208	17.33	0.17	0.040	(0.243)	0.020	0.020
209	17.42	0.17	0.040	(0.242)	0.020	0.020
210	17.50	0.17	0.040	(0.241)	0.020	0.020
211	17.58	0.17	0.040	(0.240)	0.020	0.020
212	17.67	0.17	0.040	(0.238)	0.020	0.020
213	17.75	0.17	0.040	(0.237)	0.020	0.020
214	17.83	0.13	0.032	(0.236)	0.016	0.016
215	17.92	0.13	0.032	(0.235)	0.016	0.016
216	18.00	0.13	0.032	(0.234)	0.016	0.016
217	18.08	0.13	0.032	(0.233)	0.016	0.016
218	18.17	0.13	0.032	(0.231)	0.016	0.016
219	18.25	0.13	0.032	(0.230)	0.016	0.016
220	18.33	0.13	0.032	(0.229)	0.016	0.016
221	18.42	0.13	0.032	(0.228)	0.016	0.016
222	18.50	0.13	0.032	(0.227)	0.016	0.016
223	18.58	0.10	0.024	(0.226)	0.012	0.012
224	18.67	0.10	0.024	(0.225)	0.012	0.012
225	18.75	0.10	0.024	(0.224)	0.012	0.012
226	18.83	0.07	0.016	(0.223)	0.008	0.008
227	18.92	0.07	0.016	(0.222)	0.008	0.008
228	19.00	0.07	0.016	(0.221)	0.008	0.008
229	19.08	0.10	0.024	(0.219)	0.012	0.012
230	19.17	0.10	0.024	(0.218)	0.012	0.012
231	19.25	0.10	0.024	(0.217)	0.012	0.012
232	19.33	0.13	0.032	(0.216)	0.016	0.016
233	19.42	0.13	0.032	(0.215)	0.016	0.016
234	19.50	0.13	0.032	(0.214)	0.016	0.016
235	19.58	0.10	0.024	(0.213)	0.012	0.012
236	19.67	0.10	0.024	(0.212)	0.012	0.012
237	19.75	0.10	0.024	(0.211)	0.012	0.012
238	19.83	0.07	0.016	(0.211)	0.008	0.008
239	19.92	0.07	0.016	(0.210)	0.008	0.008
240	20.00	0.07	0.016	(0.209)	0.008	0.008
241	20.08	0.10	0.024	(0.208)	0.012	0.012
242	20.17	0.10	0.024	(0.207)	0.012	0.012
243	20.25	0.10	0.024	(0.206)	0.012	0.012
244	20.33	0.10	0.024	(0.205)	0.012	0.012
245	20.42	0.10	0.024	(0.204)	0.012	0.012
246	20.50	0.10	0.024	(0.203)	0.012	0.012
247	20.58	0.10	0.024	(0.202)	0.012	0.012
248	20.67	0.10	0.024	(0.202)	0.012	0.012
249	20.75	0.10	0.024	(0.201)	0.012	0.012
250	20.83	0.07	0.016	(0.200)	0.008	0.008
251	20.92	0.07	0.016	(0.199)	0.008	0.008

252	21.00	0.07	0.016	(0.198)	0.008	0.008
253	21.08	0.10	0.024	(0.198)	0.012	0.012
254	21.17	0.10	0.024	(0.197)	0.012	0.012
255	21.25	0.10	0.024	(0.196)	0.012	0.012
256	21.33	0.07	0.016	(0.195)	0.008	0.008
257	21.42	0.07	0.016	(0.195)	0.008	0.008
258	21.50	0.07	0.016	(0.194)	0.008	0.008
259	21.58	0.10	0.024	(0.193)	0.012	0.012
260	21.67	0.10	0.024	(0.192)	0.012	0.012
261	21.75	0.10	0.024	(0.192)	0.012	0.012
262	21.83	0.07	0.016	(0.191)	0.008	0.008
263	21.92	0.07	0.016	(0.190)	0.008	0.008
264	22.00	0.07	0.016	(0.190)	0.008	0.008
265	22.08	0.10	0.024	(0.189)	0.012	0.012
266	22.17	0.10	0.024	(0.188)	0.012	0.012
267	22.25	0.10	0.024	(0.188)	0.012	0.012
268	22.33	0.07	0.016	(0.187)	0.008	0.008
269	22.42	0.07	0.016	(0.187)	0.008	0.008
270	22.50	0.07	0.016	(0.186)	0.008	0.008
271	22.58	0.07	0.016	(0.186)	0.008	0.008
272	22.67	0.07	0.016	(0.185)	0.008	0.008
273	22.75	0.07	0.016	(0.185)	0.008	0.008
274	22.83	0.07	0.016	(0.184)	0.008	0.008
275	22.92	0.07	0.016	(0.184)	0.008	0.008
276	23.00	0.07	0.016	(0.183)	0.008	0.008
277	23.08	0.07	0.016	(0.183)	0.008	0.008
278	23.17	0.07	0.016	(0.182)	0.008	0.008
279	23.25	0.07	0.016	(0.182)	0.008	0.008
280	23.33	0.07	0.016	(0.182)	0.008	0.008
281	23.42	0.07	0.016	(0.181)	0.008	0.008
282	23.50	0.07	0.016	(0.181)	0.008	0.008
283	23.58	0.07	0.016	(0.181)	0.008	0.008
284	23.67	0.07	0.016	(0.180)	0.008	0.008
285	23.75	0.07	0.016	(0.180)	0.008	0.008
286	23.83	0.07	0.016	(0.180)	0.008	0.008
287	23.92	0.07	0.016	(0.180)	0.008	0.008
288	24.00	0.07	0.016	(0.180)	0.008	0.008

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                 (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    12.0
      Flood volume = Effective rainfall      1.00(In)
       times area      25.1(Ac.)/[(In)/(Ft.)] =       2.1(Ac.Ft)
      Total soil loss =      1.00(In)
      Total soil loss =     2.096(Ac.Ft)
      Total rainfall =      2.00(In)
      Flood volume =       91290.0 Cubic Feet
      Total soil loss =       91290.0 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      3.449(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5      0.0007     0.10  Q         |         |         |         |
  0+10      0.0019     0.18  Q         |         |         |         |
  0+15      0.0033     0.20  Q         |         |         |         |
  0+20      0.0050     0.25  VQ        |         |         |         |
  0+25      0.0070     0.29  VQ        |         |         |         |
  0+30      0.0091     0.30  VQ        |         |         |         |
  0+35      0.0112     0.30  VQ        |         |         |         |
  0+40      0.0133     0.30  VQ        |         |         |         |
  0+45      0.0154     0.30  VQ        |         |         |         |
  0+50      0.0178     0.35  VQ        |         |         |         |
  0+55      0.0206     0.40  VQ        |         |         |         |
  1+ 0      0.0233     0.40  VQ        |         |         |         |
  1+ 5      0.0258     0.36  VQ        |         |         |         |
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  1+10     0.0280    0.31  VQ        |         |         |         |
  1+15     0.0301    0.31  VQ        |         |         |         |
  1+20     0.0322    0.30  VQ        |         |         |         |
  1+25     0.0343    0.30  VQ        |         |         |         |
  1+30     0.0364    0.30  VQ        |         |         |         |
  1+35     0.0385    0.30  VQ        |         |         |         |
  1+40     0.0406    0.30  VQ        |         |         |         |
  1+45     0.0427    0.30  VQ        |         |         |         |
  1+50     0.0451    0.35  VQ        |         |         |         |
  1+55     0.0478    0.40  VQ        |         |         |         |
  2+ 0     0.0506    0.40  VQ        |         |         |         |
  2+ 5     0.0534    0.41  |Q        |         |         |         |
  2+10     0.0562    0.41  |Q        |         |         |         |
  2+15     0.0590    0.41  |Q        |         |         |         |
  2+20     0.0618    0.41  |Q        |         |         |         |
  2+25     0.0646    0.41  |Q        |         |         |         |
  2+30     0.0674    0.41  |Q        |         |         |         |
  2+35     0.0705    0.45  |Q        |         |         |         |
  2+40     0.0739    0.50  |Q        |         |         |         |
  2+45     0.0774    0.50  |VQ       |         |         |         |
  2+50     0.0809    0.51  |VQ       |         |         |         |
  2+55     0.0844    0.51  |VQ       |         |         |         |
  3+ 0     0.0879    0.51  |VQ       |         |         |         |
  3+ 5     0.0914    0.51  |VQ       |         |         |         |
  3+10     0.0948    0.51  |VQ       |         |         |         |
  3+15     0.0983    0.51  |VQ       |         |         |         |
  3+20     0.1018    0.51  |VQ       |         |         |         |
  3+25     0.1053    0.51  | Q       |         |         |         |
  3+30     0.1088    0.51  | Q       |         |         |         |
  3+35     0.1123    0.51  | Q       |         |         |         |
  3+40     0.1158    0.51  | Q       |         |         |         |
  3+45     0.1193    0.51  | Q       |         |         |         |
  3+50     0.1231    0.56  | Q       |         |         |         |
  3+55     0.1272    0.60  | Q       |         |         |         |
  4+ 0     0.1314    0.61  | Q       |         |         |         |
  4+ 5     0.1356    0.61  | Q       |         |         |         |
  4+10     0.1398    0.61  | Q       |         |         |         |
  4+15     0.1440    0.61  | Q       |         |         |         |
  4+20     0.1485    0.66  | Q       |         |         |         |
  4+25     0.1533    0.70  | Q       |         |         |         |
  4+30     0.1582    0.71  | QV      |         |         |         |
  4+35     0.1631    0.71  | QV      |         |         |         |
  4+40     0.1680    0.71  | QV      |         |         |         |
  4+45     0.1729    0.71  | QV      |         |         |         |
  4+50     0.1781    0.76  |  Q      |         |         |         |
  4+55     0.1836    0.80  |  Q      |         |         |         |
  5+ 0     0.1892    0.81  |  Q      |         |         |         |
  5+ 5     0.1941    0.71  | QV      |         |         |         |
  5+10     0.1984    0.63  | QV      |         |         |         |
  5+15     0.2027    0.61  | QV      |         |         |         |
  5+20     0.2072    0.66  | QV      |         |         |         |
  5+25     0.2120    0.70  | Q V     |         |         |         |
  5+30     0.2169    0.71  | Q V     |         |         |         |
  5+35     0.2221    0.76  |  QV     |         |         |         |
  5+40     0.2276    0.80  |  QV     |         |         |         |
  5+45     0.2332    0.81  |  QV     |         |         |         |
  5+50     0.2388    0.81  |  QV     |         |         |         |
  5+55     0.2444    0.81  |  QV     |         |         |         |
  6+ 0     0.2500    0.81  |  QV     |         |         |         |
  6+ 5     0.2559    0.86  |  QV     |         |         |         |
  6+10     0.2621    0.90  |  Q V    |         |         |         |
  6+15     0.2684    0.91  |  Q V    |         |         |         |
  6+20     0.2747    0.91  |  Q V    |         |         |         |
  6+25     0.2810    0.91  |  Q V    |         |         |         |
  6+30     0.2872    0.91  |  Q V    |         |         |         |
  6+35     0.2939    0.96  |  Q V    |         |         |         |
  6+40     0.3008    1.00  |   QV    |         |         |         |
  6+45     0.3077    1.01  |   QV    |         |         |         |
  6+50     0.3147    1.01  |   Q V   |         |         |         |
  6+55     0.3217    1.01  |   Q V   |         |         |         |
  7+ 0     0.3287    1.01  |   Q V   |         |         |         |
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  7+ 5     0.3357    1.01  |   Q V   |         |         |         |
  7+10     0.3427    1.01  |   Q V   |         |         |         |
  7+15     0.3497    1.01  |   Q V   |         |         |         |
  7+20     0.3570    1.06  |   Q V   |         |         |         |
  7+25     0.3646    1.11  |   Q V   |         |         |         |
  7+30     0.3723    1.11  |   Q  V  |         |         |         |
  7+35     0.3803    1.16  |   Q  V  |         |         |         |
  7+40     0.3886    1.21  |   Q  V  |         |         |         |
  7+45     0.3970    1.21  |   Q  V  |         |         |         |
  7+50     0.4057    1.27  |    Q V  |         |         |         |
  7+55     0.4147    1.31  |    Q V  |         |         |         |
  8+ 0     0.4238    1.32  |    Q  V |         |         |         |
  8+ 5     0.4335    1.42  |    Q  V |         |         |         |
  8+10     0.4438    1.50  |     Q V |         |         |         |
  8+15     0.4543    1.52  |     Q V |         |         |         |
  8+20     0.4648    1.52  |     Q V |         |         |         |
  8+25     0.4752    1.52  |     Q  V|         |         |         |
  8+30     0.4857    1.52  |     Q  V|         |         |         |
  8+35     0.4965    1.57  |     Q  V|         |         |         |
  8+40     0.5076    1.61  |     Q  V|         |         |         |
  8+45     0.5188    1.62  |     Q  V|         |         |         |
  8+50     0.5303    1.67  |     Q   V         |         |         |
  8+55     0.5421    1.71  |     Q   V         |         |         |
  9+ 0     0.5540    1.72  |     Q   V         |         |         |
  9+ 5     0.5665    1.82  |      Q  V         |         |         |
  9+10     0.5797    1.91  |      Q  |V        |         |         |
  9+15     0.5929    1.92  |      Q  |V        |         |         |
  9+20     0.6065    1.98  |      Q  |V        |         |         |
  9+25     0.6204    2.02  |       Q |V        |         |         |
  9+30     0.6344    2.03  |       Q | V       |         |         |
  9+35     0.6487    2.08  |       Q | V       |         |         |
  9+40     0.6633    2.12  |       Q | V       |         |         |
  9+45     0.6779    2.13  |       Q | V       |         |         |
  9+50     0.6929    2.18  |       Q |  V      |         |         |
  9+55     0.7082    2.22  |       Q |  V      |         |         |
 10+ 0     0.7236    2.23  |       Q |  V      |         |         |
 10+ 5     0.7366    1.89  |      Q  |   V     |         |         |
 10+10     0.7476    1.60  |     Q   |   V     |         |         |
 10+15     0.7582    1.54  |     Q   |   V     |         |         |
 10+20     0.7686    1.52  |     Q   |   V     |         |         |
 10+25     0.7791    1.52  |     Q   |   V     |         |         |
 10+30     0.7896    1.52  |     Q   |    V    |         |         |
 10+35     0.8018    1.77  |      Q  |    V    |         |         |
 10+40     0.8154    1.98  |      Q  |    V    |         |         |
 10+45     0.8293    2.01  |       Q |    V    |         |         |
 10+50     0.8432    2.03  |       Q |     V   |         |         |
 10+55     0.8572    2.03  |       Q |     V   |         |         |
 11+ 0     0.8712    2.03  |       Q |     V   |         |         |
 11+ 5     0.8848    1.98  |      Q  |     V   |         |         |
 11+10     0.8981    1.94  |      Q  |      V  |         |         |
 11+15     0.9114    1.93  |      Q  |      V  |         |         |
 11+20     0.9247    1.93  |      Q  |      V  |         |         |
 11+25     0.9380    1.93  |      Q  |      V  |         |         |
 11+30     0.9513    1.93  |      Q  |       V |         |         |
 11+35     0.9639    1.83  |      Q  |       V |         |         |
 11+40     0.9759    1.75  |     Q   |       V |         |         |
 11+45     0.9878    1.73  |     Q   |       V |         |         |
 11+50     1.0000    1.77  |      Q  |        V|         |         |
 11+55     1.0125    1.82  |      Q  |        V|         |         |
 12+ 0     1.0251    1.82  |      Q  |        V|         |         |
 12+ 5     1.0400    2.17  |       Q |        V|         |         |
 12+10     1.0570    2.46  |        Q|         V         |         |
 12+15     1.0743    2.52  |         Q         V         |         |
 12+20     1.0921    2.58  |         Q         V         |         |
 12+25     1.1102    2.63  |         Q         |V        |         |
 12+30     1.1283    2.63  |         Q         |V        |         |
 12+35     1.1472    2.74  |         Q         |V        |         |
 12+40     1.1666    2.82  |         |Q        | V       |         |
 12+45     1.1861    2.83  |         |Q        | V       |         |
 12+50     1.2060    2.89  |         |Q        |  V      |         |
 12+55     1.2262    2.93  |         |Q        |  V      |         |
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13+ 0       1.2464      2.94  |         |Q        |  V      |         |
13+ 5       1.2684      3.19  |         | Q       |   V     |         |
13+10       1.2918      3.40  |         |  Q      |   V     |         |
13+15       1.3154      3.43  |         |  Q      |    V    |         |
13+20       1.3392      3.45  |         |  Q      |    V    |         |
13+25       1.3629      3.45  |         |  Q      |     V   |         |
13+30       1.3867      3.45  |         |  Q      |     V   |         |
13+35       1.4067      2.91  |         |Q        |     V   |         |
13+40       1.4236      2.45  |        Q|         |      V  |         |
13+45       1.4399      2.36  |        Q|         |      V  |         |
13+50       1.4559      2.33  |        Q|         |      V  |         |
13+55       1.4720      2.33  |        Q|         |       V |         |
14+ 0       1.4881      2.33  |        Q|         |       V |         |
14+ 5       1.5055      2.53  |         Q         |       V |         |
14+10       1.5240      2.70  |         Q         |        V|         |
14+15       1.5428      2.73  |         Q         |        V|         |
14+20       1.5614      2.69  |         Q         |        V|         |
14+25       1.5796      2.65  |         Q         |         V         |
14+30       1.5978      2.64  |         Q         |         V         |
14+35       1.6159      2.64  |         Q         |         V         |
14+40       1.6341      2.64  |         Q         |         |V        |
14+45       1.6523      2.64  |         Q         |         |V        |
14+50       1.6701      2.59  |         Q         |         |V        |
14+55       1.6876      2.55  |         Q         |         | V       |
15+ 0       1.7051      2.54  |         Q         |         | V       |
15+ 5       1.7222      2.49  |        Q|         |         | V       |
15+10       1.7391      2.44  |        Q|         |         |  V      |
15+15       1.7559      2.44  |        Q|         |         |  V      |
15+20       1.7723      2.39  |        Q|         |         |  V      |
15+25       1.7884      2.34  |        Q|         |         |   V     |
15+30       1.8045      2.34  |        Q|         |         |   V     |
15+35       1.8192      2.14  |       Q |         |         |   V     |
15+40       1.8328      1.97  |      Q  |         |         |   V     |
15+45       1.8461      1.94  |      Q  |         |         |    V    |
15+50       1.8594      1.93  |      Q  |         |         |    V    |
15+55       1.8727      1.93  |      Q  |         |         |    V    |
16+ 0       1.8860      1.93  |      Q  |         |         |    V    |
16+ 5       1.8942      1.19  |   Q     |         |         |     V   |
16+10       1.8980      0.56  | Q       |         |         |     V   |
16+15       1.9011      0.45  |Q        |         |         |     V   |
16+20       1.9039      0.41  |Q        |         |         |     V   |
16+25       1.9067      0.41  |Q        |         |         |     V   |
16+30       1.9095      0.41  |Q        |         |         |     V   |
16+35       1.9120      0.36  |Q        |         |         |     V   |
16+40       1.9141      0.31  |Q        |         |         |     V   |
16+45       1.9162      0.31  |Q        |         |         |     V   |
16+50       1.9183      0.30  |Q        |         |         |     V   |
16+55       1.9204      0.30  |Q        |         |         |     V   |
17+ 0       1.9225      0.30  |Q        |         |         |     V   |
17+ 5       1.9253      0.40  |Q        |         |         |     V   |
17+10       1.9286      0.49  |Q        |         |         |     V   |
17+15       1.9321      0.50  | Q       |         |         |     V   |
17+20       1.9356      0.51  | Q       |         |         |     V   |
17+25       1.9391      0.51  | Q       |         |         |      V  |
17+30       1.9426      0.51  | Q       |         |         |      V  |
17+35       1.9461      0.51  | Q       |         |         |      V  |
17+40       1.9496      0.51  | Q       |         |         |      V  |
17+45       1.9531      0.51  | Q       |         |         |      V  |
17+50       1.9562      0.46  |Q        |         |         |      V  |
17+55       1.9591      0.42  |Q        |         |         |      V  |
18+ 0       1.9619      0.41  |Q        |         |         |      V  |
18+ 5       1.9647      0.41  |Q        |         |         |      V  |
18+10       1.9675      0.41  |Q        |         |         |      V  |
18+15       1.9703      0.41  |Q        |         |         |      V  |
18+20       1.9731      0.41  |Q        |         |         |      V  |
18+25       1.9759      0.41  |Q        |         |         |      V  |
18+30       1.9787      0.41  |Q        |         |         |      V  |
18+35       1.9811      0.36  |Q        |         |         |      V  |
18+40       1.9833      0.31  |Q        |         |         |      V  |
18+45       1.9854      0.31  |Q        |         |         |      V  |
18+50       1.9872      0.26  |Q        |         |         |      V  |
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18+55       1.9886      0.21  Q         |         |         |      V  |
19+ 0       1.9900      0.21  Q         |         |         |      V  |
19+ 5       1.9918      0.25  |Q        |         |         |       V |
19+10       1.9938      0.29  |Q        |         |         |       V |
19+15       1.9959      0.30  |Q        |         |         |       V |
19+20       1.9983      0.35  |Q        |         |         |       V |
19+25       2.0010      0.40  |Q        |         |         |       V |
19+30       2.0038      0.40  |Q        |         |         |       V |
19+35       2.0063      0.36  |Q        |         |         |       V |
19+40       2.0084      0.31  |Q        |         |         |       V |
19+45       2.0105      0.31  |Q        |         |         |       V |
19+50       2.0123      0.26  |Q        |         |         |       V |
19+55       2.0138      0.21  Q         |         |         |       V |
20+ 0       2.0152      0.21  Q         |         |         |       V |
20+ 5       2.0169      0.25  |Q        |         |         |       V |
20+10       2.0189      0.29  |Q        |         |         |       V |
20+15       2.0210      0.30  |Q        |         |         |       V |
20+20       2.0231      0.30  |Q        |         |         |       V |
20+25       2.0252      0.30  |Q        |         |         |       V |
20+30       2.0273      0.30  |Q        |         |         |       V |
20+35       2.0294      0.30  |Q        |         |         |       V |
20+40       2.0315      0.30  |Q        |         |         |       V |
20+45       2.0336      0.30  |Q        |         |         |       V |
20+50       2.0354      0.26  |Q        |         |         |       V |
20+55       2.0368      0.21  Q         |         |         |       V |
21+ 0       2.0382      0.21  Q         |         |         |       V |
21+ 5       2.0400      0.25  |Q        |         |         |       V |
21+10       2.0420      0.29  |Q        |         |         |       V |
21+15       2.0441      0.30  |Q        |         |         |        V|
21+20       2.0458      0.26  |Q        |         |         |        V|
21+25       2.0473      0.21  Q         |         |         |        V|
21+30       2.0487      0.21  Q         |         |         |        V|
21+35       2.0505      0.25  |Q        |         |         |        V|
21+40       2.0525      0.29  |Q        |         |         |        V|
21+45       2.0546      0.30  |Q        |         |         |        V|
21+50       2.0563      0.26  |Q        |         |         |        V|
21+55       2.0578      0.21  Q         |         |         |        V|
22+ 0       2.0592      0.21  Q         |         |         |        V|
22+ 5       2.0609      0.25  |Q        |         |         |        V|
22+10       2.0630      0.29  |Q        |         |         |        V|
22+15       2.0650      0.30  |Q        |         |         |        V|
22+20       2.0668      0.26  |Q        |         |         |        V|
22+25       2.0683      0.21  Q         |         |         |        V|
22+30       2.0697      0.21  Q         |         |         |        V|
22+35       2.0711      0.20  Q         |         |         |        V|
22+40       2.0725      0.20  Q         |         |         |        V|
22+45       2.0739      0.20  Q         |         |         |        V|
22+50       2.0753      0.20  Q         |         |         |        V|
22+55       2.0767      0.20  Q         |         |         |        V|
23+ 0       2.0781      0.20  Q         |         |         |        V|
23+ 5       2.0795      0.20  Q         |         |         |        V|
23+10       2.0809      0.20  Q         |         |         |        V|
23+15       2.0823      0.20  Q         |         |         |        V|
23+20       2.0836      0.20  Q         |         |         |        V|
23+25       2.0850      0.20  Q         |         |         |        V|
23+30       2.0864      0.20  Q         |         |         |        V|
23+35       2.0878      0.20  Q         |         |         |        V|
23+40       2.0892      0.20  Q         |         |         |        V|
23+45       2.0906      0.20  Q         |         |         |        V|
23+50       2.0920      0.20  Q         |         |         |        V|
23+55       2.0934      0.20  Q         |         |         |        V|
24+ 0       2.0948      0.20  Q         |         |         |        V|
24+ 5       2.0955      0.10  Q         |         |         |        V|
24+10       2.0957      0.02  Q         |         |         |        V|
24+15       2.0957      0.01  Q         |         |         |         V
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APPENDIX C.3: AREA "A2" – PRE-PROJECT CONDITION

U n i t   H y d r o g r a p h   A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
Study date 06/10/16 File: ARA2EXONSITE242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD PRE-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 2-YEAR, 24-HOUR STORM DURATION
ONSITE AREA "A2"
FILENAME: ARA2EXONSITE

Drainage Area = 29.70(Ac.) = 0.046 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 29.70(Ac.) = 0.046 Sq. Mi.
Length along longest watercourse = 2054.72(Ft.)
Length along longest watercourse measured to centroid = 1192.18(Ft.)
Length along longest watercourse = 0.389 Mi.
Length along longest watercourse measured to centroid = 0.226 Mi.
Difference in elevation = 65.10(Ft.)
Slope along watercourse = 167.2870 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.108 Hr.
Lag time = 6.48 Min.
25% of lag time = 1.62 Min.
40% of lag time = 2.59 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
29.70	2.00	59.40

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
29.70	5.00	148.50

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.000(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 2.000(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
29.700	74.76	0.000

Total Area Entered = 29.70(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
74.8	56.7	0.504	0.000	0.504	1.000	0.504
					Sum (F) =	0.504

Area averaged mean soil loss (F) (In/Hr) = 0.504
Minimum soil loss rate ((In/Hr)) = 0.252
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	77.142	12.512	3.745
2	0.167	154.284	43.368	12.981
3	0.250	231.426	20.790	6.223
4	0.333	308.567	8.441	2.527
5	0.417	385.709	5.086	1.522
6	0.500	462.851	3.263	0.977
7	0.583	539.993	2.301	0.689
8	0.667	617.135	1.644	0.492
9	0.750	694.277	1.125	0.337
10	0.833	771.418	0.799	0.239
11	0.917	848.560	0.672	0.201
			Sum = 100.000	Sum= 29.932

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.016	(0.893)	0.014	0.002
2	0.17	0.07	0.016	(0.889)	0.014	0.002
3	0.25	0.07	0.016	(0.886)	0.014	0.002
4	0.33	0.10	0.024	(0.882)	0.022	0.002
5	0.42	0.10	0.024	(0.879)	0.022	0.002
6	0.50	0.10	0.024	(0.875)	0.022	0.002
7	0.58	0.10	0.024	(0.872)	0.022	0.002
8	0.67	0.10	0.024	(0.869)	0.022	0.002
9	0.75	0.10	0.024	(0.865)	0.022	0.002
10	0.83	0.13	0.032	(0.862)	0.029	0.003
11	0.92	0.13	0.032	(0.858)	0.029	0.003
12	1.00	0.13	0.032	(0.855)	0.029	0.003
13	1.08	0.10	0.024	(0.852)	0.022	0.002
14	1.17	0.10	0.024	(0.848)	0.022	0.002
15	1.25	0.10	0.024	(0.845)	0.022	0.002
16	1.33	0.10	0.024	(0.842)	0.022	0.002
17	1.42	0.10	0.024	(0.838)	0.022	0.002
18	1.50	0.10	0.024	(0.835)	0.022	0.002
19	1.58	0.10	0.024	(0.832)	0.022	0.002
20	1.67	0.10	0.024	(0.828)	0.022	0.002
21	1.75	0.10	0.024	(0.825)	0.022	0.002
22	1.83	0.13	0.032	(0.822)	0.029	0.003
23	1.92	0.13	0.032	(0.818)	0.029	0.003
24	2.00	0.13	0.032	(0.815)	0.029	0.003
25	2.08	0.13	0.032	(0.812)	0.029	0.003
26	2.17	0.13	0.032	(0.808)	0.029	0.003
27	2.25	0.13	0.032	(0.805)	0.029	0.003
28	2.33	0.13	0.032	(0.802)	0.029	0.003
29	2.42	0.13	0.032	(0.799)	0.029	0.003
30	2.50	0.13	0.032	(0.795)	0.029	0.003
31	2.58	0.17	0.040	(0.792)	0.036	0.004

32	2.67	0.17	0.040	(0.789)	0.036	0.004
33	2.75	0.17	0.040	(0.786)	0.036	0.004
34	2.83	0.17	0.040	(0.782)	0.036	0.004
35	2.92	0.17	0.040	(0.779)	0.036	0.004
36	3.00	0.17	0.040	(0.776)	0.036	0.004
37	3.08	0.17	0.040	(0.773)	0.036	0.004
38	3.17	0.17	0.040	(0.769)	0.036	0.004
39	3.25	0.17	0.040	(0.766)	0.036	0.004
40	3.33	0.17	0.040	(0.763)	0.036	0.004
41	3.42	0.17	0.040	(0.760)	0.036	0.004
42	3.50	0.17	0.040	(0.757)	0.036	0.004
43	3.58	0.17	0.040	(0.753)	0.036	0.004
44	3.67	0.17	0.040	(0.750)	0.036	0.004
45	3.75	0.17	0.040	(0.747)	0.036	0.004
46	3.83	0.20	0.048	(0.744)	0.043	0.005
47	3.92	0.20	0.048	(0.741)	0.043	0.005
48	4.00	0.20	0.048	(0.738)	0.043	0.005
49	4.08	0.20	0.048	(0.735)	0.043	0.005
50	4.17	0.20	0.048	(0.731)	0.043	0.005
51	4.25	0.20	0.048	(0.728)	0.043	0.005
52	4.33	0.23	0.056	(0.725)	0.050	0.006
53	4.42	0.23	0.056	(0.722)	0.050	0.006
54	4.50	0.23	0.056	(0.719)	0.050	0.006
55	4.58	0.23	0.056	(0.716)	0.050	0.006
56	4.67	0.23	0.056	(0.713)	0.050	0.006
57	4.75	0.23	0.056	(0.710)	0.050	0.006
58	4.83	0.27	0.064	(0.707)	0.058	0.006
59	4.92	0.27	0.064	(0.704)	0.058	0.006
60	5.00	0.27	0.064	(0.701)	0.058	0.006
61	5.08	0.20	0.048	(0.698)	0.043	0.005
62	5.17	0.20	0.048	(0.695)	0.043	0.005
63	5.25	0.20	0.048	(0.692)	0.043	0.005
64	5.33	0.23	0.056	(0.689)	0.050	0.006
65	5.42	0.23	0.056	(0.686)	0.050	0.006
66	5.50	0.23	0.056	(0.683)	0.050	0.006
67	5.58	0.27	0.064	(0.680)	0.058	0.006
68	5.67	0.27	0.064	(0.677)	0.058	0.006
69	5.75	0.27	0.064	(0.674)	0.058	0.006
70	5.83	0.27	0.064	(0.671)	0.058	0.006
71	5.92	0.27	0.064	(0.668)	0.058	0.006
72	6.00	0.27	0.064	(0.665)	0.058	0.006
73	6.08	0.30	0.072	(0.662)	0.065	0.007
74	6.17	0.30	0.072	(0.659)	0.065	0.007
75	6.25	0.30	0.072	(0.656)	0.065	0.007
76	6.33	0.30	0.072	(0.653)	0.065	0.007
77	6.42	0.30	0.072	(0.650)	0.065	0.007
78	6.50	0.30	0.072	(0.647)	0.065	0.007
79	6.58	0.33	0.080	(0.644)	0.072	0.008
80	6.67	0.33	0.080	(0.641)	0.072	0.008
81	6.75	0.33	0.080	(0.638)	0.072	0.008
82	6.83	0.33	0.080	(0.635)	0.072	0.008
83	6.92	0.33	0.080	(0.633)	0.072	0.008
84	7.00	0.33	0.080	(0.630)	0.072	0.008
85	7.08	0.33	0.080	(0.627)	0.072	0.008
86	7.17	0.33	0.080	(0.624)	0.072	0.008
87	7.25	0.33	0.080	(0.621)	0.072	0.008
88	7.33	0.37	0.088	(0.618)	0.079	0.009
89	7.42	0.37	0.088	(0.616)	0.079	0.009
90	7.50	0.37	0.088	(0.613)	0.079	0.009
91	7.58	0.40	0.096	(0.610)	0.086	0.010
92	7.67	0.40	0.096	(0.607)	0.086	0.010
93	7.75	0.40	0.096	(0.604)	0.086	0.010
94	7.83	0.43	0.104	(0.601)	0.094	0.010
95	7.92	0.43	0.104	(0.599)	0.094	0.010
96	8.00	0.43	0.104	(0.596)	0.094	0.010
97	8.08	0.50	0.120	(0.593)	0.108	0.012
98	8.17	0.50	0.120	(0.590)	0.108	0.012
99	8.25	0.50	0.120	(0.588)	0.108	0.012
100	8.33	0.50	0.120	(0.585)	0.108	0.012
101	8.42	0.50	0.120	(0.582)	0.108	0.012
102	8.50	0.50	0.120	(0.579)	0.108	0.012

103	8.58	0.53	0.128	(0.577)	0.115	0.013
104	8.67	0.53	0.128	(0.574)	0.115	0.013
105	8.75	0.53	0.128	(0.571)	0.115	0.013
106	8.83	0.57	0.136	(0.569)	0.122	0.014
107	8.92	0.57	0.136	(0.566)	0.122	0.014
108	9.00	0.57	0.136	(0.563)	0.122	0.014
109	9.08	0.63	0.152	(0.561)	0.137	0.015
110	9.17	0.63	0.152	(0.558)	0.137	0.015
111	9.25	0.63	0.152	(0.555)	0.137	0.015
112	9.33	0.67	0.160	(0.553)	0.144	0.016
113	9.42	0.67	0.160	(0.550)	0.144	0.016
114	9.50	0.67	0.160	(0.547)	0.144	0.016
115	9.58	0.70	0.168	(0.545)	0.151	0.017
116	9.67	0.70	0.168	(0.542)	0.151	0.017
117	9.75	0.70	0.168	(0.539)	0.151	0.017
118	9.83	0.73	0.176	(0.537)	0.158	0.018
119	9.92	0.73	0.176	(0.534)	0.158	0.018
120	10.00	0.73	0.176	(0.532)	0.158	0.018
121	10.08	0.50	0.120	(0.529)	0.108	0.012
122	10.17	0.50	0.120	(0.527)	0.108	0.012
123	10.25	0.50	0.120	(0.524)	0.108	0.012
124	10.33	0.50	0.120	(0.522)	0.108	0.012
125	10.42	0.50	0.120	(0.519)	0.108	0.012
126	10.50	0.50	0.120	(0.516)	0.108	0.012
127	10.58	0.67	0.160	(0.514)	0.144	0.016
128	10.67	0.67	0.160	(0.511)	0.144	0.016
129	10.75	0.67	0.160	(0.509)	0.144	0.016
130	10.83	0.67	0.160	(0.506)	0.144	0.016
131	10.92	0.67	0.160	(0.504)	0.144	0.016
132	11.00	0.67	0.160	(0.501)	0.144	0.016
133	11.08	0.63	0.152	(0.499)	0.137	0.015
134	11.17	0.63	0.152	(0.497)	0.137	0.015
135	11.25	0.63	0.152	(0.494)	0.137	0.015
136	11.33	0.63	0.152	(0.492)	0.137	0.015
137	11.42	0.63	0.152	(0.489)	0.137	0.015
138	11.50	0.63	0.152	(0.487)	0.137	0.015
139	11.58	0.57	0.136	(0.484)	0.122	0.014
140	11.67	0.57	0.136	(0.482)	0.122	0.014
141	11.75	0.57	0.136	(0.480)	0.122	0.014
142	11.83	0.60	0.144	(0.477)	0.130	0.014
143	11.92	0.60	0.144	(0.475)	0.130	0.014
144	12.00	0.60	0.144	(0.472)	0.130	0.014
145	12.08	0.83	0.200	(0.470)	0.180	0.020
146	12.17	0.83	0.200	(0.468)	0.180	0.020
147	12.25	0.83	0.200	(0.465)	0.180	0.020
148	12.33	0.87	0.208	(0.463)	0.187	0.021
149	12.42	0.87	0.208	(0.461)	0.187	0.021
150	12.50	0.87	0.208	(0.458)	0.187	0.021
151	12.58	0.93	0.224	(0.456)	0.202	0.022
152	12.67	0.93	0.224	(0.454)	0.202	0.022
153	12.75	0.93	0.224	(0.451)	0.202	0.022
154	12.83	0.97	0.232	(0.449)	0.209	0.023
155	12.92	0.97	0.232	(0.447)	0.209	0.023
156	13.00	0.97	0.232	(0.445)	0.209	0.023
157	13.08	1.13	0.272	(0.442)	0.245	0.027
158	13.17	1.13	0.272	(0.440)	0.245	0.027
159	13.25	1.13	0.272	(0.438)	0.245	0.027
160	13.33	1.13	0.272	(0.436)	0.245	0.027
161	13.42	1.13	0.272	(0.433)	0.245	0.027
162	13.50	1.13	0.272	(0.431)	0.245	0.027
163	13.58	0.77	0.184	(0.429)	0.166	0.018
164	13.67	0.77	0.184	(0.427)	0.166	0.018
165	13.75	0.77	0.184	(0.425)	0.166	0.018
166	13.83	0.77	0.184	(0.423)	0.166	0.018
167	13.92	0.77	0.184	(0.420)	0.166	0.018
168	14.00	0.77	0.184	(0.418)	0.166	0.018
169	14.08	0.90	0.216	(0.416)	0.194	0.022
170	14.17	0.90	0.216	(0.414)	0.194	0.022
171	14.25	0.90	0.216	(0.412)	0.194	0.022
172	14.33	0.87	0.208	(0.410)	0.187	0.021
173	14.42	0.87	0.208	(0.408)	0.187	0.021

174	14.50	0.87	0.208	(0.406)	0.187	0.021
175	14.58	0.87	0.208	(0.404)	0.187	0.021
176	14.67	0.87	0.208	(0.401)	0.187	0.021
177	14.75	0.87	0.208	(0.399)	0.187	0.021
178	14.83	0.83	0.200	(0.397)	0.180	0.020
179	14.92	0.83	0.200	(0.395)	0.180	0.020
180	15.00	0.83	0.200	(0.393)	0.180	0.020
181	15.08	0.80	0.192	(0.391)	0.173	0.019
182	15.17	0.80	0.192	(0.389)	0.173	0.019
183	15.25	0.80	0.192	(0.387)	0.173	0.019
184	15.33	0.77	0.184	(0.385)	0.166	0.018
185	15.42	0.77	0.184	(0.383)	0.166	0.018
186	15.50	0.77	0.184	(0.381)	0.166	0.018
187	15.58	0.63	0.152	(0.379)	0.137	0.015
188	15.67	0.63	0.152	(0.377)	0.137	0.015
189	15.75	0.63	0.152	(0.376)	0.137	0.015
190	15.83	0.63	0.152	(0.374)	0.137	0.015
191	15.92	0.63	0.152	(0.372)	0.137	0.015
192	16.00	0.63	0.152	(0.370)	0.137	0.015
193	16.08	0.13	0.032	(0.368)	0.029	0.003
194	16.17	0.13	0.032	(0.366)	0.029	0.003
195	16.25	0.13	0.032	(0.364)	0.029	0.003
196	16.33	0.13	0.032	(0.362)	0.029	0.003
197	16.42	0.13	0.032	(0.360)	0.029	0.003
198	16.50	0.13	0.032	(0.359)	0.029	0.003
199	16.58	0.10	0.024	(0.357)	0.022	0.002
200	16.67	0.10	0.024	(0.355)	0.022	0.002
201	16.75	0.10	0.024	(0.353)	0.022	0.002
202	16.83	0.10	0.024	(0.351)	0.022	0.002
203	16.92	0.10	0.024	(0.350)	0.022	0.002
204	17.00	0.10	0.024	(0.348)	0.022	0.002
205	17.08	0.17	0.040	(0.346)	0.036	0.004
206	17.17	0.17	0.040	(0.344)	0.036	0.004
207	17.25	0.17	0.040	(0.343)	0.036	0.004
208	17.33	0.17	0.040	(0.341)	0.036	0.004
209	17.42	0.17	0.040	(0.339)	0.036	0.004
210	17.50	0.17	0.040	(0.337)	0.036	0.004
211	17.58	0.17	0.040	(0.336)	0.036	0.004
212	17.67	0.17	0.040	(0.334)	0.036	0.004
213	17.75	0.17	0.040	(0.332)	0.036	0.004
214	17.83	0.13	0.032	(0.331)	0.029	0.003
215	17.92	0.13	0.032	(0.329)	0.029	0.003
216	18.00	0.13	0.032	(0.328)	0.029	0.003
217	18.08	0.13	0.032	(0.326)	0.029	0.003
218	18.17	0.13	0.032	(0.324)	0.029	0.003
219	18.25	0.13	0.032	(0.323)	0.029	0.003
220	18.33	0.13	0.032	(0.321)	0.029	0.003
221	18.42	0.13	0.032	(0.320)	0.029	0.003
222	18.50	0.13	0.032	(0.318)	0.029	0.003
223	18.58	0.10	0.024	(0.316)	0.022	0.002
224	18.67	0.10	0.024	(0.315)	0.022	0.002
225	18.75	0.10	0.024	(0.313)	0.022	0.002
226	18.83	0.07	0.016	(0.312)	0.014	0.002
227	18.92	0.07	0.016	(0.310)	0.014	0.002
228	19.00	0.07	0.016	(0.309)	0.014	0.002
229	19.08	0.10	0.024	(0.308)	0.022	0.002
230	19.17	0.10	0.024	(0.306)	0.022	0.002
231	19.25	0.10	0.024	(0.305)	0.022	0.002
232	19.33	0.13	0.032	(0.303)	0.029	0.003
233	19.42	0.13	0.032	(0.302)	0.029	0.003
234	19.50	0.13	0.032	(0.300)	0.029	0.003
235	19.58	0.10	0.024	(0.299)	0.022	0.002
236	19.67	0.10	0.024	(0.298)	0.022	0.002
237	19.75	0.10	0.024	(0.296)	0.022	0.002
238	19.83	0.07	0.016	(0.295)	0.014	0.002
239	19.92	0.07	0.016	(0.294)	0.014	0.002
240	20.00	0.07	0.016	(0.292)	0.014	0.002
241	20.08	0.10	0.024	(0.291)	0.022	0.002
242	20.17	0.10	0.024	(0.290)	0.022	0.002
243	20.25	0.10	0.024	(0.289)	0.022	0.002
244	20.33	0.10	0.024	(0.287)	0.022	0.002

245	20.42	0.10	0.024	(0.286)	0.022	0.002
246	20.50	0.10	0.024	(0.285)	0.022	0.002
247	20.58	0.10	0.024	(0.284)	0.022	0.002
248	20.67	0.10	0.024	(0.282)	0.022	0.002
249	20.75	0.10	0.024	(0.281)	0.022	0.002
250	20.83	0.07	0.016	(0.280)	0.014	0.002
251	20.92	0.07	0.016	(0.279)	0.014	0.002
252	21.00	0.07	0.016	(0.278)	0.014	0.002
253	21.08	0.10	0.024	(0.277)	0.022	0.002
254	21.17	0.10	0.024	(0.276)	0.022	0.002
255	21.25	0.10	0.024	(0.275)	0.022	0.002
256	21.33	0.07	0.016	(0.274)	0.014	0.002
257	21.42	0.07	0.016	(0.273)	0.014	0.002
258	21.50	0.07	0.016	(0.272)	0.014	0.002
259	21.58	0.10	0.024	(0.271)	0.022	0.002
260	21.67	0.10	0.024	(0.270)	0.022	0.002
261	21.75	0.10	0.024	(0.269)	0.022	0.002
262	21.83	0.07	0.016	(0.268)	0.014	0.002
263	21.92	0.07	0.016	(0.267)	0.014	0.002
264	22.00	0.07	0.016	(0.266)	0.014	0.002
265	22.08	0.10	0.024	(0.265)	0.022	0.002
266	22.17	0.10	0.024	(0.264)	0.022	0.002
267	22.25	0.10	0.024	(0.263)	0.022	0.002
268	22.33	0.07	0.016	(0.262)	0.014	0.002
269	22.42	0.07	0.016	(0.262)	0.014	0.002
270	22.50	0.07	0.016	(0.261)	0.014	0.002
271	22.58	0.07	0.016	(0.260)	0.014	0.002
272	22.67	0.07	0.016	(0.259)	0.014	0.002
273	22.75	0.07	0.016	(0.259)	0.014	0.002
274	22.83	0.07	0.016	(0.258)	0.014	0.002
275	22.92	0.07	0.016	(0.257)	0.014	0.002
276	23.00	0.07	0.016	(0.257)	0.014	0.002
277	23.08	0.07	0.016	(0.256)	0.014	0.002
278	23.17	0.07	0.016	(0.256)	0.014	0.002
279	23.25	0.07	0.016	(0.255)	0.014	0.002
280	23.33	0.07	0.016	(0.255)	0.014	0.002
281	23.42	0.07	0.016	(0.254)	0.014	0.002
282	23.50	0.07	0.016	(0.254)	0.014	0.002
283	23.58	0.07	0.016	(0.253)	0.014	0.002
284	23.67	0.07	0.016	(0.253)	0.014	0.002
285	23.75	0.07	0.016	(0.252)	0.014	0.002
286	23.83	0.07	0.016	(0.252)	0.014	0.002
287	23.92	0.07	0.016	(0.252)	0.014	0.002
288	24.00	0.07	0.016	(0.252)	0.014	0.002

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                (Loss Rate Not Used)
    Sum =     100.0                                  Sum =     2.4
      Flood volume = Effective rainfall      0.20(In)
       times area      29.7(Ac.)/[(In)/(Ft.)] =       0.5(Ac.Ft)
      Total soil loss =      1.80(In)
      Total soil loss =     4.455(Ac.Ft)
      Total rainfall =      2.00(In)
      Flood volume =       21560.9 Cubic Feet
      Total soil loss =      194048.5 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.806(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0       2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5      0.0000      0.01  Q          |         |         |         |
  0+10      0.0002      0.03  Q          |         |         |         |
  0+15      0.0005      0.04  Q          |         |         |         |
  0+20      0.0008      0.04  Q          |         |         |         |
  0+25      0.0012      0.06  Q          |         |         |         |
  0+30      0.0016      0.06  Q          |         |         |         |
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 0+35    0.0021    0.07  Q         |         |         |         |
 0+40    0.0025    0.07  Q         |         |         |         |
 0+45    0.0030    0.07  Q         |         |         |         |
 0+50    0.0035    0.07  Q         |         |         |         |
 0+55    0.0041    0.08  Q         |         |         |         |
 1+ 0    0.0047    0.09  Q         |         |         |         |
 1+ 5    0.0053    0.09  Q         |         |         |         |
 1+10    0.0059    0.08  Q         |         |         |         |
 1+15    0.0064    0.08  Q         |         |         |         |
 1+20    0.0069    0.07  Q         |         |         |         |
 1+25    0.0074    0.07  Q         |         |         |         |
 1+30    0.0079    0.07  Q         |         |         |         |
 1+35    0.0084    0.07  Q         |         |         |         |
 1+40    0.0089    0.07  Q         |         |         |         |
 1+45    0.0094    0.07  Q         |         |         |         |
 1+50    0.0099    0.08  Q         |         |         |         |
 1+55    0.0105    0.09  Q         |         |         |         |
 2+ 0    0.0112    0.09  Q         |         |         |         |
 2+ 5    0.0118    0.09  Q         |         |         |         |
 2+10    0.0124    0.09  QV        |         |         |         |
 2+15    0.0131    0.09  QV        |         |         |         |
 2+20    0.0137    0.09  QV        |         |         |         |
 2+25    0.0144    0.10  QV        |         |         |         |
 2+30    0.0150    0.10  QV        |         |         |         |
 2+35    0.0157    0.10  QV        |         |         |         |
 2+40    0.0165    0.11  QV        |         |         |         |
 2+45    0.0173    0.11  QV        |         |         |         |
 2+50    0.0181    0.12  QV        |         |         |         |
 2+55    0.0189    0.12  QV        |         |         |         |
 3+ 0    0.0197    0.12  QV        |         |         |         |
 3+ 5    0.0205    0.12  QV        |         |         |         |
 3+10    0.0213    0.12  QV        |         |         |         |
 3+15    0.0221    0.12  QV        |         |         |         |
 3+20    0.0230    0.12  QV        |         |         |         |
 3+25    0.0238    0.12  QV        |         |         |         |
 3+30    0.0246    0.12  QV        |         |         |         |
 3+35    0.0254    0.12  Q V       |         |         |         |
 3+40    0.0263    0.12  Q V       |         |         |         |
 3+45    0.0271    0.12  Q V       |         |         |         |
 3+50    0.0279    0.12  Q V       |         |         |         |
 3+55    0.0289    0.13  Q V       |         |         |         |
 4+ 0    0.0298    0.14  Q V       |         |         |         |
 4+ 5    0.0308    0.14  Q V       |         |         |         |
 4+10    0.0318    0.14  Q V       |         |         |         |
 4+15    0.0327    0.14  Q V       |         |         |         |
 4+20    0.0337    0.15  Q V       |         |         |         |
 4+25    0.0348    0.16  Q V       |         |         |         |
 4+30    0.0359    0.16  Q V       |         |         |         |
 4+35    0.0371    0.16  Q V       |         |         |         |
 4+40    0.0382    0.17  Q  V      |         |         |         |
 4+45    0.0393    0.17  Q  V      |         |         |         |
 4+50    0.0405    0.17  Q  V      |         |         |         |
 4+55    0.0417    0.18  Q  V      |         |         |         |
 5+ 0    0.0430    0.19  Q  V      |         |         |         |
 5+ 5    0.0443    0.18  Q  V      |         |         |         |
 5+10    0.0454    0.16  Q  V      |         |         |         |
 5+15    0.0465    0.15  Q  V      |         |         |         |
 5+20    0.0475    0.15  Q  V      |         |         |         |
 5+25    0.0486    0.16  Q  V      |         |         |         |
 5+30    0.0498    0.16  Q   V     |         |         |         |
 5+35    0.0509    0.17  Q   V     |         |         |         |
 5+40    0.0522    0.18  Q   V     |         |         |         |
 5+45    0.0534    0.19  Q   V     |         |         |         |
 5+50    0.0547    0.19  Q   V     |         |         |         |
 5+55    0.0560    0.19  Q   V     |         |         |         |
 6+ 0    0.0573    0.19  Q   V     |         |         |         |
 6+ 5    0.0587    0.19  Q   V     |         |         |         |
 6+10    0.0601    0.20  Q   V     |         |         |         |
 6+15    0.0615    0.21  Q   V     |         |         |         |
 6+20    0.0630    0.21  Q    V    |         |         |         |
 6+25    0.0644    0.21  Q    V    |         |         |         |
```



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 6+30    0.0659    0.21  Q    V    |         |         |         |
 6+35    0.0674    0.22  Q    V    |         |         |         |
 6+40    0.0690    0.23  Q    V    |         |         |         |
 6+45    0.0706    0.23  Q    V    |         |         |         |
 6+50    0.0722    0.24  Q    V    |         |         |         |
 6+55    0.0739    0.24  Q    V    |         |         |         |
 7+ 0    0.0755    0.24  Q     V   |         |         |         |
 7+ 5    0.0771    0.24  Q     V   |         |         |         |
 7+10    0.0788    0.24  Q     V   |         |         |         |
 7+15    0.0804    0.24  Q     V   |         |         |         |
 7+20    0.0821    0.24  Q     V   |         |         |         |
 7+25    0.0838    0.25  |Q    V   |         |         |         |
 7+30    0.0856    0.26  |Q    V   |         |         |         |
 7+35    0.0874    0.26  |Q     V  |         |         |         |
 7+40    0.0893    0.27  |Q     V  |         |         |         |
 7+45    0.0913    0.28  |Q     V  |         |         |         |
 7+50    0.0932    0.29  |Q     V  |         |         |         |
 7+55    0.0953    0.30  |Q     V  |         |         |         |
 8+ 0    0.0974    0.30  |Q     V  |         |         |         |
 8+ 5    0.0995    0.31  |Q      V |         |         |         |
 8+10    0.1018    0.34  |Q      V |         |         |         |
 8+15    0.1042    0.35  |Q      V |         |         |         |
 8+20    0.1066    0.35  |Q      V |         |         |         |
 8+25    0.1091    0.35  |Q      V |         |         |         |
 8+30    0.1115    0.36  |Q       V|         |         |         |
 8+35    0.1140    0.36  |Q       V|         |         |         |
 8+40    0.1166    0.37  |Q       V|         |         |         |
 8+45    0.1192    0.38  |Q       V|         |         |         |
 8+50    0.1218    0.38  |Q       V|         |         |         |
 8+55    0.1245    0.39  |Q        V         |         |         |
 9+ 0    0.1273    0.40  |Q        V         |         |         |
 9+ 5    0.1301    0.41  |Q        V         |         |         |
 9+10    0.1330    0.43  |Q        V         |         |         |
 9+15    0.1361    0.44  |Q        V         |         |         |
 9+20    0.1392    0.45  |Q        |V        |         |         |
 9+25    0.1424    0.46  |Q        |V        |         |         |
 9+30    0.1456    0.47  |Q        |V        |         |         |
 9+35    0.1489    0.48  |Q        | V       |         |         |
 9+40    0.1523    0.49  |Q        | V       |         |         |
 9+45    0.1557    0.50  |Q        | V       |         |         |
 9+50    0.1591    0.50  | Q       | V       |         |         |
 9+55    0.1627    0.51  | Q       |  V      |         |         |
10+ 0    0.1662    0.52  | Q       |  V      |         |         |
10+ 5    0.1697    0.50  | Q       |  V      |         |         |
10+10    0.1727    0.43  |Q        |  V      |         |         |
10+15    0.1754    0.40  |Q        |   V     |         |         |
10+20    0.1780    0.38  |Q        |   V     |         |         |
10+25    0.1806    0.38  |Q        |   V     |         |         |
10+30    0.1832    0.37  |Q        |   V     |         |         |
10+35    0.1858    0.38  |Q        |    V    |         |         |
10+40    0.1887    0.43  |Q        |    V    |         |         |
10+45    0.1919    0.45  |Q        |    V    |         |         |
10+50    0.1951    0.46  |Q        |    V    |         |         |
10+55    0.1983    0.47  |Q        |     V   |         |         |
11+ 0    0.2015    0.47  |Q        |     V   |         |         |
11+ 5    0.2048    0.47  |Q        |     V   |         |         |
11+10    0.2080    0.46  |Q        |     V   |         |         |
11+15    0.2111    0.46  |Q        |      V  |         |         |
11+20    0.2143    0.46  |Q        |      V  |         |         |
11+25    0.2174    0.46  |Q        |      V  |         |         |
11+30    0.2206    0.46  |Q        |      V  |         |         |
11+35    0.2237    0.45  |Q        |       V |         |         |
11+40    0.2266    0.43  |Q        |       V |         |         |
11+45    0.2295    0.42  |Q        |       V |         |         |
11+50    0.2324    0.42  |Q        |       V |         |         |
11+55    0.2353    0.43  |Q        |        V|         |         |
12+ 0    0.2383    0.43  |Q        |        V|         |         |
12+ 5    0.2414    0.45  |Q        |        V|         |         |
12+10    0.2450    0.52  | Q       |        V|         |         |
12+15    0.2488    0.56  | Q       |         V         |         |
12+20    0.2528    0.58  | Q       |         V         |         |
```

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12+25       0.2569      0.60  | Q       |         V         |         |
12+30       0.2611      0.61  | Q       |         |V        |         |
12+35       0.2653      0.62  | Q       |         |V        |         |
12+40       0.2697      0.64  | Q       |         |V        |         |
12+45       0.2743      0.66  | Q       |         | V       |         |
12+50       0.2788      0.66  | Q       |         | V       |         |
12+55       0.2835      0.68  | Q       |         | V       |         |
13+ 0       0.2882      0.69  | Q       |         |  V      |         |
13+ 5       0.2931      0.70  | Q       |         |  V      |         |
13+10       0.2983      0.76  |  Q      |         |   V     |         |
13+15       0.3037      0.78  |  Q      |         |   V     |         |
13+20       0.3092      0.80  |  Q      |         |   V     |         |
13+25       0.3147      0.80  |  Q      |         |    V    |         |
13+30       0.3203      0.81  |  Q      |         |    V    |         |
13+35       0.3256      0.78  |  Q      |         |     V   |         |
13+40       0.3302      0.66  | Q       |         |     V   |         |
13+45       0.3344      0.61  | Q       |         |      V  |         |
13+50       0.3384      0.59  | Q       |         |      V  |         |
13+55       0.3424      0.58  | Q       |         |      V  |         |
14+ 0       0.3463      0.57  | Q       |         |      V  |         |
14+ 5       0.3503      0.57  | Q       |         |       V |         |
14+10       0.3545      0.61  | Q       |         |       V |         |
14+15       0.3588      0.63  | Q       |         |       V |         |
14+20       0.3632      0.63  | Q       |         |        V|         |
14+25       0.3675      0.62  | Q       |         |        V|         |
14+30       0.3718      0.62  | Q       |         |         V         |
14+35       0.3760      0.62  | Q       |         |         V         |
14+40       0.3803      0.62  | Q       |         |         V         |
14+45       0.3846      0.62  | Q       |         |         |V        |
14+50       0.3889      0.62  | Q       |         |         |V        |
14+55       0.3931      0.61  | Q       |         |         |V        |
15+ 0       0.3973      0.60  | Q       |         |         | V       |
15+ 5       0.4014      0.60  | Q       |         |         | V       |
15+10       0.4054      0.59  | Q       |         |         | V       |
15+15       0.4095      0.58  | Q       |         |         |  V      |
15+20       0.4134      0.58  | Q       |         |         |  V      |
15+25       0.4173      0.56  | Q       |         |         |  V      |
15+30       0.4212      0.56  | Q       |         |         |   V     |
15+35       0.4249      0.54  | Q       |         |         |   V     |
15+40       0.4283      0.50  | Q       |         |         |   V     |
15+45       0.4317      0.48  |Q        |         |         |   V     |
15+50       0.4349      0.47  |Q        |         |         |    V    |
15+55       0.4381      0.47  |Q        |         |         |    V    |
16+ 0       0.4413      0.46  |Q        |         |         |    V    |
16+ 5       0.4441      0.41  |Q        |         |         |    V    |
16+10       0.4459      0.26  |Q        |         |         |     V   |
16+15       0.4471      0.18  Q         |         |         |     V   |
16+20       0.4482      0.15  Q         |         |         |     V   |
16+25       0.4491      0.13  Q         |         |         |     V   |
16+30       0.4499      0.12  Q         |         |         |     V   |
16+35       0.4506      0.11  Q         |         |         |     V   |
16+40       0.4513      0.09  Q         |         |         |     V   |
16+45       0.4518      0.08  Q         |         |         |     V   |
16+50       0.4524      0.08  Q         |         |         |     V   |
16+55       0.4529      0.07  Q         |         |         |     V   |
17+ 0       0.4534      0.07  Q         |         |         |     V   |
17+ 5       0.4539      0.08  Q         |         |         |     V   |
17+10       0.4546      0.10  Q         |         |         |     V   |
17+15       0.4554      0.11  Q         |         |         |     V   |
17+20       0.4562      0.11  Q         |         |         |     V   |
17+25       0.4569      0.12  Q         |         |         |     V   |
17+30       0.4578      0.12  Q         |         |         |     V   |
17+35       0.4586      0.12  Q         |         |         |      V  |
17+40       0.4594      0.12  Q         |         |         |      V  |
17+45       0.4602      0.12  Q         |         |         |      V  |
17+50       0.4610      0.12  Q         |         |         |      V  |
17+55       0.4617      0.11  Q         |         |         |      V  |
18+ 0       0.4624      0.10  Q         |         |         |      V  |
18+ 5       0.4631      0.10  Q         |         |         |      V  |
18+10       0.4638      0.10  Q         |         |         |      V  |
18+15       0.4645      0.10  Q         |         |         |      V  |
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18+20       0.4651      0.10  Q         |         |         |      V  |
18+25       0.4658      0.10  Q         |         |         |      V  |
18+30       0.4665      0.10  Q         |         |         |      V  |
18+35       0.4671      0.09  Q         |         |         |      V  |
18+40       0.4677      0.08  Q         |         |         |      V  |
18+45       0.4682      0.08  Q         |         |         |      V  |
18+50       0.4687      0.07  Q         |         |         |      V  |
18+55       0.4691      0.06  Q         |         |         |      V  |
19+ 0       0.4695      0.06  Q         |         |         |      V  |
19+ 5       0.4699      0.06  Q         |         |         |      V  |
19+10       0.4703      0.06  Q         |         |         |       V |
19+15       0.4708      0.07  Q         |         |         |       V |
19+20       0.4713      0.07  Q         |         |         |       V |
19+25       0.4719      0.08  Q         |         |         |       V |
19+30       0.4725      0.09  Q         |         |         |       V |
19+35       0.4731      0.09  Q         |         |         |       V |
19+40       0.4736      0.08  Q         |         |         |       V |
19+45       0.4742      0.08  Q         |         |         |       V |
19+50       0.4746      0.07  Q         |         |         |       V |
19+55       0.4751      0.06  Q         |         |         |       V |
20+ 0       0.4754      0.05  Q         |         |         |       V |
20+ 5       0.4758      0.06  Q         |         |         |       V |
20+10       0.4763      0.06  Q         |         |         |       V |
20+15       0.4767      0.07  Q         |         |         |       V |
20+20       0.4772      0.07  Q         |         |         |       V |
20+25       0.4777      0.07  Q         |         |         |       V |
20+30       0.4782      0.07  Q         |         |         |       V |
20+35       0.4787      0.07  Q         |         |         |       V |
20+40       0.4792      0.07  Q         |         |         |       V |
20+45       0.4797      0.07  Q         |         |         |       V |
20+50       0.4801      0.07  Q         |         |         |       V |
20+55       0.4805      0.06  Q         |         |         |       V |
21+ 0       0.4809      0.05  Q         |         |         |       V |
21+ 5       0.4813      0.05  Q         |         |         |       V |
21+10       0.4817      0.06  Q         |         |         |       V |
21+15       0.4822      0.07  Q         |         |         |       V |
21+20       0.4826      0.07  Q         |         |         |        V|
21+25       0.4830      0.06  Q         |         |         |        V|
21+30       0.4834      0.05  Q         |         |         |        V|
21+35       0.4838      0.05  Q         |         |         |        V|
21+40       0.4842      0.06  Q         |         |         |        V|
21+45       0.4847      0.07  Q         |         |         |        V|
21+50       0.4851      0.07  Q         |         |         |        V|
21+55       0.4855      0.06  Q         |         |         |        V|
22+ 0       0.4859      0.05  Q         |         |         |        V|
22+ 5       0.4862      0.05  Q         |         |         |        V|
22+10       0.4867      0.06  Q         |         |         |        V|
22+15       0.4871      0.07  Q         |         |         |        V|
22+20       0.4876      0.07  Q         |         |         |        V|
22+25       0.4880      0.06  Q         |         |         |        V|
22+30       0.4883      0.05  Q         |         |         |        V|
22+35       0.4887      0.05  Q         |         |         |        V|
22+40       0.4890      0.05  Q         |         |         |        V|
22+45       0.4894      0.05  Q         |         |         |        V|
22+50       0.4897      0.05  Q         |         |         |        V|
22+55       0.4900      0.05  Q         |         |         |        V|
23+ 0       0.4904      0.05  Q         |         |         |        V|
23+ 5       0.4907      0.05  Q         |         |         |        V|
23+10       0.4910      0.05  Q         |         |         |        V|
23+15       0.4914      0.05  Q         |         |         |        V|
23+20       0.4917      0.05  Q         |         |         |        V|
23+25       0.4920      0.05  Q         |         |         |        V|
23+30       0.4923      0.05  Q         |         |         |        V|
23+35       0.4927      0.05  Q         |         |         |        V|
23+40       0.4930      0.05  Q         |         |         |        V|
23+45       0.4933      0.05  Q         |         |         |        V|
23+50       0.4937      0.05  Q         |         |         |        V|
23+55       0.4940      0.05  Q         |         |         |        V|
24+ 0       0.4943      0.05  Q         |         |         |        V|
24+ 5       0.4946      0.04  Q         |         |         |        V|
24+10       0.4948      0.02  Q         |         |         |        V|
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   24+15       0.4948      0.01  Q        |         |         |        V|
   24+20       0.4949      0.01  Q        |         |         |        V|
   24+25       0.4949      0.00  Q        |         |         |        V|
   24+30       0.4949      0.00  Q        |         |         |        V|
   24+35       0.4950      0.00  Q        |         |         |        V|
   24+40       0.4950      0.00  Q        |         |         |        V|
   24+45       0.4950      0.00  Q        |         |         |        V|
   24+50       0.4950      0.00  Q        |         |         |        V|
-----------------------------------------------------------------------
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APPENDIX C.4: AREA "A2" – POST-PROJECT CONDITION

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 06/10/16 File: ARA2ONSITE242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 2-YEAR, 24-HOUR STORM DURATION
ONSITE AREA "A2"
FILENAME: ARA2ONSITE

Drainage Area = 29.70(Ac.) = 0.046 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 29.70(Ac.) = 0.046 Sq. Mi.
Length along longest watercourse = 2054.72(Ft.)
Length along longest watercourse measured to centroid = 1192.18(Ft.)
Length along longest watercourse = 0.389 Mi.
Length along longest watercourse measured to centroid = 0.226 Mi.
Difference in elevation = 65.10(Ft.)
Slope along watercourse = 167.2870 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.054 Hr.
Lag time = 3.24 Min.
25% of lag time = 0.81 Min.
40% of lag time = 1.30 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
29.70	2.00	59.40

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
29.70	5.00	148.50

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.000(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 2.000(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
29.700	53.20	0.500

Total Area Entered = 29.70(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
53.2	33.6	0.728	0.500	0.400	1.000	0.400
					Sum (F) =	0.400

Area averaged mean soil loss (F) (In/Hr) = 0.400
Minimum soil loss rate ((In/Hr)) = 0.200
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	154.284	34.196	10.236
2	0.167	308.567	46.694	13.976
3	0.250	462.851	10.938	3.274
4	0.333	617.135	4.754	1.423
5	0.417	771.418	2.347	0.702
6	0.500	925.702	1.071	0.321
			Sum = 100.000	Sum= 29.932

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.016	(0.710)	0.008	0.008
2	0.17	0.07	0.016	(0.707)	0.008	0.008
3	0.25	0.07	0.016	(0.704)	0.008	0.008
4	0.33	0.10	0.024	(0.702)	0.012	0.012
5	0.42	0.10	0.024	(0.699)	0.012	0.012
6	0.50	0.10	0.024	(0.696)	0.012	0.012
7	0.58	0.10	0.024	(0.693)	0.012	0.012
8	0.67	0.10	0.024	(0.691)	0.012	0.012
9	0.75	0.10	0.024	(0.688)	0.012	0.012
10	0.83	0.13	0.032	(0.685)	0.016	0.016
11	0.92	0.13	0.032	(0.683)	0.016	0.016
12	1.00	0.13	0.032	(0.680)	0.016	0.016
13	1.08	0.10	0.024	(0.677)	0.012	0.012
14	1.17	0.10	0.024	(0.674)	0.012	0.012
15	1.25	0.10	0.024	(0.672)	0.012	0.012
16	1.33	0.10	0.024	(0.669)	0.012	0.012
17	1.42	0.10	0.024	(0.666)	0.012	0.012
18	1.50	0.10	0.024	(0.664)	0.012	0.012
19	1.58	0.10	0.024	(0.661)	0.012	0.012
20	1.67	0.10	0.024	(0.659)	0.012	0.012
21	1.75	0.10	0.024	(0.656)	0.012	0.012
22	1.83	0.13	0.032	(0.653)	0.016	0.016
23	1.92	0.13	0.032	(0.651)	0.016	0.016
24	2.00	0.13	0.032	(0.648)	0.016	0.016
25	2.08	0.13	0.032	(0.645)	0.016	0.016
26	2.17	0.13	0.032	(0.643)	0.016	0.016
27	2.25	0.13	0.032	(0.640)	0.016	0.016
28	2.33	0.13	0.032	(0.638)	0.016	0.016
29	2.42	0.13	0.032	(0.635)	0.016	0.016
30	2.50	0.13	0.032	(0.632)	0.016	0.016
31	2.58	0.17	0.040	(0.630)	0.020	0.020
32	2.67	0.17	0.040	(0.627)	0.020	0.020
33	2.75	0.17	0.040	(0.625)	0.020	0.020
34	2.83	0.17	0.040	(0.622)	0.020	0.020
35	2.92	0.17	0.040	(0.619)	0.020	0.020
36	3.00	0.17	0.040	(0.617)	0.020	0.020

37	3.08	0.17	0.040	(0.614)	0.020	0.020
38	3.17	0.17	0.040	(0.612)	0.020	0.020
39	3.25	0.17	0.040	(0.609)	0.020	0.020
40	3.33	0.17	0.040	(0.607)	0.020	0.020
41	3.42	0.17	0.040	(0.604)	0.020	0.020
42	3.50	0.17	0.040	(0.602)	0.020	0.020
43	3.58	0.17	0.040	(0.599)	0.020	0.020
44	3.67	0.17	0.040	(0.597)	0.020	0.020
45	3.75	0.17	0.040	(0.594)	0.020	0.020
46	3.83	0.20	0.048	(0.592)	0.024	0.024
47	3.92	0.20	0.048	(0.589)	0.024	0.024
48	4.00	0.20	0.048	(0.587)	0.024	0.024
49	4.08	0.20	0.048	(0.584)	0.024	0.024
50	4.17	0.20	0.048	(0.582)	0.024	0.024
51	4.25	0.20	0.048	(0.579)	0.024	0.024
52	4.33	0.23	0.056	(0.577)	0.028	0.028
53	4.42	0.23	0.056	(0.574)	0.028	0.028
54	4.50	0.23	0.056	(0.572)	0.028	0.028
55	4.58	0.23	0.056	(0.569)	0.028	0.028
56	4.67	0.23	0.056	(0.567)	0.028	0.028
57	4.75	0.23	0.056	(0.564)	0.028	0.028
58	4.83	0.27	0.064	(0.562)	0.032	0.032
59	4.92	0.27	0.064	(0.560)	0.032	0.032
60	5.00	0.27	0.064	(0.557)	0.032	0.032
61	5.08	0.20	0.048	(0.555)	0.024	0.024
62	5.17	0.20	0.048	(0.552)	0.024	0.024
63	5.25	0.20	0.048	(0.550)	0.024	0.024
64	5.33	0.23	0.056	(0.547)	0.028	0.028
65	5.42	0.23	0.056	(0.545)	0.028	0.028
66	5.50	0.23	0.056	(0.543)	0.028	0.028
67	5.58	0.27	0.064	(0.540)	0.032	0.032
68	5.67	0.27	0.064	(0.538)	0.032	0.032
69	5.75	0.27	0.064	(0.536)	0.032	0.032
70	5.83	0.27	0.064	(0.533)	0.032	0.032
71	5.92	0.27	0.064	(0.531)	0.032	0.032
72	6.00	0.27	0.064	(0.528)	0.032	0.032
73	6.08	0.30	0.072	(0.526)	0.036	0.036
74	6.17	0.30	0.072	(0.524)	0.036	0.036
75	6.25	0.30	0.072	(0.521)	0.036	0.036
76	6.33	0.30	0.072	(0.519)	0.036	0.036
77	6.42	0.30	0.072	(0.517)	0.036	0.036
78	6.50	0.30	0.072	(0.514)	0.036	0.036
79	6.58	0.33	0.080	(0.512)	0.040	0.040
80	6.67	0.33	0.080	(0.510)	0.040	0.040
81	6.75	0.33	0.080	(0.508)	0.040	0.040
82	6.83	0.33	0.080	(0.505)	0.040	0.040
83	6.92	0.33	0.080	(0.503)	0.040	0.040
84	7.00	0.33	0.080	(0.501)	0.040	0.040
85	7.08	0.33	0.080	(0.498)	0.040	0.040
86	7.17	0.33	0.080	(0.496)	0.040	0.040
87	7.25	0.33	0.080	(0.494)	0.040	0.040
88	7.33	0.37	0.088	(0.492)	0.044	0.044
89	7.42	0.37	0.088	(0.489)	0.044	0.044
90	7.50	0.37	0.088	(0.487)	0.044	0.044
91	7.58	0.40	0.096	(0.485)	0.048	0.048
92	7.67	0.40	0.096	(0.483)	0.048	0.048
93	7.75	0.40	0.096	(0.480)	0.048	0.048
94	7.83	0.43	0.104	(0.478)	0.052	0.052
95	7.92	0.43	0.104	(0.476)	0.052	0.052
96	8.00	0.43	0.104	(0.474)	0.052	0.052
97	8.08	0.50	0.120	(0.472)	0.060	0.060
98	8.17	0.50	0.120	(0.469)	0.060	0.060
99	8.25	0.50	0.120	(0.467)	0.060	0.060
100	8.33	0.50	0.120	(0.465)	0.060	0.060
101	8.42	0.50	0.120	(0.463)	0.060	0.060
102	8.50	0.50	0.120	(0.461)	0.060	0.060
103	8.58	0.53	0.128	(0.459)	0.064	0.064
104	8.67	0.53	0.128	(0.456)	0.064	0.064
105	8.75	0.53	0.128	(0.454)	0.064	0.064
106	8.83	0.57	0.136	(0.452)	0.068	0.068
107	8.92	0.57	0.136	(0.450)	0.068	0.068

108	9.00	0.57	0.136	(0.448)	0.068	0.068
109	9.08	0.63	0.152	(0.446)	0.076	0.076
110	9.17	0.63	0.152	(0.444)	0.076	0.076
111	9.25	0.63	0.152	(0.441)	0.076	0.076
112	9.33	0.67	0.160	(0.439)	0.080	0.080
113	9.42	0.67	0.160	(0.437)	0.080	0.080
114	9.50	0.67	0.160	(0.435)	0.080	0.080
115	9.58	0.70	0.168	(0.433)	0.084	0.084
116	9.67	0.70	0.168	(0.431)	0.084	0.084
117	9.75	0.70	0.168	(0.429)	0.084	0.084
118	9.83	0.73	0.176	(0.427)	0.088	0.088
119	9.92	0.73	0.176	(0.425)	0.088	0.088
120	10.00	0.73	0.176	(0.423)	0.088	0.088
121	10.08	0.50	0.120	(0.421)	0.060	0.060
122	10.17	0.50	0.120	(0.419)	0.060	0.060
123	10.25	0.50	0.120	(0.417)	0.060	0.060
124	10.33	0.50	0.120	(0.415)	0.060	0.060
125	10.42	0.50	0.120	(0.413)	0.060	0.060
126	10.50	0.50	0.120	(0.411)	0.060	0.060
127	10.58	0.67	0.160	(0.409)	0.080	0.080
128	10.67	0.67	0.160	(0.407)	0.080	0.080
129	10.75	0.67	0.160	(0.405)	0.080	0.080
130	10.83	0.67	0.160	(0.403)	0.080	0.080
131	10.92	0.67	0.160	(0.401)	0.080	0.080
132	11.00	0.67	0.160	(0.399)	0.080	0.080
133	11.08	0.63	0.152	(0.397)	0.076	0.076
134	11.17	0.63	0.152	(0.395)	0.076	0.076
135	11.25	0.63	0.152	(0.393)	0.076	0.076
136	11.33	0.63	0.152	(0.391)	0.076	0.076
137	11.42	0.63	0.152	(0.389)	0.076	0.076
138	11.50	0.63	0.152	(0.387)	0.076	0.076
139	11.58	0.57	0.136	(0.385)	0.068	0.068
140	11.67	0.57	0.136	(0.383)	0.068	0.068
141	11.75	0.57	0.136	(0.381)	0.068	0.068
142	11.83	0.60	0.144	(0.379)	0.072	0.072
143	11.92	0.60	0.144	(0.378)	0.072	0.072
144	12.00	0.60	0.144	(0.376)	0.072	0.072
145	12.08	0.83	0.200	(0.374)	0.100	0.100
146	12.17	0.83	0.200	(0.372)	0.100	0.100
147	12.25	0.83	0.200	(0.370)	0.100	0.100
148	12.33	0.87	0.208	(0.368)	0.104	0.104
149	12.42	0.87	0.208	(0.366)	0.104	0.104
150	12.50	0.87	0.208	(0.364)	0.104	0.104
151	12.58	0.93	0.224	(0.363)	0.112	0.112
152	12.67	0.93	0.224	(0.361)	0.112	0.112
153	12.75	0.93	0.224	(0.359)	0.112	0.112
154	12.83	0.97	0.232	(0.357)	0.116	0.116
155	12.92	0.97	0.232	(0.355)	0.116	0.116
156	13.00	0.97	0.232	(0.354)	0.116	0.116
157	13.08	1.13	0.272	(0.352)	0.136	0.136
158	13.17	1.13	0.272	(0.350)	0.136	0.136
159	13.25	1.13	0.272	(0.348)	0.136	0.136
160	13.33	1.13	0.272	(0.346)	0.136	0.136
161	13.42	1.13	0.272	(0.345)	0.136	0.136
162	13.50	1.13	0.272	(0.343)	0.136	0.136
163	13.58	0.77	0.184	(0.341)	0.092	0.092
164	13.67	0.77	0.184	(0.339)	0.092	0.092
165	13.75	0.77	0.184	(0.338)	0.092	0.092
166	13.83	0.77	0.184	(0.336)	0.092	0.092
167	13.92	0.77	0.184	(0.334)	0.092	0.092
168	14.00	0.77	0.184	(0.333)	0.092	0.092
169	14.08	0.90	0.216	(0.331)	0.108	0.108
170	14.17	0.90	0.216	(0.329)	0.108	0.108
171	14.25	0.90	0.216	(0.328)	0.108	0.108
172	14.33	0.87	0.208	(0.326)	0.104	0.104
173	14.42	0.87	0.208	(0.324)	0.104	0.104
174	14.50	0.87	0.208	(0.322)	0.104	0.104
175	14.58	0.87	0.208	(0.321)	0.104	0.104
176	14.67	0.87	0.208	(0.319)	0.104	0.104
177	14.75	0.87	0.208	(0.318)	0.104	0.104
178	14.83	0.83	0.200	(0.316)	0.100	0.100

179	14.92	0.83	0.200	(0.314)	0.100	0.100
180	15.00	0.83	0.200	(0.313)	0.100	0.100
181	15.08	0.80	0.192	(0.311)	0.096	0.096
182	15.17	0.80	0.192	(0.310)	0.096	0.096
183	15.25	0.80	0.192	(0.308)	0.096	0.096
184	15.33	0.77	0.184	(0.306)	0.092	0.092
185	15.42	0.77	0.184	(0.305)	0.092	0.092
186	15.50	0.77	0.184	(0.303)	0.092	0.092
187	15.58	0.63	0.152	(0.302)	0.076	0.076
188	15.67	0.63	0.152	(0.300)	0.076	0.076
189	15.75	0.63	0.152	(0.299)	0.076	0.076
190	15.83	0.63	0.152	(0.297)	0.076	0.076
191	15.92	0.63	0.152	(0.296)	0.076	0.076
192	16.00	0.63	0.152	(0.294)	0.076	0.076
193	16.08	0.13	0.032	(0.293)	0.016	0.016
194	16.17	0.13	0.032	(0.291)	0.016	0.016
195	16.25	0.13	0.032	(0.290)	0.016	0.016
196	16.33	0.13	0.032	(0.288)	0.016	0.016
197	16.42	0.13	0.032	(0.287)	0.016	0.016
198	16.50	0.13	0.032	(0.285)	0.016	0.016
199	16.58	0.10	0.024	(0.284)	0.012	0.012
200	16.67	0.10	0.024	(0.282)	0.012	0.012
201	16.75	0.10	0.024	(0.281)	0.012	0.012
202	16.83	0.10	0.024	(0.279)	0.012	0.012
203	16.92	0.10	0.024	(0.278)	0.012	0.012
204	17.00	0.10	0.024	(0.277)	0.012	0.012
205	17.08	0.17	0.040	(0.275)	0.020	0.020
206	17.17	0.17	0.040	(0.274)	0.020	0.020
207	17.25	0.17	0.040	(0.272)	0.020	0.020
208	17.33	0.17	0.040	(0.271)	0.020	0.020
209	17.42	0.17	0.040	(0.270)	0.020	0.020
210	17.50	0.17	0.040	(0.268)	0.020	0.020
211	17.58	0.17	0.040	(0.267)	0.020	0.020
212	17.67	0.17	0.040	(0.266)	0.020	0.020
213	17.75	0.17	0.040	(0.264)	0.020	0.020
214	17.83	0.13	0.032	(0.263)	0.016	0.016
215	17.92	0.13	0.032	(0.262)	0.016	0.016
216	18.00	0.13	0.032	(0.260)	0.016	0.016
217	18.08	0.13	0.032	(0.259)	0.016	0.016
218	18.17	0.13	0.032	(0.258)	0.016	0.016
219	18.25	0.13	0.032	(0.257)	0.016	0.016
220	18.33	0.13	0.032	(0.255)	0.016	0.016
221	18.42	0.13	0.032	(0.254)	0.016	0.016
222	18.50	0.13	0.032	(0.253)	0.016	0.016
223	18.58	0.10	0.024	(0.252)	0.012	0.012
224	18.67	0.10	0.024	(0.250)	0.012	0.012
225	18.75	0.10	0.024	(0.249)	0.012	0.012
226	18.83	0.07	0.016	(0.248)	0.008	0.008
227	18.92	0.07	0.016	(0.247)	0.008	0.008
228	19.00	0.07	0.016	(0.246)	0.008	0.008
229	19.08	0.10	0.024	(0.245)	0.012	0.012
230	19.17	0.10	0.024	(0.243)	0.012	0.012
231	19.25	0.10	0.024	(0.242)	0.012	0.012
232	19.33	0.13	0.032	(0.241)	0.016	0.016
233	19.42	0.13	0.032	(0.240)	0.016	0.016
234	19.50	0.13	0.032	(0.239)	0.016	0.016
235	19.58	0.10	0.024	(0.238)	0.012	0.012
236	19.67	0.10	0.024	(0.237)	0.012	0.012
237	19.75	0.10	0.024	(0.236)	0.012	0.012
238	19.83	0.07	0.016	(0.235)	0.008	0.008
239	19.92	0.07	0.016	(0.234)	0.008	0.008
240	20.00	0.07	0.016	(0.232)	0.008	0.008
241	20.08	0.10	0.024	(0.231)	0.012	0.012
242	20.17	0.10	0.024	(0.230)	0.012	0.012
243	20.25	0.10	0.024	(0.229)	0.012	0.012
244	20.33	0.10	0.024	(0.228)	0.012	0.012
245	20.42	0.10	0.024	(0.227)	0.012	0.012
246	20.50	0.10	0.024	(0.227)	0.012	0.012
247	20.58	0.10	0.024	(0.226)	0.012	0.012
248	20.67	0.10	0.024	(0.225)	0.012	0.012
249	20.75	0.10	0.024	(0.224)	0.012	0.012

250	20.83	0.07	0.016	(0.223)	0.008	0.008
251	20.92	0.07	0.016	(0.222)	0.008	0.008
252	21.00	0.07	0.016	(0.221)	0.008	0.008
253	21.08	0.10	0.024	(0.220)	0.012	0.012
254	21.17	0.10	0.024	(0.219)	0.012	0.012
255	21.25	0.10	0.024	(0.218)	0.012	0.012
256	21.33	0.07	0.016	(0.218)	0.008	0.008
257	21.42	0.07	0.016	(0.217)	0.008	0.008
258	21.50	0.07	0.016	(0.216)	0.008	0.008
259	21.58	0.10	0.024	(0.215)	0.012	0.012
260	21.67	0.10	0.024	(0.214)	0.012	0.012
261	21.75	0.10	0.024	(0.214)	0.012	0.012
262	21.83	0.07	0.016	(0.213)	0.008	0.008
263	21.92	0.07	0.016	(0.212)	0.008	0.008
264	22.00	0.07	0.016	(0.211)	0.008	0.008
265	22.08	0.10	0.024	(0.211)	0.012	0.012
266	22.17	0.10	0.024	(0.210)	0.012	0.012
267	22.25	0.10	0.024	(0.209)	0.012	0.012
268	22.33	0.07	0.016	(0.209)	0.008	0.008
269	22.42	0.07	0.016	(0.208)	0.008	0.008
270	22.50	0.07	0.016	(0.207)	0.008	0.008
271	22.58	0.07	0.016	(0.207)	0.008	0.008
272	22.67	0.07	0.016	(0.206)	0.008	0.008
273	22.75	0.07	0.016	(0.206)	0.008	0.008
274	22.83	0.07	0.016	(0.205)	0.008	0.008
275	22.92	0.07	0.016	(0.205)	0.008	0.008
276	23.00	0.07	0.016	(0.204)	0.008	0.008
277	23.08	0.07	0.016	(0.204)	0.008	0.008
278	23.17	0.07	0.016	(0.203)	0.008	0.008
279	23.25	0.07	0.016	(0.203)	0.008	0.008
280	23.33	0.07	0.016	(0.202)	0.008	0.008
281	23.42	0.07	0.016	(0.202)	0.008	0.008
282	23.50	0.07	0.016	(0.202)	0.008	0.008
283	23.58	0.07	0.016	(0.201)	0.008	0.008
284	23.67	0.07	0.016	(0.201)	0.008	0.008
285	23.75	0.07	0.016	(0.201)	0.008	0.008
286	23.83	0.07	0.016	(0.201)	0.008	0.008
287	23.92	0.07	0.016	(0.200)	0.008	0.008
288	24.00	0.07	0.016	(0.200)	0.008	0.008

```
                    (Loss Rate Not Used)
    Sum =     100.0                                    Sum =    12.0
       Flood volume = Effective rainfall     1.00(In)
        times area      29.7(Ac.)/[(In)/(Ft.)] =       2.5(Ac.Ft)
       Total soil loss =      1.00(In)
       Total soil loss =     2.475(Ac.Ft)
       Total rainfall =      2.00(In)
       Flood volume =      107804.7 Cubic Feet
       Total soil loss =      107804.7 Cubic Feet
       --------------------------------------------------------------------
        Peak flow rate of this hydrograph =      4.073(CFS)
       --------------------------------------------------------------------
       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           24 - H O U R   S T O R M
                      R u n o f f     H y d r o g r a p h
       --------------------------------------------------------------------
                    Hydrograph in   5  Minute intervals ((CFS))

       --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0       2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
   0+ 5      0.0006     0.08  Q         |         |         |         |
   0+10      0.0019     0.19  Q         |         |         |         |
   0+15      0.0034     0.22  Q         |         |         |         |
   0+20      0.0053     0.27  VQ        |         |         |         |
   0+25      0.0076     0.33  VQ        |         |         |         |
   0+30      0.0100     0.35  VQ        |         |         |         |
   0+35      0.0124     0.36  VQ        |         |         |         |
   0+40      0.0149     0.36  VQ        |         |         |         |
   0+45      0.0174     0.36  VQ        |         |         |         |
   0+50      0.0201     0.40  VQ        |         |         |         |
   0+55      0.0233     0.46  VQ        |         |         |         |
```

```
 1+ 0     0.0265     0.47  VQ        |         |         |         |
 1+ 5     0.0295     0.43  VQ        |         |         |         |
 1+10     0.0321     0.38  VQ        |         |         |         |
 1+15     0.0347     0.37  VQ        |         |         |         |
 1+20     0.0372     0.36  VQ        |         |         |         |
 1+25     0.0397     0.36  VQ        |         |         |         |
 1+30     0.0421     0.36  VQ        |         |         |         |
 1+35     0.0446     0.36  VQ        |         |         |         |
 1+40     0.0471     0.36  VQ        |         |         |         |
 1+45     0.0496     0.36  VQ        |         |         |         |
 1+50     0.0523     0.40  VQ        |         |         |         |
 1+55     0.0555     0.46  VQ        |         |         |         |
 2+ 0     0.0587     0.47  VQ        |         |         |         |
 2+ 5     0.0620     0.48  |Q        |         |         |         |
 2+10     0.0653     0.48  |Q        |         |         |         |
 2+15     0.0686     0.48  |Q        |         |         |         |
 2+20     0.0719     0.48  |Q        |         |         |         |
 2+25     0.0752     0.48  |Q        |         |         |         |
 2+30     0.0785     0.48  |Q        |         |         |         |
 2+35     0.0820     0.52  |VQ       |         |         |         |
 2+40     0.0860     0.58  |VQ       |         |         |         |
 2+45     0.0901     0.59  |VQ       |         |         |         |
 2+50     0.0942     0.59  |VQ       |         |         |         |
 2+55     0.0983     0.60  |VQ       |         |         |         |
 3+ 0     0.1024     0.60  |VQ       |         |         |         |
 3+ 5     0.1065     0.60  |VQ       |         |         |         |
 3+10     0.1106     0.60  |VQ       |         |         |         |
 3+15     0.1148     0.60  |VQ       |         |         |         |
 3+20     0.1189     0.60  |VQ       |         |         |         |
 3+25     0.1230     0.60  |VQ       |         |         |         |
 3+30     0.1271     0.60  | Q       |         |         |         |
 3+35     0.1313     0.60  | Q       |         |         |         |
 3+40     0.1354     0.60  | Q       |         |         |         |
 3+45     0.1395     0.60  | Q       |         |         |         |
 3+50     0.1439     0.64  | Q       |         |         |         |
 3+55     0.1487     0.70  | Q       |         |         |         |
 4+ 0     0.1536     0.71  | Q       |         |         |         |
 4+ 5     0.1585     0.71  | Q       |         |         |         |
 4+10     0.1635     0.72  | Q       |         |         |         |
 4+15     0.1684     0.72  | Q       |         |         |         |
 4+20     0.1736     0.76  | VQ      |         |         |         |
 4+25     0.1793     0.82  | VQ      |         |         |         |
 4+30     0.1850     0.83  | VQ      |         |         |         |
 4+35     0.1907     0.83  |  Q      |         |         |         |
 4+40     0.1965     0.84  |  Q      |         |         |         |
 4+45     0.2023     0.84  |  Q      |         |         |         |
 4+50     0.2083     0.88  |  Q      |         |         |         |
 4+55     0.2148     0.94  |  Q      |         |         |         |
 5+ 0     0.2213     0.95  |  Q      |         |         |         |
 5+ 5     0.2273     0.87  |  Q      |         |         |         |
 5+10     0.2325     0.76  |  Q      |         |         |         |
 5+15     0.2376     0.74  | QV      |         |         |         |
 5+20     0.2429     0.77  |  Q      |         |         |         |
 5+25     0.2486     0.82  |  QV     |         |         |         |
 5+30     0.2543     0.83  |  QV     |         |         |         |
 5+35     0.2603     0.88  |  QV     |         |         |         |
 5+40     0.2667     0.93  |  QV     |         |         |         |
 5+45     0.2733     0.95  |  QV     |         |         |         |
 5+50     0.2798     0.95  |  QV     |         |         |         |
 5+55     0.2864     0.96  |  QV     |         |         |         |
 6+ 0     0.2930     0.96  |  QV     |         |         |         |
 6+ 5     0.2999     1.00  |  QV     |         |         |         |
 6+10     0.3072     1.06  |   Q     |         |         |         |
 6+15     0.3145     1.07  |   QV    |         |         |         |
 6+20     0.3219     1.07  |   QV    |         |         |         |
 6+25     0.3293     1.08  |   QV    |         |         |         |
 6+30     0.3368     1.08  |   QV    |         |         |         |
 6+35     0.3445     1.12  |   QV    |         |         |         |
 6+40     0.3526     1.17  |   QV    |         |         |         |
 6+45     0.3607     1.19  |   QV    |         |         |         |
 6+50     0.3690     1.19  |   QV    |         |         |         |
```



```
 6+55     0.3772     1.20  |   Q V   |         |         |         |
 7+ 0     0.3855     1.20  |   Q V   |         |         |         |
 7+ 5     0.3937     1.20  |   Q V   |         |         |         |
 7+10     0.4020     1.20  |   Q V   |         |         |         |
 7+15     0.4102     1.20  |   Q V   |         |         |         |
 7+20     0.4187     1.24  |   Q V   |         |         |         |
 7+25     0.4276     1.29  |    QV   |         |         |         |
 7+30     0.4367     1.31  |    Q V  |         |         |         |
 7+35     0.4460     1.35  |    Q V  |         |         |         |
 7+40     0.4557     1.41  |    Q V  |         |         |         |
 7+45     0.4655     1.43  |    Q V  |         |         |         |
 7+50     0.4757     1.47  |    Q V  |         |         |         |
 7+55     0.4863     1.53  |     QV  |         |         |         |
 8+ 0     0.4969     1.55  |     Q V |         |         |         |
 8+ 5     0.5082     1.64  |     Q V |         |         |         |
 8+10     0.5202     1.75  |     Q V |         |         |         |
 8+15     0.5325     1.78  |      QV |         |         |         |
 8+20     0.5448     1.79  |      QV |         |         |         |
 8+25     0.5571     1.79  |      Q V|         |         |         |
 8+30     0.5695     1.80  |      Q V|         |         |         |
 8+35     0.5822     1.84  |      Q V|         |         |         |
 8+40     0.5952     1.89  |      Q V|         |         |         |
 8+45     0.6083     1.91  |      Q V|         |         |         |
 8+50     0.6218     1.95  |      Q  V         |         |         |
 8+55     0.6357     2.01  |       Q V         |         |         |
 9+ 0     0.6496     2.03  |       Q V         |         |         |
 9+ 5     0.6642     2.11  |       Q V         |         |         |
 9+10     0.6795     2.23  |       Q V         |         |         |
 9+15     0.6951     2.26  |        Q|V        |         |         |
 9+20     0.7110     2.31  |        Q|V        |         |         |
 9+25     0.7273     2.37  |        Q|V        |         |         |
 9+30     0.7437     2.39  |        Q| V       |         |         |
 9+35     0.7605     2.43  |        Q| V       |         |         |
 9+40     0.7776     2.49  |        Q| V       |         |         |
 9+45     0.7949     2.51  |         Q V       |         |         |
 9+50     0.8125     2.55  |         Q  V      |         |         |
 9+55     0.8304     2.61  |         Q  V      |         |         |
10+ 0     0.8485     2.63  |         Q  V      |         |         |
10+ 5     0.8647     2.34  |        Q|  V      |         |         |
10+10     0.8781     1.96  |      Q  |   V     |         |         |
10+15     0.8910     1.87  |      Q  |   V     |         |         |
10+20     0.9036     1.83  |      Q  |   V     |         |         |
10+25     0.9160     1.81  |      Q  |   V     |         |         |
10+30     0.9284     1.80  |      Q  |    V    |         |         |
10+35     0.9422     2.00  |       Q |    V    |         |         |
10+40     0.9579     2.28  |        Q|    V    |         |         |
10+45     0.9740     2.35  |        Q|    V    |         |         |
10+50     0.9904     2.38  |        Q|     V   |         |         |
10+55     1.0068     2.39  |        Q|     V   |         |         |
11+ 0     1.0233     2.40  |        Q|     V   |         |         |
11+ 5     1.0396     2.35  |        Q|     V   |         |         |
11+10     1.0554     2.30  |        Q|      V  |         |         |
11+15     1.0711     2.29  |        Q|      V  |         |         |
11+20     1.0868     2.28  |        Q|      V  |         |         |
11+25     1.1025     2.28  |        Q|      V  |         |         |
11+30     1.1182     2.28  |        Q|       V |         |         |
11+35     1.1333     2.19  |       Q |       V |         |         |
11+40     1.1476     2.08  |       Q |       V |         |         |
11+45     1.1618     2.06  |       Q |       V |         |         |
11+50     1.1762     2.09  |       Q |        V|         |         |
11+55     1.1909     2.14  |       Q |        V|         |         |
12+ 0     1.2057     2.15  |       Q |        V|         |         |
12+ 5     1.2224     2.44  |        Q|        V|         |         |
12+10     1.2420     2.83  |         |Q        V         |         |
12+15     1.2621     2.93  |         |Q        V         |         |
12+20     1.2828     3.01  |         | Q       V         |         |
12+25     1.3040     3.08  |         | Q       |V        |         |
12+30     1.3254     3.10  |         | Q       |V        |         |
12+35     1.3474     3.19  |         | Q       |V        |         |
12+40     1.3702     3.31  |         |  Q      | V       |         |
12+45     1.3932     3.33  |         |  Q      | V       |         |
```

```
12+50       1.4165      3.39  |         |  Q      | V       |         |
12+55       1.4402      3.45  |         |  Q      |  V      |         |
13+ 0       1.4641      3.46  |         |  Q      |  V      |         |
13+ 5       1.4894      3.67  |         |   Q     |   V     |         |
13+10       1.5166      3.96  |         |    Q    |   V     |         |
13+15       1.5444      4.02  |         |     Q   |   V     |         |
13+20       1.5723      4.05  |         |     Q   |    V    |         |
13+25       1.6003      4.07  |         |     Q   |    V    |         |
13+30       1.6283      4.07  |         |     Q   |     V   |         |
13+35       1.6533      3.62  |         |   Q     |     V   |         |
13+40       1.6740      3.01  |         | Q       |      V  |         |
13+45       1.6937      2.86  |         |Q        |      V  |         |
13+50       1.7130      2.80  |         |Q        |      V  |         |
13+55       1.7320      2.77  |         |Q        |      V  |         |
14+ 0       1.7510      2.76  |         |Q        |       V |         |
14+ 5       1.7711      2.92  |         |Q        |       V |         |
14+10       1.7928      3.14  |         | Q       |       V |         |
14+15       1.8148      3.19  |         | Q       |        V|         |
14+20       1.8366      3.18  |         | Q       |        V|         |
14+25       1.8582      3.13  |         | Q       |         V         |
14+30       1.8797      3.12  |         | Q       |         V         |
14+35       1.9012      3.12  |         | Q       |         V         |
14+40       1.9227      3.12  |         | Q       |         |V        |
14+45       1.9441      3.11  |         | Q       |         |V        |
14+50       1.9653      3.07  |         | Q       |         |V        |
14+55       1.9861      3.02  |         | Q       |         | V       |
15+ 0       2.0067      3.00  |         | Q       |         | V       |
15+ 5       2.0271      2.96  |         |Q        |         | V       |
15+10       2.0471      2.90  |         |Q        |         |  V      |
15+15       2.0669      2.88  |         |Q        |         |  V      |
15+20       2.0865      2.84  |         |Q        |         |  V      |
15+25       2.1056      2.78  |         |Q        |         |   V     |
15+30       2.1247      2.76  |         |Q        |         |   V     |
15+35       2.1425      2.60  |         Q         |         |   V     |
15+40       2.1589      2.37  |        Q|         |         |   V     |
15+45       2.1748      2.32  |        Q|         |         |    V    |
15+50       2.1906      2.29  |        Q|         |         |    V    |
15+55       2.2063      2.28  |        Q|         |         |    V    |
16+ 0       2.2220      2.28  |        Q|         |         |    V    |
16+ 5       2.2334      1.66  |     Q   |         |         |     V   |
16+10       2.2391      0.82  |  Q      |         |         |     V   |
16+15       2.2434      0.63  | Q       |         |         |     V   |
16+20       2.2471      0.54  | Q       |         |         |     V   |
16+25       2.2505      0.50  |Q        |         |         |     V   |
16+30       2.2538      0.48  |Q        |         |         |     V   |
16+35       2.2569      0.44  |Q        |         |         |     V   |
16+40       2.2595      0.38  |Q        |         |         |     V   |
16+45       2.2620      0.37  |Q        |         |         |     V   |
16+50       2.2645      0.36  |Q        |         |         |     V   |
16+55       2.2670      0.36  |Q        |         |         |     V   |
17+ 0       2.2695      0.36  |Q        |         |         |     V   |
17+ 5       2.2725      0.44  |Q        |         |         |     V   |
17+10       2.2764      0.55  | Q       |         |         |     V   |
17+15       2.2803      0.58  | Q       |         |         |     V   |
17+20       2.2844      0.59  | Q       |         |         |     V   |
17+25       2.2885      0.60  | Q       |         |         |     V   |
17+30       2.2926      0.60  | Q       |         |         |      V  |
17+35       2.2968      0.60  | Q       |         |         |      V  |
17+40       2.3009      0.60  | Q       |         |         |      V  |
17+45       2.3050      0.60  | Q       |         |         |      V  |
17+50       2.3089      0.56  | Q       |         |         |      V  |
17+55       2.3123      0.50  | Q       |         |         |      V  |
18+ 0       2.3157      0.49  |Q        |         |         |      V  |
18+ 5       2.3190      0.48  |Q        |         |         |      V  |
18+10       2.3223      0.48  |Q        |         |         |      V  |
18+15       2.3256      0.48  |Q        |         |         |      V  |
18+20       2.3289      0.48  |Q        |         |         |      V  |
18+25       2.3322      0.48  |Q        |         |         |      V  |
18+30       2.3355      0.48  |Q        |         |         |      V  |
18+35       2.3385      0.44  |Q        |         |         |      V  |
18+40       2.3412      0.38  |Q        |         |         |      V  |
```



```
18+45       2.3437      0.37  |Q        |         |         |      V  |
18+50       2.3459      0.32  |Q        |         |         |      V  |
18+55       2.3477      0.26  |Q        |         |         |      V  |
19+ 0       2.3495      0.25  Q         |         |         |      V  |
19+ 5       2.3514      0.28  |Q        |         |         |       V |
19+10       2.3538      0.34  |Q        |         |         |       V |
19+15       2.3562      0.35  |Q        |         |         |       V |
19+20       2.3589      0.40  |Q        |         |         |       V |
19+25       2.3620      0.45  |Q        |         |         |       V |
19+30       2.3653      0.47  |Q        |         |         |       V |
19+35       2.3682      0.43  |Q        |         |         |       V |
19+40       2.3709      0.38  |Q        |         |         |       V |
19+45       2.3734      0.37  |Q        |         |         |       V |
19+50       2.3756      0.32  |Q        |         |         |       V |
19+55       2.3774      0.26  |Q        |         |         |       V |
20+ 0       2.3792      0.25  Q         |         |         |       V |
20+ 5       2.3811      0.28  |Q        |         |         |       V |
20+10       2.3835      0.34  |Q        |         |         |       V |
20+15       2.3859      0.35  |Q        |         |         |       V |
20+20       2.3883      0.36  |Q        |         |         |       V |
20+25       2.3908      0.36  |Q        |         |         |       V |
20+30       2.3932      0.36  |Q        |         |         |       V |
20+35       2.3957      0.36  |Q        |         |         |       V |
20+40       2.3982      0.36  |Q        |         |         |       V |
20+45       2.4007      0.36  |Q        |         |         |       V |
20+50       2.4029      0.32  |Q        |         |         |       V |
20+55       2.4047      0.26  |Q        |         |         |       V |
21+ 0       2.4064      0.25  Q         |         |         |       V |
21+ 5       2.4083      0.28  |Q        |         |         |       V |
21+10       2.4107      0.34  |Q        |         |         |       V |
21+15       2.4131      0.35  |Q        |         |         |        V|
21+20       2.4152      0.31  |Q        |         |         |        V|
21+25       2.4170      0.26  |Q        |         |         |        V|
21+30       2.4188      0.25  Q         |         |         |        V|
21+35       2.4207      0.28  |Q        |         |         |        V|
21+40       2.4230      0.34  |Q        |         |         |        V|
21+45       2.4255      0.35  |Q        |         |         |        V|
21+50       2.4276      0.31  |Q        |         |         |        V|
21+55       2.4294      0.26  |Q        |         |         |        V|
22+ 0       2.4311      0.25  Q         |         |         |        V|
22+ 5       2.4331      0.28  |Q        |         |         |        V|
22+10       2.4354      0.34  |Q        |         |         |        V|
22+15       2.4378      0.35  |Q        |         |         |        V|
22+20       2.4400      0.31  |Q        |         |         |        V|
22+25       2.4418      0.26  |Q        |         |         |        V|
22+30       2.4435      0.25  Q         |         |         |        V|
22+35       2.4452      0.24  Q         |         |         |        V|
22+40       2.4468      0.24  Q         |         |         |        V|
22+45       2.4485      0.24  Q         |         |         |        V|
22+50       2.4501      0.24  Q         |         |         |        V|
22+55       2.4518      0.24  Q         |         |         |        V|
23+ 0       2.4534      0.24  Q         |         |         |        V|
23+ 5       2.4551      0.24  Q         |         |         |        V|
23+10       2.4567      0.24  Q         |         |         |        V|
23+15       2.4584      0.24  Q         |         |         |        V|
23+20       2.4600      0.24  Q         |         |         |        V|
23+25       2.4617      0.24  Q         |         |         |        V|
23+30       2.4633      0.24  Q         |         |         |        V|
23+35       2.4650      0.24  Q         |         |         |        V|
23+40       2.4666      0.24  Q         |         |         |        V|
23+45       2.4683      0.24  Q         |         |         |        V|
23+50       2.4699      0.24  Q         |         |         |        V|
23+55       2.4716      0.24  Q         |         |         |        V|
24+ 0       2.4732      0.24  Q         |         |         |        V|
24+ 5       2.4743      0.16  Q         |         |         |        V|
24+10       2.4746      0.05  Q         |         |         |        V|
24+15       2.4748      0.02  Q         |         |         |        V|
24+20       2.4748      0.01  Q         |         |         |        V|
24+25       2.4749      0.00  Q         |         |         |         V
----------------------------------------------------------------------
```

APPENDIX C.5: AREA "B" – PRE-PROJECT CONDITION

U n i t   H y d r o g r a p h   A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
Study date 06/10/16 File: ARBEXONSITE242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD PRE-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 2-YEAR, 24-HOUR STORM DURATION
ONSITE AREA "B"
FILENAME: ARBEXONSITE

Drainage Area = 15.65(Ac.) = 0.024 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 15.65(Ac.) = 0.024 Sq. Mi.
Length along longest watercourse = 1881.50(Ft.)
Length along longest watercourse measured to centroid = 959.32(Ft.)
Length along longest watercourse = 0.356 Mi.
Length along longest watercourse measured to centroid = 0.182 Mi.
Difference in elevation = 136.00(Ft.)
Slope along watercourse = 381.6529 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.082 Hr.
Lag time = 4.93 Min.
25% of lag time = 1.23 Min.
40% of lag time = 1.97 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
15.65	2.00	31.30

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
15.65	5.00	78.25

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.000(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 2.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
15.650	82.47	0.000

Total Area Entered = 15.65(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
82.5	66.5	0.400	0.000	0.400	1.000	0.400
					Sum (F) =	0.400

Area averaged mean soil loss (F) (In/Hr) = 0.400
Minimum soil loss rate ((In/Hr)) = 0.200
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	101.332	19.610	3.093
2	0.167	202.664	48.497	7.649
3	0.250	303.997	15.437	2.435
4	0.333	405.329	6.993	1.103
5	0.417	506.661	3.922	0.619
6	0.500	607.993	2.535	0.400
7	0.583	709.325	1.558	0.246
8	0.667	810.657	1.448	0.228
			Sum = 100.000	Sum= 15.772

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.016	(0.710)	0.014	0.002
2	0.17	0.07	0.016	(0.707)	0.014	0.002
3	0.25	0.07	0.016	(0.704)	0.014	0.002
4	0.33	0.10	0.024	(0.701)	0.022	0.002
5	0.42	0.10	0.024	(0.699)	0.022	0.002
6	0.50	0.10	0.024	(0.696)	0.022	0.002
7	0.58	0.10	0.024	(0.693)	0.022	0.002
8	0.67	0.10	0.024	(0.690)	0.022	0.002
9	0.75	0.10	0.024	(0.688)	0.022	0.002
10	0.83	0.13	0.032	(0.685)	0.029	0.003
11	0.92	0.13	0.032	(0.682)	0.029	0.003
12	1.00	0.13	0.032	(0.680)	0.029	0.003
13	1.08	0.10	0.024	(0.677)	0.022	0.002
14	1.17	0.10	0.024	(0.674)	0.022	0.002
15	1.25	0.10	0.024	(0.672)	0.022	0.002
16	1.33	0.10	0.024	(0.669)	0.022	0.002
17	1.42	0.10	0.024	(0.666)	0.022	0.002
18	1.50	0.10	0.024	(0.664)	0.022	0.002
19	1.58	0.10	0.024	(0.661)	0.022	0.002
20	1.67	0.10	0.024	(0.658)	0.022	0.002
21	1.75	0.10	0.024	(0.656)	0.022	0.002
22	1.83	0.13	0.032	(0.653)	0.029	0.003
23	1.92	0.13	0.032	(0.650)	0.029	0.003
24	2.00	0.13	0.032	(0.648)	0.029	0.003
25	2.08	0.13	0.032	(0.645)	0.029	0.003
26	2.17	0.13	0.032	(0.643)	0.029	0.003
27	2.25	0.13	0.032	(0.640)	0.029	0.003
28	2.33	0.13	0.032	(0.637)	0.029	0.003
29	2.42	0.13	0.032	(0.635)	0.029	0.003
30	2.50	0.13	0.032	(0.632)	0.029	0.003
31	2.58	0.17	0.040	(0.630)	0.036	0.004
32	2.67	0.17	0.040	(0.627)	0.036	0.004
33	2.75	0.17	0.040	(0.624)	0.036	0.004
34	2.83	0.17	0.040	(0.622)	0.036	0.004

35	2.92	0.17	0.040	(0.619)	0.036	0.004
36	3.00	0.17	0.040	(0.617)	0.036	0.004
37	3.08	0.17	0.040	(0.614)	0.036	0.004
38	3.17	0.17	0.040	(0.612)	0.036	0.004
39	3.25	0.17	0.040	(0.609)	0.036	0.004
40	3.33	0.17	0.040	(0.607)	0.036	0.004
41	3.42	0.17	0.040	(0.604)	0.036	0.004
42	3.50	0.17	0.040	(0.601)	0.036	0.004
43	3.58	0.17	0.040	(0.599)	0.036	0.004
44	3.67	0.17	0.040	(0.596)	0.036	0.004
45	3.75	0.17	0.040	(0.594)	0.036	0.004
46	3.83	0.20	0.048	(0.591)	0.043	0.005
47	3.92	0.20	0.048	(0.589)	0.043	0.005
48	4.00	0.20	0.048	(0.586)	0.043	0.005
49	4.08	0.20	0.048	(0.584)	0.043	0.005
50	4.17	0.20	0.048	(0.581)	0.043	0.005
51	4.25	0.20	0.048	(0.579)	0.043	0.005
52	4.33	0.23	0.056	(0.577)	0.050	0.006
53	4.42	0.23	0.056	(0.574)	0.050	0.006
54	4.50	0.23	0.056	(0.572)	0.050	0.006
55	4.58	0.23	0.056	(0.569)	0.050	0.006
56	4.67	0.23	0.056	(0.567)	0.050	0.006
57	4.75	0.23	0.056	(0.564)	0.050	0.006
58	4.83	0.27	0.064	(0.562)	0.058	0.006
59	4.92	0.27	0.064	(0.559)	0.058	0.006
60	5.00	0.27	0.064	(0.557)	0.058	0.006
61	5.08	0.20	0.048	(0.555)	0.043	0.005
62	5.17	0.20	0.048	(0.552)	0.043	0.005
63	5.25	0.20	0.048	(0.550)	0.043	0.005
64	5.33	0.23	0.056	(0.547)	0.050	0.006
65	5.42	0.23	0.056	(0.545)	0.050	0.006
66	5.50	0.23	0.056	(0.543)	0.050	0.006
67	5.58	0.27	0.064	(0.540)	0.058	0.006
68	5.67	0.27	0.064	(0.538)	0.058	0.006
69	5.75	0.27	0.064	(0.535)	0.058	0.006
70	5.83	0.27	0.064	(0.533)	0.058	0.006
71	5.92	0.27	0.064	(0.531)	0.058	0.006
72	6.00	0.27	0.064	(0.528)	0.058	0.006
73	6.08	0.30	0.072	(0.526)	0.065	0.007
74	6.17	0.30	0.072	(0.524)	0.065	0.007
75	6.25	0.30	0.072	(0.521)	0.065	0.007
76	6.33	0.30	0.072	(0.519)	0.065	0.007
77	6.42	0.30	0.072	(0.517)	0.065	0.007
78	6.50	0.30	0.072	(0.514)	0.065	0.007
79	6.58	0.33	0.080	(0.512)	0.072	0.008
80	6.67	0.33	0.080	(0.510)	0.072	0.008
81	6.75	0.33	0.080	(0.507)	0.072	0.008
82	6.83	0.33	0.080	(0.505)	0.072	0.008
83	6.92	0.33	0.080	(0.503)	0.072	0.008
84	7.00	0.33	0.080	(0.501)	0.072	0.008
85	7.08	0.33	0.080	(0.498)	0.072	0.008
86	7.17	0.33	0.080	(0.496)	0.072	0.008
87	7.25	0.33	0.080	(0.494)	0.072	0.008
88	7.33	0.37	0.088	(0.492)	0.079	0.009
89	7.42	0.37	0.088	(0.489)	0.079	0.009
90	7.50	0.37	0.088	(0.487)	0.079	0.009
91	7.58	0.40	0.096	(0.485)	0.086	0.010
92	7.67	0.40	0.096	(0.483)	0.086	0.010
93	7.75	0.40	0.096	(0.480)	0.086	0.010
94	7.83	0.43	0.104	(0.478)	0.094	0.010
95	7.92	0.43	0.104	(0.476)	0.094	0.010
96	8.00	0.43	0.104	(0.474)	0.094	0.010
97	8.08	0.50	0.120	(0.471)	0.108	0.012
98	8.17	0.50	0.120	(0.469)	0.108	0.012
99	8.25	0.50	0.120	(0.467)	0.108	0.012
100	8.33	0.50	0.120	(0.465)	0.108	0.012
101	8.42	0.50	0.120	(0.463)	0.108	0.012
102	8.50	0.50	0.120	(0.461)	0.108	0.012
103	8.58	0.53	0.128	(0.458)	0.115	0.013
104	8.67	0.53	0.128	(0.456)	0.115	0.013
105	8.75	0.53	0.128	(0.454)	0.115	0.013

106	8.83	0.57	0.136	(0.452)	0.122	0.014
107	8.92	0.57	0.136	(0.450)	0.122	0.014
108	9.00	0.57	0.136	(0.448)	0.122	0.014
109	9.08	0.63	0.152	(0.446)	0.137	0.015
110	9.17	0.63	0.152	(0.443)	0.137	0.015
111	9.25	0.63	0.152	(0.441)	0.137	0.015
112	9.33	0.67	0.160	(0.439)	0.144	0.016
113	9.42	0.67	0.160	(0.437)	0.144	0.016
114	9.50	0.67	0.160	(0.435)	0.144	0.016
115	9.58	0.70	0.168	(0.433)	0.151	0.017
116	9.67	0.70	0.168	(0.431)	0.151	0.017
117	9.75	0.70	0.168	(0.429)	0.151	0.017
118	9.83	0.73	0.176	(0.427)	0.158	0.018
119	9.92	0.73	0.176	(0.425)	0.158	0.018
120	10.00	0.73	0.176	(0.423)	0.158	0.018
121	10.08	0.50	0.120	(0.421)	0.108	0.012
122	10.17	0.50	0.120	(0.419)	0.108	0.012
123	10.25	0.50	0.120	(0.417)	0.108	0.012
124	10.33	0.50	0.120	(0.415)	0.108	0.012
125	10.42	0.50	0.120	(0.413)	0.108	0.012
126	10.50	0.50	0.120	(0.411)	0.108	0.012
127	10.58	0.67	0.160	(0.409)	0.144	0.016
128	10.67	0.67	0.160	(0.407)	0.144	0.016
129	10.75	0.67	0.160	(0.405)	0.144	0.016
130	10.83	0.67	0.160	(0.403)	0.144	0.016
131	10.92	0.67	0.160	(0.401)	0.144	0.016
132	11.00	0.67	0.160	(0.399)	0.144	0.016
133	11.08	0.63	0.152	(0.397)	0.137	0.015
134	11.17	0.63	0.152	(0.395)	0.137	0.015
135	11.25	0.63	0.152	(0.393)	0.137	0.015
136	11.33	0.63	0.152	(0.391)	0.137	0.015
137	11.42	0.63	0.152	(0.389)	0.137	0.015
138	11.50	0.63	0.152	(0.387)	0.137	0.015
139	11.58	0.57	0.136	(0.385)	0.122	0.014
140	11.67	0.57	0.136	(0.383)	0.122	0.014
141	11.75	0.57	0.136	(0.381)	0.122	0.014
142	11.83	0.60	0.144	(0.379)	0.130	0.014
143	11.92	0.60	0.144	(0.377)	0.130	0.014
144	12.00	0.60	0.144	(0.376)	0.130	0.014
145	12.08	0.83	0.200	(0.374)	0.180	0.020
146	12.17	0.83	0.200	(0.372)	0.180	0.020
147	12.25	0.83	0.200	(0.370)	0.180	0.020
148	12.33	0.87	0.208	(0.368)	0.187	0.021
149	12.42	0.87	0.208	(0.366)	0.187	0.021
150	12.50	0.87	0.208	(0.364)	0.187	0.021
151	12.58	0.93	0.224	(0.363)	0.202	0.022
152	12.67	0.93	0.224	(0.361)	0.202	0.022
153	12.75	0.93	0.224	(0.359)	0.202	0.022
154	12.83	0.97	0.232	(0.357)	0.209	0.023
155	12.92	0.97	0.232	(0.355)	0.209	0.023
156	13.00	0.97	0.232	(0.353)	0.209	0.023
157	13.08	1.13	0.272	(0.352)	0.245	0.027
158	13.17	1.13	0.272	(0.350)	0.245	0.027
159	13.25	1.13	0.272	(0.348)	0.245	0.027
160	13.33	1.13	0.272	(0.346)	0.245	0.027
161	13.42	1.13	0.272	(0.345)	0.245	0.027
162	13.50	1.13	0.272	(0.343)	0.245	0.027
163	13.58	0.77	0.184	(0.341)	0.166	0.018
164	13.67	0.77	0.184	(0.339)	0.166	0.018
165	13.75	0.77	0.184	(0.338)	0.166	0.018
166	13.83	0.77	0.184	(0.336)	0.166	0.018
167	13.92	0.77	0.184	(0.334)	0.166	0.018
168	14.00	0.77	0.184	(0.332)	0.166	0.018
169	14.08	0.90	0.216	(0.331)	0.194	0.022
170	14.17	0.90	0.216	(0.329)	0.194	0.022
171	14.25	0.90	0.216	(0.327)	0.194	0.022
172	14.33	0.87	0.208	(0.326)	0.187	0.021
173	14.42	0.87	0.208	(0.324)	0.187	0.021
174	14.50	0.87	0.208	(0.322)	0.187	0.021
175	14.58	0.87	0.208	(0.321)	0.187	0.021
176	14.67	0.87	0.208	(0.319)	0.187	0.021

177	14.75	0.87	0.208	(0.317)	0.187	0.021
178	14.83	0.83	0.200	(0.316)	0.180	0.020
179	14.92	0.83	0.200	(0.314)	0.180	0.020
180	15.00	0.83	0.200	(0.313)	0.180	0.020
181	15.08	0.80	0.192	(0.311)	0.173	0.019
182	15.17	0.80	0.192	(0.309)	0.173	0.019
183	15.25	0.80	0.192	(0.308)	0.173	0.019
184	15.33	0.77	0.184	(0.306)	0.166	0.018
185	15.42	0.77	0.184	(0.305)	0.166	0.018
186	15.50	0.77	0.184	(0.303)	0.166	0.018
187	15.58	0.63	0.152	(0.302)	0.137	0.015
188	15.67	0.63	0.152	(0.300)	0.137	0.015
189	15.75	0.63	0.152	(0.298)	0.137	0.015
190	15.83	0.63	0.152	(0.297)	0.137	0.015
191	15.92	0.63	0.152	(0.295)	0.137	0.015
192	16.00	0.63	0.152	(0.294)	0.137	0.015
193	16.08	0.13	0.032	(0.292)	0.029	0.003
194	16.17	0.13	0.032	(0.291)	0.029	0.003
195	16.25	0.13	0.032	(0.289)	0.029	0.003
196	16.33	0.13	0.032	(0.288)	0.029	0.003
197	16.42	0.13	0.032	(0.287)	0.029	0.003
198	16.50	0.13	0.032	(0.285)	0.029	0.003
199	16.58	0.10	0.024	(0.284)	0.022	0.002
200	16.67	0.10	0.024	(0.282)	0.022	0.002
201	16.75	0.10	0.024	(0.281)	0.022	0.002
202	16.83	0.10	0.024	(0.279)	0.022	0.002
203	16.92	0.10	0.024	(0.278)	0.022	0.002
204	17.00	0.10	0.024	(0.276)	0.022	0.002
205	17.08	0.17	0.040	(0.275)	0.036	0.004
206	17.17	0.17	0.040	(0.274)	0.036	0.004
207	17.25	0.17	0.040	(0.272)	0.036	0.004
208	17.33	0.17	0.040	(0.271)	0.036	0.004
209	17.42	0.17	0.040	(0.270)	0.036	0.004
210	17.50	0.17	0.040	(0.268)	0.036	0.004
211	17.58	0.17	0.040	(0.267)	0.036	0.004
212	17.67	0.17	0.040	(0.266)	0.036	0.004
213	17.75	0.17	0.040	(0.264)	0.036	0.004
214	17.83	0.13	0.032	(0.263)	0.029	0.003
215	17.92	0.13	0.032	(0.262)	0.029	0.003
216	18.00	0.13	0.032	(0.260)	0.029	0.003
217	18.08	0.13	0.032	(0.259)	0.029	0.003
218	18.17	0.13	0.032	(0.258)	0.029	0.003
219	18.25	0.13	0.032	(0.257)	0.029	0.003
220	18.33	0.13	0.032	(0.255)	0.029	0.003
221	18.42	0.13	0.032	(0.254)	0.029	0.003
222	18.50	0.13	0.032	(0.253)	0.029	0.003
223	18.58	0.10	0.024	(0.252)	0.022	0.002
224	18.67	0.10	0.024	(0.250)	0.022	0.002
225	18.75	0.10	0.024	(0.249)	0.022	0.002
226	18.83	0.07	0.016	(0.248)	0.014	0.002
227	18.92	0.07	0.016	(0.247)	0.014	0.002
228	19.00	0.07	0.016	(0.246)	0.014	0.002
229	19.08	0.10	0.024	(0.244)	0.022	0.002
230	19.17	0.10	0.024	(0.243)	0.022	0.002
231	19.25	0.10	0.024	(0.242)	0.022	0.002
232	19.33	0.13	0.032	(0.241)	0.029	0.003
233	19.42	0.13	0.032	(0.240)	0.029	0.003
234	19.50	0.13	0.032	(0.239)	0.029	0.003
235	19.58	0.10	0.024	(0.238)	0.022	0.002
236	19.67	0.10	0.024	(0.237)	0.022	0.002
237	19.75	0.10	0.024	(0.236)	0.022	0.002
238	19.83	0.07	0.016	(0.235)	0.014	0.002
239	19.92	0.07	0.016	(0.233)	0.014	0.002
240	20.00	0.07	0.016	(0.232)	0.014	0.002
241	20.08	0.10	0.024	(0.231)	0.022	0.002
242	20.17	0.10	0.024	(0.230)	0.022	0.002
243	20.25	0.10	0.024	(0.229)	0.022	0.002
244	20.33	0.10	0.024	(0.228)	0.022	0.002
245	20.42	0.10	0.024	(0.227)	0.022	0.002
246	20.50	0.10	0.024	(0.226)	0.022	0.002
247	20.58	0.10	0.024	(0.225)	0.022	0.002
248	20.67	0.10	0.024	(0.225)	0.022	0.002
249	20.75	0.10	0.024	(0.224)	0.022	0.002
250	20.83	0.07	0.016	(0.223)	0.014	0.002
251	20.92	0.07	0.016	(0.222)	0.014	0.002
252	21.00	0.07	0.016	(0.221)	0.014	0.002
253	21.08	0.10	0.024	(0.220)	0.022	0.002
254	21.17	0.10	0.024	(0.219)	0.022	0.002
255	21.25	0.10	0.024	(0.218)	0.022	0.002
256	21.33	0.07	0.016	(0.217)	0.014	0.002
257	21.42	0.07	0.016	(0.217)	0.014	0.002
258	21.50	0.07	0.016	(0.216)	0.014	0.002
259	21.58	0.10	0.024	(0.215)	0.022	0.002
260	21.67	0.10	0.024	(0.214)	0.022	0.002
261	21.75	0.10	0.024	(0.214)	0.022	0.002
262	21.83	0.07	0.016	(0.213)	0.014	0.002
263	21.92	0.07	0.016	(0.212)	0.014	0.002
264	22.00	0.07	0.016	(0.211)	0.014	0.002
265	22.08	0.10	0.024	(0.211)	0.022	0.002
266	22.17	0.10	0.024	(0.210)	0.022	0.002
267	22.25	0.10	0.024	(0.209)	0.022	0.002
268	22.33	0.07	0.016	(0.209)	0.014	0.002
269	22.42	0.07	0.016	(0.208)	0.014	0.002
270	22.50	0.07	0.016	(0.207)	0.014	0.002
271	22.58	0.07	0.016	(0.207)	0.014	0.002
272	22.67	0.07	0.016	(0.206)	0.014	0.002
273	22.75	0.07	0.016	(0.206)	0.014	0.002
274	22.83	0.07	0.016	(0.205)	0.014	0.002
275	22.92	0.07	0.016	(0.205)	0.014	0.002
276	23.00	0.07	0.016	(0.204)	0.014	0.002
277	23.08	0.07	0.016	(0.204)	0.014	0.002
278	23.17	0.07	0.016	(0.203)	0.014	0.002
279	23.25	0.07	0.016	(0.203)	0.014	0.002
280	23.33	0.07	0.016	(0.202)	0.014	0.002
281	23.42	0.07	0.016	(0.202)	0.014	0.002
282	23.50	0.07	0.016	(0.202)	0.014	0.002
283	23.58	0.07	0.016	(0.201)	0.014	0.002
284	23.67	0.07	0.016	(0.201)	0.014	0.002
285	23.75	0.07	0.016	(0.201)	0.014	0.002
286	23.83	0.07	0.016	(0.200)	0.014	0.002
287	23.92	0.07	0.016	(0.200)	0.014	0.002
288	24.00	0.07	0.016	(0.200)	0.014	0.002

```
               (Loss Rate Not Used)
   Sum =    100.0                                  Sum =     2.4
     Flood volume = Effective rainfall      0.20(In)
      times area      15.7(Ac.)/[(In)/(Ft.)] =       0.3(Ac.Ft)
     Total soil loss =       1.80(In)
     Total soil loss =     2.347(Ac.Ft)
     Total rainfall =      2.00(In)
     Flood volume =       11361.6 Cubic Feet
     Total soil loss =      102254.0 Cubic Feet
     --------------------------------------------------------------------
      Peak flow rate of this hydrograph =      0.427(CFS)
     --------------------------------------------------------------------
     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                         24 - H O U R   S T O R M
                    R u n o f f      H y d r o g r a p h
     --------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

     --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
   0+ 5      0.0000      0.00  Q         |         |         |         |
   0+10      0.0002      0.02  Q         |         |         |         |
   0+15      0.0003      0.02  Q         |         |         |         |
   0+20      0.0005      0.03  Q         |         |         |         |
   0+25      0.0007      0.03  Q         |         |         |         |
   0+30      0.0009      0.04  Q         |         |         |         |
   0+35      0.0012      0.04  Q         |         |         |         |
   0+40      0.0014      0.04  Q         |         |         |         |
   0+45      0.0017      0.04  Q         |         |         |         |
```

```
 0+50       0.0020      0.04  Q         |         |         |         |
 0+55       0.0023      0.05  Q         |         |         |         |
 1+ 0       0.0026      0.05  Q         |         |         |         |
 1+ 5       0.0030      0.05  Q         |         |         |         |
 1+10       0.0032      0.04  Q         |         |         |         |
 1+15       0.0035      0.04  Q         |         |         |         |
 1+20       0.0038      0.04  Q         |         |         |         |
 1+25       0.0040      0.04  Q         |         |         |         |
 1+30       0.0043      0.04  Q         |         |         |         |
 1+35       0.0046      0.04  Q         |         |         |         |
 1+40       0.0048      0.04  Q         |         |         |         |
 1+45       0.0051      0.04  Q         |         |         |         |
 1+50       0.0054      0.04  Q         |         |         |         |
 1+55       0.0057      0.05  Q         |         |         |         |
 2+ 0       0.0060      0.05  Q         |         |         |         |
 2+ 5       0.0064      0.05  Q         |         |         |         |
 2+10       0.0067      0.05  QV        |         |         |         |
 2+15       0.0070      0.05  QV        |         |         |         |
 2+20       0.0074      0.05  QV        |         |         |         |
 2+25       0.0077      0.05  QV        |         |         |         |
 2+30       0.0081      0.05  QV        |         |         |         |
 2+35       0.0085      0.05  QV        |         |         |         |
 2+40       0.0089      0.06  QV        |         |         |         |
 2+45       0.0093      0.06  QV        |         |         |         |
 2+50       0.0097      0.06  QV        |         |         |         |
 2+55       0.0101      0.06  QV        |         |         |         |
 3+ 0       0.0106      0.06  QV        |         |         |         |
 3+ 5       0.0110      0.06  QV        |         |         |         |
 3+10       0.0114      0.06  QV        |         |         |         |
 3+15       0.0119      0.06  QV        |         |         |         |
 3+20       0.0123      0.06  QV        |         |         |         |
 3+25       0.0127      0.06  QV        |         |         |         |
 3+30       0.0132      0.06  Q V       |         |         |         |
 3+35       0.0136      0.06  Q V       |         |         |         |
 3+40       0.0140      0.06  Q V       |         |         |         |
 3+45       0.0145      0.06  Q V       |         |         |         |
 3+50       0.0149      0.07  Q V       |         |         |         |
 3+55       0.0154      0.07  Q V       |         |         |         |
 4+ 0       0.0159      0.07  Q V       |         |         |         |
 4+ 5       0.0165      0.07  Q V       |         |         |         |
 4+10       0.0170      0.08  Q V       |         |         |         |
 4+15       0.0175      0.08  Q V       |         |         |         |
 4+20       0.0180      0.08  Q V       |         |         |         |
 4+25       0.0186      0.08  Q V       |         |         |         |
 4+30       0.0192      0.09  Q V       |         |         |         |
 4+35       0.0198      0.09  Q  V      |         |         |         |
 4+40       0.0204      0.09  Q  V      |         |         |         |
 4+45       0.0210      0.09  Q  V      |         |         |         |
 4+50       0.0216      0.09  Q  V      |         |         |         |
 4+55       0.0223      0.10  Q  V      |         |         |         |
 5+ 0       0.0230      0.10  Q  V      |         |         |         |
 5+ 5       0.0236      0.09  Q  V      |         |         |         |
 5+10       0.0242      0.08  Q  V      |         |         |         |
 5+15       0.0248      0.08  Q  V      |         |         |         |
 5+20       0.0253      0.08  Q  V      |         |         |         |
 5+25       0.0259      0.09  Q  V      |         |         |         |
 5+30       0.0265      0.09  Q   V     |         |         |         |
 5+35       0.0271      0.09  Q   V     |         |         |         |
 5+40       0.0278      0.10  Q   V     |         |         |         |
 5+45       0.0285      0.10  Q   V     |         |         |         |
 5+50       0.0291      0.10  Q   V     |         |         |         |
 5+55       0.0298      0.10  Q   V     |         |         |         |
 6+ 0       0.0305      0.10  Q   V     |         |         |         |
 6+ 5       0.0312      0.10  Q   V     |         |         |         |
 6+10       0.0320      0.11  Q   V     |         |         |         |
 6+15       0.0328      0.11  Q    V    |         |         |         |
 6+20       0.0335      0.11  Q    V    |         |         |         |
 6+25       0.0343      0.11  Q    V    |         |         |         |
 6+30       0.0351      0.11  Q    V    |         |         |         |
 6+35       0.0359      0.12  Q    V    |         |         |         |
 6+40       0.0367      0.12  Q    V    |         |         |         |
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 6+45       0.0376      0.12  Q    V    |         |         |         |
 6+50       0.0385      0.13  Q    V    |         |         |         |
 6+55       0.0393      0.13  Q     V   |         |         |         |
 7+ 0       0.0402      0.13  Q     V   |         |         |         |
 7+ 5       0.0411      0.13  Q     V   |         |         |         |
 7+10       0.0419      0.13  Q     V   |         |         |         |
 7+15       0.0428      0.13  Q     V   |         |         |         |
 7+20       0.0437      0.13  Q     V   |         |         |         |
 7+25       0.0446      0.13  Q     V   |         |         |         |
 7+30       0.0455      0.14  Q     V   |         |         |         |
 7+35       0.0465      0.14  Q      V  |         |         |         |
 7+40       0.0475      0.15  Q      V  |         |         |         |
 7+45       0.0486      0.15  Q      V  |         |         |         |
 7+50       0.0496      0.15  Q      V  |         |         |         |
 7+55       0.0507      0.16  Q      V  |         |         |         |
 8+ 0       0.0518      0.16  Q      V  |         |         |         |
 8+ 5       0.0530      0.17  Q       V |         |         |         |
 8+10       0.0542      0.18  Q       V |         |         |         |
 8+15       0.0555      0.18  Q       V |         |         |         |
 8+20       0.0568      0.19  Q       V |         |         |         |
 8+25       0.0581      0.19  Q       V |         |         |         |
 8+30       0.0594      0.19  Q        V|         |         |         |
 8+35       0.0607      0.19  Q        V|         |         |         |
 8+40       0.0620      0.20  Q        V|         |         |         |
 8+45       0.0634      0.20  Q        V|         |         |         |
 8+50       0.0648      0.20  Q        V|         |         |         |
 8+55       0.0663      0.21  Q         V         |         |         |
 9+ 0       0.0677      0.21  Q         V         |         |         |
 9+ 5       0.0692      0.22  Q         V         |         |         |
 9+10       0.0708      0.23  Q         V         |         |         |
 9+15       0.0724      0.24  Q         |V        |         |         |
 9+20       0.0741      0.24  Q         |V        |         |         |
 9+25       0.0758      0.25  Q         |V        |         |         |
 9+30       0.0775      0.25  Q         |V        |         |         |
 9+35       0.0793      0.25  |Q        | V       |         |         |
 9+40       0.0811      0.26  |Q        | V       |         |         |
 9+45       0.0829      0.26  |Q        | V       |         |         |
 9+50       0.0847      0.27  |Q        | V       |         |         |
 9+55       0.0866      0.27  |Q        |  V      |         |         |
10+ 0       0.0885      0.28  |Q        |  V      |         |         |
10+ 5       0.0903      0.26  |Q        |  V      |         |         |
10+10       0.0917      0.22  Q         |   V     |         |         |
10+15       0.0932      0.20  Q         |   V     |         |         |
10+20       0.0945      0.20  Q         |   V     |         |         |
10+25       0.0958      0.19  Q         |   V     |         |         |
10+30       0.0972      0.19  Q         |   V     |         |         |
10+35       0.0986      0.20  Q         |    V    |         |         |
10+40       0.1002      0.23  Q         |    V    |         |         |
10+45       0.1018      0.24  Q         |    V    |         |         |
10+50       0.1035      0.25  Q         |    V    |         |         |
10+55       0.1053      0.25  Q         |     V   |         |         |
11+ 0       0.1070      0.25  |Q        |     V   |         |         |
11+ 5       0.1087      0.25  Q         |     V   |         |         |
11+10       0.1104      0.24  Q         |     V   |         |         |
11+15       0.1120      0.24  Q         |      V  |         |         |
11+20       0.1137      0.24  Q         |      V  |         |         |
11+25       0.1154      0.24  Q         |      V  |         |         |
11+30       0.1170      0.24  Q         |      V  |         |         |
11+35       0.1186      0.24  Q         |       V |         |         |
11+40       0.1202      0.22  Q         |       V |         |         |
11+45       0.1217      0.22  Q         |       V |         |         |
11+50       0.1232      0.22  Q         |       V |         |         |
11+55       0.1247      0.22  Q         |        V|         |         |
12+ 0       0.1263      0.23  Q         |        V|         |         |
12+ 5       0.1280      0.24  Q         |        V|         |         |
12+10       0.1299      0.29  |Q        |        V|         |         |
12+15       0.1320      0.30  |Q        |         V         |         |
12+20       0.1341      0.31  |Q        |         V         |         |
12+25       0.1363      0.32  |Q        |         V         |         |
12+30       0.1386      0.32  |Q        |         |V        |         |
12+35       0.1408      0.33  |Q        |         |V        |         |
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12+40       0.1432      0.34  |Q        |         |V        |         |
12+45       0.1456      0.35  |Q        |         | V       |         |
12+50       0.1481      0.35  |Q        |         | V       |         |
12+55       0.1505      0.36  |Q        |         |  V      |         |
13+ 0       0.1530      0.36  |Q        |         |  V      |         |
13+ 5       0.1556      0.38  |Q        |         |  V      |         |
13+10       0.1584      0.41  |Q        |         |   V     |         |
13+15       0.1613      0.42  |Q        |         |   V     |         |
13+20       0.1642      0.42  |Q        |         |    V    |         |
13+25       0.1672      0.43  |Q        |         |    V    |         |
13+30       0.1701      0.43  |Q        |         |     V   |         |
13+35       0.1729      0.40  |Q        |         |     V   |         |
13+40       0.1752      0.33  |Q        |         |     V   |         |
13+45       0.1773      0.31  |Q        |         |      V  |         |
13+50       0.1794      0.30  |Q        |         |      V  |         |
13+55       0.1815      0.30  |Q        |         |      V  |         |
14+ 0       0.1835      0.29  |Q        |         |       V |         |
14+ 5       0.1856      0.30  |Q        |         |       V |         |
14+10       0.1878      0.32  |Q        |         |       V |         |
14+15       0.1901      0.33  |Q        |         |        V|         |
14+20       0.1924      0.33  |Q        |         |        V|         |
14+25       0.1947      0.33  |Q        |         |        V|         |
14+30       0.1970      0.33  |Q        |         |         V         |
14+35       0.1992      0.33  |Q        |         |         V         |
14+40       0.2015      0.33  |Q        |         |         V         |
14+45       0.2037      0.33  |Q        |         |         |V        |
14+50       0.2060      0.33  |Q        |         |         |V        |
14+55       0.2082      0.32  |Q        |         |         |V        |
15+ 0       0.2104      0.32  |Q        |         |         | V       |
15+ 5       0.2125      0.31  |Q        |         |         | V       |
15+10       0.2147      0.31  |Q        |         |         | V       |
15+15       0.2168      0.31  |Q        |         |         |  V      |
15+20       0.2188      0.30  |Q        |         |         |  V      |
15+25       0.2209      0.30  |Q        |         |         |  V      |
15+30       0.2229      0.29  |Q        |         |         |   V     |
15+35       0.2248      0.28  |Q        |         |         |   V     |
15+40       0.2266      0.26  |Q        |         |         |   V     |
15+45       0.2283      0.25  Q         |         |         |    V    |
15+50       0.2300      0.24  Q         |         |         |    V    |
15+55       0.2317      0.24  Q         |         |         |    V    |
16+ 0       0.2333      0.24  Q         |         |         |    V    |
16+ 5       0.2347      0.20  Q         |         |         |    V    |
16+10       0.2355      0.11  Q         |         |         |     V   |
16+15       0.2361      0.08  Q         |         |         |     V   |
16+20       0.2365      0.07  Q         |         |         |     V   |
16+25       0.2370      0.06  Q         |         |         |     V   |
16+30       0.2373      0.06  Q         |         |         |     V   |
16+35       0.2377      0.05  Q         |         |         |     V   |
16+40       0.2380      0.04  Q         |         |         |     V   |
16+45       0.2383      0.04  Q         |         |         |     V   |
16+50       0.2385      0.04  Q         |         |         |     V   |
16+55       0.2388      0.04  Q         |         |         |     V   |
17+ 0       0.2390      0.04  Q         |         |         |     V   |
17+ 5       0.2393      0.04  Q         |         |         |     V   |
17+10       0.2397      0.06  Q         |         |         |     V   |
17+15       0.2401      0.06  Q         |         |         |     V   |
17+20       0.2405      0.06  Q         |         |         |     V   |
17+25       0.2410      0.06  Q         |         |         |     V   |
17+30       0.2414      0.06  Q         |         |         |      V  |
17+35       0.2418      0.06  Q         |         |         |      V  |
17+40       0.2423      0.06  Q         |         |         |      V  |
17+45       0.2427      0.06  Q         |         |         |      V  |
17+50       0.2431      0.06  Q         |         |         |      V  |
17+55       0.2435      0.05  Q         |         |         |      V  |
18+ 0       0.2439      0.05  Q         |         |         |      V  |
18+ 5       0.2442      0.05  Q         |         |         |      V  |
18+10       0.2446      0.05  Q         |         |         |      V  |
18+15       0.2449      0.05  Q         |         |         |      V  |
18+20       0.2453      0.05  Q         |         |         |      V  |
18+25       0.2456      0.05  Q         |         |         |      V  |
18+30       0.2460      0.05  Q         |         |         |      V  |
```



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18+35       0.2463      0.05  Q         |         |         |      V  |
18+40       0.2466      0.04  Q         |         |         |      V  |
18+45       0.2469      0.04  Q         |         |         |      V  |
18+50       0.2471      0.04  Q         |         |         |      V  |
18+55       0.2473      0.03  Q         |         |         |      V  |
19+ 0       0.2475      0.03  Q         |         |         |      V  |
19+ 5       0.2477      0.03  Q         |         |         |      V  |
19+10       0.2479      0.03  Q         |         |         |       V |
19+15       0.2482      0.04  Q         |         |         |       V |
19+20       0.2485      0.04  Q         |         |         |       V |
19+25       0.2488      0.05  Q         |         |         |       V |
19+30       0.2491      0.05  Q         |         |         |       V |
19+35       0.2494      0.05  Q         |         |         |       V |
19+40       0.2497      0.04  Q         |         |         |       V |
19+45       0.2500      0.04  Q         |         |         |       V |
19+50       0.2502      0.04  Q         |         |         |       V |
19+55       0.2504      0.03  Q         |         |         |       V |
20+ 0       0.2506      0.03  Q         |         |         |       V |
20+ 5       0.2508      0.03  Q         |         |         |       V |
20+10       0.2511      0.03  Q         |         |         |       V |
20+15       0.2513      0.04  Q         |         |         |       V |
20+20       0.2516      0.04  Q         |         |         |       V |
20+25       0.2518      0.04  Q         |         |         |       V |
20+30       0.2521      0.04  Q         |         |         |       V |
20+35       0.2524      0.04  Q         |         |         |       V |
20+40       0.2526      0.04  Q         |         |         |       V |
20+45       0.2529      0.04  Q         |         |         |       V |
20+50       0.2531      0.04  Q         |         |         |       V |
20+55       0.2533      0.03  Q         |         |         |       V |
21+ 0       0.2535      0.03  Q         |         |         |       V |
21+ 5       0.2537      0.03  Q         |         |         |       V |
21+10       0.2539      0.03  Q         |         |         |       V |
21+15       0.2542      0.04  Q         |         |         |       V |
21+20       0.2544      0.03  Q         |         |         |        V|
21+25       0.2546      0.03  Q         |         |         |        V|
21+30       0.2548      0.03  Q         |         |         |        V|
21+35       0.2550      0.03  Q         |         |         |        V|
21+40       0.2552      0.03  Q         |         |         |        V|
21+45       0.2555      0.04  Q         |         |         |        V|
21+50       0.2557      0.03  Q         |         |         |        V|
21+55       0.2559      0.03  Q         |         |         |        V|
22+ 0       0.2561      0.03  Q         |         |         |        V|
22+ 5       0.2563      0.03  Q         |         |         |        V|
22+10       0.2566      0.03  Q         |         |         |        V|
22+15       0.2568      0.04  Q         |         |         |        V|
22+20       0.2570      0.03  Q         |         |         |        V|
22+25       0.2572      0.03  Q         |         |         |        V|
22+30       0.2574      0.03  Q         |         |         |        V|
22+35       0.2576      0.03  Q         |         |         |        V|
22+40       0.2578      0.03  Q         |         |         |        V|
22+45       0.2580      0.03  Q         |         |         |        V|
22+50       0.2581      0.03  Q         |         |         |        V|
22+55       0.2583      0.03  Q         |         |         |        V|
23+ 0       0.2585      0.03  Q         |         |         |        V|
23+ 5       0.2587      0.03  Q         |         |         |        V|
23+10       0.2588      0.03  Q         |         |         |        V|
23+15       0.2590      0.03  Q         |         |         |        V|
23+20       0.2592      0.03  Q         |         |         |        V|
23+25       0.2594      0.03  Q         |         |         |        V|
23+30       0.2595      0.03  Q         |         |         |        V|
23+35       0.2597      0.03  Q         |         |         |        V|
23+40       0.2599      0.03  Q         |         |         |        V|
23+45       0.2600      0.03  Q         |         |         |        V|
23+50       0.2602      0.03  Q         |         |         |        V|
23+55       0.2604      0.03  Q         |         |         |        V|
24+ 0       0.2606      0.03  Q         |         |         |        V|
24+ 5       0.2607      0.02  Q         |         |         |        V|
24+10       0.2608      0.01  Q         |         |         |        V|
24+15       0.2608      0.00  Q         |         |         |        V|
24+20       0.2608      0.00  Q         |         |         |        V|
24+25       0.2608      0.00  Q         |         |         |        V|
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   24+30       0.2608      0.00  Q         |         |         |        V|
   24+35       0.2608      0.00  Q         |         |         |         V
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APPENDIX C.6: AREA "B" – POST-PROJECT CONDITION

U n i t   H y d r o g r a p h   A n a l y s i s

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Study date 06/10/16 File: ARBONSITE242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 2-YEAR, 24-HOUR STORM DURATION
ONSITE AREA "B"
FILENAME: ARBONSITE

Drainage Area = 15.65(Ac.) = 0.024 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 15.65(Ac.) = 0.024 Sq. Mi.
Length along longest watercourse = 1881.50(Ft.)
Length along longest watercourse measured to centroid = 959.32(Ft.)
Length along longest watercourse = 0.356 Mi.
Length along longest watercourse measured to centroid = 0.182 Mi.
Difference in elevation = 136.00(Ft.)
Slope along watercourse = 381.6529 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.041 Hr.
Lag time = 2.47 Min.
25% of lag time = 0.62 Min.
40% of lag time = 0.99 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
15.65	2.00	31.30

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
15.65	5.00	78.25

STORM EVENT (YEAR) = 2.00
Area Averaged 2-Year Rainfall = 2.000(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 2.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 2.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
15.650	68.90	0.429

Total Area Entered = 15.65(Ac.)

RI AMC2	RI AMC-1	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
68.9	49.7	0.575	0.429	0.353	1.000	0.353
					Sum (F) =	0.353

Area averaged mean soil loss (F) (In/Hr) = 0.353
Minimum soil loss rate ((In/Hr)) = 0.177
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.557

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	202.664	43.858	6.917
2	0.167	405.329	43.182	6.811
3	0.250	607.993	8.686	1.370
4	0.333	810.657	4.274	0.674
			Sum = 100.000	Sum= 15.772

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.016	(0.626)	0.009	0.007
2	0.17	0.07	0.016	(0.623)	0.009	0.007
3	0.25	0.07	0.016	(0.621)	0.009	0.007
4	0.33	0.10	0.024	(0.619)	0.013	0.011
5	0.42	0.10	0.024	(0.616)	0.013	0.011
6	0.50	0.10	0.024	(0.614)	0.013	0.011
7	0.58	0.10	0.024	(0.611)	0.013	0.011
8	0.67	0.10	0.024	(0.609)	0.013	0.011
9	0.75	0.10	0.024	(0.607)	0.013	0.011
10	0.83	0.13	0.032	(0.604)	0.018	0.014
11	0.92	0.13	0.032	(0.602)	0.018	0.014
12	1.00	0.13	0.032	(0.600)	0.018	0.014
13	1.08	0.10	0.024	(0.597)	0.013	0.011
14	1.17	0.10	0.024	(0.595)	0.013	0.011
15	1.25	0.10	0.024	(0.592)	0.013	0.011
16	1.33	0.10	0.024	(0.590)	0.013	0.011
17	1.42	0.10	0.024	(0.588)	0.013	0.011
18	1.50	0.10	0.024	(0.585)	0.013	0.011
19	1.58	0.10	0.024	(0.583)	0.013	0.011
20	1.67	0.10	0.024	(0.581)	0.013	0.011
21	1.75	0.10	0.024	(0.578)	0.013	0.011
22	1.83	0.13	0.032	(0.576)	0.018	0.014
23	1.92	0.13	0.032	(0.574)	0.018	0.014
24	2.00	0.13	0.032	(0.571)	0.018	0.014
25	2.08	0.13	0.032	(0.569)	0.018	0.014
26	2.17	0.13	0.032	(0.567)	0.018	0.014
27	2.25	0.13	0.032	(0.565)	0.018	0.014
28	2.33	0.13	0.032	(0.562)	0.018	0.014
29	2.42	0.13	0.032	(0.560)	0.018	0.014
30	2.50	0.13	0.032	(0.558)	0.018	0.014
31	2.58	0.17	0.040	(0.555)	0.022	0.018
32	2.67	0.17	0.040	(0.553)	0.022	0.018
33	2.75	0.17	0.040	(0.551)	0.022	0.018
34	2.83	0.17	0.040	(0.549)	0.022	0.018
35	2.92	0.17	0.040	(0.546)	0.022	0.018
36	3.00	0.17	0.040	(0.544)	0.022	0.018
37	3.08	0.17	0.040	(0.542)	0.022	0.018
38	3.17	0.17	0.040	(0.540)	0.022	0.018

39	3.25	0.17	0.040	(0.537)	0.022	0.018
40	3.33	0.17	0.040	(0.535)	0.022	0.018
41	3.42	0.17	0.040	(0.533)	0.022	0.018
42	3.50	0.17	0.040	(0.531)	0.022	0.018
43	3.58	0.17	0.040	(0.528)	0.022	0.018
44	3.67	0.17	0.040	(0.526)	0.022	0.018
45	3.75	0.17	0.040	(0.524)	0.022	0.018
46	3.83	0.20	0.048	(0.522)	0.027	0.021
47	3.92	0.20	0.048	(0.519)	0.027	0.021
48	4.00	0.20	0.048	(0.517)	0.027	0.021
49	4.08	0.20	0.048	(0.515)	0.027	0.021
50	4.17	0.20	0.048	(0.513)	0.027	0.021
51	4.25	0.20	0.048	(0.511)	0.027	0.021
52	4.33	0.23	0.056	(0.509)	0.031	0.025
53	4.42	0.23	0.056	(0.506)	0.031	0.025
54	4.50	0.23	0.056	(0.504)	0.031	0.025
55	4.58	0.23	0.056	(0.502)	0.031	0.025
56	4.67	0.23	0.056	(0.500)	0.031	0.025
57	4.75	0.23	0.056	(0.498)	0.031	0.025
58	4.83	0.27	0.064	(0.496)	0.036	0.028
59	4.92	0.27	0.064	(0.493)	0.036	0.028
60	5.00	0.27	0.064	(0.491)	0.036	0.028
61	5.08	0.20	0.048	(0.489)	0.027	0.021
62	5.17	0.20	0.048	(0.487)	0.027	0.021
63	5.25	0.20	0.048	(0.485)	0.027	0.021
64	5.33	0.23	0.056	(0.483)	0.031	0.025
65	5.42	0.23	0.056	(0.481)	0.031	0.025
66	5.50	0.23	0.056	(0.479)	0.031	0.025
67	5.58	0.27	0.064	(0.476)	0.036	0.028
68	5.67	0.27	0.064	(0.474)	0.036	0.028
69	5.75	0.27	0.064	(0.472)	0.036	0.028
70	5.83	0.27	0.064	(0.470)	0.036	0.028
71	5.92	0.27	0.064	(0.468)	0.036	0.028
72	6.00	0.27	0.064	(0.466)	0.036	0.028
73	6.08	0.30	0.072	(0.464)	0.040	0.032
74	6.17	0.30	0.072	(0.462)	0.040	0.032
75	6.25	0.30	0.072	(0.460)	0.040	0.032
76	6.33	0.30	0.072	(0.458)	0.040	0.032
77	6.42	0.30	0.072	(0.456)	0.040	0.032
78	6.50	0.30	0.072	(0.454)	0.040	0.032
79	6.58	0.33	0.080	(0.452)	0.045	0.035
80	6.67	0.33	0.080	(0.450)	0.045	0.035
81	6.75	0.33	0.080	(0.448)	0.045	0.035
82	6.83	0.33	0.080	(0.446)	0.045	0.035
83	6.92	0.33	0.080	(0.444)	0.045	0.035
84	7.00	0.33	0.080	(0.442)	0.045	0.035
85	7.08	0.33	0.080	(0.440)	0.045	0.035
86	7.17	0.33	0.080	(0.438)	0.045	0.035
87	7.25	0.33	0.080	(0.436)	0.045	0.035
88	7.33	0.37	0.088	(0.434)	0.049	0.039
89	7.42	0.37	0.088	(0.432)	0.049	0.039
90	7.50	0.37	0.088	(0.430)	0.049	0.039
91	7.58	0.40	0.096	(0.428)	0.053	0.043
92	7.67	0.40	0.096	(0.426)	0.053	0.043
93	7.75	0.40	0.096	(0.424)	0.053	0.043
94	7.83	0.43	0.104	(0.422)	0.058	0.046
95	7.92	0.43	0.104	(0.420)	0.058	0.046
96	8.00	0.43	0.104	(0.418)	0.058	0.046
97	8.08	0.50	0.120	(0.416)	0.067	0.053
98	8.17	0.50	0.120	(0.414)	0.067	0.053
99	8.25	0.50	0.120	(0.412)	0.067	0.053
100	8.33	0.50	0.120	(0.410)	0.067	0.053
101	8.42	0.50	0.120	(0.408)	0.067	0.053
102	8.50	0.50	0.120	(0.406)	0.067	0.053
103	8.58	0.53	0.128	(0.404)	0.071	0.057
104	8.67	0.53	0.128	(0.402)	0.071	0.057
105	8.75	0.53	0.128	(0.401)	0.071	0.057
106	8.83	0.57	0.136	(0.399)	0.076	0.060
107	8.92	0.57	0.136	(0.397)	0.076	0.060
108	9.00	0.57	0.136	(0.395)	0.076	0.060
109	9.08	0.63	0.152	(0.393)	0.085	0.067

110	9.17	0.63	0.152	(0.391)	0.085	0.067
111	9.25	0.63	0.152	(0.389)	0.085	0.067
112	9.33	0.67	0.160	(0.387)	0.089	0.071
113	9.42	0.67	0.160	(0.386)	0.089	0.071
114	9.50	0.67	0.160	(0.384)	0.089	0.071
115	9.58	0.70	0.168	(0.382)	0.094	0.074
116	9.67	0.70	0.168	(0.380)	0.094	0.074
117	9.75	0.70	0.168	(0.378)	0.094	0.074
118	9.83	0.73	0.176	(0.376)	0.098	0.078
119	9.92	0.73	0.176	(0.375)	0.098	0.078
120	10.00	0.73	0.176	(0.373)	0.098	0.078
121	10.08	0.50	0.120	(0.371)	0.067	0.053
122	10.17	0.50	0.120	(0.369)	0.067	0.053
123	10.25	0.50	0.120	(0.367)	0.067	0.053
124	10.33	0.50	0.120	(0.366)	0.067	0.053
125	10.42	0.50	0.120	(0.364)	0.067	0.053
126	10.50	0.50	0.120	(0.362)	0.067	0.053
127	10.58	0.67	0.160	(0.360)	0.089	0.071
128	10.67	0.67	0.160	(0.359)	0.089	0.071
129	10.75	0.67	0.160	(0.357)	0.089	0.071
130	10.83	0.67	0.160	(0.355)	0.089	0.071
131	10.92	0.67	0.160	(0.353)	0.089	0.071
132	11.00	0.67	0.160	(0.352)	0.089	0.071
133	11.08	0.63	0.152	(0.350)	0.085	0.067
134	11.17	0.63	0.152	(0.348)	0.085	0.067
135	11.25	0.63	0.152	(0.346)	0.085	0.067
136	11.33	0.63	0.152	(0.345)	0.085	0.067
137	11.42	0.63	0.152	(0.343)	0.085	0.067
138	11.50	0.63	0.152	(0.341)	0.085	0.067
139	11.58	0.57	0.136	(0.340)	0.076	0.060
140	11.67	0.57	0.136	(0.338)	0.076	0.060
141	11.75	0.57	0.136	(0.336)	0.076	0.060
142	11.83	0.60	0.144	(0.335)	0.080	0.064
143	11.92	0.60	0.144	(0.333)	0.080	0.064
144	12.00	0.60	0.144	(0.331)	0.080	0.064
145	12.08	0.83	0.200	(0.330)	0.111	0.089
146	12.17	0.83	0.200	(0.328)	0.111	0.089
147	12.25	0.83	0.200	(0.326)	0.111	0.089
148	12.33	0.87	0.208	(0.325)	0.116	0.092
149	12.42	0.87	0.208	(0.323)	0.116	0.092
150	12.50	0.87	0.208	(0.321)	0.116	0.092
151	12.58	0.93	0.224	(0.320)	0.125	0.099
152	12.67	0.93	0.224	(0.318)	0.125	0.099
153	12.75	0.93	0.224	(0.317)	0.125	0.099
154	12.83	0.97	0.232	(0.315)	0.129	0.103
155	12.92	0.97	0.232	(0.313)	0.129	0.103
156	13.00	0.97	0.232	(0.312)	0.129	0.103
157	13.08	1.13	0.272	(0.310)	0.151	0.121
158	13.17	1.13	0.272	(0.309)	0.151	0.121
159	13.25	1.13	0.272	(0.307)	0.151	0.121
160	13.33	1.13	0.272	(0.306)	0.151	0.121
161	13.42	1.13	0.272	(0.304)	0.151	0.121
162	13.50	1.13	0.272	(0.302)	0.151	0.121
163	13.58	0.77	0.184	(0.301)	0.102	0.082
164	13.67	0.77	0.184	(0.299)	0.102	0.082
165	13.75	0.77	0.184	(0.298)	0.102	0.082
166	13.83	0.77	0.184	(0.296)	0.102	0.082
167	13.92	0.77	0.184	(0.295)	0.102	0.082
168	14.00	0.77	0.184	(0.293)	0.102	0.082
169	14.08	0.90	0.216	(0.292)	0.120	0.096
170	14.17	0.90	0.216	(0.290)	0.120	0.096
171	14.25	0.90	0.216	(0.289)	0.120	0.096
172	14.33	0.87	0.208	(0.287)	0.116	0.092
173	14.42	0.87	0.208	(0.286)	0.116	0.092
174	14.50	0.87	0.208	(0.284)	0.116	0.092
175	14.58	0.87	0.208	(0.283)	0.116	0.092
176	14.67	0.87	0.208	(0.281)	0.116	0.092
177	14.75	0.87	0.208	(0.280)	0.116	0.092
178	14.83	0.83	0.200	(0.279)	0.111	0.089
179	14.92	0.83	0.200	(0.277)	0.111	0.089
180	15.00	0.83	0.200	(0.276)	0.111	0.089

181	15.08	0.80	0.192	(0.274)	0.107	0.085
182	15.17	0.80	0.192	(0.273)	0.107	0.085
183	15.25	0.80	0.192	(0.272)	0.107	0.085
184	15.33	0.77	0.184	(0.270)	0.102	0.082
185	15.42	0.77	0.184	(0.269)	0.102	0.082
186	15.50	0.77	0.184	(0.267)	0.102	0.082
187	15.58	0.63	0.152	(0.266)	0.085	0.067
188	15.67	0.63	0.152	(0.265)	0.085	0.067
189	15.75	0.63	0.152	(0.263)	0.085	0.067
190	15.83	0.63	0.152	(0.262)	0.085	0.067
191	15.92	0.63	0.152	(0.261)	0.085	0.067
192	16.00	0.63	0.152	(0.259)	0.085	0.067
193	16.08	0.13	0.032	(0.258)	0.018	0.014
194	16.17	0.13	0.032	(0.257)	0.018	0.014
195	16.25	0.13	0.032	(0.255)	0.018	0.014
196	16.33	0.13	0.032	(0.254)	0.018	0.014
197	16.42	0.13	0.032	(0.253)	0.018	0.014
198	16.50	0.13	0.032	(0.251)	0.018	0.014
199	16.58	0.10	0.024	(0.250)	0.013	0.011
200	16.67	0.10	0.024	(0.249)	0.013	0.011
201	16.75	0.10	0.024	(0.248)	0.013	0.011
202	16.83	0.10	0.024	(0.246)	0.013	0.011
203	16.92	0.10	0.024	(0.245)	0.013	0.011
204	17.00	0.10	0.024	(0.244)	0.013	0.011
205	17.08	0.17	0.040	(0.243)	0.022	0.018
206	17.17	0.17	0.040	(0.241)	0.022	0.018
207	17.25	0.17	0.040	(0.240)	0.022	0.018
208	17.33	0.17	0.040	(0.239)	0.022	0.018
209	17.42	0.17	0.040	(0.238)	0.022	0.018
210	17.50	0.17	0.040	(0.237)	0.022	0.018
211	17.58	0.17	0.040	(0.235)	0.022	0.018
212	17.67	0.17	0.040	(0.234)	0.022	0.018
213	17.75	0.17	0.040	(0.233)	0.022	0.018
214	17.83	0.13	0.032	(0.232)	0.018	0.014
215	17.92	0.13	0.032	(0.231)	0.018	0.014
216	18.00	0.13	0.032	(0.230)	0.018	0.014
217	18.08	0.13	0.032	(0.229)	0.018	0.014
218	18.17	0.13	0.032	(0.227)	0.018	0.014
219	18.25	0.13	0.032	(0.226)	0.018	0.014
220	18.33	0.13	0.032	(0.225)	0.018	0.014
221	18.42	0.13	0.032	(0.224)	0.018	0.014
222	18.50	0.13	0.032	(0.223)	0.018	0.014
223	18.58	0.10	0.024	(0.222)	0.013	0.011
224	18.67	0.10	0.024	(0.221)	0.013	0.011
225	18.75	0.10	0.024	(0.220)	0.013	0.011
226	18.83	0.07	0.016	(0.219)	0.009	0.007
227	18.92	0.07	0.016	(0.218)	0.009	0.007
228	19.00	0.07	0.016	(0.217)	0.009	0.007
229	19.08	0.10	0.024	(0.216)	0.013	0.011
230	19.17	0.10	0.024	(0.215)	0.013	0.011
231	19.25	0.10	0.024	(0.214)	0.013	0.011
232	19.33	0.13	0.032	(0.213)	0.018	0.014
233	19.42	0.13	0.032	(0.212)	0.018	0.014
234	19.50	0.13	0.032	(0.211)	0.018	0.014
235	19.58	0.10	0.024	(0.210)	0.013	0.011
236	19.67	0.10	0.024	(0.209)	0.013	0.011
237	19.75	0.10	0.024	(0.208)	0.013	0.011
238	19.83	0.07	0.016	(0.207)	0.009	0.007
239	19.92	0.07	0.016	(0.206)	0.009	0.007
240	20.00	0.07	0.016	(0.205)	0.009	0.007
241	20.08	0.10	0.024	(0.204)	0.013	0.011
242	20.17	0.10	0.024	(0.203)	0.013	0.011
243	20.25	0.10	0.024	(0.202)	0.013	0.011
244	20.33	0.10	0.024	(0.201)	0.013	0.011
245	20.42	0.10	0.024	(0.201)	0.013	0.011
246	20.50	0.10	0.024	(0.200)	0.013	0.011
247	20.58	0.10	0.024	(0.199)	0.013	0.011
248	20.67	0.10	0.024	(0.198)	0.013	0.011
249	20.75	0.10	0.024	(0.197)	0.013	0.011
250	20.83	0.07	0.016	(0.196)	0.009	0.007
251	20.92	0.07	0.016	(0.196)	0.009	0.007

252	21.00	0.07	0.016	(0.195)	0.009	0.007
253	21.08	0.10	0.024	(0.194)	0.013	0.011
254	21.17	0.10	0.024	(0.193)	0.013	0.011
255	21.25	0.10	0.024	(0.193)	0.013	0.011
256	21.33	0.07	0.016	(0.192)	0.009	0.007
257	21.42	0.07	0.016	(0.191)	0.009	0.007
258	21.50	0.07	0.016	(0.190)	0.009	0.007
259	21.58	0.10	0.024	(0.190)	0.013	0.011
260	21.67	0.10	0.024	(0.189)	0.013	0.011
261	21.75	0.10	0.024	(0.188)	0.013	0.011
262	21.83	0.07	0.016	(0.188)	0.009	0.007
263	21.92	0.07	0.016	(0.187)	0.009	0.007
264	22.00	0.07	0.016	(0.186)	0.009	0.007
265	22.08	0.10	0.024	(0.186)	0.013	0.011
266	22.17	0.10	0.024	(0.185)	0.013	0.011
267	22.25	0.10	0.024	(0.185)	0.013	0.011
268	22.33	0.07	0.016	(0.184)	0.009	0.007
269	22.42	0.07	0.016	(0.183)	0.009	0.007
270	22.50	0.07	0.016	(0.183)	0.009	0.007
271	22.58	0.07	0.016	(0.182)	0.009	0.007
272	22.67	0.07	0.016	(0.182)	0.009	0.007
273	22.75	0.07	0.016	(0.181)	0.009	0.007
274	22.83	0.07	0.016	(0.181)	0.009	0.007
275	22.92	0.07	0.016	(0.180)	0.009	0.007
276	23.00	0.07	0.016	(0.180)	0.009	0.007
277	23.08	0.07	0.016	(0.180)	0.009	0.007
278	23.17	0.07	0.016	(0.179)	0.009	0.007
279	23.25	0.07	0.016	(0.179)	0.009	0.007
280	23.33	0.07	0.016	(0.178)	0.009	0.007
281	23.42	0.07	0.016	(0.178)	0.009	0.007
282	23.50	0.07	0.016	(0.178)	0.009	0.007
283	23.58	0.07	0.016	(0.178)	0.009	0.007
284	23.67	0.07	0.016	(0.177)	0.009	0.007
285	23.75	0.07	0.016	(0.177)	0.009	0.007
286	23.83	0.07	0.016	(0.177)	0.009	0.007
287	23.92	0.07	0.016	(0.177)	0.009	0.007
288	24.00	0.07	0.016	(0.177)	0.009	0.007

```
                 (Loss Rate Not Used)
    Sum =     100.0                                    Sum =    10.6
      Flood volume = Effective rainfall      0.89(In)
       times area      15.7(Ac.)/[(In)/(Ft.)] =       1.2(Ac.Ft)
      Total soil loss =      1.11(In)
      Total soil loss =     1.452(Ac.Ft)
      Total rainfall =      2.00(In)
      Flood volume =       50354.4 Cubic Feet
      Total soil loss =       63261.1 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      1.902(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in  5   Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 -----------------------------------------------------------------------
   0+ 5      0.0003      0.05  Q         |         |         |         |
   0+10      0.0010      0.10  Q         |         |         |         |
   0+15      0.0017      0.11  Q         |         |         |         |
   0+20      0.0027      0.14  Q         |         |         |         |
   0+25      0.0038      0.16  Q         |         |         |         |
   0+30      0.0049      0.17  Q         |         |         |         |
   0+35      0.0061      0.17  Q         |         |         |         |
   0+40      0.0072      0.17  Q         |         |         |         |
   0+45      0.0084      0.17  Q         |         |         |         |
   0+50      0.0097      0.19  Q         |         |         |         |
   0+55      0.0112      0.22  Q         |         |         |         |
   1+ 0      0.0127      0.22  Q         |         |         |         |
   1+ 5      0.0141      0.20  Q         |         |         |         |
```

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1+10      0.0153      0.18  Q         |         |         |         |
1+15      0.0165      0.17  Q         |         |         |         |
1+20      0.0176      0.17  Q         |         |         |         |
1+25      0.0188      0.17  Q         |         |         |         |
1+30      0.0200      0.17  Q         |         |         |         |
1+35      0.0211      0.17  Q         |         |         |         |
1+40      0.0223      0.17  Q         |         |         |         |
1+45      0.0234      0.17  Q         |         |         |         |
1+50      0.0248      0.19  Q         |         |         |         |
1+55      0.0262      0.22  Q         |         |         |         |
2+ 0      0.0278      0.22  Q         |         |         |         |
2+ 5      0.0293      0.22  QV        |         |         |         |
2+10      0.0309      0.22  QV        |         |         |         |
2+15      0.0324      0.22  QV        |         |         |         |
2+20      0.0339      0.22  QV        |         |         |         |
2+25      0.0355      0.22  QV        |         |         |         |
2+30      0.0370      0.22  QV        |         |         |         |
2+35      0.0387      0.25  QV        |         |         |         |
2+40      0.0406      0.27  |Q        |         |         |         |
2+45      0.0425      0.28  |Q        |         |         |         |
2+50      0.0444      0.28  |Q        |         |         |         |
2+55      0.0464      0.28  |Q        |         |         |         |
3+ 0      0.0483      0.28  |Q        |         |         |         |
3+ 5      0.0502      0.28  |Q        |         |         |         |
3+10      0.0521      0.28  |Q        |         |         |         |
3+15      0.0541      0.28  |Q        |         |         |         |
3+20      0.0560      0.28  |Q        |         |         |         |
3+25      0.0579      0.28  |QV       |         |         |         |
3+30      0.0599      0.28  |QV       |         |         |         |
3+35      0.0618      0.28  |QV       |         |         |         |
3+40      0.0637      0.28  |QV       |         |         |         |
3+45      0.0656      0.28  |QV       |         |         |         |
3+50      0.0677      0.30  |QV       |         |         |         |
3+55      0.0700      0.33  |QV       |         |         |         |
4+ 0      0.0723      0.33  |QV       |         |         |         |
4+ 5      0.0746      0.34  |QV       |         |         |         |
4+10      0.0769      0.34  |QV       |         |         |         |
4+15      0.0792      0.34  |QV       |         |         |         |
4+20      0.0817      0.36  |QV       |         |         |         |
4+25      0.0844      0.38  |QV       |         |         |         |
4+30      0.0870      0.39  |Q V      |         |         |         |
4+35      0.0897      0.39  |Q V      |         |         |         |
4+40      0.0924      0.39  |Q V      |         |         |         |
4+45      0.0951      0.39  |Q V      |         |         |         |
4+50      0.0980      0.42  |Q V      |         |         |         |
4+55      0.1010      0.44  |Q V      |         |         |         |
5+ 0      0.1041      0.45  |Q V      |         |         |         |
5+ 5      0.1068      0.40  |Q V      |         |         |         |
5+10      0.1092      0.35  |Q V      |         |         |         |
5+15      0.1116      0.34  |Q V      |         |         |         |
5+20      0.1141      0.36  |Q V      |         |         |         |
5+25      0.1167      0.38  |Q  V     |         |         |         |
5+30      0.1194      0.39  |Q  V     |         |         |         |
5+35      0.1223      0.42  |Q  V     |         |         |         |
5+40      0.1253      0.44  |Q  V     |         |         |         |
5+45      0.1284      0.45  |Q  V     |         |         |         |
5+50      0.1314      0.45  |Q  V     |         |         |         |
5+55      0.1345      0.45  |Q  V     |         |         |         |
6+ 0      0.1376      0.45  |Q  V     |         |         |         |
6+ 5      0.1409      0.47  |Q  V     |         |         |         |
6+10      0.1443      0.50  |Q  V     |         |         |         |
6+15      0.1477      0.50  | Q  V    |         |         |         |
6+20      0.1512      0.50  | Q  V    |         |         |         |
6+25      0.1547      0.50  | Q  V    |         |         |         |
6+30      0.1581      0.50  | Q  V    |         |         |         |
6+35      0.1618      0.53  | Q  V    |         |         |         |
6+40      0.1656      0.55  | Q  V    |         |         |         |
6+45      0.1694      0.56  | Q  V    |         |         |         |
6+50      0.1733      0.56  | Q  V    |         |         |         |
6+55      0.1771      0.56  | Q   V   |         |         |         |
7+ 0      0.1810      0.56  | Q   V   |         |         |         |
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7+ 5      0.1848      0.56  | Q   V   |         |         |         |
7+10      0.1887      0.56  | Q   V   |         |         |         |
7+15      0.1925      0.56  | Q   V   |         |         |         |
7+20      0.1966      0.58  | Q   V   |         |         |         |
7+25      0.2007      0.61  | Q   V   |         |         |         |
7+30      0.2050      0.61  | Q    V  |         |         |         |
7+35      0.2094      0.64  | Q    V  |         |         |         |
7+40      0.2139      0.66  | Q    V  |         |         |         |
7+45      0.2186      0.67  | Q    V  |         |         |         |
7+50      0.2233      0.70  | Q    V  |         |         |         |
7+55      0.2283      0.72  | Q    V  |         |         |         |
8+ 0      0.2333      0.72  | Q     V |         |         |         |
8+ 5      0.2386      0.78  |  Q    V |         |         |         |
8+10      0.2443      0.82  |  Q    V |         |         |         |
8+15      0.2501      0.83  |  Q    V |         |         |         |
8+20      0.2559      0.84  |  Q    V |         |         |         |
8+25      0.2616      0.84  |  Q     V|         |         |         |
8+30      0.2674      0.84  |  Q     V|         |         |         |
8+35      0.2734      0.86  |  Q     V|         |         |         |
8+40      0.2795      0.89  |  Q     V|         |         |         |
8+45      0.2856      0.89  |  Q     V|         |         |         |
8+50      0.2920      0.92  |  Q      V         |         |         |
8+55      0.2985      0.94  |  Q      V         |         |         |
9+ 0      0.3050      0.95  |  Q      V         |         |         |
9+ 5      0.3119      1.00  |   Q     V         |         |         |
9+10      0.3191      1.05  |   Q     |V        |         |         |
9+15      0.3264      1.06  |   Q     |V        |         |         |
9+20      0.3339      1.09  |   Q     |V        |         |         |
9+25      0.3415      1.11  |   Q     |V        |         |         |
9+30      0.3492      1.12  |   Q     | V       |         |         |
9+35      0.3571      1.14  |   Q     | V       |         |         |
9+40      0.3651      1.17  |   Q     | V       |         |         |
9+45      0.3732      1.17  |   Q     | V       |         |         |
9+50      0.3815      1.20  |   Q     |  V      |         |         |
9+55      0.3899      1.22  |   Q     |  V      |         |         |
10+ 0     0.3984      1.23  |   Q     |  V      |         |         |
10+ 5     0.4057      1.06  |   Q     |   V     |         |         |
10+10     0.4118      0.89  |  Q      |   V     |         |         |
10+15     0.4177      0.86  |  Q      |   V     |         |         |
10+20     0.4235      0.84  |  Q      |   V     |         |         |
10+25     0.4293      0.84  |  Q      |   V     |         |         |
10+30     0.4350      0.84  |  Q      |    V    |         |         |
10+35     0.4417      0.96  |  Q      |    V    |         |         |
10+40     0.4491      1.08  |   Q     |    V    |         |         |
10+45     0.4567      1.11  |   Q     |    V    |         |         |
10+50     0.4644      1.12  |   Q     |     V   |         |         |
10+55     0.4721      1.12  |   Q     |     V   |         |         |
11+ 0     0.4799      1.12  |   Q     |     V   |         |         |
11+ 5     0.4874      1.09  |   Q     |     V   |         |         |
11+10     0.4948      1.07  |   Q     |      V  |         |         |
11+15     0.5021      1.07  |   Q     |      V  |         |         |
11+20     0.5094      1.06  |   Q     |      V  |         |         |
11+25     0.5167      1.06  |   Q     |      V  |         |         |
11+30     0.5241      1.06  |   Q     |       V |         |         |
11+35     0.5310      1.01  |   Q     |       V |         |         |
11+40     0.5377      0.97  |  Q      |       V |         |         |
11+45     0.5443      0.96  |  Q      |       V |         |         |
11+50     0.5510      0.98  |  Q      |        V|         |         |
11+55     0.5579      1.00  |  Q      |        V|         |         |
12+ 0     0.5648      1.00  |   Q     |        V|         |         |
12+ 5     0.5729      1.18  |   Q     |        V|         |         |
12+10     0.5822      1.35  |    Q    |         V         |         |
12+15     0.5917      1.38  |    Q    |         V         |         |
12+20     0.6015      1.42  |    Q    |         V         |         |
12+25     0.6115      1.45  |    Q    |         |V        |         |
12+30     0.6215      1.45  |    Q    |         |V        |         |
12+35     0.6319      1.50  |     Q   |         |V        |         |
12+40     0.6425      1.55  |     Q   |         | V       |         |
12+45     0.6533      1.56  |     Q   |         | V       |         |
12+50     0.6643      1.59  |     Q   |         | V       |         |
12+55     0.6754      1.62  |     Q   |         |  V      |         |
```

```
13+ 0       0.6865      1.62  |     Q   |         |  V      |         |
13+ 5       0.6986      1.75  |     Q   |         |   V     |         |
13+10       0.7114      1.87  |      Q  |         |   V     |         |
13+15       0.7244      1.89  |      Q  |         |    V    |         |
13+20       0.7375      1.90  |      Q  |         |    V    |         |
13+25       0.7506      1.90  |      Q  |         |    V    |         |
13+30       0.7637      1.90  |      Q  |         |     V   |         |
13+35       0.7750      1.63  |     Q   |         |     V   |         |
13+40       0.7844      1.37  |    Q    |         |      V  |         |
13+45       0.7934      1.31  |    Q    |         |      V  |         |
13+50       0.8023      1.29  |    Q    |         |      V  |         |
13+55       0.8112      1.29  |    Q    |         |       V |         |
14+ 0       0.8200      1.29  |    Q    |         |       V |         |
14+ 5       0.8296      1.38  |    Q    |         |       V |         |
14+10       0.8398      1.48  |    Q    |         |        V|         |
14+15       0.8501      1.50  |     Q   |         |        V|         |
14+20       0.8603      1.49  |    Q    |         |        V|         |
14+25       0.8704      1.46  |    Q    |         |         V         |
14+30       0.8804      1.46  |    Q    |         |         V         |
14+35       0.8905      1.45  |    Q    |         |         V         |
14+40       0.9005      1.45  |    Q    |         |         |V        |
14+45       0.9105      1.45  |    Q    |         |         |V        |
14+50       0.9203      1.43  |    Q    |         |         |V        |
14+55       0.9300      1.41  |    Q    |         |         | V       |
15+ 0       0.9397      1.40  |    Q    |         |         | V       |
15+ 5       0.9491      1.37  |    Q    |         |         | V       |
15+10       0.9584      1.35  |    Q    |         |         |  V      |
15+15       0.9677      1.35  |    Q    |         |         |  V      |
15+20       0.9768      1.32  |    Q    |         |         |  V      |
15+25       0.9857      1.29  |    Q    |         |         |   V     |
15+30       0.9946      1.29  |    Q    |         |         |   V     |
15+35       1.0028      1.19  |   Q     |         |         |   V     |
15+40       1.0103      1.09  |   Q     |         |         |   V     |
15+45       1.0177      1.07  |   Q     |         |         |    V    |
15+50       1.0250      1.06  |   Q     |         |         |    V    |
15+55       1.0323      1.06  |   Q     |         |         |    V    |
16+ 0       1.0396      1.06  |   Q     |         |         |    V    |
16+ 5       1.0444      0.69  | Q       |         |         |     V   |
16+10       1.0467      0.33  |Q        |         |         |     V   |
16+15       1.0485      0.26  |Q        |         |         |     V   |
16+20       1.0500      0.22  Q         |         |         |     V   |
16+25       1.0516      0.22  Q         |         |         |     V   |
16+30       1.0531      0.22  Q         |         |         |     V   |
16+35       1.0545      0.20  Q         |         |         |     V   |
16+40       1.0557      0.18  Q         |         |         |     V   |
16+45       1.0569      0.17  Q         |         |         |     V   |
16+50       1.0580      0.17  Q         |         |         |     V   |
16+55       1.0592      0.17  Q         |         |         |     V   |
17+ 0       1.0603      0.17  Q         |         |         |     V   |
17+ 5       1.0618      0.22  Q         |         |         |     V   |
17+10       1.0637      0.27  |Q        |         |         |     V   |
17+15       1.0656      0.27  |Q        |         |         |     V   |
17+20       1.0675      0.28  |Q        |         |         |     V   |
17+25       1.0694      0.28  |Q        |         |         |      V  |
17+30       1.0713      0.28  |Q        |         |         |      V  |
17+35       1.0733      0.28  |Q        |         |         |      V  |
17+40       1.0752      0.28  |Q        |         |         |      V  |
17+45       1.0771      0.28  |Q        |         |         |      V  |
17+50       1.0789      0.26  |Q        |         |         |      V  |
17+55       1.0805      0.23  Q         |         |         |      V  |
18+ 0       1.0820      0.23  Q         |         |         |      V  |
18+ 5       1.0836      0.22  Q         |         |         |      V  |
18+10       1.0851      0.22  Q         |         |         |      V  |
18+15       1.0866      0.22  Q         |         |         |      V  |
18+20       1.0882      0.22  Q         |         |         |      V  |
18+25       1.0897      0.22  Q         |         |         |      V  |
18+30       1.0913      0.22  Q         |         |         |      V  |
18+35       1.0926      0.20  Q         |         |         |      V  |
18+40       1.0938      0.18  Q         |         |         |      V  |
18+45       1.0950      0.17  Q         |         |         |      V  |
18+50       1.0960      0.14  Q         |         |         |      V  |
```



```
18+55       1.0968      0.12  Q         |         |         |      V  |
19+ 0       1.0976      0.11  Q         |         |         |      V  |
19+ 5       1.0986      0.14  Q         |         |         |       V |
19+10       1.0997      0.16  Q         |         |         |       V |
19+15       1.1008      0.17  Q         |         |         |       V |
19+20       1.1021      0.19  Q         |         |         |       V |
19+25       1.1036      0.22  Q         |         |         |       V |
19+30       1.1051      0.22  Q         |         |         |       V |
19+35       1.1065      0.20  Q         |         |         |       V |
19+40       1.1077      0.18  Q         |         |         |       V |
19+45       1.1089      0.17  Q         |         |         |       V |
19+50       1.1099      0.14  Q         |         |         |       V |
19+55       1.1107      0.12  Q         |         |         |       V |
20+ 0       1.1115      0.11  Q         |         |         |       V |
20+ 5       1.1124      0.14  Q         |         |         |       V |
20+10       1.1135      0.16  Q         |         |         |       V |
20+15       1.1147      0.17  Q         |         |         |       V |
20+20       1.1158      0.17  Q         |         |         |       V |
20+25       1.1170      0.17  Q         |         |         |       V |
20+30       1.1181      0.17  Q         |         |         |       V |
20+35       1.1193      0.17  Q         |         |         |       V |
20+40       1.1205      0.17  Q         |         |         |       V |
20+45       1.1216      0.17  Q         |         |         |       V |
20+50       1.1226      0.14  Q         |         |         |       V |
20+55       1.1234      0.12  Q         |         |         |       V |
21+ 0       1.1242      0.11  Q         |         |         |       V |
21+ 5       1.1251      0.14  Q         |         |         |       V |
21+10       1.1262      0.16  Q         |         |         |       V |
21+15       1.1274      0.17  Q         |         |         |        V|
21+20       1.1284      0.14  Q         |         |         |        V|
21+25       1.1292      0.12  Q         |         |         |        V|
21+30       1.1300      0.11  Q         |         |         |        V|
21+35       1.1309      0.14  Q         |         |         |        V|
21+40       1.1320      0.16  Q         |         |         |        V|
21+45       1.1332      0.17  Q         |         |         |        V|
21+50       1.1342      0.14  Q         |         |         |        V|
21+55       1.1350      0.12  Q         |         |         |        V|
22+ 0       1.1358      0.11  Q         |         |         |        V|
22+ 5       1.1367      0.14  Q         |         |         |        V|
22+10       1.1378      0.16  Q         |         |         |        V|
22+15       1.1389      0.17  Q         |         |         |        V|
22+20       1.1399      0.14  Q         |         |         |        V|
22+25       1.1408      0.12  Q         |         |         |        V|
22+30       1.1415      0.11  Q         |         |         |        V|
22+35       1.1423      0.11  Q         |         |         |        V|
22+40       1.1431      0.11  Q         |         |         |        V|
22+45       1.1439      0.11  Q         |         |         |        V|
22+50       1.1446      0.11  Q         |         |         |        V|
22+55       1.1454      0.11  Q         |         |         |        V|
23+ 0       1.1462      0.11  Q         |         |         |        V|
23+ 5       1.1469      0.11  Q         |         |         |        V|
23+10       1.1477      0.11  Q         |         |         |        V|
23+15       1.1485      0.11  Q         |         |         |        V|
23+20       1.1492      0.11  Q         |         |         |        V|
23+25       1.1500      0.11  Q         |         |         |        V|
23+30       1.1508      0.11  Q         |         |         |        V|
23+35       1.1516      0.11  Q         |         |         |        V|
23+40       1.1523      0.11  Q         |         |         |        V|
23+45       1.1531      0.11  Q         |         |         |        V|
23+50       1.1539      0.11  Q         |         |         |        V|
23+55       1.1546      0.11  Q         |         |         |        V|
24+ 0       1.1554      0.11  Q         |         |         |        V|
24+ 5       1.1558      0.06  Q         |         |         |        V|
24+10       1.1559      0.01  Q         |         |         |        V|
24+15       1.1560      0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

APPENDIX D: POST-PROJECT UNIT HYDROGRAPH ANALYSES – 100-YEAR STORM EVENT

APPENDIX D.1: OFFSITE AREA "A"

100-YEAR, 1-HOUR

```
      U n i t   H y d r o g r a p h   A n a l y s i s

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              Study date  06/10/16 File: ARAOFF1100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6279

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
OFFSITE AREA "A"
FILENAME: ARAOFF
--------------------------------------------------------------------
Drainage Area =      30.79(Ac.)  =      0.048 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      30.79(Ac.)  =      0.048 Sq. Mi.
Length along longest watercourse =    2900.95(Ft.)
Length along longest watercourse measured to centroid =    1549.43(Ft.)
Length along longest watercourse =      0.549 Mi.
Length along longest watercourse measured to centroid =      0.293 Mi.
Difference in elevation =     397.00(Ft.)
Slope along watercourse =    722.5771 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.103 Hr.
Lag time =     6.18 Min.
25% of lag time =     1.55 Min.
40% of lag time =     2.47 Min.
Unit time =     5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       30.79           0.50                 15.40

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       30.79           1.20                 36.95

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    0.500(In)
Area Averaged 100-Year Rainfall =    1.200(In)

Point rain (area averaged) =    1.200(In)
Areal adjustment factor =   99.97 %
Adjusted average point rain =    1.200(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    30.790           84.20         0.118
 Total Area Entered =     30.79(Ac.)
```



```
RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
84.2  84.2      0.196     0.118       0.175      1.000      0.175
                                                   Sum (F) =   0.175
Area averaged mean soil loss (F) (In/Hr) =  0.175
Minimum soil loss rate ((In/Hr)) =  0.088
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.806
--------------------------------------------------------------------
Slope of intensity-duration curve for a 1 hour storm =0.5000
---------------------------------------------------------------------

               U n i t   H y d r o g r a p h
                       VALLEY S-Curve
--------------------------------------------------------------------
               Unit Hydrograph Data
--------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                            Graph %          (CFS)
--------------------------------------------------------------------
    1  0.083         80.881         13.546             4.203
    2  0.167        161.762         44.716            13.876
    3  0.250        242.642         19.684             6.108
    4  0.333        323.523          8.187             2.540
    5  0.417        404.404          4.910             1.524
    6  0.500        485.285          3.076             0.955
    7  0.583        566.166          2.229             0.692
    8  0.667        647.046          1.515             0.470
    9  0.750        727.927          1.010             0.314
   10  0.833        808.808          1.125             0.349
                              Sum = 100.000   Sum=      31.031
----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)        Max   |   Low        (In/Hr)
   1   0.08     4.20     0.605         0.175    (  0.487)        0.429
   2   0.17     4.30     0.619         0.175    (  0.499)        0.444
   3   0.25     5.00     0.720         0.175    (  0.580)        0.545
   4   0.33     5.00     0.720         0.175    (  0.580)        0.545
   5   0.42     5.80     0.835         0.175    (  0.673)        0.660
   6   0.50     6.50     0.936         0.175    (  0.754)        0.760
   7   0.58     7.40     1.065         0.175    (  0.858)        0.890
   8   0.67     8.60     1.238         0.175    (  0.997)        1.063
   9   0.75    12.30     1.771         0.175    (  1.426)        1.595
  10   0.83    29.10     4.189         0.175    (  3.375)        4.014
  11   0.92     6.80     0.979         0.175    (  0.789)        0.804
  12   1.00     5.00     0.720         0.175    (  0.580)        0.545
                 (Loss Rate Not Used)
     Sum =     100.0                                    Sum =    12.3
        Flood volume = Effective rainfall      1.02(In)
         times area      30.8(Ac.)/[(In)/(Ft.)] =       2.6(Ac.Ft)
        Total soil loss =      0.18(In)
        Total soil loss =     0.450(Ac.Ft)
        Total rainfall =      1.20(In)
        Flood volume =      114491.8 Cubic Feet
        Total soil loss =       19592.0 Cubic Feet
        --------------------------------------------------------------------
         Peak flow rate of this hydrograph =      74.678(CFS)
        --------------------------------------------------------------------
        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                            1 - H O U R   S T O R M
                       R u n o f f     H y d r o g r a p h
        --------------------------------------------------------------------
                    Hydrograph in   5   Minute intervals ((CFS))
```

```
      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0       20.0      40.0      60.0      80.0
-----------------------------------------------------------------------
  0+ 5       0.0124      1.81  Q         |         |         |         |
  0+10       0.0663      7.83  |V Q      |         |         |         |
  0+15       0.1426     11.07  | V  Q    |         |         |         |
  0+20       0.2366     13.65  |  V  Q   |         |         |         |
  0+25       0.3430     15.44  |    V Q  |         |         |         |
  0+30       0.4680     18.15  |      V Q|         |         |         |
  0+35       0.6145     21.27  |        VQ         |         |         |
  0+40       0.7867     25.01  |         |VQ       |         |         |
  0+45       1.0008     31.08  |         |    Q    |         |         |
  0+50       1.3486     50.50  |         |         V    Q    |         |
  0+55       1.8629     74.68  |         |         |       V |      Q  |
  1+ 0       2.1776     45.70  |         |         | Q       |  V      |
  1+ 5       2.3669     27.49  |         |  Q      |         |     V   |
  1+10       2.4677     14.64  |      Q  |         |         |      V  |
  1+15       2.5269      8.59  |   Q     |         |         |       V |
  1+20       2.5667      5.77  | Q       |         |         |        V|
  1+25       2.5931      3.84  |Q        |         |         |        V|
  1+30       2.6108      2.57  |Q        |         |         |        V|
  1+35       2.6240      1.91  Q         |         |         |        V|
  1+40       2.6271      0.45  Q         |         |         |        V|
  1+45       2.6284      0.19  Q         |         |         |        V|
----------------------------------------------------------------------
```

100-YEAR, 3-HOUR

U n i t   H y d r o g r a p h   A n a l y s i s

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Study date 06/10/16 File: ARAOFF3100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
OFFSITE AREA "A"
FILENAME: ARAOFF

Drainage Area = 30.79(Ac.) = 0.048 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 30.79(Ac.) = 0.048 Sq. Mi.
Length along longest watercourse = 2900.95(Ft.)
Length along longest watercourse measured to centroid = 1549.43(Ft.)
Length along longest watercourse = 0.549 Mi.
Length along longest watercourse measured to centroid = 0.293 Mi.
Difference in elevation = 397.00(Ft.)
Slope along watercourse = 722.5771 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.103 Hr.
Lag time = 6.18 Min.
25% of lag time = 1.55 Min.
40% of lag time = 2.47 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
30.79	0.90	27.71

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
30.79	1.90	58.50

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.900(In)
Area Averaged 100-Year Rainfall = 1.900(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.900(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
30.790	84.20	0.118

Total Area Entered = 30.79(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
84.2	84.2	0.196	0.118	0.175	1.000	0.175
					Sum (F) =	0.175

Area averaged mean soil loss (F) (In/Hr) = 0.175
Minimum soil loss rate ((In/Hr)) = 0.088
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.806

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	80.881	13.546	4.203
2	0.167	161.762	44.716	13.876
3	0.250	242.642	19.684	6.108
4	0.333	323.523	8.187	2.540
5	0.417	404.404	4.910	1.524
6	0.500	485.285	3.076	0.955
7	0.583	566.166	2.229	0.692
8	0.667	647.046	1.515	0.470
9	0.750	727.927	1.010	0.314
10	0.833	808.808	1.125	0.349
			Sum = 100.000	Sum= 31.031

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	1.30	0.296	0.175	(0.239)	0.121
2	0.17	1.30	0.296	0.175	(0.239)	0.121
3	0.25	1.10	0.251	0.175	(0.202)	0.075
4	0.33	1.50	0.342	0.175	(0.275)	0.167
5	0.42	1.50	0.342	0.175	(0.275)	0.167
6	0.50	1.80	0.410	0.175	(0.331)	0.235
7	0.58	1.50	0.342	0.175	(0.275)	0.167
8	0.67	1.80	0.410	0.175	(0.331)	0.235
9	0.75	1.80	0.410	0.175	(0.331)	0.235
10	0.83	1.50	0.342	0.175	(0.275)	0.167
11	0.92	1.60	0.365	0.175	(0.294)	0.189
12	1.00	1.80	0.410	0.175	(0.331)	0.235
13	1.08	2.20	0.502	0.175	(0.404)	0.326
14	1.17	2.20	0.502	0.175	(0.404)	0.326
15	1.25	2.20	0.502	0.175	(0.404)	0.326
16	1.33	2.00	0.456	0.175	(0.367)	0.281
17	1.42	2.60	0.593	0.175	(0.477)	0.417
18	1.50	2.70	0.616	0.175	(0.496)	0.440
19	1.58	2.40	0.547	0.175	(0.441)	0.372
20	1.67	2.70	0.616	0.175	(0.496)	0.440
21	1.75	3.30	0.752	0.175	(0.606)	0.577
22	1.83	3.10	0.707	0.175	(0.569)	0.531
23	1.92	2.90	0.661	0.175	(0.533)	0.486
24	2.00	3.00	0.684	0.175	(0.551)	0.509
25	2.08	3.10	0.707	0.175	(0.569)	0.531
26	2.17	4.20	0.957	0.175	(0.771)	0.782
27	2.25	5.00	1.140	0.175	(0.918)	0.965
28	2.33	3.50	0.798	0.175	(0.643)	0.623
29	2.42	6.80	1.550	0.175	(1.249)	1.375
30	2.50	7.30	1.664	0.175	(1.341)	1.489
31	2.58	8.20	1.869	0.175	(1.506)	1.694
32	2.67	5.90	1.345	0.175	(1.084)	1.170

```
 33   2.75     2.00      0.456          0.175    (  0.367)        0.281
 34   2.83     1.80      0.410          0.175    (  0.331)        0.235
 35   2.92     1.80      0.410          0.175    (  0.331)        0.235
 36   3.00     0.60      0.137       (  0.175)       0.110        0.027
                (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    16.6
       Flood volume = Effective rainfall      1.38(In)
        times area      30.8(Ac.)/[(In)/(Ft.)] =       3.5(Ac.Ft)
       Total soil loss =      0.52(In)
       Total soil loss =     1.335(Ac.Ft)
       Total rainfall =      1.90(In)
       Flood volume =      154160.4 Cubic Feet
       Total soil loss =       58169.6 Cubic Feet
       --------------------------------------------------------------------
        Peak flow rate of this hydrograph =     44.022(CFS)
       --------------------------------------------------------------------
       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           3 - H O U R   S T O R M
                      R u n o f f     H y d r o g r a p h
       --------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

       --------------------------------------------------------------------
  Time(h+m) Volume Ac.Ft   Q(CFS)  0       12.5      25.0      37.5      50.0
  -----------------------------------------------------------------------
    0+ 5      0.0035      0.51  Q         |         |         |         |
    0+10      0.0186      2.19  VQ        |         |         |         |
    0+15      0.0374      2.74  V Q       |         |         |         |
    0+20      0.0567      2.80  V Q       |         |         |         |
    0+25      0.0840      3.97  V  Q      |         |         |         |
    0+30      0.1172      4.81  |V Q      |         |         |         |
    0+35      0.1566      5.72  |V  Q     |         |         |         |
    0+40      0.1953      5.63  | V Q     |         |         |         |
    0+45      0.2396      6.43  | V  Q    |         |         |         |
    0+50      0.2849      6.57  |  V Q    |         |         |         |
    0+55      0.3254      5.88  |  VQ     |         |         |         |
    1+ 0      0.3672      6.07  |   Q     |         |         |         |
    1+ 5      0.4164      7.14  |   VQ    |         |         |         |
    1+10      0.4761      8.67  |    VQ   |         |         |         |
    1+15      0.5405      9.35  |     VQ  |         |         |         |
    1+20      0.6054      9.43  |     VQ  |         |         |         |
    1+25      0.6713      9.56  |      Q  |         |         |         |
    1+30      0.7497     11.39  |       VQ|         |         |         |
    1+35      0.8337     12.20  |        Q|         |         |         |
    1+40      0.9165     12.02  |        QV         |         |         |
    1+45      1.0088     13.40  |         QV        |         |         |
    1+50      1.1156     15.51  |         | Q       |         |         |
    1+55      1.2237     15.69  |         | QV      |         |         |
    2+ 0      1.3293     15.33  |         | Q  V    |         |         |
    2+ 5      1.4368     15.61  |         | Q   V   |         |         |
    2+10      1.5548     17.13  |         |  Q   V  |         |         |
    2+15      1.7034     21.58  |         |      Q V|         |         |
    2+20      1.8707     24.29  |         |        Q|V        |         |
    2+25      2.0396     24.53  |         |        Q|  V      |         |
    2+30      2.2755     34.25  |         |         |    V Q  |         |
    2+35      2.5574     40.94  |         |         |       V | Q       |
    2+40      2.8606     44.02  |         |         |         | V  Q    |
    2+45      3.1060     35.63  |         |         |       Q |    V    |
    2+50      3.2523     21.24  |         |     Q   |         |     V   |
    2+55      3.3539     14.76  |         |Q        |         |      V  |
    3+ 0      3.4306     11.14  |       Q |         |         |       V |
    3+ 5      3.4752      6.47  |    Q    |         |         |        V|
    3+10      3.5023      3.94  |  Q      |         |         |        V|
    3+15      3.5192      2.45  |Q        |         |         |        V|
    3+20      3.5296      1.52  |Q        |         |         |        V|
    3+25      3.5351      0.80  Q         |         |         |        V|
    3+30      3.5372      0.30  Q         |         |         |        V|
    3+35      3.5383      0.17  Q         |         |         |        V|
    3+40      3.5390      0.09  Q         |         |         |        V|
    3+45      3.5390      0.01  Q         |         |         |         V
-----------------------------------------------------------------------
```

100-YEAR, 6-HOUR

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 06/10/16 File: ARAOFF6100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
OFFSITE AREA "A"
FILENAME: ARAOFF

Drainage Area = 30.79(Ac.) = 0.048 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 30.79(Ac.) = 0.048 Sq. Mi.
Length along longest watercourse = 2900.95(Ft.)
Length along longest watercourse measured to centroid = 1549.43(Ft.)
Length along longest watercourse = 0.549 Mi.
Length along longest watercourse measured to centroid = 0.293 Mi.
Difference in elevation = 397.00(Ft.)
Slope along watercourse = 722.5771 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.103 Hr.
Lag time = 6.18 Min.
25% of lag time = 1.55 Min.
40% of lag time = 2.47 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
30.79	1.20	36.95

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
30.79	2.50	76.97

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.200(In)
Area Averaged 100-Year Rainfall = 2.500(In)

Point rain (area averaged) = 2.500(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
30.790	84.20	0.118

Total Area Entered = 30.79(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
84.2	84.2	0.196	0.118	0.175	1.000	0.175
					Sum (F) =	0.175

Area averaged mean soil loss (F) (In/Hr) = 0.175
Minimum soil loss rate ((In/Hr)) = 0.088
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.806

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	80.881	13.546	4.203
2	0.167	161.762	44.716	13.876
3	0.250	242.642	19.684	6.108
4	0.333	323.523	8.187	2.540
5	0.417	404.404	4.910	1.524
6	0.500	485.285	3.076	0.955
7	0.583	566.166	2.229	0.692
8	0.667	647.046	1.515	0.470
9	0.750	727.927	1.010	0.314
10	0.833	808.808	1.125	0.349
			Sum = 100.000	Sum= 31.031

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.50	0.150	(0.175)	0.121	0.029
2	0.17	0.60	0.180	(0.175)	0.145	0.035
3	0.25	0.60	0.180	(0.175)	0.145	0.035
4	0.33	0.60	0.180	(0.175)	0.145	0.035
5	0.42	0.60	0.180	(0.175)	0.145	0.035
6	0.50	0.70	0.210	(0.175)	0.169	0.041
7	0.58	0.70	0.210	(0.175)	0.169	0.041
8	0.67	0.70	0.210	(0.175)	0.169	0.041
9	0.75	0.70	0.210	(0.175)	0.169	0.041
10	0.83	0.70	0.210	(0.175)	0.169	0.041
11	0.92	0.70	0.210	(0.175)	0.169	0.041
12	1.00	0.80	0.240	0.175	(0.193)	0.065
13	1.08	0.80	0.240	0.175	(0.193)	0.065
14	1.17	0.80	0.240	0.175	(0.193)	0.065
15	1.25	0.80	0.240	0.175	(0.193)	0.065
16	1.33	0.80	0.240	0.175	(0.193)	0.065
17	1.42	0.80	0.240	0.175	(0.193)	0.065
18	1.50	0.80	0.240	0.175	(0.193)	0.065
19	1.58	0.80	0.240	0.175	(0.193)	0.065
20	1.67	0.80	0.240	0.175	(0.193)	0.065
21	1.75	0.80	0.240	0.175	(0.193)	0.065
22	1.83	0.80	0.240	0.175	(0.193)	0.065
23	1.92	0.80	0.240	0.175	(0.193)	0.065
24	2.00	0.90	0.270	0.175	(0.217)	0.095
25	2.08	0.80	0.240	0.175	(0.193)	0.065
26	2.17	0.90	0.270	0.175	(0.217)	0.095
27	2.25	0.90	0.270	0.175	(0.217)	0.095
28	2.33	0.90	0.270	0.175	(0.217)	0.095
29	2.42	0.90	0.270	0.175	(0.217)	0.095
30	2.50	0.90	0.270	0.175	(0.217)	0.095
31	2.58	0.90	0.270	0.175	(0.217)	0.095
32	2.67	0.90	0.270	0.175	(0.217)	0.095

```
 33   2.75     1.00     0.300         0.175    ( 0.242)       0.125
 34   2.83     1.00     0.300         0.175    ( 0.242)       0.125
 35   2.92     1.00     0.300         0.175    ( 0.242)       0.125
 36   3.00     1.00     0.300         0.175    ( 0.242)       0.125
 37   3.08     1.00     0.300         0.175    ( 0.242)       0.125
 38   3.17     1.10     0.330         0.175    ( 0.266)       0.155
 39   3.25     1.10     0.330         0.175    ( 0.266)       0.155
 40   3.33     1.10     0.330         0.175    ( 0.266)       0.155
 41   3.42     1.20     0.360         0.175    ( 0.290)       0.185
 42   3.50     1.30     0.390         0.175    ( 0.314)       0.215
 43   3.58     1.40     0.420         0.175    ( 0.338)       0.245
 44   3.67     1.40     0.420         0.175    ( 0.338)       0.245
 45   3.75     1.50     0.450         0.175    ( 0.362)       0.275
 46   3.83     1.50     0.450         0.175    ( 0.362)       0.275
 47   3.92     1.60     0.480         0.175    ( 0.387)       0.305
 48   4.00     1.60     0.480         0.175    ( 0.387)       0.305
 49   4.08     1.70     0.510         0.175    ( 0.411)       0.335
 50   4.17     1.80     0.540         0.175    ( 0.435)       0.365
 51   4.25     1.90     0.570         0.175    ( 0.459)       0.395
 52   4.33     2.00     0.600         0.175    ( 0.483)       0.425
 53   4.42     2.10     0.630         0.175    ( 0.507)       0.455
 54   4.50     2.10     0.630         0.175    ( 0.507)       0.455
 55   4.58     2.20     0.660         0.175    ( 0.532)       0.485
 56   4.67     2.30     0.690         0.175    ( 0.556)       0.515
 57   4.75     2.40     0.720         0.175    ( 0.580)       0.545
 58   4.83     2.40     0.720         0.175    ( 0.580)       0.545
 59   4.92     2.50     0.750         0.175    ( 0.604)       0.575
 60   5.00     2.60     0.780         0.175    ( 0.628)       0.605
 61   5.08     3.10     0.930         0.175    ( 0.749)       0.755
 62   5.17     3.60     1.080         0.175    ( 0.870)       0.905
 63   5.25     3.90     1.170         0.175    ( 0.942)       0.995
 64   5.33     4.20     1.260         0.175    ( 1.015)       1.085
 65   5.42     4.70     1.410         0.175    ( 1.136)       1.235
 66   5.50     5.60     1.680         0.175    ( 1.353)       1.505
 67   5.58     1.90     0.570         0.175    ( 0.459)       0.395
 68   5.67     0.90     0.270         0.175    ( 0.217)       0.095
 69   5.75     0.60     0.180       ( 0.175)      0.145        0.035
 70   5.83     0.50     0.150       ( 0.175)      0.121        0.029
 71   5.92     0.30     0.090       ( 0.175)      0.072        0.017
 72   6.00     0.20     0.060       ( 0.175)      0.048        0.012
              (Loss Rate Not Used)
    Sum =     100.0                                 Sum =    17.9
       Flood volume = Effective rainfall     1.49(In)
        times area      30.8(Ac.)/[(In)/(Ft.)] =      3.8(Ac.Ft)
       Total soil loss =      1.01(In)
       Total soil loss =     2.586(Ac.Ft)
       Total rainfall =      2.50(In)
       Flood volume =      166746.1 Cubic Feet
       Total soil loss =      112643.6 Cubic Feet
       --------------------------------------------------------------------
        Peak flow rate of this hydrograph =     36.406(CFS)
       --------------------------------------------------------------------
       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           6 - H O U R   S T O R M
                      R u n o f f     H y d r o g r a p h
       --------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

       --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0       10.0      20.0      30.0      40.0
-----------------------------------------------------------------------
  0+ 5       0.0008      0.12  Q         |         |         |         |
  0+10       0.0046      0.55  Q         |         |         |         |
  0+15       0.0102      0.81  Q         |         |         |         |
  0+20       0.0166      0.92  Q         |         |         |         |
  0+25       0.0233      0.98  Q         |         |         |         |
  0+30       0.0305      1.04  VQ        |         |         |         |
  0+35       0.0384      1.15  VQ        |         |         |         |
  0+40       0.0467      1.20  VQ        |         |         |         |
  0+45       0.0551      1.23  VQ        |         |         |         |
  0+50       0.0637      1.25  VQ        |         |         |         |
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  0+55       0.0724      1.26  VQ        |         |         |         |
  1+ 0       0.0818      1.36  VQ        |         |         |         |
  1+ 5       0.0934      1.70  VQ        |         |         |         |
  1+10       0.1061      1.84  |Q        |         |         |         |
  1+15       0.1193      1.91  |Q        |         |         |         |
  1+20       0.1326      1.94  |Q        |         |         |         |
  1+25       0.1462      1.96  |Q        |         |         |         |
  1+30       0.1598      1.98  |Q        |         |         |         |
  1+35       0.1735      1.99  |Q        |         |         |         |
  1+40       0.1873      2.00  |Q        |         |         |         |
  1+45       0.2011      2.01  | Q       |         |         |         |
  1+50       0.2150      2.01  | Q       |         |         |         |
  1+55       0.2288      2.01  | Q       |         |         |         |
  2+ 0       0.2435      2.13  | Q       |         |         |         |
  2+ 5       0.2602      2.42  | Q       |         |         |         |
  2+10       0.2761      2.32  | Q       |         |         |         |
  2+15       0.2942      2.63  | QV      |         |         |         |
  2+20       0.3134      2.78  | QV      |         |         |         |
  2+25       0.3329      2.84  | QV      |         |         |         |
  2+30       0.3527      2.88  | QV      |         |         |         |
  2+35       0.3727      2.90  | QV      |         |         |         |
  2+40       0.3928      2.91  | Q V     |         |         |         |
  2+45       0.4138      3.06  |  QV     |         |         |         |
  2+50       0.4377      3.47  |  QV     |         |         |         |
  2+55       0.4630      3.67  |  QV     |         |         |         |
  3+ 0       0.4888      3.74  |  Q V    |         |         |         |
  3+ 5       0.5148      3.79  |  Q V    |         |         |         |
  3+10       0.5420      3.94  |  Q V    |         |         |         |
  3+15       0.5722      4.38  |   QV    |         |         |         |
  3+20       0.6037      4.58  |   Q V   |         |         |         |
  3+25       0.6367      4.79  |   Q V   |         |         |         |
  3+30       0.6738      5.39  |    Q V  |         |         |         |
  3+35       0.7161      6.14  |     QV  |         |         |         |
  3+40       0.7632      6.84  |     QV  |         |         |         |
  3+45       0.8133      7.28  |      QV |         |         |         |
  3+50       0.8675      7.86  |      Q V|         |         |         |
  3+55       0.9245      8.28  |       QV|         |         |         |
  4+ 0       0.9853      8.83  |       Q V         |         |         |
  4+ 5       1.0489      9.23  |        QV         |         |         |
  4+10       1.1171      9.91  |        Q|V        |         |         |
  4+15       1.1910     10.73  |         Q V       |         |         |
  4+20       1.2708     11.58  |         |Q V      |         |         |
  4+25       1.3566     12.46  |         | Q V     |         |         |
  4+30       1.4477     13.23  |         |  Q V    |         |         |
  4+35       1.5422     13.72  |         |  Q  V   |         |         |
  4+40       1.6418     14.46  |         |   Q  V  |         |         |
  4+45       1.7472     15.31  |         |    Q  V |         |         |
  4+50       1.8579     16.07  |         |     Q  V|         |         |
  4+55       1.9719     16.55  |         |     Q   V         |         |
  5+ 0       2.0909     17.28  |         |      Q  |V        |         |
  5+ 5       2.2192     18.63  |         |       Q |  V      |         |
  5+10       2.3684     21.67  |         |         |Q  V     |         |
  5+15       2.5421     25.22  |         |         |    QV   |         |
  5+20       2.7367     28.25  |         |         |       Q |         |
  5+25       2.9526     31.36  |         |         |         VQ        |
  5+30       3.1990     35.77  |         |         |         |  V Q    |
  5+35       3.4497     36.41  |         |         |         |     Q   |
  5+40       3.6025     22.18  |         |         | Q       |      V  |
  5+45       3.6864     12.18  |         | Q       |         |       V |
  5+50       3.7375      7.43  |      Q  |         |         |        V|
  5+55       3.7717      4.96  |   Q     |         |         |        V|
  6+ 0       3.7951      3.39  |  Q      |         |         |        V|
  6+ 5       3.8105      2.23  | Q       |         |         |        V|
  6+10       3.8197      1.35  |Q        |         |         |        V|
  6+15       3.8253      0.80  Q         |         |         |        V|
  6+20       3.8269      0.24  Q         |         |         |        V|
  6+25       3.8275      0.08  Q         |         |         |        V|
  6+30       3.8277      0.04  Q         |         |         |        V|
  6+35       3.8279      0.02  Q         |         |         |        V|
  6+40       3.8279      0.01  Q         |         |         |        V|
  6+45       3.8280      0.00  Q         |         |         |         V
```

100-YEAR, 24-HOUR

U n i t   H y d r o g r a p h   A n a l y s i s

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Study date 06/10/16 File: ARAOFF24100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
OFFSITE AREA "A"
FILENAME: ARAOFF

Drainage Area = 30.79(Ac.) = 0.048 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 30.79(Ac.) = 0.048 Sq. Mi.
Length along longest watercourse = 2900.95(Ft.)
Length along longest watercourse measured to centroid = 1549.43(Ft.)
Length along longest watercourse = 0.549 Mi.
Length along longest watercourse measured to centroid = 0.293 Mi.
Difference in elevation = 397.00(Ft.)
Slope along watercourse = 722.5771 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.103 Hr.
Lag time = 6.18 Min.
25% of lag time = 1.55 Min.
40% of lag time = 2.47 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
30.79	2.00	61.58

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
30.79	5.00	153.95

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 2.000(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 5.000(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 5.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
30.790	84.20	0.118

Total Area Entered = 30.79(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
84.2	84.2	0.196	0.118	0.175	1.000	0.175
					Sum (F) =	0.175

Area averaged mean soil loss (F) (In/Hr) = 0.175
Minimum soil loss rate ((In/Hr)) = 0.088
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.806

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	80.881	13.546	4.203
2	0.167	161.762	44.716	13.876
3	0.250	242.642	19.684	6.108
4	0.333	323.523	8.187	2.540
5	0.417	404.404	4.910	1.524
6	0.500	485.285	3.076	0.955
7	0.583	566.166	2.229	0.692
8	0.667	647.046	1.515	0.470
9	0.750	727.927	1.010	0.314
10	0.833	808.808	1.125	0.349
			Sum = 100.000	Sum= 31.031

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.040	(0.311)	0.032	0.008
2	0.17	0.07	0.040	(0.310)	0.032	0.008
3	0.25	0.07	0.040	(0.308)	0.032	0.008
4	0.33	0.10	0.060	(0.307)	0.048	0.012
5	0.42	0.10	0.060	(0.306)	0.048	0.012
6	0.50	0.10	0.060	(0.305)	0.048	0.012
7	0.58	0.10	0.060	(0.304)	0.048	0.012
8	0.67	0.10	0.060	(0.302)	0.048	0.012
9	0.75	0.10	0.060	(0.301)	0.048	0.012
10	0.83	0.13	0.080	(0.300)	0.064	0.016
11	0.92	0.13	0.080	(0.299)	0.064	0.016
12	1.00	0.13	0.080	(0.298)	0.064	0.016
13	1.08	0.10	0.060	(0.296)	0.048	0.012
14	1.17	0.10	0.060	(0.295)	0.048	0.012
15	1.25	0.10	0.060	(0.294)	0.048	0.012
16	1.33	0.10	0.060	(0.293)	0.048	0.012
17	1.42	0.10	0.060	(0.292)	0.048	0.012
18	1.50	0.10	0.060	(0.291)	0.048	0.012
19	1.58	0.10	0.060	(0.289)	0.048	0.012
20	1.67	0.10	0.060	(0.288)	0.048	0.012
21	1.75	0.10	0.060	(0.287)	0.048	0.012
22	1.83	0.13	0.080	(0.286)	0.064	0.016
23	1.92	0.13	0.080	(0.285)	0.064	0.016
24	2.00	0.13	0.080	(0.284)	0.064	0.016
25	2.08	0.13	0.080	(0.283)	0.064	0.016
26	2.17	0.13	0.080	(0.281)	0.064	0.016
27	2.25	0.13	0.080	(0.280)	0.064	0.016
28	2.33	0.13	0.080	(0.279)	0.064	0.016
29	2.42	0.13	0.080	(0.278)	0.064	0.016
30	2.50	0.13	0.080	(0.277)	0.064	0.016
31	2.58	0.17	0.100	(0.276)	0.081	0.019
32	2.67	0.17	0.100	(0.275)	0.081	0.019

33	2.75	0.17	0.100	(0.273)	0.081	0.019
34	2.83	0.17	0.100	(0.272)	0.081	0.019
35	2.92	0.17	0.100	(0.271)	0.081	0.019
36	3.00	0.17	0.100	(0.270)	0.081	0.019
37	3.08	0.17	0.100	(0.269)	0.081	0.019
38	3.17	0.17	0.100	(0.268)	0.081	0.019
39	3.25	0.17	0.100	(0.267)	0.081	0.019
40	3.33	0.17	0.100	(0.266)	0.081	0.019
41	3.42	0.17	0.100	(0.265)	0.081	0.019
42	3.50	0.17	0.100	(0.263)	0.081	0.019
43	3.58	0.17	0.100	(0.262)	0.081	0.019
44	3.67	0.17	0.100	(0.261)	0.081	0.019
45	3.75	0.17	0.100	(0.260)	0.081	0.019
46	3.83	0.20	0.120	(0.259)	0.097	0.023
47	3.92	0.20	0.120	(0.258)	0.097	0.023
48	4.00	0.20	0.120	(0.257)	0.097	0.023
49	4.08	0.20	0.120	(0.256)	0.097	0.023
50	4.17	0.20	0.120	(0.255)	0.097	0.023
51	4.25	0.20	0.120	(0.254)	0.097	0.023
52	4.33	0.23	0.140	(0.252)	0.113	0.027
53	4.42	0.23	0.140	(0.251)	0.113	0.027
54	4.50	0.23	0.140	(0.250)	0.113	0.027
55	4.58	0.23	0.140	(0.249)	0.113	0.027
56	4.67	0.23	0.140	(0.248)	0.113	0.027
57	4.75	0.23	0.140	(0.247)	0.113	0.027
58	4.83	0.27	0.160	(0.246)	0.129	0.031
59	4.92	0.27	0.160	(0.245)	0.129	0.031
60	5.00	0.27	0.160	(0.244)	0.129	0.031
61	5.08	0.20	0.120	(0.243)	0.097	0.023
62	5.17	0.20	0.120	(0.242)	0.097	0.023
63	5.25	0.20	0.120	(0.241)	0.097	0.023
64	5.33	0.23	0.140	(0.240)	0.113	0.027
65	5.42	0.23	0.140	(0.239)	0.113	0.027
66	5.50	0.23	0.140	(0.238)	0.113	0.027
67	5.58	0.27	0.160	(0.237)	0.129	0.031
68	5.67	0.27	0.160	(0.236)	0.129	0.031
69	5.75	0.27	0.160	(0.234)	0.129	0.031
70	5.83	0.27	0.160	(0.233)	0.129	0.031
71	5.92	0.27	0.160	(0.232)	0.129	0.031
72	6.00	0.27	0.160	(0.231)	0.129	0.031
73	6.08	0.30	0.180	(0.230)	0.145	0.035
74	6.17	0.30	0.180	(0.229)	0.145	0.035
75	6.25	0.30	0.180	(0.228)	0.145	0.035
76	6.33	0.30	0.180	(0.227)	0.145	0.035
77	6.42	0.30	0.180	(0.226)	0.145	0.035
78	6.50	0.30	0.180	(0.225)	0.145	0.035
79	6.58	0.33	0.200	(0.224)	0.161	0.039
80	6.67	0.33	0.200	(0.223)	0.161	0.039
81	6.75	0.33	0.200	(0.222)	0.161	0.039
82	6.83	0.33	0.200	(0.221)	0.161	0.039
83	6.92	0.33	0.200	(0.220)	0.161	0.039
84	7.00	0.33	0.200	(0.219)	0.161	0.039
85	7.08	0.33	0.200	(0.218)	0.161	0.039
86	7.17	0.33	0.200	(0.217)	0.161	0.039
87	7.25	0.33	0.200	(0.216)	0.161	0.039
88	7.33	0.37	0.220	(0.215)	0.177	0.043
89	7.42	0.37	0.220	(0.214)	0.177	0.043
90	7.50	0.37	0.220	(0.213)	0.177	0.043
91	7.58	0.40	0.240	(0.212)	0.193	0.047
92	7.67	0.40	0.240	(0.211)	0.193	0.047
93	7.75	0.40	0.240	(0.210)	0.193	0.047
94	7.83	0.43	0.260	0.209	(0.209)	0.051
95	7.92	0.43	0.260	0.208	(0.209)	0.052
96	8.00	0.43	0.260	0.207	(0.209)	0.053
97	8.08	0.50	0.300	0.206	(0.242)	0.093
98	8.17	0.50	0.300	0.206	(0.242)	0.094
99	8.25	0.50	0.300	0.205	(0.242)	0.095
100	8.33	0.50	0.300	0.204	(0.242)	0.096
101	8.42	0.50	0.300	0.203	(0.242)	0.097
102	8.50	0.50	0.300	0.202	(0.242)	0.098
103	8.58	0.53	0.320	0.201	(0.258)	0.119

104	8.67	0.53	0.320	0.200	(0.258)	0.120
105	8.75	0.53	0.320	0.199	(0.258)	0.121
106	8.83	0.57	0.340	0.198	(0.274)	0.142
107	8.92	0.57	0.340	0.197	(0.274)	0.143
108	9.00	0.57	0.340	0.196	(0.274)	0.144
109	9.08	0.63	0.380	0.195	(0.306)	0.185
110	9.17	0.63	0.380	0.194	(0.306)	0.186
111	9.25	0.63	0.380	0.193	(0.306)	0.187
112	9.33	0.67	0.400	0.192	(0.322)	0.208
113	9.42	0.67	0.400	0.191	(0.322)	0.209
114	9.50	0.67	0.400	0.191	(0.322)	0.209
115	9.58	0.70	0.420	0.190	(0.338)	0.230
116	9.67	0.70	0.420	0.189	(0.338)	0.231
117	9.75	0.70	0.420	0.188	(0.338)	0.232
118	9.83	0.73	0.440	0.187	(0.354)	0.253
119	9.92	0.73	0.440	0.186	(0.354)	0.254
120	10.00	0.73	0.440	0.185	(0.354)	0.255
121	10.08	0.50	0.300	0.184	(0.242)	0.116
122	10.17	0.50	0.300	0.183	(0.242)	0.117
123	10.25	0.50	0.300	0.182	(0.242)	0.118
124	10.33	0.50	0.300	0.182	(0.242)	0.118
125	10.42	0.50	0.300	0.181	(0.242)	0.119
126	10.50	0.50	0.300	0.180	(0.242)	0.120
127	10.58	0.67	0.400	0.179	(0.322)	0.221
128	10.67	0.67	0.400	0.178	(0.322)	0.222
129	10.75	0.67	0.400	0.177	(0.322)	0.223
130	10.83	0.67	0.400	0.176	(0.322)	0.224
131	10.92	0.67	0.400	0.175	(0.322)	0.225
132	11.00	0.67	0.400	0.175	(0.322)	0.225
133	11.08	0.63	0.380	0.174	(0.306)	0.206
134	11.17	0.63	0.380	0.173	(0.306)	0.207
135	11.25	0.63	0.380	0.172	(0.306)	0.208
136	11.33	0.63	0.380	0.171	(0.306)	0.209
137	11.42	0.63	0.380	0.170	(0.306)	0.210
138	11.50	0.63	0.380	0.169	(0.306)	0.211
139	11.58	0.57	0.340	0.169	(0.274)	0.171
140	11.67	0.57	0.340	0.168	(0.274)	0.172
141	11.75	0.57	0.340	0.167	(0.274)	0.173
142	11.83	0.60	0.360	0.166	(0.290)	0.194
143	11.92	0.60	0.360	0.165	(0.290)	0.195
144	12.00	0.60	0.360	0.164	(0.290)	0.196
145	12.08	0.83	0.500	0.164	(0.403)	0.336
146	12.17	0.83	0.500	0.163	(0.403)	0.337
147	12.25	0.83	0.500	0.162	(0.403)	0.338
148	12.33	0.87	0.520	0.161	(0.419)	0.359
149	12.42	0.87	0.520	0.160	(0.419)	0.360
150	12.50	0.87	0.520	0.160	(0.419)	0.360
151	12.58	0.93	0.560	0.159	(0.451)	0.401
152	12.67	0.93	0.560	0.158	(0.451)	0.402
153	12.75	0.93	0.560	0.157	(0.451)	0.403
154	12.83	0.97	0.580	0.156	(0.467)	0.424
155	12.92	0.97	0.580	0.156	(0.467)	0.424
156	13.00	0.97	0.580	0.155	(0.467)	0.425
157	13.08	1.13	0.680	0.154	(0.548)	0.526
158	13.17	1.13	0.680	0.153	(0.548)	0.527
159	13.25	1.13	0.680	0.152	(0.548)	0.528
160	13.33	1.13	0.680	0.152	(0.548)	0.528
161	13.42	1.13	0.680	0.151	(0.548)	0.529
162	13.50	1.13	0.680	0.150	(0.548)	0.530
163	13.58	0.77	0.460	0.149	(0.371)	0.311
164	13.67	0.77	0.460	0.149	(0.371)	0.311
165	13.75	0.77	0.460	0.148	(0.371)	0.312
166	13.83	0.77	0.460	0.147	(0.371)	0.313
167	13.92	0.77	0.460	0.146	(0.371)	0.314
168	14.00	0.77	0.460	0.146	(0.371)	0.314
169	14.08	0.90	0.540	0.145	(0.435)	0.395
170	14.17	0.90	0.540	0.144	(0.435)	0.396
171	14.25	0.90	0.540	0.143	(0.435)	0.397
172	14.33	0.87	0.520	0.143	(0.419)	0.377
173	14.42	0.87	0.520	0.142	(0.419)	0.378
174	14.50	0.87	0.520	0.141	(0.419)	0.379

175	14.58	0.87	0.520	0.140	(0.419)	0.379
176	14.67	0.87	0.520	0.140	(0.419)	0.380
177	14.75	0.87	0.520	0.139	(0.419)	0.381
178	14.83	0.83	0.500	0.138	(0.403)	0.362
179	14.92	0.83	0.500	0.138	(0.403)	0.362
180	15.00	0.83	0.500	0.137	(0.403)	0.363
181	15.08	0.80	0.480	0.136	(0.387)	0.344
182	15.17	0.80	0.480	0.136	(0.387)	0.344
183	15.25	0.80	0.480	0.135	(0.387)	0.345
184	15.33	0.77	0.460	0.134	(0.371)	0.326
185	15.42	0.77	0.460	0.133	(0.371)	0.327
186	15.50	0.77	0.460	0.133	(0.371)	0.327
187	15.58	0.63	0.380	0.132	(0.306)	0.248
188	15.67	0.63	0.380	0.131	(0.306)	0.249
189	15.75	0.63	0.380	0.131	(0.306)	0.249
190	15.83	0.63	0.380	0.130	(0.306)	0.250
191	15.92	0.63	0.380	0.129	(0.306)	0.251
192	16.00	0.63	0.380	0.129	(0.306)	0.251
193	16.08	0.13	0.080	(0.128)	0.064	0.016
194	16.17	0.13	0.080	(0.127)	0.064	0.016
195	16.25	0.13	0.080	(0.127)	0.064	0.016
196	16.33	0.13	0.080	(0.126)	0.064	0.016
197	16.42	0.13	0.080	(0.125)	0.064	0.016
198	16.50	0.13	0.080	(0.125)	0.064	0.016
199	16.58	0.10	0.060	(0.124)	0.048	0.012
200	16.67	0.10	0.060	(0.124)	0.048	0.012
201	16.75	0.10	0.060	(0.123)	0.048	0.012
202	16.83	0.10	0.060	(0.122)	0.048	0.012
203	16.92	0.10	0.060	(0.122)	0.048	0.012
204	17.00	0.10	0.060	(0.121)	0.048	0.012
205	17.08	0.17	0.100	(0.120)	0.081	0.019
206	17.17	0.17	0.100	(0.120)	0.081	0.019
207	17.25	0.17	0.100	(0.119)	0.081	0.019
208	17.33	0.17	0.100	(0.119)	0.081	0.019
209	17.42	0.17	0.100	(0.118)	0.081	0.019
210	17.50	0.17	0.100	(0.117)	0.081	0.019
211	17.58	0.17	0.100	(0.117)	0.081	0.019
212	17.67	0.17	0.100	(0.116)	0.081	0.019
213	17.75	0.17	0.100	(0.116)	0.081	0.019
214	17.83	0.13	0.080	(0.115)	0.064	0.016
215	17.92	0.13	0.080	(0.115)	0.064	0.016
216	18.00	0.13	0.080	(0.114)	0.064	0.016
217	18.08	0.13	0.080	(0.113)	0.064	0.016
218	18.17	0.13	0.080	(0.113)	0.064	0.016
219	18.25	0.13	0.080	(0.112)	0.064	0.016
220	18.33	0.13	0.080	(0.112)	0.064	0.016
221	18.42	0.13	0.080	(0.111)	0.064	0.016
222	18.50	0.13	0.080	(0.111)	0.064	0.016
223	18.58	0.10	0.060	(0.110)	0.048	0.012
224	18.67	0.10	0.060	(0.110)	0.048	0.012
225	18.75	0.10	0.060	(0.109)	0.048	0.012
226	18.83	0.07	0.040	(0.109)	0.032	0.008
227	18.92	0.07	0.040	(0.108)	0.032	0.008
228	19.00	0.07	0.040	(0.108)	0.032	0.008
229	19.08	0.10	0.060	(0.107)	0.048	0.012
230	19.17	0.10	0.060	(0.107)	0.048	0.012
231	19.25	0.10	0.060	(0.106)	0.048	0.012
232	19.33	0.13	0.080	(0.106)	0.064	0.016
233	19.42	0.13	0.080	(0.105)	0.064	0.016
234	19.50	0.13	0.080	(0.105)	0.064	0.016
235	19.58	0.10	0.060	(0.104)	0.048	0.012
236	19.67	0.10	0.060	(0.104)	0.048	0.012
237	19.75	0.10	0.060	(0.103)	0.048	0.012
238	19.83	0.07	0.040	(0.103)	0.032	0.008
239	19.92	0.07	0.040	(0.102)	0.032	0.008
240	20.00	0.07	0.040	(0.102)	0.032	0.008
241	20.08	0.10	0.060	(0.101)	0.048	0.012
242	20.17	0.10	0.060	(0.101)	0.048	0.012
243	20.25	0.10	0.060	(0.100)	0.048	0.012
244	20.33	0.10	0.060	(0.100)	0.048	0.012
245	20.42	0.10	0.060	(0.100)	0.048	0.012

246	20.50	0.10	0.060	(0.099)	0.048	0.012
247	20.58	0.10	0.060	(0.099)	0.048	0.012
248	20.67	0.10	0.060	(0.098)	0.048	0.012
249	20.75	0.10	0.060	(0.098)	0.048	0.012
250	20.83	0.07	0.040	(0.098)	0.032	0.008
251	20.92	0.07	0.040	(0.097)	0.032	0.008
252	21.00	0.07	0.040	(0.097)	0.032	0.008
253	21.08	0.10	0.060	(0.096)	0.048	0.012
254	21.17	0.10	0.060	(0.096)	0.048	0.012
255	21.25	0.10	0.060	(0.096)	0.048	0.012
256	21.33	0.07	0.040	(0.095)	0.032	0.008
257	21.42	0.07	0.040	(0.095)	0.032	0.008
258	21.50	0.07	0.040	(0.095)	0.032	0.008
259	21.58	0.10	0.060	(0.094)	0.048	0.012
260	21.67	0.10	0.060	(0.094)	0.048	0.012
261	21.75	0.10	0.060	(0.094)	0.048	0.012
262	21.83	0.07	0.040	(0.093)	0.032	0.008
263	21.92	0.07	0.040	(0.093)	0.032	0.008
264	22.00	0.07	0.040	(0.093)	0.032	0.008
265	22.08	0.10	0.060	(0.092)	0.048	0.012
266	22.17	0.10	0.060	(0.092)	0.048	0.012
267	22.25	0.10	0.060	(0.092)	0.048	0.012
268	22.33	0.07	0.040	(0.091)	0.032	0.008
269	22.42	0.07	0.040	(0.091)	0.032	0.008
270	22.50	0.07	0.040	(0.091)	0.032	0.008
271	22.58	0.07	0.040	(0.091)	0.032	0.008
272	22.67	0.07	0.040	(0.090)	0.032	0.008
273	22.75	0.07	0.040	(0.090)	0.032	0.008
274	22.83	0.07	0.040	(0.090)	0.032	0.008
275	22.92	0.07	0.040	(0.090)	0.032	0.008
276	23.00	0.07	0.040	(0.089)	0.032	0.008
277	23.08	0.07	0.040	(0.089)	0.032	0.008
278	23.17	0.07	0.040	(0.089)	0.032	0.008
279	23.25	0.07	0.040	(0.089)	0.032	0.008
280	23.33	0.07	0.040	(0.089)	0.032	0.008
281	23.42	0.07	0.040	(0.088)	0.032	0.008
282	23.50	0.07	0.040	(0.088)	0.032	0.008
283	23.58	0.07	0.040	(0.088)	0.032	0.008
284	23.67	0.07	0.040	(0.088)	0.032	0.008
285	23.75	0.07	0.040	(0.088)	0.032	0.008
286	23.83	0.07	0.040	(0.088)	0.032	0.008
287	23.92	0.07	0.040	(0.088)	0.032	0.008
288	24.00	0.07	0.040	(0.088)	0.032	0.008

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              (Loss Rate Not Used)
    Sum =     100.0                                     Sum =    29.6
       Flood volume = Effective rainfall      2.47(In)
        times area      30.8(Ac.)/[(In)/(Ft.)] =       6.3(Ac.Ft)
       Total soil loss =      2.53(In)
       Total soil loss =     6.502(Ac.Ft)
       Total rainfall =      5.00(In)
       Flood volume =      275572.5 Cubic Feet
       Total soil loss =      283232.4 Cubic Feet
       --------------------------------------------------------------------
        Peak flow rate of this hydrograph =     16.215(CFS)
       --------------------------------------------------------------------
       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           24 - H O U R   S T O R M
                      R u n o f f     H y d r o g r a p h
       --------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

       --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
   0+ 5      0.0002      0.03  Q         |         |         |         |
   0+10      0.0012      0.14  Q         |         |         |         |
   0+15      0.0025      0.19  Q         |         |         |         |
   0+20      0.0040      0.22  Q         |         |         |         |
   0+25      0.0060      0.29  Q         |         |         |         |
   0+30      0.0082      0.32  Q         |         |         |         |
   0+35      0.0106      0.34  Q         |         |         |         |
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 0+40     0.0129    0.35  Q         |         |         |         |
 0+45     0.0154    0.35  Q         |         |         |         |
 0+50     0.0179    0.37  Q         |         |         |         |
 0+55     0.0209    0.43  Q         |         |         |         |
 1+ 0     0.0240    0.45  Q         |         |         |         |
 1+ 5     0.0271    0.45  Q         |         |         |         |
 1+10     0.0299    0.40  Q         |         |         |         |
 1+15     0.0325    0.38  Q         |         |         |         |
 1+20     0.0351    0.37  Q         |         |         |         |
 1+25     0.0377    0.37  Q         |         |         |         |
 1+30     0.0402    0.37  Q         |         |         |         |
 1+35     0.0427    0.37  Q         |         |         |         |
 1+40     0.0452    0.36  Q         |         |         |         |
 1+45     0.0477    0.36  Q         |         |         |         |
 1+50     0.0503    0.38  Q         |         |         |         |
 1+55     0.0533    0.43  Q         |         |         |         |
 2+ 0     0.0565    0.46  Q         |         |         |         |
 2+ 5     0.0597    0.47  Q         |         |         |         |
 2+10     0.0629    0.47  Q         |         |         |         |
 2+15     0.0662    0.48  Q         |         |         |         |
 2+20     0.0695    0.48  Q         |         |         |         |
 2+25     0.0728    0.48  Q         |         |         |         |
 2+30     0.0761    0.48  Q         |         |         |         |
 2+35     0.0796    0.50  Q         |         |         |         |
 2+40     0.0834    0.55  VQ        |         |         |         |
 2+45     0.0873    0.58  VQ        |         |         |         |
 2+50     0.0914    0.59  VQ        |         |         |         |
 2+55     0.0955    0.59  VQ        |         |         |         |
 3+ 0     0.0996    0.60  VQ        |         |         |         |
 3+ 5     0.1037    0.60  VQ        |         |         |         |
 3+10     0.1078    0.60  VQ        |         |         |         |
 3+15     0.1120    0.60  VQ        |         |         |         |
 3+20     0.1161    0.60  VQ        |         |         |         |
 3+25     0.1203    0.60  VQ        |         |         |         |
 3+30     0.1244    0.60  VQ        |         |         |         |
 3+35     0.1286    0.60  VQ        |         |         |         |
 3+40     0.1328    0.60  VQ        |         |         |         |
 3+45     0.1369    0.60  VQ        |         |         |         |
 3+50     0.1412    0.62  VQ        |         |         |         |
 3+55     0.1458    0.67  VQ        |         |         |         |
 4+ 0     0.1506    0.70  VQ        |         |         |         |
 4+ 5     0.1555    0.71  VQ        |         |         |         |
 4+10     0.1604    0.71  |Q        |         |         |         |
 4+15     0.1654    0.72  |Q        |         |         |         |
 4+20     0.1704    0.74  |Q        |         |         |         |
 4+25     0.1759    0.79  |Q        |         |         |         |
 4+30     0.1815    0.82  |Q        |         |         |         |
 4+35     0.1872    0.83  |Q        |         |         |         |
 4+40     0.1930    0.83  |Q        |         |         |         |
 4+45     0.1987    0.84  |Q        |         |         |         |
 4+50     0.2046    0.86  |Q        |         |         |         |
 4+55     0.2109    0.91  |Q        |         |         |         |
 5+ 0     0.2174    0.94  |Q        |         |         |         |
 5+ 5     0.2237    0.92  |Q        |         |         |         |
 5+10     0.2293    0.81  |Q        |         |         |         |
 5+15     0.2346    0.77  |Q        |         |         |         |
 5+20     0.2399    0.77  |Q        |         |         |         |
 5+25     0.2455    0.81  |Q        |         |         |         |
 5+30     0.2512    0.83  |Q        |         |         |         |
 5+35     0.2571    0.85  |Q        |         |         |         |
 5+40     0.2634    0.91  |Q        |         |         |         |
 5+45     0.2698    0.93  |Q        |         |         |         |
 5+50     0.2763    0.94  |Q        |         |         |         |
 5+55     0.2829    0.95  |Q        |         |         |         |
 6+ 0     0.2895    0.96  |Q        |         |         |         |
 6+ 5     0.2962    0.98  |Q        |         |         |         |
 6+10     0.3033    1.03  |VQ       |         |         |         |
 6+15     0.3106    1.06  |VQ       |         |         |         |
 6+20     0.3180    1.07  | Q       |         |         |         |
 6+25     0.3254    1.08  | Q       |         |         |         |
 6+30     0.3328    1.08  | Q       |         |         |         |
```



```
 6+35     0.3404    1.10  | Q       |         |         |         |
 6+40     0.3483    1.15  | Q       |         |         |         |
 6+45     0.3564    1.18  | Q       |         |         |         |
 6+50     0.3646    1.19  | Q       |         |         |         |
 6+55     0.3729    1.20  | Q       |         |         |         |
 7+ 0     0.3811    1.20  | Q       |         |         |         |
 7+ 5     0.3894    1.20  | Q       |         |         |         |
 7+10     0.3977    1.20  | Q       |         |         |         |
 7+15     0.4060    1.21  | Q       |         |         |         |
 7+20     0.4144    1.22  | Q       |         |         |         |
 7+25     0.4232    1.28  | Q       |         |         |         |
 7+30     0.4322    1.30  | Q       |         |         |         |
 7+35     0.4413    1.33  | Q       |         |         |         |
 7+40     0.4509    1.39  | Q       |         |         |         |
 7+45     0.4606    1.41  | Q       |         |         |         |
 7+50     0.4706    1.44  | Q       |         |         |         |
 7+55     0.4810    1.51  |  Q      |         |         |         |
 8+ 0     0.4917    1.56  |  Q      |         |         |         |
 8+ 5     0.5038    1.76  |  Q      |         |         |         |
 8+10     0.5200    2.35  |  VQ     |         |         |         |
 8+15     0.5381    2.63  |  V Q    |         |         |         |
 8+20     0.5572    2.76  |  V Q    |         |         |         |
 8+25     0.5768    2.85  |  V Q    |         |         |         |
 8+30     0.5969    2.92  |  V Q    |         |         |         |
 8+35     0.6180    3.06  |  V  Q   |         |         |         |
 8+40     0.6414    3.39  |   V Q   |         |         |         |
 8+45     0.6659    3.55  |   V  Q  |         |         |         |
 8+50     0.6916    3.73  |   V  Q  |         |         |         |
 8+55     0.7196    4.07  |   V   Q |         |         |         |
 9+ 0     0.7488    4.24  |   V   Q |         |         |         |
 9+ 5     0.7798    4.50  |   V    Q|         |         |         |
 9+10     0.8151    5.13  |    V    Q         |         |         |
 9+15     0.8525    5.42  |    V    Q         |         |         |
 9+20     0.8915    5.66  |    V    |Q        |         |         |
 9+25     0.9330    6.04  |    V    | Q       |         |         |
 9+30     0.9760    6.23  |     V   | Q       |         |         |
 9+35     1.0202    6.43  |     V   | Q       |         |         |
 9+40     1.0670    6.79  |     V   |  Q      |         |         |
 9+45     1.1150    6.97  |      V  |  Q      |         |         |
 9+50     1.1643    7.16  |      V  |   Q     |         |         |
 9+55     1.2160    7.50  |      V  |    Q    |         |         |
10+ 0     1.2688    7.68  |       V |    Q    |         |         |
10+ 5     1.3184    7.19  |       V |   Q     |         |         |
10+10     1.3550    5.32  |       V Q         |         |         |
10+15     1.3861    4.51  |       VQ|         |         |         |
10+20     1.4150    4.21  |       Q |         |         |         |
10+25     1.4428    4.03  |       QV|         |         |         |
10+30     1.4698    3.93  |      Q V|         |         |         |
10+35     1.4994    4.29  |       QV|         |         |         |
10+40     1.5382    5.64  |        V|Q        |         |         |
10+45     1.5811    6.23  |        V| Q       |         |         |
10+50     1.6256    6.46  |         V Q       |         |         |
10+55     1.6714    6.64  |         V  Q      |         |         |
11+ 0     1.7180    6.77  |         V  Q      |         |         |
11+ 5     1.7647    6.78  |         |V Q      |         |         |
11+10     1.8099    6.57  |         |V Q      |         |         |
11+15     1.8548    6.51  |         |V Q      |         |         |
11+20     1.8997    6.52  |         | VQ      |         |         |
11+25     1.9445    6.52  |         | VQ      |         |         |
11+30     1.9895    6.52  |         | VQ      |         |         |
11+35     2.0333    6.37  |         | Q       |         |         |
11+40     2.0735    5.83  |         |Q V      |         |         |
11+45     2.1121    5.60  |         |Q V      |         |         |
11+50     2.1507    5.61  |         |Q V      |         |         |
11+55     2.1910    5.85  |         |Q V      |         |         |
12+ 0     2.2320    5.96  |         |Q  V     |         |         |
12+ 5     2.2774    6.60  |         |  QV     |         |         |
12+10     2.3365    8.58  |         |   V  Q  |         |         |
12+15     2.4017    9.46  |         |    V  Q |         |         |
12+20     2.4701    9.93  |         |    V   Q|         |         |
12+25     2.5421   10.46  |         |     V   Q         |         |
```

```
12+30     2.6161     10.74 |         |     V   |Q        |         |
12+35     2.6925     11.09 |         |      V  | Q       |         |
12+40     2.7735     11.77 |         |      V  |  Q      |         |
12+45     2.8568     12.10 |         |       V |   Q     |         |
12+50     2.9420     12.37 |         |       V |   Q     |         |
12+55     3.0298     12.75 |         |        V|    Q    |         |
13+ 0     3.1189     12.94 |         |        V|    Q    |         |
13+ 5     3.2117     13.47 |         |         V     Q   |         |
13+10     3.3145     14.93 |         |         V        Q|         |
13+15     3.4219     15.60 |         |         |V        |Q        |
13+20     3.5315     15.90 |         |         | V       |Q        |
13+25     3.6423     16.09 |         |         |  V      | Q       |
13+30     3.7539     16.21 |         |         |  V      | Q       |
13+35     3.8599     15.39 |         |         |   V     Q         |
13+40     3.9454     12.41 |         |         |   Q     |         |
13+45     4.0219     11.12 |         |         | Q  V    |         |
13+50     4.0951     10.62 |         |         |Q   V    |         |
13+55     4.1660     10.30 |         |         Q     V   |         |
14+ 0     4.2357     10.12 |         |         Q     V   |         |
14+ 5     4.3068     10.33 |         |         Q      V  |         |
14+10     4.3850     11.36 |         |         | Q    V  |         |
14+15     4.4663     11.80 |         |         |  Q    V |         |
14+20     4.5480     11.86 |         |         |  Q    V |         |
14+25     4.6288     11.73 |         |         |  Q     V|         |
14+30     4.7094     11.71 |         |         |  Q     V|         |
14+35     4.7903     11.74 |         |         |  Q      V         |
14+40     4.8713     11.77 |         |         |  Q      V         |
14+45     4.9525     11.79 |         |         |  Q      |V        |
14+50     5.0334     11.75 |         |         |  Q      |V        |
14+55     5.1125     11.48 |         |         | Q       | V       |
15+ 0     5.1908     11.37 |         |         | Q       | V       |
15+ 5     5.2683     11.25 |         |         | Q       |  V      |
15+10     5.3439     10.97 |         |         |Q        |  V      |
15+15     5.4186     10.85 |         |         |Q        |   V     |
15+20     5.4924     10.72 |         |         |Q        |   V     |
15+25     5.5642     10.43 |         |         Q         |    V    |
15+30     5.6352     10.30 |         |         Q         |    V    |
15+35     5.7034      9.91 |         |        Q|         |     V   |
15+40     5.7639      8.78 |         |      Q  |         |     V   |
15+45     5.8210      8.29 |         |     Q   |         |     V   |
15+50     5.8767      8.09 |         |     Q   |         |      V  |
15+55     5.9317      7.98 |         |    Q    |         |      V  |
16+ 0     5.9862      7.92 |         |    Q    |         |      V  |
16+ 5     6.0336      6.88 |         |  Q      |         |       V |
16+10     6.0582      3.58 |      Q  |         |         |       V |
16+15     6.0728      2.12 |   Q     |         |         |       V |
16+20     6.0831      1.49 | Q       |         |         |       V |
16+25     6.0909      1.14 | Q       |         |         |       V |
16+30     6.0972      0.91 |Q        |         |         |       V |
16+35     6.1022      0.73 |Q        |         |         |       V |
16+40     6.1061      0.57 |Q        |         |         |       V |
16+45     6.1094      0.47 Q         |         |         |       V |
16+50     6.1120      0.38 Q         |         |         |       V |
16+55     6.1145      0.37 Q         |         |         |       V |
17+ 0     6.1171      0.37 Q         |         |         |       V |
17+ 5     6.1198      0.40 Q         |         |         |       V |
17+10     6.1233      0.51 |Q        |         |         |       V |
17+15     6.1271      0.55 |Q        |         |         |       V |
17+20     6.1310      0.57 |Q        |         |         |       V |
17+25     6.1350      0.58 |Q        |         |         |       V |
17+30     6.1391      0.59 |Q        |         |         |       V |
17+35     6.1432      0.59 |Q        |         |         |       V |
17+40     6.1473      0.60 |Q        |         |         |       V |
17+45     6.1515      0.60 |Q        |         |         |       V |
17+50     6.1555      0.59 |Q        |         |         |       V |
17+55     6.1592      0.53 |Q        |         |         |       V |
18+ 0     6.1627      0.51 |Q        |         |         |       V |
18+ 5     6.1661      0.50 Q         |         |         |       V |
18+10     6.1695      0.49 Q         |         |         |        V|
18+15     6.1729      0.49 Q         |         |         |        V|
18+20     6.1763      0.49 Q         |         |         |        V|
```



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18+25     6.1796      0.49 Q         |         |         |        V|
18+30     6.1829      0.48 Q         |         |         |        V|
18+35     6.1861      0.47 Q         |         |         |        V|
18+40     6.1890      0.41 Q         |         |         |        V|
18+45     6.1917      0.39 Q         |         |         |        V|
18+50     6.1942      0.36 Q         |         |         |        V|
18+55     6.1962      0.30 Q         |         |         |        V|
19+ 0     6.1981      0.28 Q         |         |         |        V|
19+ 5     6.2001      0.28 Q         |         |         |        V|
19+10     6.2023      0.33 Q         |         |         |        V|
19+15     6.2047      0.34 Q         |         |         |        V|
19+20     6.2072      0.37 Q         |         |         |        V|
19+25     6.2101      0.42 Q         |         |         |        V|
19+30     6.2132      0.45 Q         |         |         |        V|
19+35     6.2163      0.45 Q         |         |         |        V|
19+40     6.2190      0.40 Q         |         |         |        V|
19+45     6.2216      0.38 Q         |         |         |        V|
19+50     6.2241      0.36 Q         |         |         |        V|
19+55     6.2262      0.30 Q         |         |         |        V|
20+ 0     6.2281      0.27 Q         |         |         |        V|
20+ 5     6.2300      0.28 Q         |         |         |        V|
20+10     6.2322      0.33 Q         |         |         |        V|
20+15     6.2346      0.34 Q         |         |         |        V|
20+20     6.2370      0.35 Q         |         |         |        V|
20+25     6.2394      0.35 Q         |         |         |        V|
20+30     6.2419      0.36 Q         |         |         |        V|
20+35     6.2444      0.36 Q         |         |         |        V|
20+40     6.2468      0.36 Q         |         |         |        V|
20+45     6.2493      0.36 Q         |         |         |        V|
20+50     6.2517      0.35 Q         |         |         |        V|
20+55     6.2537      0.29 Q         |         |         |        V|
21+ 0     6.2556      0.27 Q         |         |         |        V|
21+ 5     6.2574      0.27 Q         |         |         |        V|
21+10     6.2597      0.32 Q         |         |         |        V|
21+15     6.2620      0.34 Q         |         |         |        V|
21+20     6.2643      0.33 Q         |         |         |        V|
21+25     6.2663      0.28 Q         |         |         |        V|
21+30     6.2681      0.26 Q         |         |         |        V|
21+35     6.2699      0.27 Q         |         |         |        V|
21+40     6.2721      0.32 Q         |         |         |        V|
21+45     6.2745      0.34 Q         |         |         |        V|
21+50     6.2768      0.33 Q         |         |         |        V|
21+55     6.2787      0.28 Q         |         |         |        V|
22+ 0     6.2806      0.26 Q         |         |         |        V|
22+ 5     6.2824      0.27 Q         |         |         |        V|
22+10     6.2846      0.32 Q         |         |         |        V|
22+15     6.2870      0.34 Q         |         |         |        V|
22+20     6.2893      0.33 Q         |         |         |        V|
22+25     6.2912      0.28 Q         |         |         |        V|
22+30     6.2930      0.26 Q         |         |         |        V|
22+35     6.2948      0.25 Q         |         |         |        V|
22+40     6.2965      0.25 Q         |         |         |        V|
22+45     6.2982      0.25 Q         |         |         |        V|
22+50     6.2999      0.25 Q         |         |         |        V|
22+55     6.3016      0.24 Q         |         |         |        V|
23+ 0     6.3032      0.24 Q         |         |         |        V|
23+ 5     6.3049      0.24 Q         |         |         |        V|
23+10     6.3066      0.24 Q         |         |         |        V|
23+15     6.3082      0.24 Q         |         |         |        V|
23+20     6.3099      0.24 Q         |         |         |        V|
23+25     6.3115      0.24 Q         |         |         |        V|
23+30     6.3132      0.24 Q         |         |         |        V|
23+35     6.3149      0.24 Q         |         |         |        V|
23+40     6.3165      0.24 Q         |         |         |        V|
23+45     6.3182      0.24 Q         |         |         |        V|
23+50     6.3199      0.24 Q         |         |         |        V|
23+55     6.3215      0.24 Q         |         |         |        V|
24+ 0     6.3232      0.24 Q         |         |         |        V|
24+ 5     6.3246      0.21 Q         |         |         |        V|
24+10     6.3253      0.10 Q         |         |         |        V|
24+15     6.3257      0.05 Q         |         |         |        V|
```

```
  24+20       6.3259      0.03  Q         |         |         |        V|
  24+25       6.3261      0.02  Q         |         |         |        V|
  24+30       6.3262      0.01  Q         |         |         |        V|
  24+35       6.3262      0.01  Q         |         |         |        V|
  24+40       6.3263      0.01  Q         |         |         |        V|
  24+45       6.3263      0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

APPENDIX D.2: OFFSITE AREA "B"

100-YEAR, 1-HOUR

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
             Study date  06/10/16 File: ARBOFF1100.out

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6279

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
OFFSITE AREA B
FILENAME: ARBOFF
--------------------------------------------------------------------
Drainage Area =      73.03(Ac.)  =      0.114 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      73.03(Ac.)  =      0.114 Sq. Mi.
Length along longest watercourse =    3313.64(Ft.)
Length along longest watercourse measured to centroid =    2180.67(Ft.)
Length along longest watercourse =      0.628 Mi.
Length along longest watercourse measured to centroid =      0.413 Mi.
Difference in elevation =     387.00(Ft.)
Slope along watercourse =    616.6512 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time =    0.127 Hr.
Lag time =     7.63 Min.
25% of lag time =     1.91 Min.
40% of lag time =     3.05 Min.
Unit time =     5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       73.03           0.50                 36.52

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       73.03           1.20                 87.64

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    0.500(In)
Area Averaged 100-Year Rainfall =    1.200(In)

Point rain (area averaged) =    1.200(In)
Areal adjustment factor =   99.93 %
Adjusted average point rain =    1.199(In)

Sub-Area Data:
Area(Ac.)        Runoff Index   Impervious %
    73.030           82.30         0.044
 Total Area Entered =     73.03(Ac.)
```



```
RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
82.3  82.3      0.218     0.044        0.209      1.000      0.209
                                                   Sum (F) =   0.209
Area averaged mean soil loss (F) (In/Hr) =  0.209
Minimum soil loss rate ((In/Hr)) =  0.105
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.865
--------------------------------------------------------------------
Slope of intensity-duration curve for a 1 hour storm =0.5000
---------------------------------------------------------------------

               U n i t   H y d r o g r a p h
                       VALLEY S-Curve
--------------------------------------------------------------------
               Unit Hydrograph Data
---------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                            Graph %          (CFS)
---------------------------------------------------------------------
    1  0.083         65.526          9.512             7.001
    2  0.167        131.053         37.593            27.669
    3  0.250        196.579         24.689            18.171
    4  0.333        262.105          9.501             6.993
    5  0.417        327.631          5.745             4.229
    6  0.500        393.158          3.856             2.838
    7  0.583        458.684          2.628             1.934
    8  0.667        524.210          1.984             1.460
    9  0.750        589.736          1.498             1.102
   10  0.833        655.263          1.106             0.814
   11  0.917        720.789          0.769             0.566
   12  1.000        786.315          0.655             0.482
   13  1.083        851.841          0.464             0.342
                                 Sum = 100.000   Sum=      73.601
----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
      (Hr.)  Percent   (In/Hr)        Max   |   Low        (In/Hr)
   1  0.08     4.20      0.604         0.209    (  0.523)        0.395
   2  0.17     4.30      0.619         0.209    (  0.535)        0.410
   3  0.25     5.00      0.720         0.209    (  0.622)        0.510
   4  0.33     5.00      0.720         0.209    (  0.622)        0.510
   5  0.42     5.80      0.835         0.209    (  0.722)        0.625
   6  0.50     6.50      0.935         0.209    (  0.809)        0.726
   7  0.58     7.40      1.065         0.209    (  0.921)        0.856
   8  0.67     8.60      1.238         0.209    (  1.070)        1.028
   9  0.75    12.30      1.770         0.209    (  1.531)        1.561
  10  0.83    29.10      4.188         0.209    (  3.621)        3.978
  11  0.92     6.80      0.979         0.209    (  0.846)        0.769
  12  1.00     5.00      0.720         0.209    (  0.622)        0.510
             (Loss Rate Not Used)
     Sum =     100.0                                  Sum =    11.9
       Flood volume = Effective rainfall      0.99(In)
        times area      73.0(Ac.)/[(In)/(Ft.)] =       6.0(Ac.Ft)
       Total soil loss =      0.21(In)
       Total soil loss =     1.273(Ac.Ft)
       Total rainfall =      1.20(In)
       Flood volume =      262461.1 Cubic Feet
       Total soil loss =       55447.0 Cubic Feet
       --------------------------------------------------------------------
        Peak flow rate of this hydrograph =    159.858(CFS)
       --------------------------------------------------------------------
       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           1 - H O U R   S T O R M
                      R u n o f f     H y d r o g r a p h
```

```
     -------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

     -------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0       50.0     100.0     150.0     200.0
-----------------------------------------------------------------------
  0+ 5       0.0191      2.77  Q         |         |         |         |
  0+10       0.1142     13.81  V Q       |         |         |         |
  0+15       0.2664     22.10  |V  Q     |         |         |         |
  0+20       0.4586     27.92  |  V Q    |         |         |         |
  0+25       0.6813     32.33  |   V Q   |         |         |         |
  0+30       0.9437     38.11  |     VQ  |         |         |         |
  0+35       1.2545     45.13  |       VQ|         |         |         |
  0+40       1.6226     53.45  |         Q         |         |         |
  0+45       2.0783     66.16  |         |  Q      |         |         |
  0+50       2.7884    103.12  |         |       V Q         |         |
  0+55       3.8894    159.86  |         |         |    V    |Q        |
  1+ 0       4.7064    118.63  |         |         |  Q      |V        |
  1+ 5       5.1879     69.92  |         |  Q      |         |   V     |
  1+10       5.4713     41.15  |       Q |         |         |     V   |
  1+15       5.6432     24.96  |   Q     |         |         |      V  |
  1+20       5.7606     17.04  |  Q      |         |         |       V |
  1+25       5.8457     12.36  | Q       |         |         |       V |
  1+30       5.9078      9.01  |Q        |         |         |        V|
  1+35       5.9526      6.51  |Q        |         |         |        V|
  1+40       5.9839      4.55  Q         |         |         |        V|
  1+45       6.0066      3.31  Q         |         |         |        V|
  1+50       6.0206      2.02  Q         |         |         |        V|
  1+55       6.0241      0.51  Q         |         |         |        V|
  2+ 0       6.0253      0.17  Q         |         |         |        V|
-----------------------------------------------------------------------
```

100-YEAR, 3-HOUR

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 06/10/16 File: ARBOFF3100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
OFFSITE AREA B
FILENAME: ARBOFF

Drainage Area = 73.03(Ac.) = 0.114 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 73.03(Ac.) = 0.114 Sq. Mi.
Length along longest watercourse = 3313.64(Ft.)
Length along longest watercourse measured to centroid = 2180.67(Ft.)
Length along longest watercourse = 0.628 Mi.
Length along longest watercourse measured to centroid = 0.413 Mi.
Difference in elevation = 387.00(Ft.)
Slope along watercourse = 616.6512 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.127 Hr.
Lag time = 7.63 Min.
25% of lag time = 1.91 Min.
40% of lag time = 3.05 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
73.03	0.90	65.73

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
73.03	1.90	138.76

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.900(In)
Area Averaged 100-Year Rainfall = 1.900(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 99.97 %
Adjusted average point rain = 1.899(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
73.030	82.30	0.044

Total Area Entered = 73.03(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
82.3	82.3	0.218	0.044	0.209	1.000	0.209

Sum (F) = 0.209

Area averaged mean soil loss (F) (In/Hr) = 0.209
Minimum soil loss rate ((In/Hr)) = 0.105
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.865

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	65.526	9.512	7.001
2	0.167	131.053	37.593	27.669
3	0.250	196.579	24.689	18.171
4	0.333	262.105	9.501	6.993
5	0.417	327.631	5.745	4.229
6	0.500	393.158	3.856	2.838
7	0.583	458.684	2.628	1.934
8	0.667	524.210	1.984	1.460
9	0.750	589.736	1.498	1.102
10	0.833	655.263	1.106	0.814
11	0.917	720.789	0.769	0.566
12	1.000	786.315	0.655	0.482
13	1.083	851.841	0.464	0.342
			Sum = 100.000	Sum= 73.601

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	1.30	0.296	0.209	(0.256)	0.087
2	0.17	1.30	0.296	0.209	(0.256)	0.087
3	0.25	1.10	0.251	0.209	(0.217)	0.042
4	0.33	1.50	0.342	0.209	(0.296)	0.133
5	0.42	1.50	0.342	0.209	(0.296)	0.133
6	0.50	1.80	0.410	0.209	(0.355)	0.201
7	0.58	1.50	0.342	0.209	(0.296)	0.133
8	0.67	1.80	0.410	0.209	(0.355)	0.201
9	0.75	1.80	0.410	0.209	(0.355)	0.201
10	0.83	1.50	0.342	0.209	(0.296)	0.133
11	0.92	1.60	0.365	0.209	(0.315)	0.156
12	1.00	1.80	0.410	0.209	(0.355)	0.201
13	1.08	2.20	0.501	0.209	(0.434)	0.292
14	1.17	2.20	0.501	0.209	(0.434)	0.292
15	1.25	2.20	0.501	0.209	(0.434)	0.292
16	1.33	2.00	0.456	0.209	(0.394)	0.247
17	1.42	2.60	0.593	0.209	(0.512)	0.383
18	1.50	2.70	0.615	0.209	(0.532)	0.406
19	1.58	2.40	0.547	0.209	(0.473)	0.338
20	1.67	2.70	0.615	0.209	(0.532)	0.406
21	1.75	3.30	0.752	0.209	(0.650)	0.543
22	1.83	3.10	0.707	0.209	(0.611)	0.497
23	1.92	2.90	0.661	0.209	(0.572)	0.452
24	2.00	3.00	0.684	0.209	(0.591)	0.475
25	2.08	3.10	0.707	0.209	(0.611)	0.497
26	2.17	4.20	0.957	0.209	(0.828)	0.748
27	2.25	5.00	1.140	0.209	(0.986)	0.930
28	2.33	3.50	0.798	0.209	(0.690)	0.589
29	2.42	6.80	1.550	0.209	(1.340)	1.341

```
30   2.50     7.30      1.664          0.209    (  1.439)        1.455
31   2.58     8.20      1.869          0.209    (  1.616)        1.660
32   2.67     5.90      1.345          0.209    (  1.163)        1.136
33   2.75     2.00      0.456          0.209    (  0.394)        0.247
34   2.83     1.80      0.410          0.209    (  0.355)        0.201
35   2.92     1.80      0.410          0.209    (  0.355)        0.201
36   3.00     0.60      0.137       (  0.209)       0.118        0.018
                (Loss Rate Not Used)
   Sum =     100.0                               Sum =    15.4
      Flood volume = Effective rainfall      1.28(In)
       times area      73.0(Ac.)/[(In)/(Ft.)] =       7.8(Ac.Ft)
      Total soil loss =      0.62(In)
      Total soil loss =     3.773(Ac.Ft)
      Total rainfall =      1.90(In)
      Flood volume =      339193.9 Cubic Feet
      Total soil loss =      164333.1 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     98.613(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          3 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0       25.0      50.0      75.0     100.0
-----------------------------------------------------------------------
  0+ 5       0.0042      0.61  Q         |         |         |         |
  0+10       0.0250      3.02  VQ        |         |         |         |
  0+15       0.0546      4.29  VQ        |         |         |         |
  0+20       0.0840      4.27  VQ        |         |         |         |
  0+25       0.1276      6.34  V Q       |         |         |         |
  0+30       0.1855      8.40  V  Q      |         |         |         |
  0+35       0.2574     10.43  |V  Q     |         |         |         |
  0+40       0.3307     10.64  |V  Q     |         |         |         |
  0+45       0.4136     12.04  | V Q     |         |         |         |
  0+50       0.5017     12.79  | V  Q    |         |         |         |
  0+55       0.5814     11.58  | V Q     |         |         |         |
  1+ 0       0.6614     11.62  |  VQ     |         |         |         |
  1+ 5       0.7557     13.69  |  V Q    |         |         |         |
  1+10       0.8732     17.05  |   V Q   |         |         |         |
  1+15       1.0043     19.04  |    V Q  |         |         |         |
  1+20       1.1391     19.57  |    V Q  |         |         |         |
  1+25       1.2754     19.78  |     VQ  |         |         |         |
  1+30       1.4353     23.23  |       V Q|        |         |         |
  1+35       1.6128     25.77  |        V Q        |         |         |
  1+40       1.7900     25.72  |         VQ        |         |         |
  1+45       1.9832     28.06  |          VQ       |         |         |
  1+50       2.2089     32.77  |         |V Q      |         |         |
  1+55       2.4445     34.21  |         | VQ      |         |         |
  2+ 0       2.6758     33.58  |         |  Q      |         |         |
  2+ 5       2.9103     34.05  |         |  QV     |         |         |
  2+10       3.1642     36.87  |         |   Q V   |         |         |
  2+15       3.4790     45.70  |         |      VQ |         |         |
  2+20       3.8456     53.23  |         |        V|Q        |         |
  2+25       4.2198     54.34  |         |         |Q        |         |
  2+30       4.7170     72.20  |         |         |   V   Q |         |
  2+35       5.3343     89.63  |         |         |      V  |    Q    |
  2+40       6.0134     98.61  |         |         |         V        Q|
  2+45       6.6014     85.37  |         |         |         |  VQ     |
  2+50       6.9791     54.84  |         |         |Q        |    V    |
  2+55       7.2292     36.31  |         |   Q     |         |      V  |
  3+ 0       7.4193     27.60  |         |Q        |         |       V |
  3+ 5       7.5447     18.20  |      Q  |         |         |       V |
  3+10       7.6249     11.65  |   Q     |         |         |        V|
  3+15       7.6804      8.06  |  Q      |         |         |        V|
  3+20       7.7195      5.68  | Q       |         |         |        V|
  3+25       7.7473      4.03  |Q        |         |         |        V|
  3+30       7.7659      2.69  |Q        |         |         |        V|
  3+35       7.7773      1.67  Q         |         |         |        V|
  3+40       7.7829      0.81  Q         |         |         |        V|
  3+45       7.7850      0.31  Q         |         |         |        V|
  3+50       7.7862      0.18  Q         |         |         |        V|
  3+55       7.7868      0.08  Q         |         |         |        V|
  4+ 0       7.7868      0.01  Q         |         |         |         V
-----------------------------------------------------------------------
```

100-YEAR, 6-HOUR

U n i t   H y d r o g r a p h   A n a l y s i s

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Study date 06/10/16 File: ARBOFF6100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
OFFSITE AREA B
FILENAME: ARBOFF

Drainage Area = 73.03(Ac.) = 0.114 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 73.03(Ac.) = 0.114 Sq. Mi.
Length along longest watercourse = 3313.64(Ft.)
Length along longest watercourse measured to centroid = 2180.67(Ft.)
Length along longest watercourse = 0.628 Mi.
Length along longest watercourse measured to centroid = 0.413 Mi.
Difference in elevation = 387.00(Ft.)
Slope along watercourse = 616.6512 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.127 Hr.
Lag time = 7.63 Min.
25% of lag time = 1.91 Min.
40% of lag time = 3.05 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
73.03	1.20	87.64

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
73.03	2.50	182.57

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.200(In)
Area Averaged 100-Year Rainfall = 2.500(In)

Point rain (area averaged) = 2.500(In)
Areal adjustment factor = 99.97 %
Adjusted average point rain = 2.499(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
73.030	82.30	0.044

Total Area Entered = 73.03(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
82.3	82.3	0.218	0.044	0.209	1.000	0.209
					Sum (F) =	0.209

Area averaged mean soil loss (F) (In/Hr) = 0.209
Minimum soil loss rate ((In/Hr)) = 0.105
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.865

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period	(hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	65.526	9.512	7.001
2	0.167	131.053	37.593	27.669
3	0.250	196.579	24.689	18.171
4	0.333	262.105	9.501	6.993
5	0.417	327.631	5.745	4.229
6	0.500	393.158	3.856	2.838
7	0.583	458.684	2.628	1.934
8	0.667	524.210	1.984	1.460
9	0.750	589.736	1.498	1.102
10	0.833	655.263	1.106	0.814
11	0.917	720.789	0.769	0.566
12	1.000	786.315	0.655	0.482
13	1.083	851.841	0.464	0.342
			Sum = 100.000	Sum= 73.601

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.50	0.150	(0.209)	0.130	0.020
2	0.17	0.60	0.180	(0.209)	0.156	0.024
3	0.25	0.60	0.180	(0.209)	0.156	0.024
4	0.33	0.60	0.180	(0.209)	0.156	0.024
5	0.42	0.60	0.180	(0.209)	0.156	0.024
6	0.50	0.70	0.210	(0.209)	0.182	0.028
7	0.58	0.70	0.210	(0.209)	0.182	0.028
8	0.67	0.70	0.210	(0.209)	0.182	0.028
9	0.75	0.70	0.210	(0.209)	0.182	0.028
10	0.83	0.70	0.210	(0.209)	0.182	0.028
11	0.92	0.70	0.210	(0.209)	0.182	0.028
12	1.00	0.80	0.240	(0.209)	0.207	0.032
13	1.08	0.80	0.240	(0.209)	0.207	0.032
14	1.17	0.80	0.240	(0.209)	0.207	0.032
15	1.25	0.80	0.240	(0.209)	0.207	0.032
16	1.33	0.80	0.240	(0.209)	0.207	0.032
17	1.42	0.80	0.240	(0.209)	0.207	0.032
18	1.50	0.80	0.240	(0.209)	0.207	0.032
19	1.58	0.80	0.240	(0.209)	0.207	0.032
20	1.67	0.80	0.240	(0.209)	0.207	0.032
21	1.75	0.80	0.240	(0.209)	0.207	0.032
22	1.83	0.80	0.240	(0.209)	0.207	0.032
23	1.92	0.80	0.240	(0.209)	0.207	0.032
24	2.00	0.90	0.270	0.209	(0.233)	0.061
25	2.08	0.80	0.240	(0.209)	0.207	0.032
26	2.17	0.90	0.270	0.209	(0.233)	0.061
27	2.25	0.90	0.270	0.209	(0.233)	0.061
28	2.33	0.90	0.270	0.209	(0.233)	0.061
29	2.42	0.90	0.270	0.209	(0.233)	0.061

```
30   2.50     0.90     0.270         0.209    ( 0.233)       0.061
31   2.58     0.90     0.270         0.209    ( 0.233)       0.061
32   2.67     0.90     0.270         0.209    ( 0.233)       0.061
33   2.75     1.00     0.300         0.209    ( 0.259)       0.091
34   2.83     1.00     0.300         0.209    ( 0.259)       0.091
35   2.92     1.00     0.300         0.209    ( 0.259)       0.091
36   3.00     1.00     0.300         0.209    ( 0.259)       0.091
37   3.08     1.00     0.300         0.209    ( 0.259)       0.091
38   3.17     1.10     0.330         0.209    ( 0.285)       0.121
39   3.25     1.10     0.330         0.209    ( 0.285)       0.121
40   3.33     1.10     0.330         0.209    ( 0.285)       0.121
41   3.42     1.20     0.360         0.209    ( 0.311)       0.151
42   3.50     1.30     0.390         0.209    ( 0.337)       0.181
43   3.58     1.40     0.420         0.209    ( 0.363)       0.211
44   3.67     1.40     0.420         0.209    ( 0.363)       0.211
45   3.75     1.50     0.450         0.209    ( 0.389)       0.241
46   3.83     1.50     0.450         0.209    ( 0.389)       0.241
47   3.92     1.60     0.480         0.209    ( 0.415)       0.271
48   4.00     1.60     0.480         0.209    ( 0.415)       0.271
49   4.08     1.70     0.510         0.209    ( 0.441)       0.301
50   4.17     1.80     0.540         0.209    ( 0.467)       0.331
51   4.25     1.90     0.570         0.209    ( 0.493)       0.361
52   4.33     2.00     0.600         0.209    ( 0.519)       0.391
53   4.42     2.10     0.630         0.209    ( 0.545)       0.421
54   4.50     2.10     0.630         0.209    ( 0.545)       0.421
55   4.58     2.20     0.660         0.209    ( 0.571)       0.451
56   4.67     2.30     0.690         0.209    ( 0.597)       0.481
57   4.75     2.40     0.720         0.209    ( 0.622)       0.511
58   4.83     2.40     0.720         0.209    ( 0.622)       0.511
59   4.92     2.50     0.750         0.209    ( 0.648)       0.541
60   5.00     2.60     0.780         0.209    ( 0.674)       0.571
61   5.08     3.10     0.930         0.209    ( 0.804)       0.721
62   5.17     3.60     1.080         0.209    ( 0.934)       0.871
63   5.25     3.90     1.170         0.209    ( 1.012)       0.961
64   5.33     4.20     1.260         0.209    ( 1.089)       1.051
65   5.42     4.70     1.410         0.209    ( 1.219)       1.200
66   5.50     5.60     1.680         0.209    ( 1.452)       1.470
67   5.58     1.90     0.570         0.209    ( 0.493)       0.361
68   5.67     0.90     0.270         0.209    ( 0.233)       0.061
69   5.75     0.60     0.180      ( 0.209)       0.156       0.024
70   5.83     0.50     0.150      ( 0.209)       0.130       0.020
71   5.92     0.30     0.090      ( 0.209)       0.078       0.012
72   6.00     0.20     0.060      ( 0.209)       0.052       0.008
              (Loss Rate Not Used)
   Sum =     100.0                                  Sum =    15.8
     Flood volume = Effective rainfall      1.32(In)
      times area      73.0(Ac.)/[(In)/(Ft.)] =       8.0(Ac.Ft)
     Total soil loss =      1.18(In)
     Total soil loss =     7.180(Ac.Ft)
     Total rainfall =      2.50(In)
     Flood volume =      349832.2 Cubic Feet
     Total soil loss =      312748.7 Cubic Feet
     --------------------------------------------------------------------
      Peak flow rate of this hydrograph =     82.859(CFS)
     --------------------------------------------------------------------
     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          6 - H O U R   S T O R M
                    R u n o f f     H y d r o g r a p h
     --------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

     --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0       22.5      45.0      67.5      90.0
-----------------------------------------------------------------------
  0+ 5       0.0010      0.14  Q         |         |         |         |
  0+10       0.0060      0.73  Q         |         |         |         |
  0+15       0.0144      1.21  Q         |         |         |         |
  0+20       0.0242      1.43  Q         |         |         |         |
  0+25       0.0348      1.54  Q         |         |         |         |
  0+30       0.0462      1.65  Q         |         |         |         |
  0+35       0.0586      1.81  Q         |         |         |         |
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0+40       0.0718      1.92  Q         |         |         |         |
0+45       0.0854      1.98  Q         |         |         |         |
0+50       0.0993      2.01  Q         |         |         |         |
0+55       0.1134      2.04  Q         |         |         |         |
1+ 0       0.1278      2.09  Q         |         |         |         |
1+ 5       0.1430      2.22  Q         |         |         |         |
1+10       0.1588      2.30  VQ        |         |         |         |
1+15       0.1749      2.33  VQ        |         |         |         |
1+20       0.1910      2.35  VQ        |         |         |         |
1+25       0.2073      2.36  |Q        |         |         |         |
1+30       0.2236      2.37  |Q        |         |         |         |
1+35       0.2400      2.38  |Q        |         |         |         |
1+40       0.2563      2.38  |Q        |         |         |         |
1+45       0.2728      2.38  |Q        |         |         |         |
1+50       0.2892      2.39  |Q        |         |         |         |
1+55       0.3056      2.39  |Q        |         |         |         |
2+ 0       0.3234      2.59  |Q        |         |         |         |
2+ 5       0.3453      3.17  |Q        |         |         |         |
2+10       0.3667      3.10  |Q        |         |         |         |
2+15       0.3913      3.57  |Q        |         |         |         |
2+20       0.4189      4.01  |QV       |         |         |         |
2+25       0.4475      4.17  |QV       |         |         |         |
2+30       0.4769      4.26  |QV       |         |         |         |
2+35       0.5067      4.33  |QV       |         |         |         |
2+40       0.5368      4.37  |QV       |         |         |         |
2+45       0.5686      4.61  | Q       |         |         |         |
2+50       0.6062      5.47  | QV      |         |         |         |
2+55       0.6478      6.04  | QV      |         |         |         |
3+ 0       0.6909      6.26  | QV      |         |         |         |
3+ 5       0.7349      6.39  | QV      |         |         |         |
3+10       0.7810      6.69  | QV      |         |         |         |
3+15       0.8332      7.58  |  QV     |         |         |         |
3+20       0.8895      8.17  |  QV     |         |         |         |
3+25       0.9489      8.62  |  QV     |         |         |         |
3+30       1.0165      9.82  |   QV    |         |         |         |
3+35       1.0957     11.50  |    Q    |         |         |         |
3+40       1.1863     13.16  |    Q    |         |         |         |
3+45       1.2849     14.31  |     Q   |         |         |         |
3+50       1.3922     15.59  |     Q   |         |         |         |
3+55       1.5069     16.64  |      Q  |         |         |         |
4+ 0       1.6300     17.89  |      QV |         |         |         |
4+ 5       1.7603     18.92  |       Q |         |         |         |
4+10       1.9006     20.36  |        Q|         |         |         |
4+15       2.0535     22.21  |        QV         |         |         |
4+20       2.2201     24.19  |         QV        |         |         |
4+25       2.4009     26.25  |         |Q        |         |         |
4+30       2.5947     28.14  |         | Q       |         |         |
4+35       2.7974     29.43  |         |  Q      |         |         |
4+40       3.0111     31.03  |         |  QV     |         |         |
4+45       3.2383     32.99  |         |   Q V   |         |         |
4+50       3.4783     34.84  |         |    Q V  |         |         |
4+55       3.7270     36.12  |         |     Q V |         |         |
5+ 0       3.9867     37.71  |         |     Q  V|         |         |
5+ 5       4.2657     40.51  |         |       Q |V        |         |
5+10       4.5875     46.72  |         |         Q V       |         |
5+15       4.9645     54.74  |         |         |   Q     |         |
5+20       5.3913     61.97  |         |         |     VQ  |         |
5+25       5.8669     69.06  |         |         |        VQ         |
5+30       6.4082     78.59  |         |         |         |V  Q     |
5+35       6.9788     82.86  |         |         |         |   V Q   |
5+40       7.3729     57.22  |         |         |    Q    |     V   |
5+45       7.5925     31.88  |         |   Q     |         |      V  |
5+50       7.7289     19.82  |       Q |         |         |       V |
5+55       7.8233     13.71  |     Q   |         |         |       V |
6+ 0       7.8908      9.79  |   Q     |         |         |        V|
6+ 5       7.9396      7.10  |  Q      |         |         |        V|
6+10       7.9740      4.99  | Q       |         |         |        V|
6+15       7.9975      3.41  |Q        |         |         |        V|
6+20       8.0132      2.28  |Q        |         |         |        V|
6+25       8.0233      1.48  Q         |         |         |        V|
6+30       8.0288      0.79  Q         |         |         |        V|
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    6+35       8.0302      0.21  Q         |         |         |        V|
    6+40       8.0306      0.06  Q         |         |         |        V|
    6+45       8.0308      0.03  Q         |         |         |        V|
    6+50       8.0310      0.02  Q         |         |         |        V|
    6+55       8.0310      0.01  Q         |         |         |        V|
    7+ 0       8.0310      0.00  Q         |         |         |         V
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100-YEAR, 24-HOUR

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 06/10/16 File: ARBOFF24100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
OFFSITE AREA B
FILENAME: ARBOFF

Drainage Area = 73.03(Ac.) = 0.114 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 73.03(Ac.) = 0.114 Sq. Mi.
Length along longest watercourse = 3313.64(Ft.)
Length along longest watercourse measured to centroid = 2180.67(Ft.)
Length along longest watercourse = 0.628 Mi.
Length along longest watercourse measured to centroid = 0.413 Mi.
Difference in elevation = 387.00(Ft.)
Slope along watercourse = 616.6512 Ft./Mi.
Average Manning's 'N' = 0.030
Lag time = 0.127 Hr.
Lag time = 7.63 Min.
25% of lag time = 1.91 Min.
40% of lag time = 3.05 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
73.03	2.00	146.06

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
73.03	5.00	365.15

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 2.000(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 5.000(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 4.999(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
73.030	82.30	0.044

Total Area Entered = 73.03(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
82.3	82.3	0.218	0.044	0.209	1.000	0.209
					Sum (F) =	0.209

Area averaged mean soil loss (F) (In/Hr) = 0.209
Minimum soil loss rate ((In/Hr)) = 0.105
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.865

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	65.526	9.512	7.001
2	0.167	131.053	37.593	27.669
3	0.250	196.579	24.689	18.171
4	0.333	262.105	9.501	6.993
5	0.417	327.631	5.745	4.229
6	0.500	393.158	3.856	2.838
7	0.583	458.684	2.628	1.934
8	0.667	524.210	1.984	1.460
9	0.750	589.736	1.498	1.102
10	0.833	655.263	1.106	0.814
11	0.917	720.789	0.769	0.566
12	1.000	786.315	0.655	0.482
13	1.083	851.841	0.464	0.342
			Sum = 100.000	Sum= 73.601

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.040	(0.371)	0.035	0.005
2	0.17	0.07	0.040	(0.369)	0.035	0.005
3	0.25	0.07	0.040	(0.368)	0.035	0.005
4	0.33	0.10	0.060	(0.366)	0.052	0.008
5	0.42	0.10	0.060	(0.365)	0.052	0.008
6	0.50	0.10	0.060	(0.364)	0.052	0.008
7	0.58	0.10	0.060	(0.362)	0.052	0.008
8	0.67	0.10	0.060	(0.361)	0.052	0.008
9	0.75	0.10	0.060	(0.359)	0.052	0.008
10	0.83	0.13	0.080	(0.358)	0.069	0.011
11	0.92	0.13	0.080	(0.357)	0.069	0.011
12	1.00	0.13	0.080	(0.355)	0.069	0.011
13	1.08	0.10	0.060	(0.354)	0.052	0.008
14	1.17	0.10	0.060	(0.352)	0.052	0.008
15	1.25	0.10	0.060	(0.351)	0.052	0.008
16	1.33	0.10	0.060	(0.350)	0.052	0.008
17	1.42	0.10	0.060	(0.348)	0.052	0.008
18	1.50	0.10	0.060	(0.347)	0.052	0.008
19	1.58	0.10	0.060	(0.345)	0.052	0.008
20	1.67	0.10	0.060	(0.344)	0.052	0.008
21	1.75	0.10	0.060	(0.343)	0.052	0.008
22	1.83	0.13	0.080	(0.341)	0.069	0.011
23	1.92	0.13	0.080	(0.340)	0.069	0.011
24	2.00	0.13	0.080	(0.339)	0.069	0.011
25	2.08	0.13	0.080	(0.337)	0.069	0.011
26	2.17	0.13	0.080	(0.336)	0.069	0.011
27	2.25	0.13	0.080	(0.334)	0.069	0.011
28	2.33	0.13	0.080	(0.333)	0.069	0.011
29	2.42	0.13	0.080	(0.332)	0.069	0.011

30	2.50	0.13	0.080	(0.330)	0.069	0.011
31	2.58	0.17	0.100	(0.329)	0.086	0.014
32	2.67	0.17	0.100	(0.328)	0.086	0.014
33	2.75	0.17	0.100	(0.326)	0.086	0.014
34	2.83	0.17	0.100	(0.325)	0.086	0.014
35	2.92	0.17	0.100	(0.324)	0.086	0.014
36	3.00	0.17	0.100	(0.322)	0.086	0.014
37	3.08	0.17	0.100	(0.321)	0.086	0.014
38	3.17	0.17	0.100	(0.320)	0.086	0.014
39	3.25	0.17	0.100	(0.318)	0.086	0.014
40	3.33	0.17	0.100	(0.317)	0.086	0.014
41	3.42	0.17	0.100	(0.316)	0.086	0.014
42	3.50	0.17	0.100	(0.314)	0.086	0.014
43	3.58	0.17	0.100	(0.313)	0.086	0.014
44	3.67	0.17	0.100	(0.312)	0.086	0.014
45	3.75	0.17	0.100	(0.310)	0.086	0.014
46	3.83	0.20	0.120	(0.309)	0.104	0.016
47	3.92	0.20	0.120	(0.308)	0.104	0.016
48	4.00	0.20	0.120	(0.306)	0.104	0.016
49	4.08	0.20	0.120	(0.305)	0.104	0.016
50	4.17	0.20	0.120	(0.304)	0.104	0.016
51	4.25	0.20	0.120	(0.303)	0.104	0.016
52	4.33	0.23	0.140	(0.301)	0.121	0.019
53	4.42	0.23	0.140	(0.300)	0.121	0.019
54	4.50	0.23	0.140	(0.299)	0.121	0.019
55	4.58	0.23	0.140	(0.297)	0.121	0.019
56	4.67	0.23	0.140	(0.296)	0.121	0.019
57	4.75	0.23	0.140	(0.295)	0.121	0.019
58	4.83	0.27	0.160	(0.294)	0.138	0.022
59	4.92	0.27	0.160	(0.292)	0.138	0.022
60	5.00	0.27	0.160	(0.291)	0.138	0.022
61	5.08	0.20	0.120	(0.290)	0.104	0.016
62	5.17	0.20	0.120	(0.289)	0.104	0.016
63	5.25	0.20	0.120	(0.287)	0.104	0.016
64	5.33	0.23	0.140	(0.286)	0.121	0.019
65	5.42	0.23	0.140	(0.285)	0.121	0.019
66	5.50	0.23	0.140	(0.284)	0.121	0.019
67	5.58	0.27	0.160	(0.282)	0.138	0.022
68	5.67	0.27	0.160	(0.281)	0.138	0.022
69	5.75	0.27	0.160	(0.280)	0.138	0.022
70	5.83	0.27	0.160	(0.279)	0.138	0.022
71	5.92	0.27	0.160	(0.277)	0.138	0.022
72	6.00	0.27	0.160	(0.276)	0.138	0.022
73	6.08	0.30	0.180	(0.275)	0.156	0.024
74	6.17	0.30	0.180	(0.274)	0.156	0.024
75	6.25	0.30	0.180	(0.272)	0.156	0.024
76	6.33	0.30	0.180	(0.271)	0.156	0.024
77	6.42	0.30	0.180	(0.270)	0.156	0.024
78	6.50	0.30	0.180	(0.269)	0.156	0.024
79	6.58	0.33	0.200	(0.268)	0.173	0.027
80	6.67	0.33	0.200	(0.266)	0.173	0.027
81	6.75	0.33	0.200	(0.265)	0.173	0.027
82	6.83	0.33	0.200	(0.264)	0.173	0.027
83	6.92	0.33	0.200	(0.263)	0.173	0.027
84	7.00	0.33	0.200	(0.262)	0.173	0.027
85	7.08	0.33	0.200	(0.260)	0.173	0.027
86	7.17	0.33	0.200	(0.259)	0.173	0.027
87	7.25	0.33	0.200	(0.258)	0.173	0.027
88	7.33	0.37	0.220	(0.257)	0.190	0.030
89	7.42	0.37	0.220	(0.256)	0.190	0.030
90	7.50	0.37	0.220	(0.254)	0.190	0.030
91	7.58	0.40	0.240	(0.253)	0.208	0.032
92	7.67	0.40	0.240	(0.252)	0.208	0.032
93	7.75	0.40	0.240	(0.251)	0.208	0.032
94	7.83	0.43	0.260	(0.250)	0.225	0.035
95	7.92	0.43	0.260	(0.249)	0.225	0.035
96	8.00	0.43	0.260	(0.248)	0.225	0.035
97	8.08	0.50	0.300	0.246	(0.259)	0.054
98	8.17	0.50	0.300	0.245	(0.259)	0.055
99	8.25	0.50	0.300	0.244	(0.259)	0.056
100	8.33	0.50	0.300	0.243	(0.259)	0.057
101	8.42	0.50	0.300	0.242	(0.259)	0.058
102	8.50	0.50	0.300	0.241	(0.259)	0.059
103	8.58	0.53	0.320	0.240	(0.277)	0.080
104	8.67	0.53	0.320	0.238	(0.277)	0.082
105	8.75	0.53	0.320	0.237	(0.277)	0.083
106	8.83	0.57	0.340	0.236	(0.294)	0.104
107	8.92	0.57	0.340	0.235	(0.294)	0.105
108	9.00	0.57	0.340	0.234	(0.294)	0.106
109	9.08	0.63	0.380	0.233	(0.329)	0.147
110	9.17	0.63	0.380	0.232	(0.329)	0.148
111	9.25	0.63	0.380	0.231	(0.329)	0.149
112	9.33	0.67	0.400	0.230	(0.346)	0.170
113	9.42	0.67	0.400	0.228	(0.346)	0.172
114	9.50	0.67	0.400	0.227	(0.346)	0.173
115	9.58	0.70	0.420	0.226	(0.363)	0.194
116	9.67	0.70	0.420	0.225	(0.363)	0.195
117	9.75	0.70	0.420	0.224	(0.363)	0.196
118	9.83	0.73	0.440	0.223	(0.380)	0.217
119	9.92	0.73	0.440	0.222	(0.380)	0.218
120	10.00	0.73	0.440	0.221	(0.380)	0.219
121	10.08	0.50	0.300	0.220	(0.259)	0.080
122	10.17	0.50	0.300	0.219	(0.259)	0.081
123	10.25	0.50	0.300	0.218	(0.259)	0.082
124	10.33	0.50	0.300	0.217	(0.259)	0.083
125	10.42	0.50	0.300	0.216	(0.259)	0.084
126	10.50	0.50	0.300	0.215	(0.259)	0.085
127	10.58	0.67	0.400	0.213	(0.346)	0.186
128	10.67	0.67	0.400	0.212	(0.346)	0.188
129	10.75	0.67	0.400	0.211	(0.346)	0.189
130	10.83	0.67	0.400	0.210	(0.346)	0.190
131	10.92	0.67	0.400	0.209	(0.346)	0.191
132	11.00	0.67	0.400	0.208	(0.346)	0.192
133	11.08	0.63	0.380	0.207	(0.329)	0.173
134	11.17	0.63	0.380	0.206	(0.329)	0.174
135	11.25	0.63	0.380	0.205	(0.329)	0.175
136	11.33	0.63	0.380	0.204	(0.329)	0.176
137	11.42	0.63	0.380	0.203	(0.329)	0.177
138	11.50	0.63	0.380	0.202	(0.329)	0.178
139	11.58	0.57	0.340	0.201	(0.294)	0.139
140	11.67	0.57	0.340	0.200	(0.294)	0.140
141	11.75	0.57	0.340	0.199	(0.294)	0.141
142	11.83	0.60	0.360	0.198	(0.311)	0.162
143	11.92	0.60	0.360	0.197	(0.311)	0.163
144	12.00	0.60	0.360	0.196	(0.311)	0.164
145	12.08	0.83	0.500	0.195	(0.432)	0.305
146	12.17	0.83	0.500	0.194	(0.432)	0.306
147	12.25	0.83	0.500	0.193	(0.432)	0.307
148	12.33	0.87	0.520	0.192	(0.450)	0.328
149	12.42	0.87	0.520	0.191	(0.450)	0.329
150	12.50	0.87	0.520	0.190	(0.450)	0.330
151	12.58	0.93	0.560	0.189	(0.484)	0.370
152	12.67	0.93	0.560	0.188	(0.484)	0.371
153	12.75	0.93	0.560	0.188	(0.484)	0.372
154	12.83	0.97	0.580	0.187	(0.502)	0.393
155	12.92	0.97	0.580	0.186	(0.502)	0.394
156	13.00	0.97	0.580	0.185	(0.502)	0.395
157	13.08	1.13	0.680	0.184	(0.588)	0.496
158	13.17	1.13	0.680	0.183	(0.588)	0.497
159	13.25	1.13	0.680	0.182	(0.588)	0.498
160	13.33	1.13	0.680	0.181	(0.588)	0.499
161	13.42	1.13	0.680	0.180	(0.588)	0.500
162	13.50	1.13	0.680	0.179	(0.588)	0.501
163	13.58	0.77	0.460	0.178	(0.398)	0.282
164	13.67	0.77	0.460	0.177	(0.398)	0.283
165	13.75	0.77	0.460	0.176	(0.398)	0.284
166	13.83	0.77	0.460	0.176	(0.398)	0.284
167	13.92	0.77	0.460	0.175	(0.398)	0.285
168	14.00	0.77	0.460	0.174	(0.398)	0.286
169	14.08	0.90	0.540	0.173	(0.467)	0.367
170	14.17	0.90	0.540	0.172	(0.467)	0.368
171	14.25	0.90	0.540	0.171	(0.467)	0.369

172	14.33	0.87	0.520	0.170	(0.450)	0.350
173	14.42	0.87	0.520	0.169	(0.450)	0.351
174	14.50	0.87	0.520	0.168	(0.450)	0.351
175	14.58	0.87	0.520	0.168	(0.450)	0.352
176	14.67	0.87	0.520	0.167	(0.450)	0.353
177	14.75	0.87	0.520	0.166	(0.450)	0.354
178	14.83	0.83	0.500	0.165	(0.432)	0.335
179	14.92	0.83	0.500	0.164	(0.432)	0.336
180	15.00	0.83	0.500	0.163	(0.432)	0.337
181	15.08	0.80	0.480	0.163	(0.415)	0.317
182	15.17	0.80	0.480	0.162	(0.415)	0.318
183	15.25	0.80	0.480	0.161	(0.415)	0.319
184	15.33	0.77	0.460	0.160	(0.398)	0.300
185	15.42	0.77	0.460	0.159	(0.398)	0.301
186	15.50	0.77	0.460	0.158	(0.398)	0.302
187	15.58	0.63	0.380	0.158	(0.329)	0.222
188	15.67	0.63	0.380	0.157	(0.329)	0.223
189	15.75	0.63	0.380	0.156	(0.329)	0.224
190	15.83	0.63	0.380	0.155	(0.329)	0.225
191	15.92	0.63	0.380	0.154	(0.329)	0.226
192	16.00	0.63	0.380	0.154	(0.329)	0.226
193	16.08	0.13	0.080	(0.153)	0.069	0.011
194	16.17	0.13	0.080	(0.152)	0.069	0.011
195	16.25	0.13	0.080	(0.151)	0.069	0.011
196	16.33	0.13	0.080	(0.150)	0.069	0.011
197	16.42	0.13	0.080	(0.150)	0.069	0.011
198	16.50	0.13	0.080	(0.149)	0.069	0.011
199	16.58	0.10	0.060	(0.148)	0.052	0.008
200	16.67	0.10	0.060	(0.147)	0.052	0.008
201	16.75	0.10	0.060	(0.147)	0.052	0.008
202	16.83	0.10	0.060	(0.146)	0.052	0.008
203	16.92	0.10	0.060	(0.145)	0.052	0.008
204	17.00	0.10	0.060	(0.144)	0.052	0.008
205	17.08	0.17	0.100	(0.144)	0.086	0.014
206	17.17	0.17	0.100	(0.143)	0.086	0.014
207	17.25	0.17	0.100	(0.142)	0.086	0.014
208	17.33	0.17	0.100	(0.142)	0.086	0.014
209	17.42	0.17	0.100	(0.141)	0.086	0.014
210	17.50	0.17	0.100	(0.140)	0.086	0.014
211	17.58	0.17	0.100	(0.139)	0.086	0.014
212	17.67	0.17	0.100	(0.139)	0.086	0.014
213	17.75	0.17	0.100	(0.138)	0.086	0.014
214	17.83	0.13	0.080	(0.137)	0.069	0.011
215	17.92	0.13	0.080	(0.137)	0.069	0.011
216	18.00	0.13	0.080	(0.136)	0.069	0.011
217	18.08	0.13	0.080	(0.135)	0.069	0.011
218	18.17	0.13	0.080	(0.135)	0.069	0.011
219	18.25	0.13	0.080	(0.134)	0.069	0.011
220	18.33	0.13	0.080	(0.133)	0.069	0.011
221	18.42	0.13	0.080	(0.133)	0.069	0.011
222	18.50	0.13	0.080	(0.132)	0.069	0.011
223	18.58	0.10	0.060	(0.131)	0.052	0.008
224	18.67	0.10	0.060	(0.131)	0.052	0.008
225	18.75	0.10	0.060	(0.130)	0.052	0.008
226	18.83	0.07	0.040	(0.130)	0.035	0.005
227	18.92	0.07	0.040	(0.129)	0.035	0.005
228	19.00	0.07	0.040	(0.128)	0.035	0.005
229	19.08	0.10	0.060	(0.128)	0.052	0.008
230	19.17	0.10	0.060	(0.127)	0.052	0.008
231	19.25	0.10	0.060	(0.127)	0.052	0.008
232	19.33	0.13	0.080	(0.126)	0.069	0.011
233	19.42	0.13	0.080	(0.125)	0.069	0.011
234	19.50	0.13	0.080	(0.125)	0.069	0.011
235	19.58	0.10	0.060	(0.124)	0.052	0.008
236	19.67	0.10	0.060	(0.124)	0.052	0.008
237	19.75	0.10	0.060	(0.123)	0.052	0.008
238	19.83	0.07	0.040	(0.123)	0.035	0.005
239	19.92	0.07	0.040	(0.122)	0.035	0.005
240	20.00	0.07	0.040	(0.121)	0.035	0.005
241	20.08	0.10	0.060	(0.121)	0.052	0.008
242	20.17	0.10	0.060	(0.120)	0.052	0.008

243	20.25	0.10	0.060	(0.120)	0.052	0.008
244	20.33	0.10	0.060	(0.119)	0.052	0.008
245	20.42	0.10	0.060	(0.119)	0.052	0.008
246	20.50	0.10	0.060	(0.118)	0.052	0.008
247	20.58	0.10	0.060	(0.118)	0.052	0.008
248	20.67	0.10	0.060	(0.117)	0.052	0.008
249	20.75	0.10	0.060	(0.117)	0.052	0.008
250	20.83	0.07	0.040	(0.116)	0.035	0.005
251	20.92	0.07	0.040	(0.116)	0.035	0.005
252	21.00	0.07	0.040	(0.115)	0.035	0.005
253	21.08	0.10	0.060	(0.115)	0.052	0.008
254	21.17	0.10	0.060	(0.115)	0.052	0.008
255	21.25	0.10	0.060	(0.114)	0.052	0.008
256	21.33	0.07	0.040	(0.114)	0.035	0.005
257	21.42	0.07	0.040	(0.113)	0.035	0.005
258	21.50	0.07	0.040	(0.113)	0.035	0.005
259	21.58	0.10	0.060	(0.112)	0.052	0.008
260	21.67	0.10	0.060	(0.112)	0.052	0.008
261	21.75	0.10	0.060	(0.112)	0.052	0.008
262	21.83	0.07	0.040	(0.111)	0.035	0.005
263	21.92	0.07	0.040	(0.111)	0.035	0.005
264	22.00	0.07	0.040	(0.110)	0.035	0.005
265	22.08	0.10	0.060	(0.110)	0.052	0.008
266	22.17	0.10	0.060	(0.110)	0.052	0.008
267	22.25	0.10	0.060	(0.109)	0.052	0.008
268	22.33	0.07	0.040	(0.109)	0.035	0.005
269	22.42	0.07	0.040	(0.109)	0.035	0.005
270	22.50	0.07	0.040	(0.108)	0.035	0.005
271	22.58	0.07	0.040	(0.108)	0.035	0.005
272	22.67	0.07	0.040	(0.108)	0.035	0.005
273	22.75	0.07	0.040	(0.107)	0.035	0.005
274	22.83	0.07	0.040	(0.107)	0.035	0.005
275	22.92	0.07	0.040	(0.107)	0.035	0.005
276	23.00	0.07	0.040	(0.107)	0.035	0.005
277	23.08	0.07	0.040	(0.106)	0.035	0.005
278	23.17	0.07	0.040	(0.106)	0.035	0.005
279	23.25	0.07	0.040	(0.106)	0.035	0.005
280	23.33	0.07	0.040	(0.106)	0.035	0.005
281	23.42	0.07	0.040	(0.106)	0.035	0.005
282	23.50	0.07	0.040	(0.105)	0.035	0.005
283	23.58	0.07	0.040	(0.105)	0.035	0.005
284	23.67	0.07	0.040	(0.105)	0.035	0.005
285	23.75	0.07	0.040	(0.105)	0.035	0.005
286	23.83	0.07	0.040	(0.105)	0.035	0.005
287	23.92	0.07	0.040	(0.105)	0.035	0.005
288	24.00	0.07	0.040	(0.105)	0.035	0.005

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                    (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    25.4
      Flood volume = Effective rainfall      2.12(In)
       times area      73.0(Ac.)/[(In)/(Ft.)] =      12.9(Ac.Ft)
      Total soil loss =      2.88(In)
      Total soil loss =    17.520(Ac.Ft)
      Total rainfall =      5.00(In)
      Flood volume =     562151.8 Cubic Feet
      Total soil loss =      763153.6 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     35.991(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5  Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0       10.0      20.0      30.0      40.0
-----------------------------------------------------------------------
   0+ 5      0.0003      0.04  Q         |         |         |         |
   0+10      0.0016      0.19  Q         |         |         |         |
   0+15      0.0035      0.29  Q         |         |         |         |
   0+20      0.0059      0.34  Q         |         |         |         |
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 0+25      0.0089      0.44 Q         |         |         |         |
 0+30      0.0124      0.50 Q         |         |         |         |
 0+35      0.0161      0.53 Q         |         |         |         |
 0+40      0.0199      0.55 Q         |         |         |         |
 0+45      0.0238      0.57 Q         |         |         |         |
 0+50      0.0279      0.60 Q         |         |         |         |
 0+55      0.0326      0.68 Q         |         |         |         |
 1+ 0      0.0376      0.73 Q         |         |         |         |
 1+ 5      0.0427      0.74 Q         |         |         |         |
 1+10      0.0473      0.67 Q         |         |         |         |
 1+15      0.0517      0.63 Q         |         |         |         |
 1+20      0.0560      0.62 Q         |         |         |         |
 1+25      0.0602      0.61 Q         |         |         |         |
 1+30      0.0644      0.61 Q         |         |         |         |
 1+35      0.0686      0.61 Q         |         |         |         |
 1+40      0.0727      0.60 Q         |         |         |         |
 1+45      0.0769      0.60 Q         |         |         |         |
 1+50      0.0812      0.62 Q         |         |         |         |
 1+55      0.0859      0.69 Q         |         |         |         |
 2+ 0      0.0910      0.74 Q         |         |         |         |
 2+ 5      0.0963      0.76 Q         |         |         |         |
 2+10      0.1016      0.77 Q         |         |         |         |
 2+15      0.1069      0.78 Q         |         |         |         |
 2+20      0.1123      0.78 Q         |         |         |         |
 2+25      0.1177      0.79 Q         |         |         |         |
 2+30      0.1232      0.79 Q         |         |         |         |
 2+35      0.1288      0.81 Q         |         |         |         |
 2+40      0.1349      0.89 Q         |         |         |         |
 2+45      0.1414      0.94 Q         |         |         |         |
 2+50      0.1480      0.96 Q         |         |         |         |
 2+55      0.1546      0.97 Q         |         |         |         |
 3+ 0      0.1614      0.98 Q         |         |         |         |
 3+ 5      0.1681      0.98 Q         |         |         |         |
 3+10      0.1749      0.99 Q         |         |         |         |
 3+15      0.1817      0.99 Q         |         |         |         |
 3+20      0.1886      0.99 Q         |         |         |         |
 3+25      0.1954      0.99 Q         |         |         |         |
 3+30      0.2023      0.99 Q         |         |         |         |
 3+35      0.2091      1.00 Q         |         |         |         |
 3+40      0.2160      1.00 Q         |         |         |         |
 3+45      0.2228      1.00 Q         |         |         |         |
 3+50      0.2298      1.01 VQ        |         |         |         |
 3+55      0.2373      1.09 VQ        |         |         |         |
 4+ 0      0.2452      1.14 VQ        |         |         |         |
 4+ 5      0.2531      1.16 VQ        |         |         |         |
 4+10      0.2612      1.17 VQ        |         |         |         |
 4+15      0.2693      1.18 VQ        |         |         |         |
 4+20      0.2775      1.20 VQ        |         |         |         |
 4+25      0.2864      1.28 VQ        |         |         |         |
 4+30      0.2955      1.33 VQ        |         |         |         |
 4+35      0.3048      1.35 VQ        |         |         |         |
 4+40      0.3142      1.37 VQ        |         |         |         |
 4+45      0.3237      1.37 |Q        |         |         |         |
 4+50      0.3334      1.40 |Q        |         |         |         |
 4+55      0.3435      1.48 |Q        |         |         |         |
 5+ 0      0.3541      1.53 |Q        |         |         |         |
 5+ 5      0.3645      1.51 |Q        |         |         |         |
 5+10      0.3740      1.38 |Q        |         |         |         |
 5+15      0.3829      1.29 |Q        |         |         |         |
 5+20      0.3916      1.28 |Q        |         |         |         |
 5+25      0.4008      1.33 |Q        |         |         |         |
 5+30      0.4102      1.37 |Q        |         |         |         |
 5+35      0.4198      1.40 |Q        |         |         |         |
 5+40      0.4300      1.48 |Q        |         |         |         |
 5+45      0.4406      1.53 |Q        |         |         |         |
 5+50      0.4512      1.55 |Q        |         |         |         |
 5+55      0.4620      1.56 |Q        |         |         |         |
 6+ 0      0.4728      1.57 |Q        |         |         |         |
 6+ 5      0.4838      1.60 |Q        |         |         |         |
 6+10      0.4953      1.68 |Q        |         |         |         |
 6+15      0.5072      1.73 |Q        |         |         |         |
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 6+20      0.5193      1.75 |Q        |         |         |         |
 6+25      0.5314      1.76 |Q        |         |         |         |
 6+30      0.5436      1.77 |Q        |         |         |         |
 6+35      0.5560      1.80 |Q        |         |         |         |
 6+40      0.5690      1.88 |Q        |         |         |         |
 6+45      0.5822      1.93 |Q        |         |         |         |
 6+50      0.5957      1.95 |Q        |         |         |         |
 6+55      0.6092      1.96 |Q        |         |         |         |
 7+ 0      0.6228      1.97 |Q        |         |         |         |
 7+ 5      0.6364      1.98 |Q        |         |         |         |
 7+10      0.6500      1.98 |QV       |         |         |         |
 7+15      0.6637      1.98 |QV       |         |         |         |
 7+20      0.6775      2.01 | Q       |         |         |         |
 7+25      0.6919      2.08 | Q       |         |         |         |
 7+30      0.7066      2.13 | Q       |         |         |         |
 7+35      0.7215      2.17 | Q       |         |         |         |
 7+40      0.7371      2.26 | Q       |         |         |         |
 7+45      0.7530      2.31 | Q       |         |         |         |
 7+50      0.7692      2.36 | Q       |         |         |         |
 7+55      0.7861      2.45 | Q       |         |         |         |
 8+ 0      0.8034      2.51 | Q       |         |         |         |
 8+ 5      0.8217      2.66 | Q       |         |         |         |
 8+10      0.8438      3.20 | VQ      |         |         |         |
 8+15      0.8684      3.59 | VQ      |         |         |         |
 8+20      0.8945      3.78 | VQ      |         |         |         |
 8+25      0.9216      3.93 | VQ      |         |         |         |
 8+30      0.9496      4.06 | V Q     |         |         |         |
 8+35      0.9793      4.32 |  VQ     |         |         |         |
 8+40      1.0136      4.98 |  VQ     |         |         |         |
 8+45      1.0511      5.44 |  V Q    |         |         |         |
 8+50      1.0912      5.82 |  V Q    |         |         |         |
 8+55      1.1363      6.55 |  V  Q   |         |         |         |
 9+ 0      1.1849      7.06 |  V   Q  |         |         |         |
 9+ 5      1.2373      7.61 |  V   Q  |         |         |         |
 9+10      1.2987      8.91 |   V   Q |         |         |         |
 9+15      1.3662      9.80 |   V    Q|         |         |         |
 9+20      1.4375     10.35 |   V     Q         |         |         |
 9+25      1.5146     11.20 |   V     |Q        |         |         |
 9+30      1.5958     11.79 |   V     |Q        |         |         |
 9+35      1.6802     12.25 |    V    | Q       |         |         |
 9+40      1.7700     13.04 |    V    |  Q      |         |         |
 9+45      1.8636     13.59 |    V    |  Q      |         |         |
 9+50      1.9603     14.03 |     V   |   Q     |         |         |
 9+55      2.0622     14.80 |     V   |   Q     |         |         |
10+ 0      2.1679     15.34 |     V   |    Q    |         |         |
10+ 5      2.2688     14.65 |      V  |   Q     |         |         |
10+10      2.3444     10.98 |      V  Q         |         |         |
10+15      2.4036      8.60 |      VQ |         |         |         |
10+20      2.4571      7.76 |      Q  |         |         |         |
10+25      2.5073      7.29 |      Q  |         |         |         |
10+30      2.5555      7.00 |      Q  |         |         |         |
10+35      2.6073      7.53 |      QV |         |         |         |
10+40      2.6775     10.18 |       V Q         |         |         |
10+45      2.7597     11.93 |       V |Q        |         |         |
10+50      2.8464     12.60 |       V | Q       |         |         |
10+55      2.9361     13.02 |        V|  Q      |         |         |
11+ 0      3.0278     13.32 |        V|  Q      |         |         |
11+ 5      3.1201     13.40 |        V|  Q      |         |         |
11+10      3.2101     13.07 |        V|  Q      |         |         |
11+15      3.2989     12.89 |         V Q       |         |         |
11+20      3.3877     12.90 |         V Q       |         |         |
11+25      3.4769     12.95 |         V Q       |         |         |
11+30      3.5666     13.02 |         |V Q      |         |         |
11+35      3.6548     12.81 |         |VQ       |         |         |
11+40      3.7357     11.75 |         |Q        |         |         |
11+45      3.8119     11.07 |         |Q        |         |         |
11+50      3.8876     10.99 |         Q V       |         |         |
11+55      3.9664     11.43 |         |QV       |         |         |
12+ 0      4.0473     11.75 |         |QV       |         |         |
12+ 5      4.1358     12.86 |         | Q       |         |         |
12+10      4.2517     16.83 |         |  V  Q   |         |         |
```

12+15	4.3858	19.46
12+20	4.5281	20.66
12+25	4.6788	21.88
12+30	4.8352	22.72
12+35	4.9970	23.48
12+40	5.1689	24.96
12+45	5.3478	25.98
12+50	5.5312	26.63
12+55	5.7208	27.53
13+ 0	5.9148	28.17
13+ 5	6.1160	29.22
13+10	6.3379	32.21
13+15	6.5735	34.21
13+20	6.8149	35.05
13+25	7.0600	35.60
13+30	7.3079	35.99
13+35	7.5472	34.74
13+40	7.7461	28.88
13+45	7.9187	25.06
13+50	8.0818	23.68
13+55	8.2393	22.87
14+ 0	8.3933	22.36
14+ 5	8.5490	22.60
14+10	8.7181	24.56
14+15	8.8960	25.83
14+20	9.0760	26.14
14+25	9.2542	25.87
14+30	9.4311	25.69
14+35	9.6080	25.69
14+40	9.7856	25.79
14+45	9.9639	25.88
14+50	10.1418	25.83
14+55	10.3164	25.36
15+ 0	10.4891	25.07
15+ 5	10.6603	24.87
15+10	10.8275	24.28
15+15	10.9922	23.91
15+20	11.1551	23.65
15+25	11.3138	23.04
15+30	11.4698	22.66
15+35	11.6211	21.96
15+40	11.7567	19.69
15+45	11.8820	18.20
15+50	12.0035	17.64
15+55	12.1228	17.32
16+ 0	12.2407	17.12
16+ 5	12.3474	15.49
16+10	12.4122	9.42
16+15	12.4496	5.42
16+20	12.4761	3.85
16+25	12.4961	2.90
16+30	12.5117	2.26
16+35	12.5241	1.80
16+40	12.5338	1.41
16+45	12.5415	1.13
16+50	12.5480	0.93
16+55	12.5535	0.80
17+ 0	12.5582	0.69
17+ 5	12.5627	0.65
17+10	12.5682	0.79
17+15	12.5743	0.89
17+20	12.5807	0.92
17+25	12.5872	0.95
17+30	12.5938	0.96
17+35	12.6005	0.97
17+40	12.6072	0.98
17+45	12.6140	0.98
17+50	12.6206	0.97
17+55	12.6268	0.90
18+ 0	12.6327	0.85
18+ 5	12.6384	0.83
18+10	12.6441	0.82
18+15	12.6497	0.81
18+20	12.6553	0.81
18+25	12.6608	0.81
18+30	12.6663	0.80
18+35	12.6717	0.78
18+40	12.6766	0.70
18+45	12.6811	0.65
18+50	12.6853	0.62
18+55	12.6890	0.53
19+ 0	12.6922	0.47
19+ 5	12.6954	0.47
19+10	12.6991	0.53
19+15	12.7030	0.57
19+20	12.7071	0.60
19+25	12.7117	0.68
19+30	12.7167	0.73
19+35	12.7218	0.73
19+40	12.7264	0.67
19+45	12.7307	0.63
19+50	12.7349	0.60
19+55	12.7384	0.52
20+ 0	12.7416	0.47
20+ 5	12.7448	0.46
20+10	12.7484	0.52
20+15	12.7523	0.56
20+20	12.7563	0.58
20+25	12.7603	0.58
20+30	12.7643	0.59
20+35	12.7684	0.59
20+40	12.7725	0.59
20+45	12.7765	0.59
20+50	12.7805	0.57
20+55	12.7839	0.50
21+ 0	12.7871	0.45
21+ 5	12.7902	0.45
21+10	12.7938	0.52
21+15	12.7976	0.56
21+20	12.8014	0.55
21+25	12.8048	0.49
21+30	12.8078	0.44
21+35	12.8109	0.45
21+40	12.8144	0.51
21+45	12.8182	0.55
21+50	12.8220	0.55
21+55	12.8254	0.48
22+ 0	12.8284	0.44
22+ 5	12.8315	0.45
22+10	12.8350	0.51
22+15	12.8388	0.55
22+20	12.8426	0.55
22+25	12.8459	0.48
22+30	12.8490	0.44
22+35	12.8519	0.43
22+40	12.8548	0.42
22+45	12.8576	0.41
22+50	12.8604	0.41
22+55	12.8632	0.40
23+ 0	12.8660	0.40
23+ 5	12.8687	0.40
23+10	12.8715	0.40
23+15	12.8742	0.40
23+20	12.8770	0.40
23+25	12.8797	0.40
23+30	12.8825	0.40
23+35	12.8852	0.40
23+40	12.8880	0.40
23+45	12.8907	0.40
23+50	12.8934	0.40
23+55	12.8962	0.40
24+ 0	12.8989	0.40

```
  24+ 5      12.9014      0.36  Q         |         |         |        V|
  24+10      12.9029      0.21  Q         |         |         |        V|
  24+15      12.9036      0.11  Q         |         |         |        V|
  24+20      12.9041      0.07  Q         |         |         |        V|
  24+25      12.9045      0.05  Q         |         |         |        V|
  24+30      12.9048      0.04  Q         |         |         |        V|
  24+35      12.9049      0.03  Q         |         |         |        V|
  24+40      12.9051      0.02  Q         |         |         |        V|
  24+45      12.9051      0.01  Q         |         |         |        V|
  24+50      12.9052      0.01  Q         |         |         |        V|
  24+55      12.9052      0.00  Q         |         |         |        V|
  25+ 0      12.9052      0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

APPENDIX D.3: ONSITE AREA "A1"

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

100-Year, 1-Hour

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
              Study date  06/10/16 File: ARA1ONSITE1100.out

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------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6279

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
ONSITE AREA "A1"
FILENAME: ARA1ONSITE
--------------------------------------------------------------------
Drainage Area =      17.86(Ac.)  =      0.028 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      17.86(Ac.)  =      0.028 Sq. Mi.
Length along longest watercourse =    1720.36(Ft.)
Length along longest watercourse measured to centroid =    1293.41(Ft.)
Length along longest watercourse =      0.326 Mi.
Length along longest watercourse measured to centroid =      0.245 Mi.
Difference in elevation =      74.00(Ft.)
Slope along watercourse =    227.1153 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.049 Hr.
Lag time =     2.95 Min.
25% of lag time =     0.74 Min.
40% of lag time =     1.18 Min.
Unit time =     5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       17.86           0.50                  8.93

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       17.86           1.20                 21.43

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    0.500(In)
Area Averaged 100-Year Rainfall =    1.200(In)

Point rain (area averaged) =    1.200(In)
Areal adjustment factor =   99.98 %
Adjusted average point rain =    1.200(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    17.860           58.70         0.500
 Total Area Entered =     17.86(Ac.)
```



```
RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
58.7  58.7      0.483     0.500       0.266      1.000      0.266
                                                  Sum (F) =   0.266
Area averaged mean soil loss (F) (In/Hr) =  0.266
Minimum soil loss rate ((In/Hr)) =  0.133
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.500
--------------------------------------------------------------------
Slope of intensity-duration curve for a 1 hour storm =0.5000
---------------------------------------------------------------------

               U n i t   H y d r o g r a p h
                       VALLEY S-Curve
--------------------------------------------------------------------
               Unit Hydrograph Data
--------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                            Graph %          (CFS)
--------------------------------------------------------------------
    1  0.083        169.594         37.603              6.768
    2  0.167        339.187         45.546              8.198
    3  0.250        508.781         10.159              1.829
    4  0.333        678.375          4.273              0.769
    5  0.417        847.969          2.418              0.435
                               Sum = 100.000   Sum=      18.000
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)         Max   |   Low        (In/Hr)
   1  0.08     4.20      0.605          0.266    (  0.302)        0.339
   2  0.17     4.30      0.619          0.266    (  0.310)        0.353
   3  0.25     5.00      0.720          0.266    (  0.360)        0.454
   4  0.33     5.00      0.720          0.266    (  0.360)        0.454
   5  0.42     5.80      0.835          0.266    (  0.418)        0.569
   6  0.50     6.50      0.936          0.266    (  0.468)        0.670
   7  0.58     7.40      1.065          0.266    (  0.533)        0.800
   8  0.67     8.60      1.238          0.266    (  0.619)        0.972
   9  0.75    12.30      1.771          0.266    (  0.885)        1.505
  10  0.83    29.10      4.190          0.266    (  2.095)        3.924
  11  0.92     6.80      0.979          0.266    (  0.490)        0.713
  12  1.00     5.00      0.720          0.266    (  0.360)        0.454
                (Loss Rate Not Used)
     Sum =     100.0                                  Sum =    11.2
       Flood volume = Effective rainfall      0.93(In)
        times area      17.9(Ac.)/[(In)/(Ft.)] =       1.4(Ac.Ft)
       Total soil loss =      0.27(In)
       Total soil loss =     0.396(Ac.Ft)
       Total rainfall =      1.20(In)
       Flood volume =      60553.7 Cubic Feet
       Total soil loss =       17231.8 Cubic Feet
       --------------------------------------------------------------------
        Peak flow rate of this hydrograph =     41.604(CFS)
       --------------------------------------------------------------------
       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                            1 - H O U R   S T O R M
                      R u n o f f     H y d r o g r a p h
       --------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

       --------------------------------------------------------------------
  Time(h+m) Volume Ac.Ft   Q(CFS)  0       12.5      25.0      37.5      50.0
  -----------------------------------------------------------------------
    0+ 5       0.0158      2.30  VQ        |         |         |         |
    0+10       0.0514      5.17  |V  Q     |         |         |         |
```

```
    0+15      0.0968      6.59  | V  Q    |         |         |         |
    0+20      0.1499      7.71  |   V Q   |         |         |         |
    0+25      0.2107      8.83  |     VQ  |         |         |         |
    0+30      0.2833     10.54  |       Q |         |         |         |
    0+35      0.3694     12.50  |        QV         |         |         |
    0+40      0.4728     15.01  |         | QV      |         |         |
    0+45      0.6132     20.40  |         |     QV  |         |         |
    0+50      0.8997     41.60  |         |         |    V    |  Q      |
    0+55      1.1812     40.87  |         |         |         | QV      |
    1+ 0      1.3030     17.69  |         |   Q     |         |      V  |
    1+ 5      1.3629      8.70  |     Q   |         |         |        V|
    1+10      1.3842      3.09  | Q       |         |         |        V|
    1+15      1.3888      0.66  Q         |         |         |        V|
    1+20      1.3901      0.20  Q         |         |         |         V
----------------------------------------------------------------------
```

100-YEAR, 3-HOUR

U n i t   H y d r o g r a p h   A n a l y s i s

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Study date 06/10/16 File: ARA1ONSITE3100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
ONSITE AREA "A1"
FILENAME: ARA1ONSITE

Drainage Area = 17.86(Ac.) = 0.028 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 17.86(Ac.) = 0.028 Sq. Mi.
Length along longest watercourse = 1720.36(Ft.)
Length along longest watercourse measured to centroid = 1293.41(Ft.)
Length along longest watercourse = 0.326 Mi.
Length along longest watercourse measured to centroid = 0.245 Mi.
Difference in elevation = 74.00(Ft.)
Slope along watercourse = 227.1153 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.049 Hr.
Lag time = 2.95 Min.
25% of lag time = 0.74 Min.
40% of lag time = 1.18 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
17.86	0.90	16.07

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
17.86	1.90	33.93

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.900(In)
Area Averaged 100-Year Rainfall = 1.900(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.900(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
17.860	58.70	0.500

Total Area Entered = 17.86(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
58.7	58.7	0.483	0.500	0.266	1.000	0.266
					Sum (F) =	0.266

Area averaged mean soil loss (F) (In/Hr) = 0.266
Minimum soil loss rate ((In/Hr)) = 0.133
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period	(hrs)	Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	169.594	37.603	6.768
2	0.167	339.187	45.546	8.198
3	0.250	508.781	10.159	1.829
4	0.333	678.375	4.273	0.769
5	0.417	847.969	2.418	0.435
			Sum = 100.000	Sum= 18.000

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	1.30	0.296	(0.266)	0.148	0.148
2	0.17	1.30	0.296	(0.266)	0.148	0.148
3	0.25	1.10	0.251	(0.266)	0.125	0.125
4	0.33	1.50	0.342	(0.266)	0.171	0.171
5	0.42	1.50	0.342	(0.266)	0.171	0.171
6	0.50	1.80	0.410	(0.266)	0.205	0.205
7	0.58	1.50	0.342	(0.266)	0.171	0.171
8	0.67	1.80	0.410	(0.266)	0.205	0.205
9	0.75	1.80	0.410	(0.266)	0.205	0.205
10	0.83	1.50	0.342	(0.266)	0.171	0.171
11	0.92	1.60	0.365	(0.266)	0.182	0.182
12	1.00	1.80	0.410	(0.266)	0.205	0.205
13	1.08	2.20	0.502	(0.266)	0.251	0.251
14	1.17	2.20	0.502	(0.266)	0.251	0.251
15	1.25	2.20	0.502	(0.266)	0.251	0.251
16	1.33	2.00	0.456	(0.266)	0.228	0.228
17	1.42	2.60	0.593	0.266	(0.296)	0.327
18	1.50	2.70	0.616	0.266	(0.308)	0.350
19	1.58	2.40	0.547	0.266	(0.274)	0.281
20	1.67	2.70	0.616	0.266	(0.308)	0.350
21	1.75	3.30	0.752	0.266	(0.376)	0.487
22	1.83	3.10	0.707	0.266	(0.353)	0.441
23	1.92	2.90	0.661	0.266	(0.331)	0.395
24	2.00	3.00	0.684	0.266	(0.342)	0.418
25	2.08	3.10	0.707	0.266	(0.353)	0.441
26	2.17	4.20	0.958	0.266	(0.479)	0.692
27	2.25	5.00	1.140	0.266	(0.570)	0.874
28	2.33	3.50	0.798	0.266	(0.399)	0.532
29	2.42	6.80	1.550	0.266	(0.775)	1.284
30	2.50	7.30	1.664	0.266	(0.832)	1.398
31	2.58	8.20	1.869	0.266	(0.935)	1.604
32	2.67	5.90	1.345	0.266	(0.673)	1.079
33	2.75	2.00	0.456	(0.266)	0.228	0.228
34	2.83	1.80	0.410	(0.266)	0.205	0.205
35	2.92	1.80	0.410	(0.266)	0.205	0.205
36	3.00	0.60	0.137	(0.266)	0.068	0.068

(Loss Rate Not Used)

```
     Sum =     100.0                                  Sum =    14.7
       Flood volume = Effective rainfall      1.23(In)
        times area      17.9(Ac.)/[(In)/(Ft.)] =       1.8(Ac.Ft)
       Total soil loss =      0.67(In)
       Total soil loss =     0.998(Ac.Ft)
       Total rainfall =      1.90(In)
       Flood volume =       79687.1 Cubic Feet
       Total soil loss =       43483.7 Cubic Feet
       --------------------------------------------------------------------
        Peak flow rate of this hydrograph =     25.471(CFS)
       --------------------------------------------------------------------
       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           3 - H O U R   S T O R M
                      R u n o f f     H y d r o g r a p h
       --------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

       --------------------------------------------------------------------
  Time(h+m) Volume Ac.Ft   Q(CFS)  0       7.5      15.0      22.5      30.0
  -----------------------------------------------------------------------
    0+ 5       0.0069      1.00  VQ        |         |         |         |
    0+10       0.0222      2.22  V Q       |         |         |         |
    0+15       0.0383      2.34  V  Q      |         |         |         |
    0+20       0.0560      2.57  |V Q      |         |         |         |
    0+25       0.0764      2.97  |V Q      |         |         |         |
    0+30       0.0989      3.27  | V Q     |         |         |         |
    0+35       0.1219      3.34  | V Q     |         |         |         |
    0+40       0.1452      3.37  |  VQ     |         |         |         |
    0+45       0.1701      3.62  |  VQ     |         |         |         |
    0+50       0.1937      3.44  |   Q     |         |         |         |
    0+55       0.2161      3.25  |   Q     |         |         |         |
    1+ 0       0.2398      3.45  |   QV    |         |         |         |
    1+ 5       0.2669      3.94  |    Q    |         |         |         |
    1+10       0.2969      4.35  |    QV   |         |         |         |
    1+15       0.3275      4.45  |    Q V  |         |         |         |
    1+20       0.3574      4.34  |    Q V  |         |         |         |
    1+25       0.3908      4.85  |     Q V |         |         |         |
    1+30       0.4305      5.77  |      Q V|         |         |         |
    1+35       0.4695      5.66  |      Q  V         |         |         |
    1+40       0.5085      5.67  |      Q  |V        |         |         |
    1+45       0.5573      7.09  |        Q| V       |         |         |
    1+50       0.6123      7.99  |         Q  V      |         |         |
    1+55       0.6645      7.58  |         Q   V     |         |         |
    2+ 0       0.7155      7.41  |        Q|    V    |         |         |
    2+ 5       0.7685      7.69  |         Q     V   |         |         |
    2+10       0.8344      9.56  |         | Q     V |         |         |
    2+15       0.9232     12.89  |         |      Q  V         |         |
    2+20       1.0097     12.56  |         |     Q   | V       |         |
    2+25       1.1156     15.39  |         |         Q   V     |         |
    2+30       1.2668     21.95  |         |         |      V Q|         |
    2+35       1.4423     25.47  |         |         |         |V Q      |
    2+40       1.6092     24.24  |         |         |         | Q  V    |
    2+45       1.7123     14.97  |         |        Q|         |      V  |
    2+50       1.7610      7.08  |        Q|         |         |       V |
    2+55       1.7956      5.02  |     Q   |         |         |        V|
    3+ 0       1.8174      3.17  |   Q     |         |         |        V|
    3+ 5       1.8256      1.19  |Q        |         |         |        V|
    3+10       1.8282      0.37  Q         |         |         |        V|
    3+15       1.8292      0.14  Q         |         |         |        V|
    3+20       1.8294      0.03  Q         |         |         |        V|
----------------------------------------------------------------------
```

100-YEAR, 6-HOUR

U n i t   H y d r o g r a p h   A n a l y s i s

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Study date 06/10/16 File: ARA1ONSITE6100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
ONSITE AREA "A1"
FILENAME: ARA1ONSITE

Drainage Area = 17.86(Ac.) = 0.028 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 17.86(Ac.) = 0.028 Sq. Mi.
Length along longest watercourse = 1720.36(Ft.)
Length along longest watercourse measured to centroid = 1293.41(Ft.)
Length along longest watercourse = 0.326 Mi.
Length along longest watercourse measured to centroid = 0.245 Mi.
Difference in elevation = 74.00(Ft.)
Slope along watercourse = 227.1153 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.049 Hr.
Lag time = 2.95 Min.
25% of lag time = 0.74 Min.
40% of lag time = 1.18 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
17.86	1.20	21.43

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
17.86	2.50	44.65

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.200(In)
Area Averaged 100-Year Rainfall = 2.500(In)

Point rain (area averaged) = 2.500(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
17.860	58.70	0.500

Total Area Entered = 17.86(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
58.7	58.7	0.483	0.500	0.266	1.000	0.266
					Sum (F) =	0.266

Area averaged mean soil loss (F) (In/Hr) = 0.266
Minimum soil loss rate ((In/Hr)) = 0.133
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	169.594	37.603	6.768
2	0.167	339.187	45.546	8.198
3	0.250	508.781	10.159	1.829
4	0.333	678.375	4.273	0.769
5	0.417	847.969	2.418	0.435
			Sum = 100.000	Sum= 18.000

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.50	0.150	(0.266)	0.075	0.075
2	0.17	0.60	0.180	(0.266)	0.090	0.090
3	0.25	0.60	0.180	(0.266)	0.090	0.090
4	0.33	0.60	0.180	(0.266)	0.090	0.090
5	0.42	0.60	0.180	(0.266)	0.090	0.090
6	0.50	0.70	0.210	(0.266)	0.105	0.105
7	0.58	0.70	0.210	(0.266)	0.105	0.105
8	0.67	0.70	0.210	(0.266)	0.105	0.105
9	0.75	0.70	0.210	(0.266)	0.105	0.105
10	0.83	0.70	0.210	(0.266)	0.105	0.105
11	0.92	0.70	0.210	(0.266)	0.105	0.105
12	1.00	0.80	0.240	(0.266)	0.120	0.120
13	1.08	0.80	0.240	(0.266)	0.120	0.120
14	1.17	0.80	0.240	(0.266)	0.120	0.120
15	1.25	0.80	0.240	(0.266)	0.120	0.120
16	1.33	0.80	0.240	(0.266)	0.120	0.120
17	1.42	0.80	0.240	(0.266)	0.120	0.120
18	1.50	0.80	0.240	(0.266)	0.120	0.120
19	1.58	0.80	0.240	(0.266)	0.120	0.120
20	1.67	0.80	0.240	(0.266)	0.120	0.120
21	1.75	0.80	0.240	(0.266)	0.120	0.120
22	1.83	0.80	0.240	(0.266)	0.120	0.120
23	1.92	0.80	0.240	(0.266)	0.120	0.120
24	2.00	0.90	0.270	(0.266)	0.135	0.135
25	2.08	0.80	0.240	(0.266)	0.120	0.120
26	2.17	0.90	0.270	(0.266)	0.135	0.135
27	2.25	0.90	0.270	(0.266)	0.135	0.135
28	2.33	0.90	0.270	(0.266)	0.135	0.135
29	2.42	0.90	0.270	(0.266)	0.135	0.135
30	2.50	0.90	0.270	(0.266)	0.135	0.135
31	2.58	0.90	0.270	(0.266)	0.135	0.135
32	2.67	0.90	0.270	(0.266)	0.135	0.135
33	2.75	1.00	0.300	(0.266)	0.150	0.150
34	2.83	1.00	0.300	(0.266)	0.150	0.150
35	2.92	1.00	0.300	(0.266)	0.150	0.150
36	3.00	1.00	0.300	(0.266)	0.150	0.150
37	3.08	1.00	0.300	(0.266)	0.150	0.150

```
38   3.17     1.10      0.330       (  0.266)       0.165        0.165
39   3.25     1.10      0.330       (  0.266)       0.165        0.165
40   3.33     1.10      0.330       (  0.266)       0.165        0.165
41   3.42     1.20      0.360       (  0.266)       0.180        0.180
42   3.50     1.30      0.390       (  0.266)       0.195        0.195
43   3.58     1.40      0.420       (  0.266)       0.210        0.210
44   3.67     1.40      0.420       (  0.266)       0.210        0.210
45   3.75     1.50      0.450       (  0.266)       0.225        0.225
46   3.83     1.50      0.450       (  0.266)       0.225        0.225
47   3.92     1.60      0.480       (  0.266)       0.240        0.240
48   4.00     1.60      0.480       (  0.266)       0.240        0.240
49   4.08     1.70      0.510       (  0.266)       0.255        0.255
50   4.17     1.80      0.540          0.266    (  0.270)       0.274
51   4.25     1.90      0.570          0.266    (  0.285)       0.304
52   4.33     2.00      0.600          0.266    (  0.300)       0.334
53   4.42     2.10      0.630          0.266    (  0.315)       0.364
54   4.50     2.10      0.630          0.266    (  0.315)       0.364
55   4.58     2.20      0.660          0.266    (  0.330)       0.394
56   4.67     2.30      0.690          0.266    (  0.345)       0.424
57   4.75     2.40      0.720          0.266    (  0.360)       0.454
58   4.83     2.40      0.720          0.266    (  0.360)       0.454
59   4.92     2.50      0.750          0.266    (  0.375)       0.484
60   5.00     2.60      0.780          0.266    (  0.390)       0.514
61   5.08     3.10      0.930          0.266    (  0.465)       0.664
62   5.17     3.60      1.080          0.266    (  0.540)       0.814
63   5.25     3.90      1.170          0.266    (  0.585)       0.904
64   5.33     4.20      1.260          0.266    (  0.630)       0.994
65   5.42     4.70      1.410          0.266    (  0.705)       1.144
66   5.50     5.60      1.680          0.266    (  0.840)       1.414
67   5.58     1.90      0.570          0.266    (  0.285)       0.304
68   5.67     0.90      0.270       (  0.266)       0.135        0.135
69   5.75     0.60      0.180       (  0.266)       0.090        0.090
70   5.83     0.50      0.150       (  0.266)       0.075        0.075
71   5.92     0.30      0.090       (  0.266)       0.045        0.045
72   6.00     0.20      0.060       (  0.266)       0.030        0.030
              (Loss Rate Not Used)
   Sum =     100.0                                   Sum =    17.9
      Flood volume = Effective rainfall      1.49(In)
       times area      17.9(Ac.)/[(In)/(Ft.)] =       2.2(Ac.Ft)
      Total soil loss =      1.01(In)
      Total soil loss =     1.499(Ac.Ft)
      Total rainfall =      2.50(In)
      Flood volume =      96757.9 Cubic Feet
      Total soil loss =       65311.7 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      21.830(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          6 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0         7.5       15.0      22.5      30.0
-----------------------------------------------------------------------
  0+ 5      0.0035      0.51  Q         |         |         |         |
  0+10      0.0119      1.22  VQ        |         |         |         |
  0+15      0.0222      1.48  VQ        |         |         |         |
  0+20      0.0330      1.57  V Q       |         |         |         |
  0+25      0.0441      1.61  V Q       |         |         |         |
  0+30      0.0559      1.72  |VQ       |         |         |         |
  0+35      0.0687      1.85  |VQ       |         |         |         |
  0+40      0.0816      1.87  |VQ       |         |         |         |
  0+45      0.0945      1.88  |VQ       |         |         |         |
  0+50      0.1076      1.89  |VQ       |         |         |         |
  0+55      0.1206      1.89  | Q       |         |         |         |
  1+ 0      0.1343      1.99  | Q       |         |         |         |
  1+ 5      0.1489      2.12  | Q       |         |         |         |
  1+10      0.1636      2.14  | Q       |         |         |         |
  1+15      0.1785      2.15  | QV      |         |         |         |
  1+20      0.1933      2.16  | QV      |         |         |         |
  1+25      0.2082      2.16  | QV      |         |         |         |
  1+30      0.2231      2.16  | Q V     |         |         |         |
  1+35      0.2380      2.16  | Q V     |         |         |         |
  1+40      0.2529      2.16  | Q V     |         |         |         |
  1+45      0.2678      2.16  | Q V     |         |         |         |
  1+50      0.2826      2.16  | Q  V    |         |         |         |
  1+55      0.2975      2.16  | Q  V    |         |         |         |
  2+ 0      0.3131      2.26  |  Q V    |         |         |         |
  2+ 5      0.3288      2.28  |  Q V    |         |         |         |
  2+10      0.3446      2.29  |  Q  V   |         |         |         |
  2+15      0.3611      2.40  |  Q  V   |         |         |         |
  2+20      0.3778      2.42  |  Q  V   |         |         |         |
  2+25      0.3945      2.42  |  Q   V  |         |         |         |
  2+30      0.4112      2.43  |  Q   V  |         |         |         |
  2+35      0.4280      2.43  |  Q   V  |         |         |         |
  2+40      0.4447      2.43  |  Q    V |         |         |         |
  2+45      0.4621      2.53  |  Q    V |         |         |         |
  2+50      0.4804      2.66  |  Q    V |         |         |         |
  2+55      0.4989      2.68  |  Q    V |         |         |         |
  3+ 0      0.5175      2.69  |  Q     V|         |         |         |
  3+ 5      0.5361      2.70  |  Q     V|         |         |         |
  3+10      0.5554      2.80  |  Q      V         |         |         |
  3+15      0.5755      2.93  |  Q      V         |         |         |
  3+20      0.5959      2.95  |  Q      V         |         |         |
  3+25      0.6170      3.07  |   Q     |V        |         |         |
  3+30      0.6397      3.30  |   Q     |V        |         |         |
  3+35      0.6641      3.55  |   Q     |V        |         |         |
  3+40      0.6897      3.71  |   Q     | V       |         |         |
  3+45      0.7163      3.86  |    Q    | V       |         |         |
  3+50      0.7438      4.00  |    Q    |  V      |         |         |
  3+55      0.7723      4.14  |    Q    |  V      |         |         |
  4+ 0      0.8017      4.27  |    Q    |   V     |         |         |
  4+ 5      0.8320      4.41  |    Q    |   V     |         |         |
  4+10      0.8642      4.67  |     Q   |    V    |         |         |
  4+15      0.8991      5.06  |     Q   |     V   |         |         |
  4+20      0.9374      5.56  |      Q  |     V   |         |         |
  4+25      0.9793      6.09  |       Q |      V  |         |         |
  4+30      1.0235      6.42  |       Q |       V |         |         |
  4+35      1.0697      6.71  |       Q |        V|         |         |
  4+40      1.1193      7.20  |        Q|         V         |         |
  4+45      1.1724      7.71  |         Q         |V        |         |
  4+50      1.2278      8.04  |         Q         | V       |         |
  4+55      1.2852      8.33  |         |Q        |  V      |         |
  5+ 0      1.3459      8.82  |         |Q        |   V     |         |
  5+ 5      1.4158     10.15  |         |  Q      |    V    |         |
  5+10      1.5017     12.47  |         |     Q   |      V  |         |
  5+15      1.6024     14.62  |         |        Q|       V |         |
  5+20      1.7152     16.37  |         |         |Q        V         |
  5+25      1.8424     18.47  |         |         |   Q     |  V      |
  5+30      1.9927     21.83  |         |         |        Q|    V    |
  5+35      2.1092     16.91  |         |         | Q       |      V  |
  5+40      2.1595      7.31  |        Q|         |         |       V |
  5+45      2.1861      3.86  |    Q    |         |         |        V|
  5+50      2.2022      2.34  |  Q      |         |         |        V|
  5+55      2.2113      1.32  |Q        |         |         |        V|
  6+ 0      2.2171      0.84  |Q        |         |         |        V|
  6+ 5      2.2200      0.43  Q         |         |         |        V|
  6+10      2.2209      0.12  Q         |         |         |        V|
  6+15      2.2212      0.04  Q         |         |         |        V|
  6+20      2.2213      0.01  Q         |         |         |        V|
-----------------------------------------------------------------------
```

100-YEAR, 24-HOUR

U n i t   H y d r o g r a p h   A n a l y s i s

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Study date 06/10/16 File: ARA1ONSITE24100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
ONSITE AREA "A1"
FILENAME: ARA1ONSITE

Drainage Area = 17.86(Ac.) = 0.028 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 17.86(Ac.) = 0.028 Sq. Mi.
Length along longest watercourse = 1720.36(Ft.)
Length along longest watercourse measured to centroid = 1293.41(Ft.)
Length along longest watercourse = 0.326 Mi.
Length along longest watercourse measured to centroid = 0.245 Mi.
Difference in elevation = 74.00(Ft.)
Slope along watercourse = 227.1153 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.049 Hr.
Lag time = 2.95 Min.
25% of lag time = 0.74 Min.
40% of lag time = 1.18 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
17.86	2.00	35.72

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
17.86	5.00	89.30

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 2.000(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 5.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 5.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
17.860	58.70	0.500

Total Area Entered = 17.86(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
58.7	58.7	0.483	0.500	0.266	1.000	0.266
					Sum (F) =	0.266

Area averaged mean soil loss (F) (In/Hr) = 0.266
Minimum soil loss rate ((In/Hr)) = 0.133
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	169.594	37.603	6.768
2	0.167	339.187	45.546	8.198
3	0.250	508.781	10.159	1.829
4	0.333	678.375	4.273	0.769
5	0.417	847.969	2.418	0.435
			Sum = 100.000	Sum= 18.000

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.040	(0.471)	0.020	0.020
2	0.17	0.07	0.040	(0.469)	0.020	0.020
3	0.25	0.07	0.040	(0.468)	0.020	0.020
4	0.33	0.10	0.060	(0.466)	0.030	0.030
5	0.42	0.10	0.060	(0.464)	0.030	0.030
6	0.50	0.10	0.060	(0.462)	0.030	0.030
7	0.58	0.10	0.060	(0.460)	0.030	0.030
8	0.67	0.10	0.060	(0.458)	0.030	0.030
9	0.75	0.10	0.060	(0.457)	0.030	0.030
10	0.83	0.13	0.080	(0.455)	0.040	0.040
11	0.92	0.13	0.080	(0.453)	0.040	0.040
12	1.00	0.13	0.080	(0.451)	0.040	0.040
13	1.08	0.10	0.060	(0.450)	0.030	0.030
14	1.17	0.10	0.060	(0.448)	0.030	0.030
15	1.25	0.10	0.060	(0.446)	0.030	0.030
16	1.33	0.10	0.060	(0.444)	0.030	0.030
17	1.42	0.10	0.060	(0.442)	0.030	0.030
18	1.50	0.10	0.060	(0.441)	0.030	0.030
19	1.58	0.10	0.060	(0.439)	0.030	0.030
20	1.67	0.10	0.060	(0.437)	0.030	0.030
21	1.75	0.10	0.060	(0.435)	0.030	0.030
22	1.83	0.13	0.080	(0.434)	0.040	0.040
23	1.92	0.13	0.080	(0.432)	0.040	0.040
24	2.00	0.13	0.080	(0.430)	0.040	0.040
25	2.08	0.13	0.080	(0.428)	0.040	0.040
26	2.17	0.13	0.080	(0.427)	0.040	0.040
27	2.25	0.13	0.080	(0.425)	0.040	0.040
28	2.33	0.13	0.080	(0.423)	0.040	0.040
29	2.42	0.13	0.080	(0.422)	0.040	0.040
30	2.50	0.13	0.080	(0.420)	0.040	0.040
31	2.58	0.17	0.100	(0.418)	0.050	0.050
32	2.67	0.17	0.100	(0.416)	0.050	0.050
33	2.75	0.17	0.100	(0.415)	0.050	0.050
34	2.83	0.17	0.100	(0.413)	0.050	0.050
35	2.92	0.17	0.100	(0.411)	0.050	0.050
36	3.00	0.17	0.100	(0.410)	0.050	0.050
37	3.08	0.17	0.100	(0.408)	0.050	0.050

38	3.17	0.17	0.100	(0.406)	0.050	0.050
39	3.25	0.17	0.100	(0.404)	0.050	0.050
40	3.33	0.17	0.100	(0.403)	0.050	0.050
41	3.42	0.17	0.100	(0.401)	0.050	0.050
42	3.50	0.17	0.100	(0.399)	0.050	0.050
43	3.58	0.17	0.100	(0.398)	0.050	0.050
44	3.67	0.17	0.100	(0.396)	0.050	0.050
45	3.75	0.17	0.100	(0.394)	0.050	0.050
46	3.83	0.20	0.120	(0.393)	0.060	0.060
47	3.92	0.20	0.120	(0.391)	0.060	0.060
48	4.00	0.20	0.120	(0.389)	0.060	0.060
49	4.08	0.20	0.120	(0.388)	0.060	0.060
50	4.17	0.20	0.120	(0.386)	0.060	0.060
51	4.25	0.20	0.120	(0.384)	0.060	0.060
52	4.33	0.23	0.140	(0.383)	0.070	0.070
53	4.42	0.23	0.140	(0.381)	0.070	0.070
54	4.50	0.23	0.140	(0.380)	0.070	0.070
55	4.58	0.23	0.140	(0.378)	0.070	0.070
56	4.67	0.23	0.140	(0.376)	0.070	0.070
57	4.75	0.23	0.140	(0.375)	0.070	0.070
58	4.83	0.27	0.160	(0.373)	0.080	0.080
59	4.92	0.27	0.160	(0.371)	0.080	0.080
60	5.00	0.27	0.160	(0.370)	0.080	0.080
61	5.08	0.20	0.120	(0.368)	0.060	0.060
62	5.17	0.20	0.120	(0.367)	0.060	0.060
63	5.25	0.20	0.120	(0.365)	0.060	0.060
64	5.33	0.23	0.140	(0.363)	0.070	0.070
65	5.42	0.23	0.140	(0.362)	0.070	0.070
66	5.50	0.23	0.140	(0.360)	0.070	0.070
67	5.58	0.27	0.160	(0.359)	0.080	0.080
68	5.67	0.27	0.160	(0.357)	0.080	0.080
69	5.75	0.27	0.160	(0.356)	0.080	0.080
70	5.83	0.27	0.160	(0.354)	0.080	0.080
71	5.92	0.27	0.160	(0.352)	0.080	0.080
72	6.00	0.27	0.160	(0.351)	0.080	0.080
73	6.08	0.30	0.180	(0.349)	0.090	0.090
74	6.17	0.30	0.180	(0.348)	0.090	0.090
75	6.25	0.30	0.180	(0.346)	0.090	0.090
76	6.33	0.30	0.180	(0.345)	0.090	0.090
77	6.42	0.30	0.180	(0.343)	0.090	0.090
78	6.50	0.30	0.180	(0.342)	0.090	0.090
79	6.58	0.33	0.200	(0.340)	0.100	0.100
80	6.67	0.33	0.200	(0.338)	0.100	0.100
81	6.75	0.33	0.200	(0.337)	0.100	0.100
82	6.83	0.33	0.200	(0.335)	0.100	0.100
83	6.92	0.33	0.200	(0.334)	0.100	0.100
84	7.00	0.33	0.200	(0.332)	0.100	0.100
85	7.08	0.33	0.200	(0.331)	0.100	0.100
86	7.17	0.33	0.200	(0.329)	0.100	0.100
87	7.25	0.33	0.200	(0.328)	0.100	0.100
88	7.33	0.37	0.220	(0.326)	0.110	0.110
89	7.42	0.37	0.220	(0.325)	0.110	0.110
90	7.50	0.37	0.220	(0.323)	0.110	0.110
91	7.58	0.40	0.240	(0.322)	0.120	0.120
92	7.67	0.40	0.240	(0.320)	0.120	0.120
93	7.75	0.40	0.240	(0.319)	0.120	0.120
94	7.83	0.43	0.260	(0.317)	0.130	0.130
95	7.92	0.43	0.260	(0.316)	0.130	0.130
96	8.00	0.43	0.260	(0.315)	0.130	0.130
97	8.08	0.50	0.300	(0.313)	0.150	0.150
98	8.17	0.50	0.300	(0.312)	0.150	0.150
99	8.25	0.50	0.300	(0.310)	0.150	0.150
100	8.33	0.50	0.300	(0.309)	0.150	0.150
101	8.42	0.50	0.300	(0.307)	0.150	0.150
102	8.50	0.50	0.300	(0.306)	0.150	0.150
103	8.58	0.53	0.320	(0.304)	0.160	0.160
104	8.67	0.53	0.320	(0.303)	0.160	0.160
105	8.75	0.53	0.320	(0.302)	0.160	0.160
106	8.83	0.57	0.340	(0.300)	0.170	0.170
107	8.92	0.57	0.340	(0.299)	0.170	0.170
108	9.00	0.57	0.340	(0.297)	0.170	0.170

109	9.08	0.63	0.380	(0.296)	0.190	0.190
110	9.17	0.63	0.380	(0.294)	0.190	0.190
111	9.25	0.63	0.380	(0.293)	0.190	0.190
112	9.33	0.67	0.400	(0.292)	0.200	0.200
113	9.42	0.67	0.400	(0.290)	0.200	0.200
114	9.50	0.67	0.400	(0.289)	0.200	0.200
115	9.58	0.70	0.420	(0.288)	0.210	0.210
116	9.67	0.70	0.420	(0.286)	0.210	0.210
117	9.75	0.70	0.420	(0.285)	0.210	0.210
118	9.83	0.73	0.440	(0.283)	0.220	0.220
119	9.92	0.73	0.440	(0.282)	0.220	0.220
120	10.00	0.73	0.440	(0.281)	0.220	0.220
121	10.08	0.50	0.300	(0.279)	0.150	0.150
122	10.17	0.50	0.300	(0.278)	0.150	0.150
123	10.25	0.50	0.300	(0.277)	0.150	0.150
124	10.33	0.50	0.300	(0.275)	0.150	0.150
125	10.42	0.50	0.300	(0.274)	0.150	0.150
126	10.50	0.50	0.300	(0.273)	0.150	0.150
127	10.58	0.67	0.400	(0.271)	0.200	0.200
128	10.67	0.67	0.400	(0.270)	0.200	0.200
129	10.75	0.67	0.400	(0.269)	0.200	0.200
130	10.83	0.67	0.400	(0.267)	0.200	0.200
131	10.92	0.67	0.400	(0.266)	0.200	0.200
132	11.00	0.67	0.400	(0.265)	0.200	0.200
133	11.08	0.63	0.380	(0.263)	0.190	0.190
134	11.17	0.63	0.380	(0.262)	0.190	0.190
135	11.25	0.63	0.380	(0.261)	0.190	0.190
136	11.33	0.63	0.380	(0.260)	0.190	0.190
137	11.42	0.63	0.380	(0.258)	0.190	0.190
138	11.50	0.63	0.380	(0.257)	0.190	0.190
139	11.58	0.57	0.340	(0.256)	0.170	0.170
140	11.67	0.57	0.340	(0.254)	0.170	0.170
141	11.75	0.57	0.340	(0.253)	0.170	0.170
142	11.83	0.60	0.360	(0.252)	0.180	0.180
143	11.92	0.60	0.360	(0.251)	0.180	0.180
144	12.00	0.60	0.360	(0.249)	0.180	0.180
145	12.08	0.83	0.500	0.248	(0.250)	0.252
146	12.17	0.83	0.500	0.247	(0.250)	0.253
147	12.25	0.83	0.500	0.246	(0.250)	0.254
148	12.33	0.87	0.520	0.244	(0.260)	0.276
149	12.42	0.87	0.520	0.243	(0.260)	0.277
150	12.50	0.87	0.520	0.242	(0.260)	0.278
151	12.58	0.93	0.560	0.241	(0.280)	0.319
152	12.67	0.93	0.560	0.240	(0.280)	0.320
153	12.75	0.93	0.560	0.238	(0.280)	0.322
154	12.83	0.97	0.580	0.237	(0.290)	0.343
155	12.92	0.97	0.580	0.236	(0.290)	0.344
156	13.00	0.97	0.580	0.235	(0.290)	0.345
157	13.08	1.13	0.680	0.234	(0.340)	0.446
158	13.17	1.13	0.680	0.232	(0.340)	0.448
159	13.25	1.13	0.680	0.231	(0.340)	0.449
160	13.33	1.13	0.680	0.230	(0.340)	0.450
161	13.42	1.13	0.680	0.229	(0.340)	0.451
162	13.50	1.13	0.680	0.228	(0.340)	0.452
163	13.58	0.77	0.460	0.226	(0.230)	0.233
164	13.67	0.77	0.460	0.225	(0.230)	0.235
165	13.75	0.77	0.460	0.224	(0.230)	0.236
166	13.83	0.77	0.460	0.223	(0.230)	0.237
167	13.92	0.77	0.460	0.222	(0.230)	0.238
168	14.00	0.77	0.460	0.221	(0.230)	0.239
169	14.08	0.90	0.540	0.220	(0.270)	0.320
170	14.17	0.90	0.540	0.219	(0.270)	0.321
171	14.25	0.90	0.540	0.217	(0.270)	0.323
172	14.33	0.87	0.520	0.216	(0.260)	0.304
173	14.42	0.87	0.520	0.215	(0.260)	0.305
174	14.50	0.87	0.520	0.214	(0.260)	0.306
175	14.58	0.87	0.520	0.213	(0.260)	0.307
176	14.67	0.87	0.520	0.212	(0.260)	0.308
177	14.75	0.87	0.520	0.211	(0.260)	0.309
178	14.83	0.83	0.500	0.210	(0.250)	0.290
179	14.92	0.83	0.500	0.209	(0.250)	0.291

180	15.00	0.83	0.500	0.208	(0.250)	0.292
181	15.08	0.80	0.480	0.207	(0.240)	0.273
182	15.17	0.80	0.480	0.205	(0.240)	0.275
183	15.25	0.80	0.480	0.204	(0.240)	0.276
184	15.33	0.77	0.460	0.203	(0.230)	0.257
185	15.42	0.77	0.460	0.202	(0.230)	0.258
186	15.50	0.77	0.460	0.201	(0.230)	0.259
187	15.58	0.63	0.380	(0.200)	0.190	0.190
188	15.67	0.63	0.380	(0.199)	0.190	0.190
189	15.75	0.63	0.380	(0.198)	0.190	0.190
190	15.83	0.63	0.380	(0.197)	0.190	0.190
191	15.92	0.63	0.380	(0.196)	0.190	0.190
192	16.00	0.63	0.380	(0.195)	0.190	0.190
193	16.08	0.13	0.080	(0.194)	0.040	0.040
194	16.17	0.13	0.080	(0.193)	0.040	0.040
195	16.25	0.13	0.080	(0.192)	0.040	0.040
196	16.33	0.13	0.080	(0.191)	0.040	0.040
197	16.42	0.13	0.080	(0.190)	0.040	0.040
198	16.50	0.13	0.080	(0.189)	0.040	0.040
199	16.58	0.10	0.060	(0.188)	0.030	0.030
200	16.67	0.10	0.060	(0.187)	0.030	0.030
201	16.75	0.10	0.060	(0.186)	0.030	0.030
202	16.83	0.10	0.060	(0.185)	0.030	0.030
203	16.92	0.10	0.060	(0.185)	0.030	0.030
204	17.00	0.10	0.060	(0.184)	0.030	0.030
205	17.08	0.17	0.100	(0.183)	0.050	0.050
206	17.17	0.17	0.100	(0.182)	0.050	0.050
207	17.25	0.17	0.100	(0.181)	0.050	0.050
208	17.33	0.17	0.100	(0.180)	0.050	0.050
209	17.42	0.17	0.100	(0.179)	0.050	0.050
210	17.50	0.17	0.100	(0.178)	0.050	0.050
211	17.58	0.17	0.100	(0.177)	0.050	0.050
212	17.67	0.17	0.100	(0.176)	0.050	0.050
213	17.75	0.17	0.100	(0.175)	0.050	0.050
214	17.83	0.13	0.080	(0.175)	0.040	0.040
215	17.92	0.13	0.080	(0.174)	0.040	0.040
216	18.00	0.13	0.080	(0.173)	0.040	0.040
217	18.08	0.13	0.080	(0.172)	0.040	0.040
218	18.17	0.13	0.080	(0.171)	0.040	0.040
219	18.25	0.13	0.080	(0.170)	0.040	0.040
220	18.33	0.13	0.080	(0.170)	0.040	0.040
221	18.42	0.13	0.080	(0.169)	0.040	0.040
222	18.50	0.13	0.080	(0.168)	0.040	0.040
223	18.58	0.10	0.060	(0.167)	0.030	0.030
224	18.67	0.10	0.060	(0.166)	0.030	0.030
225	18.75	0.10	0.060	(0.165)	0.030	0.030
226	18.83	0.07	0.040	(0.165)	0.020	0.020
227	18.92	0.07	0.040	(0.164)	0.020	0.020
228	19.00	0.07	0.040	(0.163)	0.020	0.020
229	19.08	0.10	0.060	(0.162)	0.030	0.030
230	19.17	0.10	0.060	(0.162)	0.030	0.030
231	19.25	0.10	0.060	(0.161)	0.030	0.030
232	19.33	0.13	0.080	(0.160)	0.040	0.040
233	19.42	0.13	0.080	(0.159)	0.040	0.040
234	19.50	0.13	0.080	(0.159)	0.040	0.040
235	19.58	0.10	0.060	(0.158)	0.030	0.030
236	19.67	0.10	0.060	(0.157)	0.030	0.030
237	19.75	0.10	0.060	(0.156)	0.030	0.030
238	19.83	0.07	0.040	(0.156)	0.020	0.020
239	19.92	0.07	0.040	(0.155)	0.020	0.020
240	20.00	0.07	0.040	(0.154)	0.020	0.020
241	20.08	0.10	0.060	(0.154)	0.030	0.030
242	20.17	0.10	0.060	(0.153)	0.030	0.030
243	20.25	0.10	0.060	(0.152)	0.030	0.030
244	20.33	0.10	0.060	(0.152)	0.030	0.030
245	20.42	0.10	0.060	(0.151)	0.030	0.030
246	20.50	0.10	0.060	(0.150)	0.030	0.030
247	20.58	0.10	0.060	(0.150)	0.030	0.030
248	20.67	0.10	0.060	(0.149)	0.030	0.030
249	20.75	0.10	0.060	(0.148)	0.030	0.030
250	20.83	0.07	0.040	(0.148)	0.020	0.020

251	20.92	0.07	0.040	(0.147)	0.020	0.020
252	21.00	0.07	0.040	(0.147)	0.020	0.020
253	21.08	0.10	0.060	(0.146)	0.030	0.030
254	21.17	0.10	0.060	(0.146)	0.030	0.030
255	21.25	0.10	0.060	(0.145)	0.030	0.030
256	21.33	0.07	0.040	(0.144)	0.020	0.020
257	21.42	0.07	0.040	(0.144)	0.020	0.020
258	21.50	0.07	0.040	(0.143)	0.020	0.020
259	21.58	0.10	0.060	(0.143)	0.030	0.030
260	21.67	0.10	0.060	(0.142)	0.030	0.030
261	21.75	0.10	0.060	(0.142)	0.030	0.030
262	21.83	0.07	0.040	(0.141)	0.020	0.020
263	21.92	0.07	0.040	(0.141)	0.020	0.020
264	22.00	0.07	0.040	(0.140)	0.020	0.020
265	22.08	0.10	0.060	(0.140)	0.030	0.030
266	22.17	0.10	0.060	(0.139)	0.030	0.030
267	22.25	0.10	0.060	(0.139)	0.030	0.030
268	22.33	0.07	0.040	(0.139)	0.020	0.020
269	22.42	0.07	0.040	(0.138)	0.020	0.020
270	22.50	0.07	0.040	(0.138)	0.020	0.020
271	22.58	0.07	0.040	(0.137)	0.020	0.020
272	22.67	0.07	0.040	(0.137)	0.020	0.020
273	22.75	0.07	0.040	(0.137)	0.020	0.020
274	22.83	0.07	0.040	(0.136)	0.020	0.020
275	22.92	0.07	0.040	(0.136)	0.020	0.020
276	23.00	0.07	0.040	(0.136)	0.020	0.020
277	23.08	0.07	0.040	(0.135)	0.020	0.020
278	23.17	0.07	0.040	(0.135)	0.020	0.020
279	23.25	0.07	0.040	(0.135)	0.020	0.020
280	23.33	0.07	0.040	(0.134)	0.020	0.020
281	23.42	0.07	0.040	(0.134)	0.020	0.020
282	23.50	0.07	0.040	(0.134)	0.020	0.020
283	23.58	0.07	0.040	(0.134)	0.020	0.020
284	23.67	0.07	0.040	(0.133)	0.020	0.020
285	23.75	0.07	0.040	(0.133)	0.020	0.020
286	23.83	0.07	0.040	(0.133)	0.020	0.020
287	23.92	0.07	0.040	(0.133)	0.020	0.020
288	24.00	0.07	0.040	(0.133)	0.020	0.020

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                 (Loss Rate Not Used)
   Sum =     100.0                                Sum =    31.8
      Flood volume = Effective rainfall      2.65(In)
       times area      17.9(Ac.)/[(In)/(Ft.)] =       3.9(Ac.Ft)
      Total soil loss =      2.35(In)
      Total soil loss =     3.500(Ac.Ft)
      Total rainfall =      5.00(In)
      Flood volume =      171699.1 Cubic Feet
      Total soil loss =      152448.5 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      8.127(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           24 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in  5  Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0       2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
   0+ 5      0.0009      0.14  Q         |         |         |         |
   0+10      0.0030      0.30  VQ        |         |         |         |
   0+15      0.0053      0.34  VQ        |         |         |         |
   0+20      0.0082      0.42  VQ        |         |         |         |
   0+25      0.0117      0.51  V Q       |         |         |         |
   0+30      0.0153      0.53  V Q       |         |         |         |
   0+35      0.0190      0.54  V Q       |         |         |         |
   0+40      0.0228      0.54  V Q       |         |         |         |
   0+45      0.0265      0.54  V Q       |         |         |         |
   0+50      0.0307      0.61  V Q       |         |         |         |
   0+55      0.0354      0.69  V Q       |         |         |         |
   1+ 0      0.0403      0.71  V Q       |         |         |         |
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 1+ 5     0.0448     0.65  V Q       |         |         |         |
 1+10     0.0487     0.57  V Q       |         |         |         |
 1+15     0.0525     0.55  V Q       |         |         |         |
 1+20     0.0562     0.54  V Q       |         |         |         |
 1+25     0.0600     0.54  V Q       |         |         |         |
 1+30     0.0637     0.54  V Q       |         |         |         |
 1+35     0.0674     0.54  V Q       |         |         |         |
 1+40     0.0711     0.54  V Q       |         |         |         |
 1+45     0.0748     0.54  V Q       |         |         |         |
 1+50     0.0790     0.61  V Q       |         |         |         |
 1+55     0.0838     0.69  V Q       |         |         |         |
 2+ 0     0.0887     0.71  V Q       |         |         |         |
 2+ 5     0.0936     0.72  V Q       |         |         |         |
 2+10     0.0986     0.72  |VQ       |         |         |         |
 2+15     0.1035     0.72  |VQ       |         |         |         |
 2+20     0.1085     0.72  |VQ       |         |         |         |
 2+25     0.1134     0.72  |VQ       |         |         |         |
 2+30     0.1184     0.72  |VQ       |         |         |         |
 2+35     0.1238     0.79  |V Q      |         |         |         |
 2+40     0.1298     0.87  |V Q      |         |         |         |
 2+45     0.1359     0.89  |V Q      |         |         |         |
 2+50     0.1421     0.90  |V Q      |         |         |         |
 2+55     0.1483     0.90  |V Q      |         |         |         |
 3+ 0     0.1545     0.90  |V Q      |         |         |         |
 3+ 5     0.1607     0.90  |V Q      |         |         |         |
 3+10     0.1669     0.90  |V Q      |         |         |         |
 3+15     0.1731     0.90  |V Q      |         |         |         |
 3+20     0.1793     0.90  |V Q      |         |         |         |
 3+25     0.1855     0.90  |V Q      |         |         |         |
 3+30     0.1917     0.90  |V Q      |         |         |         |
 3+35     0.1979     0.90  | VQ      |         |         |         |
 3+40     0.2041     0.90  | VQ      |         |         |         |
 3+45     0.2103     0.90  | VQ      |         |         |         |
 3+50     0.2170     0.97  | VQ      |         |         |         |
 3+55     0.2242     1.05  | V Q     |         |         |         |
 4+ 0     0.2316     1.07  | V Q     |         |         |         |
 4+ 5     0.2390     1.08  | V Q     |         |         |         |
 4+10     0.2464     1.08  | V Q     |         |         |         |
 4+15     0.2539     1.08  | V Q     |         |         |         |
 4+20     0.2618     1.15  | V Q     |         |         |         |
 4+25     0.2703     1.23  | V Q     |         |         |         |
 4+30     0.2789     1.25  | V Q     |         |         |         |
 4+35     0.2875     1.26  | V  Q    |         |         |         |
 4+40     0.2962     1.26  |  V Q    |         |         |         |
 4+45     0.3049     1.26  |  V Q    |         |         |         |
 4+50     0.3140     1.33  |  V Q    |         |         |         |
 4+55     0.3237     1.41  |  V Q    |         |         |         |
 5+ 0     0.3336     1.43  |  V Q    |         |         |         |
 5+ 5     0.3425     1.30  |  V Q    |         |         |         |
 5+10     0.3504     1.14  |  VQ     |         |         |         |
 5+15     0.3580     1.10  |  VQ     |         |         |         |
 5+20     0.3660     1.16  |  VQ     |         |         |         |
 5+25     0.3744     1.23  |  VQ     |         |         |         |
 5+30     0.3830     1.25  |  VQ     |         |         |         |
 5+35     0.3922     1.32  |  V Q    |         |         |         |
 5+40     0.4019     1.41  |   VQ    |         |         |         |
 5+45     0.4117     1.43  |   VQ    |         |         |         |
 5+50     0.4216     1.44  |   VQ    |         |         |         |
 5+55     0.4315     1.44  |   VQ    |         |         |         |
 6+ 0     0.4414     1.44  |   VQ    |         |         |         |
 6+ 5     0.4518     1.51  |   V Q   |         |         |         |
 6+10     0.4628     1.59  |   V Q   |         |         |         |
 6+15     0.4739     1.61  |   V Q   |         |         |         |
 6+20     0.4850     1.62  |   V Q   |         |         |         |
 6+25     0.4962     1.62  |    VQ   |         |         |         |
 6+30     0.5073     1.62  |    VQ   |         |         |         |
 6+35     0.5189     1.69  |    VQ   |         |         |         |
 6+40     0.5311     1.77  |    V Q  |         |         |         |
 6+45     0.5435     1.79  |    V Q  |         |         |         |
 6+50     0.5558     1.80  |    V Q  |         |         |         |
 6+55     0.5682     1.80  |    V Q  |         |         |         |
 7+ 0     0.5806     1.80  |    V Q  |         |         |         |
 7+ 5     0.5930     1.80  |     VQ  |         |         |         |
 7+10     0.6054     1.80  |     VQ  |         |         |         |
 7+15     0.6178     1.80  |     VQ  |         |         |         |
 7+20     0.6307     1.87  |     VQ  |         |         |         |
 7+25     0.6441     1.95  |     VQ  |         |         |         |
 7+30     0.6577     1.97  |     VQ  |         |         |         |
 7+35     0.6718     2.04  |     V Q |         |         |         |
 7+40     0.6865     2.13  |     V Q |         |         |         |
 7+45     0.7013     2.15  |      VQ |         |         |         |
 7+50     0.7166     2.22  |      VQ |         |         |         |
 7+55     0.7325     2.31  |      V Q|         |         |         |
 8+ 0     0.7485     2.33  |      V Q|         |         |         |
 8+ 5     0.7656     2.47  |      V Q|         |         |         |
 8+10     0.7837     2.64  |      V  Q         |         |         |
 8+15     0.8022     2.68  |       V Q         |         |         |
 8+20     0.8207     2.69  |       V Q         |         |         |
 8+25     0.8393     2.70  |       V Q         |         |         |
 8+30     0.8579     2.70  |       V Q         |         |         |
 8+35     0.8770     2.77  |       V |Q        |         |         |
 8+40     0.8966     2.85  |        V|Q        |         |         |
 8+45     0.9164     2.87  |        V|Q        |         |         |
 8+50     0.9367     2.94  |        V|Q        |         |         |
 8+55     0.9575     3.03  |        V| Q       |         |         |
 9+ 0     0.9785     3.05  |        V| Q       |         |         |
 9+ 5     1.0005     3.19  |         V Q       |         |         |
 9+10     1.0237     3.36  |         V  Q      |         |         |
 9+15     1.0471     3.40  |         V  Q      |         |         |
 9+20     1.0711     3.48  |         V  Q      |         |         |
 9+25     1.0956     3.57  |         |V  Q     |         |         |
 9+30     1.1204     3.59  |         |V  Q     |         |         |
 9+35     1.1456     3.67  |         |V  Q     |         |         |
 9+40     1.1714     3.75  |         |V   Q    |         |         |
 9+45     1.1974     3.77  |         | V  Q    |         |         |
 9+50     1.2239     3.85  |         | V  Q    |         |         |
 9+55     1.2510     3.93  |         | V  Q    |         |         |
10+ 0     1.2782     3.95  |         | V  Q    |         |         |
10+ 5     1.3022     3.48  |         |  Q      |         |         |
10+10     1.3222     2.91  |         |Q V      |         |         |
10+15     1.3414     2.79  |         |Q V      |         |         |
10+20     1.3602     2.73  |         Q  V      |         |         |
10+25     1.3788     2.70  |         Q  V      |         |         |
10+30     1.3974     2.70  |         Q   V     |         |         |
10+35     1.4184     3.04  |         | Q V     |         |         |
10+40     1.4421     3.45  |         |  QV     |         |         |
10+45     1.4665     3.54  |         |   Q     |         |         |
10+50     1.4912     3.58  |         |   QV    |         |         |
10+55     1.5160     3.60  |         |   QV    |         |         |
11+ 0     1.5408     3.60  |         |   QV    |         |         |
11+ 5     1.5651     3.53  |         |   QV    |         |         |
11+10     1.5889     3.45  |         |  Q  V   |         |         |
11+15     1.6125     3.43  |         |  Q  V   |         |         |
11+20     1.6361     3.43  |         |  Q  V   |         |         |
11+25     1.6597     3.42  |         |  Q  V   |         |         |
11+30     1.6833     3.42  |         |  Q   V  |         |         |
11+35     1.7059     3.29  |         |  Q   V  |         |         |
11+40     1.7274     3.12  |         | Q    V  |         |         |
11+45     1.7486     3.09  |         | Q    V  |         |         |
11+50     1.7703     3.14  |         | Q    V  |         |         |
11+55     1.7924     3.21  |         | Q     V |         |         |
12+ 0     1.8146     3.23  |         | Q     V |         |         |
12+ 5     1.8403     3.72  |         |   Q   V |         |         |
12+10     1.8701     4.33  |         |      QV |         |         |
12+15     1.9009     4.48  |         |      Q V|         |         |
12+20     1.9332     4.69  |         |       QV|         |         |
12+25     1.9669     4.90  |         |        Q|         |         |
12+30     2.0011     4.96  |         |        QV         |         |
12+35     2.0374     5.27  |         |         VQ        |         |
12+40     2.0762     5.63  |         |         |VQ       |         |
12+45     2.1156     5.73  |         |         |VQ       |         |
12+50     2.1564     5.91  |         |         |V Q      |         |
```

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12+55       2.1985      6.12  |         |         | V Q     |         |
13+ 0       2.2410      6.17  |         |         | V Q     |         |
13+ 5       2.2885      6.89  |         |         |  V   Q  |         |
13+10       2.3418      7.74  |         |         |  V      Q         |
13+15       2.3965      7.94  |         |         |   V     |Q        |
13+20       2.4519      8.04  |         |         |   V     | Q       |
13+25       2.5077      8.11  |         |         |    V    | Q       |
13+30       2.5637      8.13  |         |         |     V   | Q       |
13+35       2.6095      6.66  |         |         |     Q   |         |
13+40       2.6431      4.87  |         |        Q|     V   |         |
13+45       2.6740      4.49  |         |      Q  |      V  |         |
13+50       2.7039      4.34  |         |      Q  |      V  |         |
13+55       2.7333      4.27  |         |      Q  |      V  |         |
14+ 0       2.7629      4.29  |         |      Q  |       V |         |
14+ 5       2.7963      4.85  |         |        Q|       V |         |
14+10       2.8344      5.53  |         |         | Q     V |         |
14+15       2.8736      5.69  |         |         | Q      V|         |
14+20       2.9124      5.64  |         |         | Q      V|         |
14+25       2.9505      5.53  |         |         | Q      V|         |
14+30       2.9885      5.52  |         |         | Q       V         |
14+35       3.0265      5.52  |         |         | Q       V         |
14+40       3.0646      5.53  |         |         | Q       |V        |
14+45       3.1029      5.55  |         |         | Q       |V        |
14+50       3.1403      5.43  |         |         |Q        |V        |
14+55       3.1767      5.29  |         |         |Q        | V       |
15+ 0       3.2130      5.27  |         |         |Q        | V       |
15+ 5       3.2484      5.14  |         |         Q         | V       |
15+10       3.2828      4.99  |         |        Q|         |  V      |
15+15       3.3170      4.97  |         |        Q|         |  V      |
15+20       3.3503      4.84  |         |        Q|         |  V      |
15+25       3.3826      4.68  |         |       Q |         |   V     |
15+30       3.4147      4.67  |         |       Q |         |   V     |
15+35       3.4436      4.20  |         |     Q   |         |   V     |
15+40       3.4686      3.63  |         |   Q     |         |    V    |
15+45       3.4928      3.50  |         |   Q     |         |    V    |
15+50       3.5165      3.45  |         |  Q      |         |    V    |
15+55       3.5401      3.42  |         |  Q      |         |    V    |
16+ 0       3.5637      3.42  |         |  Q      |         |     V   |
16+ 5       3.5802      2.41  |        Q|         |         |     V   |
16+10       3.5883      1.18  |   Q     |         |         |     V   |
16+15       3.5945      0.90  |  Q      |         |         |     V   |
16+20       3.5999      0.79  |  Q      |         |         |     V   |
16+25       3.6049      0.72  | Q       |         |         |     V   |
16+30       3.6099      0.72  | Q       |         |         |     V   |
16+35       3.6144      0.65  | Q       |         |         |     V   |
16+40       3.6183      0.57  | Q       |         |         |     V   |
16+45       3.6221      0.55  | Q       |         |         |     V   |
16+50       3.6258      0.54  | Q       |         |         |     V   |
16+55       3.6296      0.54  | Q       |         |         |     V   |
17+ 0       3.6333      0.54  | Q       |         |         |     V   |
17+ 5       3.6379      0.68  | Q       |         |         |     V   |
17+10       3.6437      0.84  |  Q      |         |         |     V   |
17+15       3.6498      0.88  |  Q      |         |         |      V  |
17+20       3.6559      0.89  |  Q      |         |         |      V  |
17+25       3.6621      0.90  |  Q      |         |         |      V  |
17+30       3.6683      0.90  |  Q      |         |         |      V  |
17+35       3.6745      0.90  |  Q      |         |         |      V  |
17+40       3.6807      0.90  |  Q      |         |         |      V  |
17+45       3.6869      0.90  |  Q      |         |         |      V  |
17+50       3.6926      0.83  |  Q      |         |         |      V  |
17+55       3.6978      0.75  |  Q      |         |         |      V  |
18+ 0       3.7029      0.73  | Q       |         |         |      V  |
18+ 5       3.7078      0.72  | Q       |         |         |      V  |
18+10       3.7128      0.72  | Q       |         |         |      V  |
18+15       3.7178      0.72  | Q       |         |         |      V  |
18+20       3.7227      0.72  | Q       |         |         |      V  |
18+25       3.7277      0.72  | Q       |         |         |      V  |
18+30       3.7326      0.72  | Q       |         |         |      V  |
18+35       3.7371      0.65  | Q       |         |         |      V  |
18+40       3.7411      0.57  | Q       |         |         |      V  |
18+45       3.7449      0.55  | Q       |         |         |       V |
```



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18+50       3.7482      0.48  |Q        |         |         |       V |
18+55       3.7508      0.39  |Q        |         |         |       V |
19+ 0       3.7534      0.37  |Q        |         |         |       V |
19+ 5       3.7564      0.43  |Q        |         |         |       V |
19+10       3.7599      0.51  | Q       |         |         |       V |
19+15       3.7635      0.53  | Q       |         |         |       V |
19+20       3.7677      0.60  | Q       |         |         |       V |
19+25       3.7724      0.69  | Q       |         |         |       V |
19+30       3.7773      0.71  | Q       |         |         |       V |
19+35       3.7818      0.65  | Q       |         |         |       V |
19+40       3.7857      0.57  | Q       |         |         |       V |
19+45       3.7895      0.55  | Q       |         |         |       V |
19+50       3.7928      0.48  |Q        |         |         |       V |
19+55       3.7955      0.39  |Q        |         |         |       V |
20+ 0       3.7981      0.37  |Q        |         |         |       V |
20+ 5       3.8010      0.43  |Q        |         |         |       V |
20+10       3.8046      0.51  | Q       |         |         |       V |
20+15       3.8082      0.53  | Q       |         |         |       V |
20+20       3.8119      0.54  | Q       |         |         |       V |
20+25       3.8156      0.54  | Q       |         |         |       V |
20+30       3.8193      0.54  | Q       |         |         |       V |
20+35       3.8230      0.54  | Q       |         |         |       V |
20+40       3.8268      0.54  | Q       |         |         |       V |
20+45       3.8305      0.54  | Q       |         |         |       V |
20+50       3.8337      0.47  |Q        |         |         |       V |
20+55       3.8364      0.39  |Q        |         |         |       V |
21+ 0       3.8390      0.37  |Q        |         |         |       V |
21+ 5       3.8420      0.43  |Q        |         |         |       V |
21+10       3.8455      0.51  | Q       |         |         |        V|
21+15       3.8491      0.53  | Q       |         |         |        V|
21+20       3.8523      0.47  |Q        |         |         |        V|
21+25       3.8550      0.39  |Q        |         |         |        V|
21+30       3.8576      0.37  |Q        |         |         |        V|
21+35       3.8606      0.43  |Q        |         |         |        V|
21+40       3.8641      0.51  | Q       |         |         |        V|
21+45       3.8677      0.53  | Q       |         |         |        V|
21+50       3.8709      0.47  |Q        |         |         |        V|
21+55       3.8736      0.39  |Q        |         |         |        V|
22+ 0       3.8762      0.37  |Q        |         |         |        V|
22+ 5       3.8792      0.43  |Q        |         |         |        V|
22+10       3.8827      0.51  | Q       |         |         |        V|
22+15       3.8863      0.53  | Q       |         |         |        V|
22+20       3.8895      0.47  |Q        |         |         |        V|
22+25       3.8922      0.39  |Q        |         |         |        V|
22+30       3.8948      0.37  |Q        |         |         |        V|
22+35       3.8973      0.36  |Q        |         |         |        V|
22+40       3.8998      0.36  |Q        |         |         |        V|
22+45       3.9023      0.36  |Q        |         |         |        V|
22+50       3.9048      0.36  |Q        |         |         |        V|
22+55       3.9072      0.36  |Q        |         |         |        V|
23+ 0       3.9097      0.36  |Q        |         |         |        V|
23+ 5       3.9122      0.36  |Q        |         |         |        V|
23+10       3.9147      0.36  |Q        |         |         |        V|
23+15       3.9172      0.36  |Q        |         |         |        V|
23+20       3.9196      0.36  |Q        |         |         |        V|
23+25       3.9221      0.36  |Q        |         |         |        V|
23+30       3.9246      0.36  |Q        |         |         |        V|
23+35       3.9271      0.36  |Q        |         |         |        V|
23+40       3.9296      0.36  |Q        |         |         |        V|
23+45       3.9320      0.36  |Q        |         |         |        V|
23+50       3.9345      0.36  |Q        |         |         |        V|
23+55       3.9370      0.36  |Q        |         |         |        V|
24+ 0       3.9395      0.36  |Q        |         |         |        V|
24+ 5       3.9410      0.22  Q         |         |         |        V|
24+10       3.9414      0.06  Q         |         |         |        V|
24+15       3.9416      0.02  Q         |         |         |        V|
24+20       3.9417      0.01  Q         |         |         |        V|
-----------------------------------------------------------------------
```

APPENDIX D.4: ONSITE AREA "A2"

100-YEAR, 1-HOUR

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
              Study date  06/10/16 File: ARA2ONSITE1100.out

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------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6279

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
ONSITE AREA "A2"
FILENAME: ARA2ONSITE
--------------------------------------------------------------------
Drainage Area =      23.24(Ac.)  =      0.036 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      23.24(Ac.)  =      0.036 Sq. Mi.
Length along longest watercourse =    1332.85(Ft.)
Length along longest watercourse measured to centroid =    1040.51(Ft.)
Length along longest watercourse =      0.252 Mi.
Length along longest watercourse measured to centroid =      0.197 Mi.
Difference in elevation =      45.90(Ft.)
Slope along watercourse =    181.8299 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.043 Hr.
Lag time =     2.57 Min.
25% of lag time =     0.64 Min.
40% of lag time =     1.03 Min.
Unit time =     5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       23.24           0.50                 11.62

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       23.24           1.20                 27.89

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    0.500(In)
Area Averaged 100-Year Rainfall =    1.200(In)

Point rain (area averaged) =    1.200(In)
Areal adjustment factor =   99.98 %
Adjusted average point rain =    1.200(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    23.240           54.40         0.500
 Total Area Entered =     23.24(Ac.)
```



```
RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
54.4  54.4      0.527     0.500       0.290      1.000      0.290
                                                 Sum (F) =   0.290
Area averaged mean soil loss (F) (In/Hr) =  0.290
Minimum soil loss rate ((In/Hr)) =  0.145
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.500
--------------------------------------------------------------------
Slope of intensity-duration curve for a 1 hour storm =0.5000
----------------------------------------------------------------------

               U n i t   H y d r o g r a p h
                       VALLEY S-Curve
--------------------------------------------------------------------
               Unit Hydrograph Data
--------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                           Graph %          (CFS)
--------------------------------------------------------------------
    1  0.083        194.574         42.448             9.942
    2  0.167        389.147         43.748            10.246
    3  0.250        583.721          9.019             2.112
    4  0.333        778.295          3.548             0.831
    5  0.417        972.868          1.238             0.290
                                 Sum = 100.000   Sum=      23.422
-----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)          Max   |   Low        (In/Hr)
   1  0.08     4.20      0.605          0.290    (  0.302)       0.315
   2  0.17     4.30      0.619          0.290    (  0.310)       0.329
   3  0.25     5.00      0.720          0.290    (  0.360)       0.430
   4  0.33     5.00      0.720          0.290    (  0.360)       0.430
   5  0.42     5.80      0.835          0.290    (  0.418)       0.545
   6  0.50     6.50      0.936          0.290    (  0.468)       0.646
   7  0.58     7.40      1.065          0.290    (  0.533)       0.775
   8  0.67     8.60      1.238          0.290    (  0.619)       0.948
   9  0.75    12.30      1.771          0.290    (  0.885)       1.481
  10  0.83    29.10      4.190          0.290    (  2.095)       3.900
  11  0.92     6.80      0.979          0.290    (  0.489)       0.689
  12  1.00     5.00      0.720          0.290    (  0.360)       0.430
                (Loss Rate Not Used)
     Sum =     100.0                                     Sum =    10.9
        Flood volume = Effective rainfall      0.91(In)
         times area      23.2(Ac.)/[(In)/(Ft.)] =       1.8(Ac.Ft)
        Total soil loss =      0.29(In)
        Total soil loss =     0.561(Ac.Ft)
        Total rainfall =      1.20(In)
        Flood volume =      76754.5 Cubic Feet
        Total soil loss =      24457.7 Cubic Feet
        --------------------------------------------------------------------
         Peak flow rate of this hydrograph =     56.807(CFS)
        --------------------------------------------------------------------
        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                             1 - H O U R   S T O R M
                       R u n o f f     H y d r o g r a p h
        --------------------------------------------------------------------
                    Hydrograph in   5   Minute intervals ((CFS))

        --------------------------------------------------------------------
  Time(h+m) Volume Ac.Ft   Q(CFS)  0       15.0      30.0      45.0      60.0
 -----------------------------------------------------------------------
    0+ 5      0.0216      3.13  V Q       |         |         |         |
    0+10      0.0663      6.50  |V  Q     |         |         |         |
```

```
      0+15       0.1236      8.32  | V  Q     |         |         |         |
      0+20       0.1900      9.64  |   V Q    |         |         |         |
      0+25       0.2665     11.10  |     VQ   |         |         |         |
      0+30       0.3586     13.37  |       Q  |         |         |         |
      0+35       0.4686     15.97  |         Q         |         |         |
      0+40       0.6017     19.32  |          | QV      |         |         |
      0+45       0.7861     26.79  |          |      Q  |         |         |
      0+50       1.1774     56.81  |          |         |     V   |       Q |
      0+55       1.5284     50.98  |          |         |         |  QV     |
      1+ 0       1.6737     21.09  |          |   Q     |         |       V |
      1+ 5       1.7393      9.54  |     Q    |         |         |         V|
      1+10       1.7573      2.61  |Q         |         |         |         V|
      1+15       1.7612      0.56  Q          |         |         |         V|
      1+20       1.7620      0.12  Q          |         |         |          V
-----------------------------------------------------------------------
```

100-YEAR, 3-HOUR

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 06/10/16 File: ARA2ONSITE3100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
ONSITE AREA "A2"
FILENAME: ARA2ONSITE

Drainage Area = 23.24(Ac.) = 0.036 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 23.24(Ac.) = 0.036 Sq. Mi.
Length along longest watercourse = 1332.85(Ft.)
Length along longest watercourse measured to centroid = 1040.51(Ft.)
Length along longest watercourse = 0.252 Mi.
Length along longest watercourse measured to centroid = 0.197 Mi.
Difference in elevation = 45.90(Ft.)
Slope along watercourse = 181.8299 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.043 Hr.
Lag time = 2.57 Min.
25% of lag time = 0.64 Min.
40% of lag time = 1.03 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
23.24	0.90	20.92

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
23.24	1.90	44.16

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.900(In)
Area Averaged 100-Year Rainfall = 1.900(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.900(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
23.240	54.40	0.500

Total Area Entered = 23.24(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
54.4	54.4	0.527	0.500	0.290	1.000	0.290
					Sum (F) =	0.290

Area averaged mean soil loss (F) (In/Hr) = 0.290
Minimum soil loss rate ((In/Hr)) = 0.145
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	194.574	42.448	9.942
2	0.167	389.147	43.748	10.246
3	0.250	583.721	9.019	2.112
4	0.333	778.295	3.548	0.831
5	0.417	972.868	1.238	0.290
			Sum = 100.000	Sum= 23.422

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	1.30	0.296	(0.290)	0.148	0.148
2	0.17	1.30	0.296	(0.290)	0.148	0.148
3	0.25	1.10	0.251	(0.290)	0.125	0.125
4	0.33	1.50	0.342	(0.290)	0.171	0.171
5	0.42	1.50	0.342	(0.290)	0.171	0.171
6	0.50	1.80	0.410	(0.290)	0.205	0.205
7	0.58	1.50	0.342	(0.290)	0.171	0.171
8	0.67	1.80	0.410	(0.290)	0.205	0.205
9	0.75	1.80	0.410	(0.290)	0.205	0.205
10	0.83	1.50	0.342	(0.290)	0.171	0.171
11	0.92	1.60	0.365	(0.290)	0.182	0.182
12	1.00	1.80	0.410	(0.290)	0.205	0.205
13	1.08	2.20	0.502	(0.290)	0.251	0.251
14	1.17	2.20	0.502	(0.290)	0.251	0.251
15	1.25	2.20	0.502	(0.290)	0.251	0.251
16	1.33	2.00	0.456	(0.290)	0.228	0.228
17	1.42	2.60	0.593	0.290	(0.296)	0.303
18	1.50	2.70	0.616	0.290	(0.308)	0.326
19	1.58	2.40	0.547	(0.290)	0.274	0.274
20	1.67	2.70	0.616	0.290	(0.308)	0.326
21	1.75	3.30	0.752	0.290	(0.376)	0.462
22	1.83	3.10	0.707	0.290	(0.353)	0.417
23	1.92	2.90	0.661	0.290	(0.331)	0.371
24	2.00	3.00	0.684	0.290	(0.342)	0.394
25	2.08	3.10	0.707	0.290	(0.353)	0.417
26	2.17	4.20	0.958	0.290	(0.479)	0.668
27	2.25	5.00	1.140	0.290	(0.570)	0.850
28	2.33	3.50	0.798	0.290	(0.399)	0.508
29	2.42	6.80	1.550	0.290	(0.775)	1.260
30	2.50	7.30	1.664	0.290	(0.832)	1.374
31	2.58	8.20	1.869	0.290	(0.935)	1.579
32	2.67	5.90	1.345	0.290	(0.673)	1.055
33	2.75	2.00	0.456	(0.290)	0.228	0.228
34	2.83	1.80	0.410	(0.290)	0.205	0.205
35	2.92	1.80	0.410	(0.290)	0.205	0.205
36	3.00	0.60	0.137	(0.290)	0.068	0.068

(Loss Rate Not Used)

```
     Sum =     100.0                                   Sum =    14.4
        Flood volume = Effective rainfall      1.20(In)
         times area      23.2(Ac.)/[(In)/(Ft.)] =       2.3(Ac.Ft)
        Total soil loss =      0.70(In)
        Total soil loss =     1.359(Ac.Ft)
        Total rainfall =      1.90(In)
        Flood volume =      101089.7 Cubic Feet
        Total soil loss =       59180.3 Cubic Feet
        --------------------------------------------------------------------
         Peak flow rate of this hydrograph =     33.133(CFS)
        --------------------------------------------------------------------
        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                            3 - H O U R   S T O R M
                       R u n o f f     H y d r o g r a p h
        --------------------------------------------------------------------
                    Hydrograph in   5   Minute intervals ((CFS))

        --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0       10.0      20.0      30.0      40.0
-----------------------------------------------------------------------
  0+ 5       0.0102      1.47  VQ        |         |         |         |
  0+10       0.0308      2.99  V Q       |         |         |         |
  0+15       0.0520      3.08  V  Q      |         |         |         |
  0+20       0.0755      3.42  |V Q      |         |         |         |
  0+25       0.1023      3.88  |V Q      |         |         |         |
  0+30       0.1319      4.30  | V Q     |         |         |         |
  0+35       0.1618      4.34  | V Q     |         |         |         |
  0+40       0.1923      4.42  |  VQ     |         |         |         |
  0+45       0.2248      4.73  |  VQ     |         |         |         |
  0+50       0.2554      4.44  |   Q     |         |         |         |
  0+55       0.2845      4.22  |   Q     |         |         |         |
  1+ 0       0.3155      4.50  |   QV    |         |         |         |
  1+ 5       0.3512      5.19  |    QV   |         |         |         |
  1+10       0.3905      5.70  |    QV   |         |         |         |
  1+15       0.4305      5.82  |    Q V  |         |         |         |
  1+20       0.4693      5.64  |    Q  V |         |         |         |
  1+25       0.5118      6.16  |     Q V |         |         |         |
  1+30       0.5607      7.11  |      Q V|         |         |         |
  1+35       0.6087      6.96  |     Q   V         |         |         |
  1+40       0.6572      7.05  |      Q  |V        |         |         |
  1+45       0.7183      8.87  |       Q | V       |         |         |
  1+50       0.7865      9.90  |        Q|  V      |         |         |
  1+55       0.8505      9.29  |        Q|   V     |         |         |
  2+ 0       0.9131      9.08  |        Q|    V    |         |         |
  2+ 5       0.9781      9.45  |        Q|     V   |         |         |
  2+10       1.0620     12.18  |         | Q     V |         |         |
  2+15       1.1764     16.61  |         |     Q   V         |         |
  2+20       1.2841     15.64  |         |    Q    | V       |         |
  2+25       1.4234     20.22  |         |         Q   V     |         |
  2+30       1.6201     28.56  |         |         |      VQ |         |
  2+35       1.8483     33.13  |         |         |         |V Q      |
  2+40       2.0603     30.79  |         |         |         Q    V    |
  2+45       2.1838     17.93  |         |      Q  |         |      V  |
  2+50       2.2411      8.32  |       Q |         |         |       V |
  2+55       2.2822      5.96  |    Q    |         |         |        V|
  3+ 0       2.3077      3.71  |  Q      |         |         |        V|
  3+ 5       2.3172      1.37  |Q        |         |         |        V|
  3+10       2.3198      0.37  Q         |         |         |        V|
  3+15       2.3206      0.12  Q         |         |         |        V|
  3+20       2.3207      0.02  Q         |         |         |        V|
-----------------------------------------------------------------------
```

100-YEAR, 6-HOUR

U n i t   H y d r o g r a p h   A n a l y s i s

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Study date 06/10/16 File: ARA2ONSITE6100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
ONSITE AREA "A2"
FILENAME: ARA2ONSITE

Drainage Area = 23.24(Ac.) = 0.036 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 23.24(Ac.) = 0.036 Sq. Mi.
Length along longest watercourse = 1332.85(Ft.)
Length along longest watercourse measured to centroid = 1040.51(Ft.)
Length along longest watercourse = 0.252 Mi.
Length along longest watercourse measured to centroid = 0.197 Mi.
Difference in elevation = 45.90(Ft.)
Slope along watercourse = 181.8299 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.043 Hr.
Lag time = 2.57 Min.
25% of lag time = 0.64 Min.
40% of lag time = 1.03 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
23.24	1.20	27.89

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
23.24	2.50	58.10

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.200(In)
Area Averaged 100-Year Rainfall = 2.500(In)

Point rain (area averaged) = 2.500(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
23.240	54.40	0.500

Total Area Entered = 23.24(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
54.4	54.4	0.527	0.500	0.290	1.000	0.290
					Sum (F) =	0.290

Area averaged mean soil loss (F) (In/Hr) = 0.290
Minimum soil loss rate ((In/Hr)) = 0.145
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	194.574	42.448	9.942
2	0.167	389.147	43.748	10.246
3	0.250	583.721	9.019	2.112
4	0.333	778.295	3.548	0.831
5	0.417	972.868	1.238	0.290
			Sum = 100.000	Sum= 23.422

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.50	0.150	(0.290)	0.075	0.075
2	0.17	0.60	0.180	(0.290)	0.090	0.090
3	0.25	0.60	0.180	(0.290)	0.090	0.090
4	0.33	0.60	0.180	(0.290)	0.090	0.090
5	0.42	0.60	0.180	(0.290)	0.090	0.090
6	0.50	0.70	0.210	(0.290)	0.105	0.105
7	0.58	0.70	0.210	(0.290)	0.105	0.105
8	0.67	0.70	0.210	(0.290)	0.105	0.105
9	0.75	0.70	0.210	(0.290)	0.105	0.105
10	0.83	0.70	0.210	(0.290)	0.105	0.105
11	0.92	0.70	0.210	(0.290)	0.105	0.105
12	1.00	0.80	0.240	(0.290)	0.120	0.120
13	1.08	0.80	0.240	(0.290)	0.120	0.120
14	1.17	0.80	0.240	(0.290)	0.120	0.120
15	1.25	0.80	0.240	(0.290)	0.120	0.120
16	1.33	0.80	0.240	(0.290)	0.120	0.120
17	1.42	0.80	0.240	(0.290)	0.120	0.120
18	1.50	0.80	0.240	(0.290)	0.120	0.120
19	1.58	0.80	0.240	(0.290)	0.120	0.120
20	1.67	0.80	0.240	(0.290)	0.120	0.120
21	1.75	0.80	0.240	(0.290)	0.120	0.120
22	1.83	0.80	0.240	(0.290)	0.120	0.120
23	1.92	0.80	0.240	(0.290)	0.120	0.120
24	2.00	0.90	0.270	(0.290)	0.135	0.135
25	2.08	0.80	0.240	(0.290)	0.120	0.120
26	2.17	0.90	0.270	(0.290)	0.135	0.135
27	2.25	0.90	0.270	(0.290)	0.135	0.135
28	2.33	0.90	0.270	(0.290)	0.135	0.135
29	2.42	0.90	0.270	(0.290)	0.135	0.135
30	2.50	0.90	0.270	(0.290)	0.135	0.135
31	2.58	0.90	0.270	(0.290)	0.135	0.135
32	2.67	0.90	0.270	(0.290)	0.135	0.135
33	2.75	1.00	0.300	(0.290)	0.150	0.150
34	2.83	1.00	0.300	(0.290)	0.150	0.150
35	2.92	1.00	0.300	(0.290)	0.150	0.150
36	3.00	1.00	0.300	(0.290)	0.150	0.150
37	3.08	1.00	0.300	(0.290)	0.150	0.150

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38   3.17     1.10      0.330      (  0.290)      0.165       0.165
39   3.25     1.10      0.330      (  0.290)      0.165       0.165
40   3.33     1.10      0.330      (  0.290)      0.165       0.165
41   3.42     1.20      0.360      (  0.290)      0.180       0.180
42   3.50     1.30      0.390      (  0.290)      0.195       0.195
43   3.58     1.40      0.420      (  0.290)      0.210       0.210
44   3.67     1.40      0.420      (  0.290)      0.210       0.210
45   3.75     1.50      0.450      (  0.290)      0.225       0.225
46   3.83     1.50      0.450      (  0.290)      0.225       0.225
47   3.92     1.60      0.480      (  0.290)      0.240       0.240
48   4.00     1.60      0.480      (  0.290)      0.240       0.240
49   4.08     1.70      0.510      (  0.290)      0.255       0.255
50   4.17     1.80      0.540      (  0.290)      0.270       0.270
51   4.25     1.90      0.570      (  0.290)      0.285       0.285
52   4.33     2.00      0.600         0.290    (  0.300)       0.310
53   4.42     2.10      0.630         0.290    (  0.315)       0.340
54   4.50     2.10      0.630         0.290    (  0.315)       0.340
55   4.58     2.20      0.660         0.290    (  0.330)       0.370
56   4.67     2.30      0.690         0.290    (  0.345)       0.400
57   4.75     2.40      0.720         0.290    (  0.360)       0.430
58   4.83     2.40      0.720         0.290    (  0.360)       0.430
59   4.92     2.50      0.750         0.290    (  0.375)       0.460
60   5.00     2.60      0.780         0.290    (  0.390)       0.490
61   5.08     3.10      0.930         0.290    (  0.465)       0.640
62   5.17     3.60      1.080         0.290    (  0.540)       0.790
63   5.25     3.90      1.170         0.290    (  0.585)       0.880
64   5.33     4.20      1.260         0.290    (  0.630)       0.970
65   5.42     4.70      1.410         0.290    (  0.705)       1.120
66   5.50     5.60      1.680         0.290    (  0.840)       1.390
67   5.58     1.90      0.570      (  0.290)      0.285       0.285
68   5.67     0.90      0.270      (  0.290)      0.135       0.135
69   5.75     0.60      0.180      (  0.290)      0.090       0.090
70   5.83     0.50      0.150      (  0.290)      0.075       0.075
71   5.92     0.30      0.090      (  0.290)      0.045       0.045
72   6.00     0.20      0.060      (  0.290)      0.030       0.030
              (Loss Rate Not Used)
   Sum =     100.0                                 Sum =    17.5
      Flood volume = Effective rainfall      1.46(In)
       times area      23.2(Ac.)/[(In)/(Ft.)] =       2.8(Ac.Ft)
      Total soil loss =      1.04(In)
      Total soil loss =     2.016(Ac.Ft)
      Total rainfall =      2.50(In)
      Flood volume =      123058.5 Cubic Feet
      Total soil loss =       87827.7 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     28.318(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          6 - H O U R    S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
-----------------------------------------------------------------------
  0+ 5       0.0051      0.75  Q         |         |         |         |
  0+10       0.0166      1.66  V Q       |         |         |         |
  0+15       0.0302      1.98  V Q       |         |         |         |
  0+20       0.0445      2.07  V Q       |         |         |         |
  0+25       0.0590      2.10  V Q       |         |         |         |
  0+30       0.0745      2.26  |V Q      |         |         |         |
  0+35       0.0911      2.41  |V Q      |         |         |         |
  0+40       0.1080      2.44  |V Q      |         |         |         |
  0+45       0.1249      2.46  |V Q      |         |         |         |
  0+50       0.1418      2.46  | VQ      |         |         |         |
  0+55       0.1588      2.46  | VQ      |         |         |         |
  1+ 0       0.1767      2.61  | VQ      |         |         |         |
  1+ 5       0.1958      2.76  | VQ      |         |         |         |
  1+10       0.2150      2.79  |  Q      |         |         |         |
  1+15       0.2343      2.81  |  Q      |         |         |         |
  1+20       0.2537      2.81  |  Q      |         |         |         |
  1+25       0.2731      2.81  |  Q      |         |         |         |
  1+30       0.2924      2.81  |  QV     |         |         |         |
  1+35       0.3118      2.81  |  QV     |         |         |         |
  1+40       0.3312      2.81  |  QV     |         |         |         |
  1+45       0.3505      2.81  |  QV     |         |         |         |
  1+50       0.3699      2.81  |  Q V    |         |         |         |
  1+55       0.3893      2.81  |  Q V    |         |         |         |
  2+ 0       0.4097      2.96  |  Q V    |         |         |         |
  2+ 5       0.4301      2.97  |  Q  V   |         |         |         |
  2+10       0.4507      2.99  |  Q  V   |         |         |         |
  2+15       0.4722      3.13  |   Q V   |         |         |         |
  2+20       0.4939      3.15  |   Q V   |         |         |         |
  2+25       0.5157      3.16  |   Q  V  |         |         |         |
  2+30       0.5375      3.16  |   Q  V  |         |         |         |
  2+35       0.5593      3.16  |   Q  V  |         |         |         |
  2+40       0.5810      3.16  |   Q   V |         |         |         |
  2+45       0.6039      3.31  |   Q   V |         |         |         |
  2+50       0.6277      3.47  |   Q   V |         |         |         |
  2+55       0.6518      3.50  |   Q    V|         |         |         |
  3+ 0       0.6760      3.51  |   Q    V|         |         |         |
  3+ 5       0.7002      3.51  |   Q    V|         |         |         |
  3+10       0.7254      3.66  |   Q     V         |         |         |
  3+15       0.7517      3.82  |    Q    V         |         |         |
  3+20       0.7782      3.85  |    Q    |V        |         |         |
  3+25       0.8059      4.01  |    Q    |V        |         |         |
  3+30       0.8356      4.32  |    Q    |V        |         |         |
  3+35       0.8676      4.65  |     Q   | V       |         |         |
  3+40       0.9011      4.85  |     Q   | V       |         |         |
  3+45       0.9358      5.05  |     Q   |  V      |         |         |
  3+50       0.9718      5.22  |     Q   |  V      |         |         |
  3+55       1.0090      5.40  |      Q  |   V     |         |         |
  4+ 0       1.0474      5.57  |      Q  |   V     |         |         |
  4+ 5       1.0870      5.76  |      Q  |    V    |         |         |
  4+10       1.1288      6.07  |       Q |    V    |         |         |
  4+15       1.1730      6.41  |       Q |     V   |         |         |
  4+20       1.2202      6.86  |        Q|      V  |         |         |
  4+25       1.2716      7.46  |        Q|       V |         |         |
  4+30       1.3256      7.84  |         Q       V |         |         |
  4+35       1.3822      8.23  |         Q        V|         |         |
  4+40       1.4433      8.86  |         |Q        V         |         |
  4+45       1.5090      9.54  |         | Q       |V        |         |
  4+50       1.5774      9.94  |         |  Q      | V       |         |
  4+55       1.6486     10.33  |         |  Q      |  V      |         |
  5+ 0       1.7242     10.97  |         |   Q     |   V     |         |
  5+ 5       1.8126     12.84  |         |      Q  |    V    |         |
  5+10       1.9225     15.96  |         |         |Q     V  |         |
  5+15       2.0516     18.75  |         |         |   Q    V|         |
  5+20       2.1964     21.01  |         |         |       Q |V        |
  5+25       2.3602     23.79  |         |         |         |Q V      |
  5+30       2.5552     28.32  |         |         |         |     VQ  |
  5+35       2.6965     20.51  |         |         |      Q  |       V |
  5+40       2.7544      8.41  |         |Q        |         |        V|
  5+45       2.7845      4.36  |    Q    |         |         |        V|
  5+50       2.8023      2.59  |  Q      |         |         |        V|
  5+55       2.8134      1.60  | Q       |         |         |        V|
  6+ 0       2.8205      1.03  |Q        |         |         |        V|
  6+ 5       2.8239      0.49  Q         |         |         |        V|
  6+10       2.8247      0.12  Q         |         |         |        V|
  6+15       2.8250      0.04  Q         |         |         |        V|
  6+20       2.8250      0.01  Q         |         |         |         V
-----------------------------------------------------------------------
```

100-YEAR, 24-HOUR

U n i t   H y d r o g r a p h   A n a l y s i s

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Study date 06/10/16 File: ARA2ONSITE24100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
ONSITE AREA "A2"
FILENAME: ARA2ONSITE

Drainage Area = 23.24(Ac.) = 0.036 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 23.24(Ac.) = 0.036 Sq. Mi.
Length along longest watercourse = 1332.85(Ft.)
Length along longest watercourse measured to centroid = 1040.51(Ft.)
Length along longest watercourse = 0.252 Mi.
Length along longest watercourse measured to centroid = 0.197 Mi.
Difference in elevation = 45.90(Ft.)
Slope along watercourse = 181.8299 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.043 Hr.
Lag time = 2.57 Min.
25% of lag time = 0.64 Min.
40% of lag time = 1.03 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
23.24	2.00	46.48

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
23.24	5.00	116.20

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 2.000(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 5.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 5.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
23.240	54.40	0.500

Total Area Entered = 23.24(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
54.4	54.4	0.527	0.500	0.290	1.000	0.290
					Sum (F) =	0.290

Area averaged mean soil loss (F) (In/Hr) = 0.290
Minimum soil loss rate ((In/Hr)) = 0.145
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.500

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	194.574	42.448	9.942
2	0.167	389.147	43.748	10.246
3	0.250	583.721	9.019	2.112
4	0.333	778.295	3.548	0.831
5	0.417	972.868	1.238	0.290
			Sum = 100.000	Sum= 23.422

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.040	(0.514)	0.020	0.020
2	0.17	0.07	0.040	(0.512)	0.020	0.020
3	0.25	0.07	0.040	(0.510)	0.020	0.020
4	0.33	0.10	0.060	(0.508)	0.030	0.030
5	0.42	0.10	0.060	(0.506)	0.030	0.030
6	0.50	0.10	0.060	(0.504)	0.030	0.030
7	0.58	0.10	0.060	(0.502)	0.030	0.030
8	0.67	0.10	0.060	(0.500)	0.030	0.030
9	0.75	0.10	0.060	(0.498)	0.030	0.030
10	0.83	0.13	0.080	(0.496)	0.040	0.040
11	0.92	0.13	0.080	(0.494)	0.040	0.040
12	1.00	0.13	0.080	(0.492)	0.040	0.040
13	1.08	0.10	0.060	(0.490)	0.030	0.030
14	1.17	0.10	0.060	(0.488)	0.030	0.030
15	1.25	0.10	0.060	(0.486)	0.030	0.030
16	1.33	0.10	0.060	(0.485)	0.030	0.030
17	1.42	0.10	0.060	(0.483)	0.030	0.030
18	1.50	0.10	0.060	(0.481)	0.030	0.030
19	1.58	0.10	0.060	(0.479)	0.030	0.030
20	1.67	0.10	0.060	(0.477)	0.030	0.030
21	1.75	0.10	0.060	(0.475)	0.030	0.030
22	1.83	0.13	0.080	(0.473)	0.040	0.040
23	1.92	0.13	0.080	(0.471)	0.040	0.040
24	2.00	0.13	0.080	(0.469)	0.040	0.040
25	2.08	0.13	0.080	(0.467)	0.040	0.040
26	2.17	0.13	0.080	(0.465)	0.040	0.040
27	2.25	0.13	0.080	(0.464)	0.040	0.040
28	2.33	0.13	0.080	(0.462)	0.040	0.040
29	2.42	0.13	0.080	(0.460)	0.040	0.040
30	2.50	0.13	0.080	(0.458)	0.040	0.040
31	2.58	0.17	0.100	(0.456)	0.050	0.050
32	2.67	0.17	0.100	(0.454)	0.050	0.050
33	2.75	0.17	0.100	(0.452)	0.050	0.050
34	2.83	0.17	0.100	(0.450)	0.050	0.050
35	2.92	0.17	0.100	(0.449)	0.050	0.050
36	3.00	0.17	0.100	(0.447)	0.050	0.050
37	3.08	0.17	0.100	(0.445)	0.050	0.050

38	3.17	0.17	0.100	(0.443)	0.050	0.050
39	3.25	0.17	0.100	(0.441)	0.050	0.050
40	3.33	0.17	0.100	(0.439)	0.050	0.050
41	3.42	0.17	0.100	(0.437)	0.050	0.050
42	3.50	0.17	0.100	(0.436)	0.050	0.050
43	3.58	0.17	0.100	(0.434)	0.050	0.050
44	3.67	0.17	0.100	(0.432)	0.050	0.050
45	3.75	0.17	0.100	(0.430)	0.050	0.050
46	3.83	0.20	0.120	(0.428)	0.060	0.060
47	3.92	0.20	0.120	(0.427)	0.060	0.060
48	4.00	0.20	0.120	(0.425)	0.060	0.060
49	4.08	0.20	0.120	(0.423)	0.060	0.060
50	4.17	0.20	0.120	(0.421)	0.060	0.060
51	4.25	0.20	0.120	(0.419)	0.060	0.060
52	4.33	0.23	0.140	(0.418)	0.070	0.070
53	4.42	0.23	0.140	(0.416)	0.070	0.070
54	4.50	0.23	0.140	(0.414)	0.070	0.070
55	4.58	0.23	0.140	(0.412)	0.070	0.070
56	4.67	0.23	0.140	(0.410)	0.070	0.070
57	4.75	0.23	0.140	(0.409)	0.070	0.070
58	4.83	0.27	0.160	(0.407)	0.080	0.080
59	4.92	0.27	0.160	(0.405)	0.080	0.080
60	5.00	0.27	0.160	(0.403)	0.080	0.080
61	5.08	0.20	0.120	(0.402)	0.060	0.060
62	5.17	0.20	0.120	(0.400)	0.060	0.060
63	5.25	0.20	0.120	(0.398)	0.060	0.060
64	5.33	0.23	0.140	(0.396)	0.070	0.070
65	5.42	0.23	0.140	(0.395)	0.070	0.070
66	5.50	0.23	0.140	(0.393)	0.070	0.070
67	5.58	0.27	0.160	(0.391)	0.080	0.080
68	5.67	0.27	0.160	(0.390)	0.080	0.080
69	5.75	0.27	0.160	(0.388)	0.080	0.080
70	5.83	0.27	0.160	(0.386)	0.080	0.080
71	5.92	0.27	0.160	(0.384)	0.080	0.080
72	6.00	0.27	0.160	(0.383)	0.080	0.080
73	6.08	0.30	0.180	(0.381)	0.090	0.090
74	6.17	0.30	0.180	(0.379)	0.090	0.090
75	6.25	0.30	0.180	(0.378)	0.090	0.090
76	6.33	0.30	0.180	(0.376)	0.090	0.090
77	6.42	0.30	0.180	(0.374)	0.090	0.090
78	6.50	0.30	0.180	(0.373)	0.090	0.090
79	6.58	0.33	0.200	(0.371)	0.100	0.100
80	6.67	0.33	0.200	(0.369)	0.100	0.100
81	6.75	0.33	0.200	(0.368)	0.100	0.100
82	6.83	0.33	0.200	(0.366)	0.100	0.100
83	6.92	0.33	0.200	(0.364)	0.100	0.100
84	7.00	0.33	0.200	(0.363)	0.100	0.100
85	7.08	0.33	0.200	(0.361)	0.100	0.100
86	7.17	0.33	0.200	(0.359)	0.100	0.100
87	7.25	0.33	0.200	(0.358)	0.100	0.100
88	7.33	0.37	0.220	(0.356)	0.110	0.110
89	7.42	0.37	0.220	(0.354)	0.110	0.110
90	7.50	0.37	0.220	(0.353)	0.110	0.110
91	7.58	0.40	0.240	(0.351)	0.120	0.120
92	7.67	0.40	0.240	(0.350)	0.120	0.120
93	7.75	0.40	0.240	(0.348)	0.120	0.120
94	7.83	0.43	0.260	(0.346)	0.130	0.130
95	7.92	0.43	0.260	(0.345)	0.130	0.130
96	8.00	0.43	0.260	(0.343)	0.130	0.130
97	8.08	0.50	0.300	(0.342)	0.150	0.150
98	8.17	0.50	0.300	(0.340)	0.150	0.150
99	8.25	0.50	0.300	(0.338)	0.150	0.150
100	8.33	0.50	0.300	(0.337)	0.150	0.150
101	8.42	0.50	0.300	(0.335)	0.150	0.150
102	8.50	0.50	0.300	(0.334)	0.150	0.150
103	8.58	0.53	0.320	(0.332)	0.160	0.160
104	8.67	0.53	0.320	(0.330)	0.160	0.160
105	8.75	0.53	0.320	(0.329)	0.160	0.160
106	8.83	0.57	0.340	(0.327)	0.170	0.170
107	8.92	0.57	0.340	(0.326)	0.170	0.170
108	9.00	0.57	0.340	(0.324)	0.170	0.170

109	9.08	0.63	0.380	(0.323)	0.190	0.190
110	9.17	0.63	0.380	(0.321)	0.190	0.190
111	9.25	0.63	0.380	(0.320)	0.190	0.190
112	9.33	0.67	0.400	(0.318)	0.200	0.200
113	9.42	0.67	0.400	(0.317)	0.200	0.200
114	9.50	0.67	0.400	(0.315)	0.200	0.200
115	9.58	0.70	0.420	(0.314)	0.210	0.210
116	9.67	0.70	0.420	(0.312)	0.210	0.210
117	9.75	0.70	0.420	(0.311)	0.210	0.210
118	9.83	0.73	0.440	(0.309)	0.220	0.220
119	9.92	0.73	0.440	(0.308)	0.220	0.220
120	10.00	0.73	0.440	(0.306)	0.220	0.220
121	10.08	0.50	0.300	(0.305)	0.150	0.150
122	10.17	0.50	0.300	(0.303)	0.150	0.150
123	10.25	0.50	0.300	(0.302)	0.150	0.150
124	10.33	0.50	0.300	(0.300)	0.150	0.150
125	10.42	0.50	0.300	(0.299)	0.150	0.150
126	10.50	0.50	0.300	(0.297)	0.150	0.150
127	10.58	0.67	0.400	(0.296)	0.200	0.200
128	10.67	0.67	0.400	(0.294)	0.200	0.200
129	10.75	0.67	0.400	(0.293)	0.200	0.200
130	10.83	0.67	0.400	(0.292)	0.200	0.200
131	10.92	0.67	0.400	(0.290)	0.200	0.200
132	11.00	0.67	0.400	(0.289)	0.200	0.200
133	11.08	0.63	0.380	(0.287)	0.190	0.190
134	11.17	0.63	0.380	(0.286)	0.190	0.190
135	11.25	0.63	0.380	(0.284)	0.190	0.190
136	11.33	0.63	0.380	(0.283)	0.190	0.190
137	11.42	0.63	0.380	(0.282)	0.190	0.190
138	11.50	0.63	0.380	(0.280)	0.190	0.190
139	11.58	0.57	0.340	(0.279)	0.170	0.170
140	11.67	0.57	0.340	(0.277)	0.170	0.170
141	11.75	0.57	0.340	(0.276)	0.170	0.170
142	11.83	0.60	0.360	(0.275)	0.180	0.180
143	11.92	0.60	0.360	(0.273)	0.180	0.180
144	12.00	0.60	0.360	(0.272)	0.180	0.180
145	12.08	0.83	0.500	(0.271)	0.250	0.250
146	12.17	0.83	0.500	(0.269)	0.250	0.250
147	12.25	0.83	0.500	(0.268)	0.250	0.250
148	12.33	0.87	0.520	(0.267)	0.260	0.260
149	12.42	0.87	0.520	(0.265)	0.260	0.260
150	12.50	0.87	0.520	(0.264)	0.260	0.260
151	12.58	0.93	0.560	0.263	(0.280)	0.297
152	12.67	0.93	0.560	0.261	(0.280)	0.299
153	12.75	0.93	0.560	0.260	(0.280)	0.300
154	12.83	0.97	0.580	0.259	(0.290)	0.321
155	12.92	0.97	0.580	0.257	(0.290)	0.323
156	13.00	0.97	0.580	0.256	(0.290)	0.324
157	13.08	1.13	0.680	0.255	(0.340)	0.425
158	13.17	1.13	0.680	0.253	(0.340)	0.427
159	13.25	1.13	0.680	0.252	(0.340)	0.428
160	13.33	1.13	0.680	0.251	(0.340)	0.429
161	13.42	1.13	0.680	0.250	(0.340)	0.430
162	13.50	1.13	0.680	0.248	(0.340)	0.432
163	13.58	0.77	0.460	(0.247)	0.230	0.230
164	13.67	0.77	0.460	(0.246)	0.230	0.230
165	13.75	0.77	0.460	(0.245)	0.230	0.230
166	13.83	0.77	0.460	(0.243)	0.230	0.230
167	13.92	0.77	0.460	(0.242)	0.230	0.230
168	14.00	0.77	0.460	(0.241)	0.230	0.230
169	14.08	0.90	0.540	0.240	(0.270)	0.300
170	14.17	0.90	0.540	0.238	(0.270)	0.302
171	14.25	0.90	0.540	0.237	(0.270)	0.303
172	14.33	0.87	0.520	0.236	(0.260)	0.284
173	14.42	0.87	0.520	0.235	(0.260)	0.285
174	14.50	0.87	0.520	0.234	(0.260)	0.286
175	14.58	0.87	0.520	0.232	(0.260)	0.288
176	14.67	0.87	0.520	0.231	(0.260)	0.289
177	14.75	0.87	0.520	0.230	(0.260)	0.290
178	14.83	0.83	0.500	0.229	(0.250)	0.271
179	14.92	0.83	0.500	0.228	(0.250)	0.272

180	15.00	0.83	0.500	0.226	(0.250)	0.274
181	15.08	0.80	0.480	0.225	(0.240)	0.255
182	15.17	0.80	0.480	0.224	(0.240)	0.256
183	15.25	0.80	0.480	0.223	(0.240)	0.257
184	15.33	0.77	0.460	0.222	(0.230)	0.238
185	15.42	0.77	0.460	0.221	(0.230)	0.239
186	15.50	0.77	0.460	0.220	(0.230)	0.240
187	15.58	0.63	0.380	(0.218)	0.190	0.190
188	15.67	0.63	0.380	(0.217)	0.190	0.190
189	15.75	0.63	0.380	(0.216)	0.190	0.190
190	15.83	0.63	0.380	(0.215)	0.190	0.190
191	15.92	0.63	0.380	(0.214)	0.190	0.190
192	16.00	0.63	0.380	(0.213)	0.190	0.190
193	16.08	0.13	0.080	(0.212)	0.040	0.040
194	16.17	0.13	0.080	(0.211)	0.040	0.040
195	16.25	0.13	0.080	(0.210)	0.040	0.040
196	16.33	0.13	0.080	(0.209)	0.040	0.040
197	16.42	0.13	0.080	(0.208)	0.040	0.040
198	16.50	0.13	0.080	(0.206)	0.040	0.040
199	16.58	0.10	0.060	(0.205)	0.030	0.030
200	16.67	0.10	0.060	(0.204)	0.030	0.030
201	16.75	0.10	0.060	(0.203)	0.030	0.030
202	16.83	0.10	0.060	(0.202)	0.030	0.030
203	16.92	0.10	0.060	(0.201)	0.030	0.030
204	17.00	0.10	0.060	(0.200)	0.030	0.030
205	17.08	0.17	0.100	(0.199)	0.050	0.050
206	17.17	0.17	0.100	(0.198)	0.050	0.050
207	17.25	0.17	0.100	(0.197)	0.050	0.050
208	17.33	0.17	0.100	(0.196)	0.050	0.050
209	17.42	0.17	0.100	(0.195)	0.050	0.050
210	17.50	0.17	0.100	(0.194)	0.050	0.050
211	17.58	0.17	0.100	(0.193)	0.050	0.050
212	17.67	0.17	0.100	(0.192)	0.050	0.050
213	17.75	0.17	0.100	(0.191)	0.050	0.050
214	17.83	0.13	0.080	(0.190)	0.040	0.040
215	17.92	0.13	0.080	(0.190)	0.040	0.040
216	18.00	0.13	0.080	(0.189)	0.040	0.040
217	18.08	0.13	0.080	(0.188)	0.040	0.040
218	18.17	0.13	0.080	(0.187)	0.040	0.040
219	18.25	0.13	0.080	(0.186)	0.040	0.040
220	18.33	0.13	0.080	(0.185)	0.040	0.040
221	18.42	0.13	0.080	(0.184)	0.040	0.040
222	18.50	0.13	0.080	(0.183)	0.040	0.040
223	18.58	0.10	0.060	(0.182)	0.030	0.030
224	18.67	0.10	0.060	(0.181)	0.030	0.030
225	18.75	0.10	0.060	(0.180)	0.030	0.030
226	18.83	0.07	0.040	(0.180)	0.020	0.020
227	18.92	0.07	0.040	(0.179)	0.020	0.020
228	19.00	0.07	0.040	(0.178)	0.020	0.020
229	19.08	0.10	0.060	(0.177)	0.030	0.030
230	19.17	0.10	0.060	(0.176)	0.030	0.030
231	19.25	0.10	0.060	(0.175)	0.030	0.030
232	19.33	0.13	0.080	(0.175)	0.040	0.040
233	19.42	0.13	0.080	(0.174)	0.040	0.040
234	19.50	0.13	0.080	(0.173)	0.040	0.040
235	19.58	0.10	0.060	(0.172)	0.030	0.030
236	19.67	0.10	0.060	(0.171)	0.030	0.030
237	19.75	0.10	0.060	(0.171)	0.030	0.030
238	19.83	0.07	0.040	(0.170)	0.020	0.020
239	19.92	0.07	0.040	(0.169)	0.020	0.020
240	20.00	0.07	0.040	(0.168)	0.020	0.020
241	20.08	0.10	0.060	(0.168)	0.030	0.030
242	20.17	0.10	0.060	(0.167)	0.030	0.030
243	20.25	0.10	0.060	(0.166)	0.030	0.030
244	20.33	0.10	0.060	(0.165)	0.030	0.030
245	20.42	0.10	0.060	(0.165)	0.030	0.030
246	20.50	0.10	0.060	(0.164)	0.030	0.030
247	20.58	0.10	0.060	(0.163)	0.030	0.030
248	20.67	0.10	0.060	(0.163)	0.030	0.030
249	20.75	0.10	0.060	(0.162)	0.030	0.030
250	20.83	0.07	0.040	(0.161)	0.020	0.020

251	20.92	0.07	0.040	(0.161)	0.020	0.020
252	21.00	0.07	0.040	(0.160)	0.020	0.020
253	21.08	0.10	0.060	(0.159)	0.030	0.030
254	21.17	0.10	0.060	(0.159)	0.030	0.030
255	21.25	0.10	0.060	(0.158)	0.030	0.030
256	21.33	0.07	0.040	(0.158)	0.020	0.020
257	21.42	0.07	0.040	(0.157)	0.020	0.020
258	21.50	0.07	0.040	(0.156)	0.020	0.020
259	21.58	0.10	0.060	(0.156)	0.030	0.030
260	21.67	0.10	0.060	(0.155)	0.030	0.030
261	21.75	0.10	0.060	(0.155)	0.030	0.030
262	21.83	0.07	0.040	(0.154)	0.020	0.020
263	21.92	0.07	0.040	(0.154)	0.020	0.020
264	22.00	0.07	0.040	(0.153)	0.020	0.020
265	22.08	0.10	0.060	(0.153)	0.030	0.030
266	22.17	0.10	0.060	(0.152)	0.030	0.030
267	22.25	0.10	0.060	(0.152)	0.030	0.030
268	22.33	0.07	0.040	(0.151)	0.020	0.020
269	22.42	0.07	0.040	(0.151)	0.020	0.020
270	22.50	0.07	0.040	(0.150)	0.020	0.020
271	22.58	0.07	0.040	(0.150)	0.020	0.020
272	22.67	0.07	0.040	(0.149)	0.020	0.020
273	22.75	0.07	0.040	(0.149)	0.020	0.020
274	22.83	0.07	0.040	(0.149)	0.020	0.020
275	22.92	0.07	0.040	(0.148)	0.020	0.020
276	23.00	0.07	0.040	(0.148)	0.020	0.020
277	23.08	0.07	0.040	(0.147)	0.020	0.020
278	23.17	0.07	0.040	(0.147)	0.020	0.020
279	23.25	0.07	0.040	(0.147)	0.020	0.020
280	23.33	0.07	0.040	(0.147)	0.020	0.020
281	23.42	0.07	0.040	(0.146)	0.020	0.020
282	23.50	0.07	0.040	(0.146)	0.020	0.020
283	23.58	0.07	0.040	(0.146)	0.020	0.020
284	23.67	0.07	0.040	(0.146)	0.020	0.020
285	23.75	0.07	0.040	(0.145)	0.020	0.020
286	23.83	0.07	0.040	(0.145)	0.020	0.020
287	23.92	0.07	0.040	(0.145)	0.020	0.020
288	24.00	0.07	0.040	(0.145)	0.020	0.020

```
                 (Loss Rate Not Used)
    Sum =     100.0                                Sum =    31.1
       Flood volume = Effective rainfall      2.59(In)
        times area      23.2(Ac.)/[(In)/(Ft.)] =       5.0(Ac.Ft)
       Total soil loss =      2.41(In)
       Total soil loss =     4.666(Ac.Ft)
       Total rainfall =      5.00(In)
       Flood volume =      218520.2 Cubic Feet
       Total soil loss =      203266.6 Cubic Feet
       --------------------------------------------------------------------
        Peak flow rate of this hydrograph =     10.092(CFS)
       --------------------------------------------------------------------
       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                            24 - H O U R   S T O R M
                      R u n o f f     H y d r o g r a p h
       --------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

       --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0       5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
   0+ 5      0.0014     0.20  Q         |         |         |         |
   0+10      0.0042     0.40  Q         |         |         |         |
   0+15      0.0072     0.45  Q         |         |         |         |
   0+20      0.0111     0.56  VQ        |         |         |         |
   0+25      0.0157     0.67  VQ        |         |         |         |
   0+30      0.0205     0.69  VQ        |         |         |         |
   0+35      0.0253     0.70  VQ        |         |         |         |
   0+40      0.0301     0.70  VQ        |         |         |         |
   0+45      0.0350     0.70  VQ        |         |         |         |
   0+50      0.0405     0.80  VQ        |         |         |         |
   0+55      0.0467     0.90  VQ        |         |         |         |
   1+ 0      0.0531     0.93  VQ        |         |         |         |
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1+ 5     0.0589     0.83  VQ        |         |         |         |
1+10     0.0639     0.74  VQ        |         |         |         |
1+15     0.0689     0.71  VQ        |         |         |         |
1+20     0.0737     0.71  VQ        |         |         |         |
1+25     0.0786     0.70  VQ        |         |         |         |
1+30     0.0834     0.70  VQ        |         |         |         |
1+35     0.0882     0.70  VQ        |         |         |         |
1+40     0.0931     0.70  VQ        |         |         |         |
1+45     0.0979     0.70  VQ        |         |         |         |
1+50     0.1035     0.80  VQ        |         |         |         |
1+55     0.1097     0.90  VQ        |         |         |         |
2+ 0     0.1161     0.93  VQ        |         |         |         |
2+ 5     0.1225     0.93  VQ        |         |         |         |
2+10     0.1290     0.94  |Q        |         |         |         |
2+15     0.1354     0.94  |Q        |         |         |         |
2+20     0.1419     0.94  |Q        |         |         |         |
2+25     0.1483     0.94  |Q        |         |         |         |
2+30     0.1548     0.94  |Q        |         |         |         |
2+35     0.1619     1.04  |VQ       |         |         |         |
2+40     0.1698     1.14  |VQ       |         |         |         |
2+45     0.1778     1.16  |VQ       |         |         |         |
2+50     0.1858     1.17  |VQ       |         |         |         |
2+55     0.1939     1.17  |VQ       |         |         |         |
3+ 0     0.2019     1.17  |VQ       |         |         |         |
3+ 5     0.2100     1.17  |VQ       |         |         |         |
3+10     0.2181     1.17  |VQ       |         |         |         |
3+15     0.2261     1.17  |VQ       |         |         |         |
3+20     0.2342     1.17  |VQ       |         |         |         |
3+25     0.2423     1.17  |VQ       |         |         |         |
3+30     0.2504     1.17  |VQ       |         |         |         |
3+35     0.2584     1.17  | Q       |         |         |         |
3+40     0.2665     1.17  | Q       |         |         |         |
3+45     0.2746     1.17  | Q       |         |         |         |
3+50     0.2833     1.27  | Q       |         |         |         |
3+55     0.2928     1.37  | Q       |         |         |         |
4+ 0     0.3024     1.39  | Q       |         |         |         |
4+ 5     0.3120     1.40  | Q       |         |         |         |
4+10     0.3217     1.41  | Q       |         |         |         |
4+15     0.3314     1.41  | Q       |         |         |         |
4+20     0.3418     1.51  | VQ      |         |         |         |
4+25     0.3529     1.61  | VQ      |         |         |         |
4+30     0.3641     1.63  | VQ      |         |         |         |
4+35     0.3753     1.64  | VQ      |         |         |         |
4+40     0.3866     1.64  |  Q      |         |         |         |
4+45     0.3979     1.64  |  Q      |         |         |         |
4+50     0.4099     1.74  |  Q      |         |         |         |
4+55     0.4226     1.84  |  Q      |         |         |         |
5+ 0     0.4354     1.86  |  Q      |         |         |         |
5+ 5     0.4470     1.67  |  Q      |         |         |         |
5+10     0.4571     1.47  | QV      |         |         |         |
5+15     0.4669     1.43  | QV      |         |         |         |
5+20     0.4773     1.51  |  Q      |         |         |         |
5+25     0.4884     1.61  |  Q      |         |         |         |
5+30     0.4996     1.63  |  Q      |         |         |         |
5+35     0.5116     1.74  |  QV     |         |         |         |
5+40     0.5243     1.84  |  QV     |         |         |         |
5+45     0.5371     1.86  |  QV     |         |         |         |
5+50     0.5500     1.87  |  QV     |         |         |         |
5+55     0.5629     1.87  |  QV     |         |         |         |
6+ 0     0.5758     1.87  |  QV     |         |         |         |
6+ 5     0.5894     1.97  |  QV     |         |         |         |
6+10     0.6037     2.08  |   Q     |         |         |         |
6+15     0.6182     2.10  |   Q     |         |         |         |
6+20     0.6327     2.11  |   QV    |         |         |         |
6+25     0.6472     2.11  |   QV    |         |         |         |
6+30     0.6617     2.11  |   QV    |         |         |         |
6+35     0.6769     2.21  |   QV    |         |         |         |
6+40     0.6928     2.31  |   QV    |         |         |         |
6+45     0.7089     2.33  |   QV    |         |         |         |
6+50     0.7250     2.34  |   QV    |         |         |         |
6+55     0.7412     2.34  |   QV    |         |         |         |
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7+ 0     0.7573     2.34  |   Q V   |         |         |         |
7+ 5     0.7734     2.34  |   Q V   |         |         |         |
7+10     0.7896     2.34  |   Q V   |         |         |         |
7+15     0.8057     2.34  |   Q V   |         |         |         |
7+20     0.8225     2.44  |   Q V   |         |         |         |
7+25     0.8401     2.55  |    QV   |         |         |         |
7+30     0.8577     2.57  |    QV   |         |         |         |
7+35     0.8762     2.67  |    QV   |         |         |         |
7+40     0.8953     2.78  |    Q V  |         |         |         |
7+45     0.9146     2.80  |    Q V  |         |         |         |
7+50     0.9346     2.91  |    Q V  |         |         |         |
7+55     0.9554     3.01  |     QV  |         |         |         |
8+ 0     0.9763     3.04  |     QV  |         |         |         |
8+ 5     0.9986     3.24  |     QV  |         |         |         |
8+10     1.0224     3.45  |     Q V |         |         |         |
8+15     1.0464     3.49  |     Q V |         |         |         |
8+20     1.0706     3.51  |      QV |         |         |         |
8+25     1.0948     3.51  |      QV |         |         |         |
8+30     1.1190     3.51  |      QV |         |         |         |
8+35     1.1439     3.61  |      Q V|         |         |         |
8+40     1.1695     3.72  |      Q V|         |         |         |
8+45     1.1952     3.74  |      Q V|         |         |         |
8+50     1.2217     3.85  |      Q V|         |         |         |
8+55     1.2489     3.95  |      Q V|         |         |         |
9+ 0     1.2763     3.97  |      Q  V         |         |         |
9+ 5     1.3051     4.18  |       Q V         |         |         |
9+10     1.3353     4.39  |       Q V         |         |         |
9+15     1.3658     4.43  |       Q V         |         |         |
9+20     1.3971     4.55  |        Q|V        |         |         |
9+25     1.4292     4.65  |        Q|V        |         |         |
9+30     1.4614     4.68  |        Q|V        |         |         |
9+35     1.4943     4.78  |        Q|V        |         |         |
9+40     1.5280     4.89  |        Q| V       |         |         |
9+45     1.5618     4.91  |        Q| V       |         |         |
9+50     1.5963     5.02  |         Q V       |         |         |
9+55     1.6316     5.12  |         Q  V      |         |         |
10+ 0    1.6671     5.14  |         Q  V      |         |         |
10+ 5    1.6977     4.46  |       Q |  V      |         |         |
10+10    1.7235     3.74  |      Q  |  V      |         |         |
10+15    1.7483     3.59  |      Q  |  V      |         |         |
10+20    1.7726     3.54  |      Q  |   V     |         |         |
10+25    1.7968     3.51  |      Q  |   V     |         |         |
10+30    1.8210     3.51  |      Q  |   V     |         |         |
10+35    1.8487     4.01  |       Q |   V     |         |         |
10+40    1.8798     4.52  |        Q|   V     |         |         |
10+45    1.9117     4.63  |        Q|    V    |         |         |
10+50    1.9439     4.67  |        Q|    V    |         |         |
10+55    1.9762     4.69  |        Q|    V    |         |         |
11+ 0    2.0084     4.69  |        Q|     V   |         |         |
11+ 5    2.0400     4.59  |        Q|     V   |         |         |
11+10    2.0709     4.48  |       Q |     V   |         |         |
11+15    2.1016     4.46  |       Q |     V   |         |         |
11+20    2.1323     4.46  |       Q |      V  |         |         |
11+25    2.1630     4.45  |       Q |      V  |         |         |
11+30    2.1937     4.45  |       Q |      V  |         |         |
11+35    2.2229     4.25  |       Q |      V  |         |         |
11+40    2.2508     4.05  |       Q |      V  |         |         |
11+45    2.2784     4.01  |       Q |       V |         |         |
11+50    2.3066     4.09  |       Q |       V |         |         |
11+55    2.3354     4.19  |       Q |       V |         |         |
12+ 0    2.3644     4.21  |       Q |       V |         |         |
12+ 5    2.3982     4.91  |        Q|        V|         |         |
12+10    2.4370     5.63  |         |Q       V|         |         |
12+15    2.4768     5.78  |         |Q       V|         |         |
12+20    2.5177     5.94  |         |Q        V         |         |
12+25    2.5594     6.06  |         | Q       V         |         |
12+30    2.6013     6.08  |         | Q       V         |         |
12+35    2.6458     6.46  |         | Q       |V        |         |
12+40    2.6931     6.86  |         |  Q      |V        |         |
12+45    2.7410     6.97  |         |  Q      |V        |         |
12+50    2.7908     7.23  |         |   Q     | V       |         |
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12+55     2.8423     7.47 |         |   Q     | V       |         |
13+ 0     2.8942     7.55 |         |    Q    |  V      |         |
13+ 5     2.9534     8.59 |         |      Q  |  V      |         |
13+10     3.0198     9.65 |         |        Q|   V     |         |
13+15     3.0879     9.89 |         |        Q|   V     |         |
13+20     3.1568    10.00 |         |         Q    V    |         |
13+25     3.2261    10.06 |         |         Q    V    |         |
13+30     3.2956    10.09 |         |         Q     V   |         |
13+35     3.3514     8.10 |         |     Q   |     V   |         |
13+40     3.3930     6.04 |         | Q       |      V  |         |
13+45     3.4317     5.62 |         |Q        |      V  |         |
13+50     3.4692     5.45 |         Q         |      V  |         |
13+55     3.5064     5.39 |         Q         |      V  |         |
14+ 0     3.5435     5.39 |         Q         |       V |         |
14+ 5     3.5854     6.09 |         | Q       |       V |         |
14+10     3.6324     6.82 |         |  Q      |       V |         |
14+15     3.6806     7.00 |         |  Q      |        V|         |
14+20     3.7280     6.88 |         |  Q      |        V|         |
14+25     3.7743     6.73 |         |  Q      |         V         |
14+30     3.8206     6.71 |         |  Q      |         V         |
14+35     3.8669     6.72 |         |  Q      |         V         |
14+40     3.9133     6.75 |         |  Q      |         |V        |
14+45     3.9600     6.77 |         |  Q      |         |V        |
14+50     4.0055     6.60 |         |  Q      |         |V        |
14+55     4.0497     6.43 |         | Q       |         | V       |
15+ 0     4.0939     6.41 |         | Q       |         | V       |
15+ 5     4.1368     6.22 |         | Q       |         | V       |
15+10     4.1784     6.04 |         | Q       |         |  V      |
15+15     4.2198     6.02 |         | Q       |         |  V      |
15+20     4.2600     5.84 |         |Q        |         |  V      |
15+25     4.2990     5.65 |         |Q        |         |   V     |
15+30     4.3378     5.64 |         |Q        |         |   V     |
15+35     4.3731     5.13 |         Q         |         |   V     |
15+40     4.4049     4.61 |        Q|         |         |    V    |
15+45     4.4359     4.51 |        Q|         |         |    V    |
15+50     4.4667     4.47 |       Q |         |         |    V    |
15+55     4.4974     4.45 |       Q |         |         |    V    |
16+ 0     4.5280     4.45 |       Q |         |         |     V   |
16+ 5     4.5484     2.96 |    Q    |         |         |     V   |
16+10     4.5582     1.42 | Q       |         |         |     V   |
16+15     4.5658     1.11 | Q       |         |         |     V   |
16+20     4.5726     0.98 |Q        |         |         |     V   |
16+25     4.5790     0.94 |Q        |         |         |     V   |
16+30     4.5855     0.94 |Q        |         |         |     V   |
16+35     4.5913     0.84 |Q        |         |         |     V   |
16+40     4.5963     0.74 |Q        |         |         |     V   |
16+45     4.6012     0.71 |Q        |         |         |     V   |
16+50     4.6061     0.71 |Q        |         |         |     V   |
16+55     4.6109     0.70 |Q        |         |         |     V   |
17+ 0     4.6158     0.70 |Q        |         |         |     V   |
17+ 5     4.6220     0.90 |Q        |         |         |     V   |
17+10     4.6296     1.11 | Q       |         |         |     V   |
17+15     4.6375     1.15 | Q       |         |         |     V   |
17+20     4.6456     1.17 | Q       |         |         |      V  |
17+25     4.6536     1.17 | Q       |         |         |      V  |
17+30     4.6617     1.17 | Q       |         |         |      V  |
17+35     4.6698     1.17 | Q       |         |         |      V  |
17+40     4.6778     1.17 | Q       |         |         |      V  |
17+45     4.6859     1.17 | Q       |         |         |      V  |
17+50     4.6933     1.07 | Q       |         |         |      V  |
17+55     4.7000     0.97 |Q        |         |         |      V  |
18+ 0     4.7065     0.95 |Q        |         |         |      V  |
18+ 5     4.7130     0.94 |Q        |         |         |      V  |
18+10     4.7194     0.94 |Q        |         |         |      V  |
18+15     4.7259     0.94 |Q        |         |         |      V  |
18+20     4.7323     0.94 |Q        |         |         |      V  |
18+25     4.7388     0.94 |Q        |         |         |      V  |
18+30     4.7453     0.94 |Q        |         |         |      V  |
18+35     4.7510     0.84 |Q        |         |         |      V  |
18+40     4.7561     0.74 |Q        |         |         |      V  |
18+45     4.7610     0.71 |Q        |         |         |      V  |
18+50     4.7652     0.61 |Q        |         |         |      V  |
18+55     4.7686     0.50 |Q        |         |         |       V |
19+ 0     4.7719     0.48 Q         |         |         |       V |
19+ 5     4.7759     0.57 |Q        |         |         |       V |
19+10     4.7805     0.67 |Q        |         |         |       V |
19+15     4.7853     0.69 |Q        |         |         |       V |
19+20     4.7908     0.80 |Q        |         |         |       V |
19+25     4.7970     0.90 |Q        |         |         |       V |
19+30     4.8034     0.93 |Q        |         |         |       V |
19+35     4.8091     0.83 |Q        |         |         |       V |
19+40     4.8142     0.74 |Q        |         |         |       V |
19+45     4.8191     0.71 |Q        |         |         |       V |
19+50     4.8233     0.61 |Q        |         |         |       V |
19+55     4.8267     0.50 |Q        |         |         |       V |
20+ 0     4.8300     0.48 Q         |         |         |       V |
20+ 5     4.8340     0.57 |Q        |         |         |       V |
20+10     4.8386     0.67 |Q        |         |         |       V |
20+15     4.8434     0.69 |Q        |         |         |       V |
20+20     4.8482     0.70 |Q        |         |         |       V |
20+25     4.8530     0.70 |Q        |         |         |       V |
20+30     4.8579     0.70 |Q        |         |         |       V |
20+35     4.8627     0.70 |Q        |         |         |       V |
20+40     4.8675     0.70 |Q        |         |         |       V |
20+45     4.8724     0.70 |Q        |         |         |       V |
20+50     4.8765     0.60 |Q        |         |         |       V |
20+55     4.8800     0.50 |Q        |         |         |       V |
21+ 0     4.8833     0.48 Q         |         |         |       V |
21+ 5     4.8872     0.57 |Q        |         |         |       V |
21+10     4.8918     0.67 |Q        |         |         |        V|
21+15     4.8966     0.69 |Q        |         |         |        V|
21+20     4.9007     0.60 |Q        |         |         |        V|
21+25     4.9042     0.50 |Q        |         |         |        V|
21+30     4.9075     0.48 Q         |         |         |        V|
21+35     4.9114     0.57 |Q        |         |         |        V|
21+40     4.9161     0.67 |Q        |         |         |        V|
21+45     4.9208     0.69 |Q        |         |         |        V|
21+50     4.9250     0.60 |Q        |         |         |        V|
21+55     4.9284     0.50 |Q        |         |         |        V|
22+ 0     4.9317     0.48 Q         |         |         |        V|
22+ 5     4.9356     0.57 |Q        |         |         |        V|
22+10     4.9403     0.67 |Q        |         |         |        V|
22+15     4.9450     0.69 |Q        |         |         |        V|
22+20     4.9492     0.60 |Q        |         |         |        V|
22+25     4.9526     0.50 |Q        |         |         |        V|
22+30     4.9559     0.48 Q         |         |         |        V|
22+35     4.9592     0.47 Q         |         |         |        V|
22+40     4.9624     0.47 Q         |         |         |        V|
22+45     4.9656     0.47 Q         |         |         |        V|
22+50     4.9688     0.47 Q         |         |         |        V|
22+55     4.9721     0.47 Q         |         |         |        V|
23+ 0     4.9753     0.47 Q         |         |         |        V|
23+ 5     4.9785     0.47 Q         |         |         |        V|
23+10     4.9818     0.47 Q         |         |         |        V|
23+15     4.9850     0.47 Q         |         |         |        V|
23+20     4.9882     0.47 Q         |         |         |        V|
23+25     4.9914     0.47 Q         |         |         |        V|
23+30     4.9947     0.47 Q         |         |         |        V|
23+35     4.9979     0.47 Q         |         |         |        V|
23+40     5.0011     0.47 Q         |         |         |        V|
23+45     5.0044     0.47 Q         |         |         |        V|
23+50     5.0076     0.47 Q         |         |         |        V|
23+55     5.0108     0.47 Q         |         |         |        V|
24+ 0     5.0140     0.47 Q         |         |         |        V|
24+ 5     5.0159     0.27 Q         |         |         |        V|
24+10     5.0163     0.06 Q         |         |         |        V|
24+15     5.0165     0.02 Q         |         |         |        V|
24+20     5.0165     0.01 Q         |         |         |         V
-----------------------------------------------------------------------
```

APPENDIX D.5: ONSITE AREA "B"

100-YEAR, 1-HOUR

```
      U n i t   H y d r o g r a p h   A n a l y s i s

      Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
             Study date  06/10/16 File: ARBONSITE1100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6279

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
ONSITE AREA "B"
FILENAME: ARBONSITE
--------------------------------------------------------------------
Drainage Area =      15.65(Ac.)  =      0.024 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      15.65(Ac.)  =      0.024 Sq. Mi.
Length along longest watercourse =     1881.50(Ft.)
Length along longest watercourse measured to centroid =     959.32(Ft.)
Length along longest watercourse =      0.356 Mi.
Length along longest watercourse measured to centroid =      0.182 Mi.
Difference in elevation =     136.00(Ft.)
Slope along watercourse =    381.6529 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.041 Hr.
Lag time =     2.47 Min.
25% of lag time =     0.62 Min.
40% of lag time =     0.99 Min.
Unit time =     5.00 Min.
Duration of storm = 1 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       15.65           0.50                  7.83

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       15.65           1.20                 18.78

STORM EVENT (YEAR) =  100.00
Area Averaged 2-Year Rainfall =    0.500(In)
Area Averaged 100-Year Rainfall =    1.200(In)

Point rain (area averaged) =    1.200(In)
Areal adjustment factor =   99.99 %
Adjusted average point rain =    1.200(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    15.650           68.90         0.429
 Total Area Entered =     15.65(Ac.)
```



```
       RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
       AMC2 AMC-2     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
       68.9  68.9      0.374     0.429       0.230      1.000      0.230
                                                    Sum (F) =   0.230
       Area averaged mean soil loss (F) (In/Hr) =  0.230
       Minimum soil loss rate ((In/Hr)) =  0.115
       (for 24 hour storm duration)
       Soil low loss rate (decimal) =   0.557
       --------------------------------------------------------------------
       Slope of intensity-duration curve for a 1 hour storm =0.5000
       ---------------------------------------------------------------------

                      U n i t   H y d r o g r a p h
                             VALLEY S-Curve
       --------------------------------------------------------------------
                      Unit Hydrograph Data
       --------------------------------------------------------------------
       Unit time period   Time % of lag   Distribution   Unit Hydrograph
           (hrs)                            Graph %          (CFS)
       --------------------------------------------------------------------
           1  0.083        202.664         43.858             6.917
           2  0.167        405.329         43.182             6.811
           3  0.250        607.993          8.686             1.370
           4  0.333        810.657          4.274             0.674
                                     Sum = 100.000   Sum=      15.772
----------------------------------------------------------------------


 The following loss rate calculations reflect use of the minimum calculated loss
 rate subtracted from the Storm Rain to produce the maximum Effective Rain value

  Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
       (Hr.)  Percent   (In/Hr)        Max   |   Low        (In/Hr)
   1   0.08     4.20      0.605         0.230    (  0.337)        0.375
   2   0.17     4.30      0.619         0.230    (  0.345)        0.390
   3   0.25     5.00      0.720         0.230    (  0.401)        0.490
   4   0.33     5.00      0.720         0.230    (  0.401)        0.490
   5   0.42     5.80      0.835         0.230    (  0.465)        0.606
   6   0.50     6.50      0.936         0.230    (  0.521)        0.706
   7   0.58     7.40      1.065         0.230    (  0.593)        0.836
   8   0.67     8.60      1.238         0.230    (  0.689)        1.009
   9   0.75    12.30      1.771         0.230    (  0.986)        1.541
  10   0.83    29.10      4.190         0.230    (  2.333)        3.960
  11   0.92     6.80      0.979         0.230    (  0.545)        0.750
  12   1.00     5.00      0.720         0.230    (  0.401)        0.490
                (Loss Rate Not Used)
     Sum =     100.0                                   Sum =    11.6
       Flood volume = Effective rainfall      0.97(In)
        times area      15.7(Ac.)/[(In)/(Ft.)] =       1.3(Ac.Ft)
       Total soil loss =      0.23(In)
       Total soil loss =     0.299(Ac.Ft)
       Total rainfall =      1.20(In)
       Flood volume =       55122.5 Cubic Feet
       Total soil loss =       13039.2 Cubic Feet
       --------------------------------------------------------------------
        Peak flow rate of this hydrograph =     39.859(CFS)
       --------------------------------------------------------------------
       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          1 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
       --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

       --------------------------------------------------------------------
  Time(h+m) Volume Ac.Ft   Q(CFS)  0       10.0      20.0      30.0      40.0
  -----------------------------------------------------------------------
    0+ 5       0.0179      2.60  V Q       |         |         |         |
    0+10       0.0541      5.25  |V   Q    |         |         |         |
    0+15       0.0993      6.56  |  V  Q   |         |         |         |
```

```
    0+20       0.1511      7.52  |   V  Q  |         |         |         |
    0+25       0.2094      8.47  |     V Q |         |         |         |
    0+30       0.2784     10.02  |       V Q         |         |         |
    0+35       0.3594     11.76  |         |Q        |         |         |
    0+40       0.4562     14.05  |         |   Q     |         |         |
    0+45       0.5881     19.16  |         |       VQ|         |         |
    0+50       0.8627     39.86  |         |         |      V  |        Q|
    0+55       1.1035     34.97  |         |         |         |   Q     |
    1+ 0       1.2066     14.97  |         |   Q     |         |       V |
    1+ 5       1.2551      7.04  |      Q  |         |         |        V|
    1+10       1.2632      1.18  |Q        |         |         |        V|
    1+15       1.2654      0.33  Q         |         |         |         V
----------------------------------------------------------------------
```

100-YEAR, 3-HOUR

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 06/10/16 File: ARBONSITE3100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
ONSITE AREA "B"
FILENAME: ARBONSITE

Drainage Area = 15.65(Ac.) = 0.024 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 15.65(Ac.) = 0.024 Sq. Mi.
Length along longest watercourse = 1881.50(Ft.)
Length along longest watercourse measured to centroid = 959.32(Ft.)
Length along longest watercourse = 0.356 Mi.
Length along longest watercourse measured to centroid = 0.182 Mi.
Difference in elevation = 136.00(Ft.)
Slope along watercourse = 381.6529 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.041 Hr.
Lag time = 2.47 Min.
25% of lag time = 0.62 Min.
40% of lag time = 0.99 Min.
Unit time = 5.00 Min.
Duration of storm = 3 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
15.65	0.90	14.09

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
15.65	1.90	29.73

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 0.900(In)
Area Averaged 100-Year Rainfall = 1.900(In)

Point rain (area averaged) = 1.900(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 1.900(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
15.650	68.90	0.429

Total Area Entered = 15.65(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
68.9	68.9	0.374	0.429	0.230	1.000	0.230
					Sum (F) =	0.230

Area averaged mean soil loss (F) (In/Hr) = 0.230
Minimum soil loss rate ((In/Hr)) = 0.115
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.557

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	202.664	43.858	6.917
2	0.167	405.329	43.182	6.811
3	0.250	607.993	8.686	1.370
4	0.333	810.657	4.274	0.674
			Sum = 100.000	Sum= 15.772

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	1.30	0.296	(0.230)	0.165	0.131
2	0.17	1.30	0.296	(0.230)	0.165	0.131
3	0.25	1.10	0.251	(0.230)	0.140	0.111
4	0.33	1.50	0.342	(0.230)	0.190	0.152
5	0.42	1.50	0.342	(0.230)	0.190	0.152
6	0.50	1.80	0.410	(0.230)	0.228	0.182
7	0.58	1.50	0.342	(0.230)	0.190	0.152
8	0.67	1.80	0.410	(0.230)	0.228	0.182
9	0.75	1.80	0.410	(0.230)	0.228	0.182
10	0.83	1.50	0.342	(0.230)	0.190	0.152
11	0.92	1.60	0.365	(0.230)	0.203	0.162
12	1.00	1.80	0.410	(0.230)	0.228	0.182
13	1.08	2.20	0.502	0.230	(0.279)	0.272
14	1.17	2.20	0.502	0.230	(0.279)	0.272
15	1.25	2.20	0.502	0.230	(0.279)	0.272
16	1.33	2.00	0.456	0.230	(0.254)	0.226
17	1.42	2.60	0.593	0.230	(0.330)	0.363
18	1.50	2.70	0.616	0.230	(0.343)	0.386
19	1.58	2.40	0.547	0.230	(0.305)	0.318
20	1.67	2.70	0.616	0.230	(0.343)	0.386
21	1.75	3.30	0.752	0.230	(0.419)	0.523
22	1.83	3.10	0.707	0.230	(0.394)	0.477
23	1.92	2.90	0.661	0.230	(0.368)	0.432
24	2.00	3.00	0.684	0.230	(0.381)	0.454
25	2.08	3.10	0.707	0.230	(0.394)	0.477
26	2.17	4.20	0.958	0.230	(0.533)	0.728
27	2.25	5.00	1.140	0.230	(0.635)	0.910
28	2.33	3.50	0.798	0.230	(0.444)	0.568
29	2.42	6.80	1.550	0.230	(0.863)	1.321
30	2.50	7.30	1.664	0.230	(0.927)	1.435
31	2.58	8.20	1.869	0.230	(1.041)	1.640
32	2.67	5.90	1.345	0.230	(0.749)	1.116
33	2.75	2.00	0.456	0.230	(0.254)	0.226
34	2.83	1.80	0.410	(0.230)	0.228	0.182
35	2.92	1.80	0.410	(0.230)	0.228	0.182
36	3.00	0.60	0.137	(0.230)	0.076	0.061
		(Loss Rate Not Used)				
Sum =		100.0			Sum =	15.1

```
      Flood volume = Effective rainfall      1.26(In)
       times area      15.7(Ac.)/[(In)/(Ft.)] =       1.6(Ac.Ft)
      Total soil loss =      0.64(In)
      Total soil loss =     0.837(Ac.Ft)
      Total rainfall =      1.90(In)
      Flood volume =       71470.3 Cubic Feet
      Total soil loss =       36460.3 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     23.321(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          3 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
-----------------------------------------------------------------------
  0+ 5      0.0063     0.91  VQ        |         |         |         |
  0+10      0.0187     1.80  V Q       |         |         |         |
  0+15      0.0314     1.84  V Q       |         |         |         |
  0+20      0.0457     2.08  |VQ       |         |         |         |
  0+25      0.0617     2.32  |V Q      |         |         |         |
  0+30      0.0794     2.57  |V Q      |         |         |         |
  0+35      0.0973     2.60  | VQ      |         |         |         |
  0+40      0.1155     2.64  | VQ      |         |         |         |
  0+45      0.1350     2.83  |  Q      |         |         |         |
  0+50      0.1532     2.64  |  Q      |         |         |         |
  0+55      0.1705     2.52  |  QV     |         |         |         |
  1+ 0      0.1891     2.69  |  QV     |         |         |         |
  1+ 5      0.2128     3.45  |   QV    |         |         |         |
  1+10      0.2410     4.09  |    Q    |         |         |         |
  1+15      0.2702     4.23  |    QV   |         |         |         |
  1+20      0.2976     3.98  |    Q V  |         |         |         |
  1+25      0.3293     4.61  |     Q V |         |         |         |
  1+30      0.3682     5.64  |      QV |         |         |         |
  1+35      0.4059     5.48  |      Q V|         |         |         |
  1+40      0.4445     5.61  |      Q  V         |         |         |
  1+45      0.4924     6.94  |        Q| V       |         |         |
  1+50      0.5448     7.61  |         Q  V      |         |         |
  1+55      0.5945     7.22  |        Q|   V     |         |         |
  2+ 0      0.6433     7.09  |        Q|    V    |         |         |
  2+ 5      0.6937     7.31  |        Q|     V   |         |         |
  2+10      0.7571     9.20  |         | Q     V |         |         |
  2+15      0.8413    12.22  |         |     Q   V         |         |
  2+20      0.9202    11.46  |         |    Q    | V       |         |
  2+25      1.0218    14.75  |         |        Q|   V     |         |
  2+30      1.1617    20.32  |         |         |      QV |         |
  2+35      1.3224    23.32  |         |         |         |QV       |
  2+40      1.4722    21.75  |         |         |        Q|    V    |
  2+45      1.5575    12.38  |         |     Q   |         |      V  |
  2+50      1.5949     5.44  |      Q  |         |         |       V |
  2+55      1.6194     3.56  |   Q     |         |         |        V|
  3+ 0      1.6336     2.06  | Q       |         |         |        V|
  3+ 5      1.6390     0.79  |Q        |         |         |        V|
  3+10      1.6405     0.21  Q         |         |         |        V|
  3+15      1.6407     0.04  Q         |         |         |         V
-----------------------------------------------------------------------
```

100-YEAR, 6-HOUR

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 06/10/16 File: ARBONSITE6100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
ONSITE AREA "B"
FILENAME: ARBONSITE

Drainage Area = 15.65(Ac.) = 0.024 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 15.65(Ac.) = 0.024 Sq. Mi.
Length along longest watercourse = 1881.50(Ft.)
Length along longest watercourse measured to centroid = 959.32(Ft.)
Length along longest watercourse = 0.356 Mi.
Length along longest watercourse measured to centroid = 0.182 Mi.
Difference in elevation = 136.00(Ft.)
Slope along watercourse = 381.6529 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.041 Hr.
Lag time = 2.47 Min.
25% of lag time = 0.62 Min.
40% of lag time = 0.99 Min.
Unit time = 5.00 Min.
Duration of storm = 6 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
15.65	1.20	18.78

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
15.65	2.50	39.13

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 1.200(In)
Area Averaged 100-Year Rainfall = 2.500(In)

Point rain (area averaged) = 2.500(In)
Areal adjustment factor = 99.99 %
Adjusted average point rain = 2.500(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
15.650	68.90	0.429

Total Area Entered = 15.65(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
68.9	68.9	0.374	0.429	0.230	1.000	0.230
					Sum (F) =	0.230

Area averaged mean soil loss (F) (In/Hr) = 0.230
Minimum soil loss rate ((In/Hr)) = 0.115
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.557

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	202.664	43.858	6.917
2	0.167	405.329	43.182	6.811
3	0.250	607.993	8.686	1.370
4	0.333	810.657	4.274	0.674
			Sum = 100.000	Sum= 15.772

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.50	0.150	(0.230)	0.084	0.066
2	0.17	0.60	0.180	(0.230)	0.100	0.080
3	0.25	0.60	0.180	(0.230)	0.100	0.080
4	0.33	0.60	0.180	(0.230)	0.100	0.080
5	0.42	0.60	0.180	(0.230)	0.100	0.080
6	0.50	0.70	0.210	(0.230)	0.117	0.093
7	0.58	0.70	0.210	(0.230)	0.117	0.093
8	0.67	0.70	0.210	(0.230)	0.117	0.093
9	0.75	0.70	0.210	(0.230)	0.117	0.093
10	0.83	0.70	0.210	(0.230)	0.117	0.093
11	0.92	0.70	0.210	(0.230)	0.117	0.093
12	1.00	0.80	0.240	(0.230)	0.134	0.106
13	1.08	0.80	0.240	(0.230)	0.134	0.106
14	1.17	0.80	0.240	(0.230)	0.134	0.106
15	1.25	0.80	0.240	(0.230)	0.134	0.106
16	1.33	0.80	0.240	(0.230)	0.134	0.106
17	1.42	0.80	0.240	(0.230)	0.134	0.106
18	1.50	0.80	0.240	(0.230)	0.134	0.106
19	1.58	0.80	0.240	(0.230)	0.134	0.106
20	1.67	0.80	0.240	(0.230)	0.134	0.106
21	1.75	0.80	0.240	(0.230)	0.134	0.106
22	1.83	0.80	0.240	(0.230)	0.134	0.106
23	1.92	0.80	0.240	(0.230)	0.134	0.106
24	2.00	0.90	0.270	(0.230)	0.150	0.120
25	2.08	0.80	0.240	(0.230)	0.134	0.106
26	2.17	0.90	0.270	(0.230)	0.150	0.120
27	2.25	0.90	0.270	(0.230)	0.150	0.120
28	2.33	0.90	0.270	(0.230)	0.150	0.120
29	2.42	0.90	0.270	(0.230)	0.150	0.120
30	2.50	0.90	0.270	(0.230)	0.150	0.120
31	2.58	0.90	0.270	(0.230)	0.150	0.120
32	2.67	0.90	0.270	(0.230)	0.150	0.120
33	2.75	1.00	0.300	(0.230)	0.167	0.133
34	2.83	1.00	0.300	(0.230)	0.167	0.133
35	2.92	1.00	0.300	(0.230)	0.167	0.133
36	3.00	1.00	0.300	(0.230)	0.167	0.133
37	3.08	1.00	0.300	(0.230)	0.167	0.133
38	3.17	1.10	0.330	(0.230)	0.184	0.146

```
39   3.25     1.10     0.330      (  0.230)       0.184        0.146
40   3.33     1.10     0.330      (  0.230)       0.184        0.146
41   3.42     1.20     0.360      (  0.230)       0.200        0.160
42   3.50     1.30     0.390      (  0.230)       0.217        0.173
43   3.58     1.40     0.420         0.230    (  0.234)        0.190
44   3.67     1.40     0.420         0.230    (  0.234)        0.190
45   3.75     1.50     0.450         0.230    (  0.251)        0.220
46   3.83     1.50     0.450         0.230    (  0.251)        0.220
47   3.92     1.60     0.480         0.230    (  0.267)        0.250
48   4.00     1.60     0.480         0.230    (  0.267)        0.250
49   4.08     1.70     0.510         0.230    (  0.284)        0.280
50   4.17     1.80     0.540         0.230    (  0.301)        0.310
51   4.25     1.90     0.570         0.230    (  0.317)        0.340
52   4.33     2.00     0.600         0.230    (  0.334)        0.370
53   4.42     2.10     0.630         0.230    (  0.351)        0.400
54   4.50     2.10     0.630         0.230    (  0.351)        0.400
55   4.58     2.20     0.660         0.230    (  0.367)        0.430
56   4.67     2.30     0.690         0.230    (  0.384)        0.460
57   4.75     2.40     0.720         0.230    (  0.401)        0.490
58   4.83     2.40     0.720         0.230    (  0.401)        0.490
59   4.92     2.50     0.750         0.230    (  0.418)        0.520
60   5.00     2.60     0.780         0.230    (  0.434)        0.550
61   5.08     3.10     0.930         0.230    (  0.518)        0.700
62   5.17     3.60     1.080         0.230    (  0.601)        0.850
63   5.25     3.90     1.170         0.230    (  0.651)        0.940
64   5.33     4.20     1.260         0.230    (  0.702)        1.030
65   5.42     4.70     1.410         0.230    (  0.785)        1.180
66   5.50     5.60     1.680         0.230    (  0.935)        1.450
67   5.58     1.90     0.570         0.230    (  0.317)        0.340
68   5.67     0.90     0.270      (  0.230)       0.150        0.120
69   5.75     0.60     0.180      (  0.230)       0.100        0.080
70   5.83     0.50     0.150      (  0.230)       0.084        0.066
71   5.92     0.30     0.090      (  0.230)       0.050        0.040
72   6.00     0.20     0.060      (  0.230)       0.033        0.027
              (Loss Rate Not Used)
   Sum =     100.0                                 Sum =    17.9
      Flood volume = Effective rainfall      1.49(In)
       times area      15.7(Ac.)/[(In)/(Ft.)] =       1.9(Ac.Ft)
      Total soil loss =      1.01(In)
      Total soil loss =     1.313(Ac.Ft)
      Total rainfall =      2.50(In)
      Flood volume =       84802.8 Cubic Feet
      Total soil loss =       57213.3 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =     20.128(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          6 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
-----------------------------------------------------------------------
  0+ 5      0.0032      0.46  Q         |         |         |         |
  0+10      0.0101      1.01  VQ        |         |         |         |
  0+15      0.0183      1.19  VQ        |         |         |         |
  0+20      0.0269      1.25  VQ        |         |         |         |
  0+25      0.0355      1.26  VQ        |         |         |         |
  0+30      0.0448      1.35  VQ        |         |         |         |
  0+35      0.0548      1.44  |Q        |         |         |         |
  0+40      0.0648      1.46  |Q        |         |         |         |
  0+45      0.0749      1.47  |Q        |         |         |         |
  0+50      0.0851      1.47  |Q        |         |         |         |
  0+55      0.0952      1.47  |Q        |         |         |         |
  1+ 0      0.1059      1.56  | Q       |         |         |         |
  1+ 5      0.1173      1.65  | Q       |         |         |         |
  1+10      0.1288      1.67  | Q       |         |         |         |
  1+15      0.1403      1.68  | Q       |         |         |         |
  1+20      0.1519      1.68  | QV      |         |         |         |
  1+25      0.1635      1.68  | QV      |         |         |         |
  1+30      0.1750      1.68  | QV      |         |         |         |
  1+35      0.1866      1.68  | QV      |         |         |         |
  1+40      0.1981      1.68  | Q V     |         |         |         |
  1+45      0.2097      1.68  | Q V     |         |         |         |
  1+50      0.2213      1.68  | Q V     |         |         |         |
  1+55      0.2328      1.68  | Q V     |         |         |         |
  2+ 0      0.2450      1.77  | Q  V    |         |         |         |
  2+ 5      0.2572      1.77  | Q  V    |         |         |         |
  2+10      0.2695      1.79  | Q  V    |         |         |         |
  2+15      0.2824      1.87  | Q  V    |         |         |         |
  2+20      0.2953      1.88  | Q   V   |         |         |         |
  2+25      0.3083      1.89  | Q   V   |         |         |         |
  2+30      0.3213      1.89  | Q   V   |         |         |         |
  2+35      0.3344      1.89  | Q   V   |         |         |         |
  2+40      0.3474      1.89  | Q    V  |         |         |         |
  2+45      0.3610      1.98  | Q    V  |         |         |         |
  2+50      0.3753      2.07  | Q    V  |         |         |         |
  2+55      0.3896      2.09  | Q     V |         |         |         |
  3+ 0      0.4041      2.10  | Q     V |         |         |         |
  3+ 5      0.4185      2.10  | Q     V |         |         |         |
  3+10      0.4336      2.19  | Q     V |         |         |         |
  3+15      0.4493      2.28  |  Q     V|         |         |         |
  3+20      0.4652      2.30  |  Q     V|         |         |         |
  3+25      0.4817      2.40  |  Q     V|         |         |         |
  3+30      0.4995      2.58  |  Q      V         |         |         |
  3+35      0.5189      2.81  |  Q      V         |         |         |
  3+40      0.5392      2.96  |  Q      |V        |         |         |
  3+45      0.5613      3.20  |   Q     |V        |         |         |
  3+50      0.5848      3.42  |   Q     | V       |         |         |
  3+55      0.6101      3.67  |   Q     | V       |         |         |
  4+ 0      0.6369      3.89  |    Q    |  V      |         |         |
  4+ 5      0.6654      4.14  |    Q    |  V      |         |         |
  4+10      0.6969      4.57  |     Q   |   V     |         |         |
  4+15      0.7315      5.03  |     Q   |    V    |         |         |
  4+20      0.7693      5.50  |      Q  |    V    |         |         |
  4+25      0.8105      5.97  |      Q  |     V   |         |         |
  4+30      0.8534      6.24  |       Q |      V  |         |         |
  4+35      0.8982      6.51  |       Q |       V |         |         |
  4+40      0.9460      6.94  |        Q|        V|         |         |
  4+45      0.9969      7.39  |        Q|         V         |         |
  4+50      1.0497      7.66  |         Q         |V        |         |
  4+55      1.1043      7.93  |         Q         | V       |         |
  5+ 0      1.1618      8.36  |         |Q        |  V      |         |
  5+ 5      1.2282      9.64  |         | Q       |    V    |         |
  5+10      1.3093     11.76  |         |    Q    |     V   |         |
  5+15      1.4032     13.63  |         |       Q |       V |         |
  5+20      1.5077     15.18  |         |         Q         V         |
  5+25      1.6251     17.05  |         |         | Q       |  V      |
  5+30      1.7638     20.13  |         |         |     Q   |     V   |
  5+35      1.8640     14.55  |         |        Q|         |       V |
  5+40      1.9049      5.93  |      Q  |         |         |        V|
  5+45      1.9242      2.81  |  Q      |         |         |        V|
  5+50      1.9338      1.40  |Q        |         |         |        V|
  5+55      1.9402      0.92  |Q        |         |         |        V|
  6+ 0      1.9443      0.60  Q         |         |         |        V|
  6+ 5      1.9462      0.28  Q         |         |         |        V|
  6+10      1.9467      0.06  Q         |         |         |        V|
  6+15      1.9468      0.02  Q         |         |         |        V|
-----------------------------------------------------------------------
```

100-YEAR, 24-HOUR

U n i t   H y d r o g r a p h   A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
Study date 06/10/16 File: ARBONSITE24100.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978

Program License Serial Number 6279

English (in-lb) Input Units Used
English Rainfall Data (Inches) Input Values Used

English Units used in output format

IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 100-YEAR, 1-HOUR STORM DURATION
ONSITE AREA "B"
FILENAME: ARBONSITE

Drainage Area = 15.65(Ac.) = 0.024 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment = 15.65(Ac.) = 0.024 Sq. Mi.
Length along longest watercourse = 1881.50(Ft.)
Length along longest watercourse measured to centroid = 959.32(Ft.)
Length along longest watercourse = 0.356 Mi.
Length along longest watercourse measured to centroid = 0.182 Mi.
Difference in elevation = 136.00(Ft.)
Slope along watercourse = 381.6529 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time = 0.041 Hr.
Lag time = 2.47 Min.
25% of lag time = 0.62 Min.
40% of lag time = 0.99 Min.
Unit time = 5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow = 0.00(CFS)

2 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
15.65	2.00	31.30

100 YEAR Area rainfall data:

Area(Ac.)[1]	Rainfall(In)[2]	Weighting[1*2]
15.65	5.00	78.25

STORM EVENT (YEAR) = 100.00
Area Averaged 2-Year Rainfall = 2.000(In)
Area Averaged 100-Year Rainfall = 5.000(In)

Point rain (area averaged) = 5.000(In)
Areal adjustment factor = 100.00 %
Adjusted average point rain = 5.000(In)

Sub-Area Data:

Area(Ac.)	Runoff Index	Impervious %
15.650	68.90	0.429

Total Area Entered = 15.65(Ac.)

RI AMC2	RI AMC-2	Infil. Rate (In/Hr)	Impervious (Dec.%)	Adj. Infil. Rate (In/Hr)	Area% (Dec.)	F (In/Hr)
68.9	68.9	0.374	0.429	0.230	1.000	0.230
					Sum (F) =	0.230

Area averaged mean soil loss (F) (In/Hr) = 0.230
Minimum soil loss rate ((In/Hr)) = 0.115
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.557

U n i t   H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	202.664	43.858	6.917
2	0.167	405.329	43.182	6.811
3	0.250	607.993	8.686	1.370
4	0.333	810.657	4.274	0.674
			Sum = 100.000	Sum= 15.772

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Loss rate(In./Hr) Low	Effective (In/Hr)
1	0.08	0.07	0.040	(0.407)	0.022	0.018
2	0.17	0.07	0.040	(0.405)	0.022	0.018
3	0.25	0.07	0.040	(0.404)	0.022	0.018
4	0.33	0.10	0.060	(0.402)	0.033	0.027
5	0.42	0.10	0.060	(0.401)	0.033	0.027
6	0.50	0.10	0.060	(0.399)	0.033	0.027
7	0.58	0.10	0.060	(0.397)	0.033	0.027
8	0.67	0.10	0.060	(0.396)	0.033	0.027
9	0.75	0.10	0.060	(0.394)	0.033	0.027
10	0.83	0.13	0.080	(0.393)	0.045	0.035
11	0.92	0.13	0.080	(0.391)	0.045	0.035
12	1.00	0.13	0.080	(0.390)	0.045	0.035
13	1.08	0.10	0.060	(0.388)	0.033	0.027
14	1.17	0.10	0.060	(0.387)	0.033	0.027
15	1.25	0.10	0.060	(0.385)	0.033	0.027
16	1.33	0.10	0.060	(0.384)	0.033	0.027
17	1.42	0.10	0.060	(0.382)	0.033	0.027
18	1.50	0.10	0.060	(0.381)	0.033	0.027
19	1.58	0.10	0.060	(0.379)	0.033	0.027
20	1.67	0.10	0.060	(0.378)	0.033	0.027
21	1.75	0.10	0.060	(0.376)	0.033	0.027
22	1.83	0.13	0.080	(0.374)	0.045	0.035
23	1.92	0.13	0.080	(0.373)	0.045	0.035
24	2.00	0.13	0.080	(0.371)	0.045	0.035
25	2.08	0.13	0.080	(0.370)	0.045	0.035
26	2.17	0.13	0.080	(0.368)	0.045	0.035
27	2.25	0.13	0.080	(0.367)	0.045	0.035
28	2.33	0.13	0.080	(0.365)	0.045	0.035
29	2.42	0.13	0.080	(0.364)	0.045	0.035
30	2.50	0.13	0.080	(0.362)	0.045	0.035
31	2.58	0.17	0.100	(0.361)	0.056	0.044
32	2.67	0.17	0.100	(0.360)	0.056	0.044
33	2.75	0.17	0.100	(0.358)	0.056	0.044
34	2.83	0.17	0.100	(0.357)	0.056	0.044
35	2.92	0.17	0.100	(0.355)	0.056	0.044
36	3.00	0.17	0.100	(0.354)	0.056	0.044
37	3.08	0.17	0.100	(0.352)	0.056	0.044
38	3.17	0.17	0.100	(0.351)	0.056	0.044

39	3.25	0.17	0.100	(0.349)	0.056	0.044
40	3.33	0.17	0.100	(0.348)	0.056	0.044
41	3.42	0.17	0.100	(0.346)	0.056	0.044
42	3.50	0.17	0.100	(0.345)	0.056	0.044
43	3.58	0.17	0.100	(0.343)	0.056	0.044
44	3.67	0.17	0.100	(0.342)	0.056	0.044
45	3.75	0.17	0.100	(0.341)	0.056	0.044
46	3.83	0.20	0.120	(0.339)	0.067	0.053
47	3.92	0.20	0.120	(0.338)	0.067	0.053
48	4.00	0.20	0.120	(0.336)	0.067	0.053
49	4.08	0.20	0.120	(0.335)	0.067	0.053
50	4.17	0.20	0.120	(0.333)	0.067	0.053
51	4.25	0.20	0.120	(0.332)	0.067	0.053
52	4.33	0.23	0.140	(0.331)	0.078	0.062
53	4.42	0.23	0.140	(0.329)	0.078	0.062
54	4.50	0.23	0.140	(0.328)	0.078	0.062
55	4.58	0.23	0.140	(0.326)	0.078	0.062
56	4.67	0.23	0.140	(0.325)	0.078	0.062
57	4.75	0.23	0.140	(0.324)	0.078	0.062
58	4.83	0.27	0.160	(0.322)	0.089	0.071
59	4.92	0.27	0.160	(0.321)	0.089	0.071
60	5.00	0.27	0.160	(0.319)	0.089	0.071
61	5.08	0.20	0.120	(0.318)	0.067	0.053
62	5.17	0.20	0.120	(0.317)	0.067	0.053
63	5.25	0.20	0.120	(0.315)	0.067	0.053
64	5.33	0.23	0.140	(0.314)	0.078	0.062
65	5.42	0.23	0.140	(0.312)	0.078	0.062
66	5.50	0.23	0.140	(0.311)	0.078	0.062
67	5.58	0.27	0.160	(0.310)	0.089	0.071
68	5.67	0.27	0.160	(0.308)	0.089	0.071
69	5.75	0.27	0.160	(0.307)	0.089	0.071
70	5.83	0.27	0.160	(0.306)	0.089	0.071
71	5.92	0.27	0.160	(0.304)	0.089	0.071
72	6.00	0.27	0.160	(0.303)	0.089	0.071
73	6.08	0.30	0.180	(0.302)	0.100	0.080
74	6.17	0.30	0.180	(0.300)	0.100	0.080
75	6.25	0.30	0.180	(0.299)	0.100	0.080
76	6.33	0.30	0.180	(0.298)	0.100	0.080
77	6.42	0.30	0.180	(0.296)	0.100	0.080
78	6.50	0.30	0.180	(0.295)	0.100	0.080
79	6.58	0.33	0.200	(0.294)	0.111	0.089
80	6.67	0.33	0.200	(0.292)	0.111	0.089
81	6.75	0.33	0.200	(0.291)	0.111	0.089
82	6.83	0.33	0.200	(0.290)	0.111	0.089
83	6.92	0.33	0.200	(0.288)	0.111	0.089
84	7.00	0.33	0.200	(0.287)	0.111	0.089
85	7.08	0.33	0.200	(0.286)	0.111	0.089
86	7.17	0.33	0.200	(0.284)	0.111	0.089
87	7.25	0.33	0.200	(0.283)	0.111	0.089
88	7.33	0.37	0.220	(0.282)	0.122	0.098
89	7.42	0.37	0.220	(0.281)	0.122	0.098
90	7.50	0.37	0.220	(0.279)	0.122	0.098
91	7.58	0.40	0.240	(0.278)	0.134	0.106
92	7.67	0.40	0.240	(0.277)	0.134	0.106
93	7.75	0.40	0.240	(0.275)	0.134	0.106
94	7.83	0.43	0.260	(0.274)	0.145	0.115
95	7.92	0.43	0.260	(0.273)	0.145	0.115
96	8.00	0.43	0.260	(0.272)	0.145	0.115
97	8.08	0.50	0.300	(0.270)	0.167	0.133
98	8.17	0.50	0.300	(0.269)	0.167	0.133
99	8.25	0.50	0.300	(0.268)	0.167	0.133
100	8.33	0.50	0.300	(0.267)	0.167	0.133
101	8.42	0.50	0.300	(0.265)	0.167	0.133
102	8.50	0.50	0.300	(0.264)	0.167	0.133
103	8.58	0.53	0.320	(0.263)	0.178	0.142
104	8.67	0.53	0.320	(0.262)	0.178	0.142
105	8.75	0.53	0.320	(0.260)	0.178	0.142
106	8.83	0.57	0.340	(0.259)	0.189	0.151
107	8.92	0.57	0.340	(0.258)	0.189	0.151
108	9.00	0.57	0.340	(0.257)	0.189	0.151
109	9.08	0.63	0.380	(0.256)	0.212	0.168

110	9.17	0.63	0.380	(0.254)	0.212	0.168
111	9.25	0.63	0.380	(0.253)	0.212	0.168
112	9.33	0.67	0.400	(0.252)	0.223	0.177
113	9.42	0.67	0.400	(0.251)	0.223	0.177
114	9.50	0.67	0.400	(0.249)	0.223	0.177
115	9.58	0.70	0.420	(0.248)	0.234	0.186
116	9.67	0.70	0.420	(0.247)	0.234	0.186
117	9.75	0.70	0.420	(0.246)	0.234	0.186
118	9.83	0.73	0.440	0.245	(0.245)	0.195
119	9.92	0.73	0.440	0.244	(0.245)	0.196
120	10.00	0.73	0.440	0.242	(0.245)	0.198
121	10.08	0.50	0.300	(0.241)	0.167	0.133
122	10.17	0.50	0.300	(0.240)	0.167	0.133
123	10.25	0.50	0.300	(0.239)	0.167	0.133
124	10.33	0.50	0.300	(0.238)	0.167	0.133
125	10.42	0.50	0.300	(0.237)	0.167	0.133
126	10.50	0.50	0.300	(0.235)	0.167	0.133
127	10.58	0.67	0.400	(0.234)	0.223	0.177
128	10.67	0.67	0.400	(0.233)	0.223	0.177
129	10.75	0.67	0.400	(0.232)	0.223	0.177
130	10.83	0.67	0.400	(0.231)	0.223	0.177
131	10.92	0.67	0.400	(0.230)	0.223	0.177
132	11.00	0.67	0.400	(0.229)	0.223	0.177
133	11.08	0.63	0.380	(0.227)	0.212	0.168
134	11.17	0.63	0.380	(0.226)	0.212	0.168
135	11.25	0.63	0.380	(0.225)	0.212	0.168
136	11.33	0.63	0.380	(0.224)	0.212	0.168
137	11.42	0.63	0.380	(0.223)	0.212	0.168
138	11.50	0.63	0.380	(0.222)	0.212	0.168
139	11.58	0.57	0.340	(0.221)	0.189	0.151
140	11.67	0.57	0.340	(0.220)	0.189	0.151
141	11.75	0.57	0.340	(0.219)	0.189	0.151
142	11.83	0.60	0.360	(0.217)	0.200	0.160
143	11.92	0.60	0.360	(0.216)	0.200	0.160
144	12.00	0.60	0.360	(0.215)	0.200	0.160
145	12.08	0.83	0.500	0.214	(0.278)	0.286
146	12.17	0.83	0.500	0.213	(0.278)	0.287
147	12.25	0.83	0.500	0.212	(0.278)	0.288
148	12.33	0.87	0.520	0.211	(0.290)	0.309
149	12.42	0.87	0.520	0.210	(0.290)	0.310
150	12.50	0.87	0.520	0.209	(0.290)	0.311
151	12.58	0.93	0.560	0.208	(0.312)	0.352
152	12.67	0.93	0.560	0.207	(0.312)	0.353
153	12.75	0.93	0.560	0.206	(0.312)	0.354
154	12.83	0.97	0.580	0.205	(0.323)	0.375
155	12.92	0.97	0.580	0.204	(0.323)	0.376
156	13.00	0.97	0.580	0.203	(0.323)	0.377
157	13.08	1.13	0.680	0.202	(0.379)	0.478
158	13.17	1.13	0.680	0.201	(0.379)	0.479
159	13.25	1.13	0.680	0.200	(0.379)	0.480
160	13.33	1.13	0.680	0.199	(0.379)	0.481
161	13.42	1.13	0.680	0.198	(0.379)	0.482
162	13.50	1.13	0.680	0.197	(0.379)	0.483
163	13.58	0.77	0.460	0.196	(0.256)	0.264
164	13.67	0.77	0.460	0.195	(0.256)	0.265
165	13.75	0.77	0.460	0.194	(0.256)	0.266
166	13.83	0.77	0.460	0.193	(0.256)	0.267
167	13.92	0.77	0.460	0.192	(0.256)	0.268
168	14.00	0.77	0.460	0.191	(0.256)	0.269
169	14.08	0.90	0.540	0.190	(0.301)	0.350
170	14.17	0.90	0.540	0.189	(0.301)	0.351
171	14.25	0.90	0.540	0.188	(0.301)	0.352
172	14.33	0.87	0.520	0.187	(0.290)	0.333
173	14.42	0.87	0.520	0.186	(0.290)	0.334
174	14.50	0.87	0.520	0.185	(0.290)	0.335
175	14.58	0.87	0.520	0.184	(0.290)	0.336
176	14.67	0.87	0.520	0.183	(0.290)	0.337
177	14.75	0.87	0.520	0.182	(0.290)	0.338
178	14.83	0.83	0.500	0.181	(0.278)	0.319
179	14.92	0.83	0.500	0.180	(0.278)	0.320
180	15.00	0.83	0.500	0.179	(0.278)	0.321

181	15.08	0.80	0.480	0.178	(0.267)	0.302
182	15.17	0.80	0.480	0.177	(0.267)	0.303
183	15.25	0.80	0.480	0.177	(0.267)	0.303
184	15.33	0.77	0.460	0.176	(0.256)	0.284
185	15.42	0.77	0.460	0.175	(0.256)	0.285
186	15.50	0.77	0.460	0.174	(0.256)	0.286
187	15.58	0.63	0.380	0.173	(0.212)	0.207
188	15.67	0.63	0.380	0.172	(0.212)	0.208
189	15.75	0.63	0.380	0.171	(0.212)	0.209
190	15.83	0.63	0.380	0.170	(0.212)	0.210
191	15.92	0.63	0.380	0.169	(0.212)	0.211
192	16.00	0.63	0.380	0.169	(0.212)	0.211
193	16.08	0.13	0.080	(0.168)	0.045	0.035
194	16.17	0.13	0.080	(0.167)	0.045	0.035
195	16.25	0.13	0.080	(0.166)	0.045	0.035
196	16.33	0.13	0.080	(0.165)	0.045	0.035
197	16.42	0.13	0.080	(0.164)	0.045	0.035
198	16.50	0.13	0.080	(0.163)	0.045	0.035
199	16.58	0.10	0.060	(0.163)	0.033	0.027
200	16.67	0.10	0.060	(0.162)	0.033	0.027
201	16.75	0.10	0.060	(0.161)	0.033	0.027
202	16.83	0.10	0.060	(0.160)	0.033	0.027
203	16.92	0.10	0.060	(0.159)	0.033	0.027
204	17.00	0.10	0.060	(0.159)	0.033	0.027
205	17.08	0.17	0.100	(0.158)	0.056	0.044
206	17.17	0.17	0.100	(0.157)	0.056	0.044
207	17.25	0.17	0.100	(0.156)	0.056	0.044
208	17.33	0.17	0.100	(0.155)	0.056	0.044
209	17.42	0.17	0.100	(0.155)	0.056	0.044
210	17.50	0.17	0.100	(0.154)	0.056	0.044
211	17.58	0.17	0.100	(0.153)	0.056	0.044
212	17.67	0.17	0.100	(0.152)	0.056	0.044
213	17.75	0.17	0.100	(0.152)	0.056	0.044
214	17.83	0.13	0.080	(0.151)	0.045	0.035
215	17.92	0.13	0.080	(0.150)	0.045	0.035
216	18.00	0.13	0.080	(0.149)	0.045	0.035
217	18.08	0.13	0.080	(0.149)	0.045	0.035
218	18.17	0.13	0.080	(0.148)	0.045	0.035
219	18.25	0.13	0.080	(0.147)	0.045	0.035
220	18.33	0.13	0.080	(0.146)	0.045	0.035
221	18.42	0.13	0.080	(0.146)	0.045	0.035
222	18.50	0.13	0.080	(0.145)	0.045	0.035
223	18.58	0.10	0.060	(0.144)	0.033	0.027
224	18.67	0.10	0.060	(0.144)	0.033	0.027
225	18.75	0.10	0.060	(0.143)	0.033	0.027
226	18.83	0.07	0.040	(0.142)	0.022	0.018
227	18.92	0.07	0.040	(0.142)	0.022	0.018
228	19.00	0.07	0.040	(0.141)	0.022	0.018
229	19.08	0.10	0.060	(0.140)	0.033	0.027
230	19.17	0.10	0.060	(0.140)	0.033	0.027
231	19.25	0.10	0.060	(0.139)	0.033	0.027
232	19.33	0.13	0.080	(0.138)	0.045	0.035
233	19.42	0.13	0.080	(0.138)	0.045	0.035
234	19.50	0.13	0.080	(0.137)	0.045	0.035
235	19.58	0.10	0.060	(0.136)	0.033	0.027
236	19.67	0.10	0.060	(0.136)	0.033	0.027
237	19.75	0.10	0.060	(0.135)	0.033	0.027
238	19.83	0.07	0.040	(0.134)	0.022	0.018
239	19.92	0.07	0.040	(0.134)	0.022	0.018
240	20.00	0.07	0.040	(0.133)	0.022	0.018
241	20.08	0.10	0.060	(0.133)	0.033	0.027
242	20.17	0.10	0.060	(0.132)	0.033	0.027
243	20.25	0.10	0.060	(0.132)	0.033	0.027
244	20.33	0.10	0.060	(0.131)	0.033	0.027
245	20.42	0.10	0.060	(0.130)	0.033	0.027
246	20.50	0.10	0.060	(0.130)	0.033	0.027
247	20.58	0.10	0.060	(0.129)	0.033	0.027
248	20.67	0.10	0.060	(0.129)	0.033	0.027
249	20.75	0.10	0.060	(0.128)	0.033	0.027
250	20.83	0.07	0.040	(0.128)	0.022	0.018
251	20.92	0.07	0.040	(0.127)	0.022	0.018

252	21.00	0.07	0.040	(0.127)	0.022	0.018
253	21.08	0.10	0.060	(0.126)	0.033	0.027
254	21.17	0.10	0.060	(0.126)	0.033	0.027
255	21.25	0.10	0.060	(0.125)	0.033	0.027
256	21.33	0.07	0.040	(0.125)	0.022	0.018
257	21.42	0.07	0.040	(0.124)	0.022	0.018
258	21.50	0.07	0.040	(0.124)	0.022	0.018
259	21.58	0.10	0.060	(0.123)	0.033	0.027
260	21.67	0.10	0.060	(0.123)	0.033	0.027
261	21.75	0.10	0.060	(0.122)	0.033	0.027
262	21.83	0.07	0.040	(0.122)	0.022	0.018
263	21.92	0.07	0.040	(0.122)	0.022	0.018
264	22.00	0.07	0.040	(0.121)	0.022	0.018
265	22.08	0.10	0.060	(0.121)	0.033	0.027
266	22.17	0.10	0.060	(0.120)	0.033	0.027
267	22.25	0.10	0.060	(0.120)	0.033	0.027
268	22.33	0.07	0.040	(0.120)	0.022	0.018
269	22.42	0.07	0.040	(0.119)	0.022	0.018
270	22.50	0.07	0.040	(0.119)	0.022	0.018
271	22.58	0.07	0.040	(0.119)	0.022	0.018
272	22.67	0.07	0.040	(0.118)	0.022	0.018
273	22.75	0.07	0.040	(0.118)	0.022	0.018
274	22.83	0.07	0.040	(0.118)	0.022	0.018
275	22.92	0.07	0.040	(0.117)	0.022	0.018
276	23.00	0.07	0.040	(0.117)	0.022	0.018
277	23.08	0.07	0.040	(0.117)	0.022	0.018
278	23.17	0.07	0.040	(0.116)	0.022	0.018
279	23.25	0.07	0.040	(0.116)	0.022	0.018
280	23.33	0.07	0.040	(0.116)	0.022	0.018
281	23.42	0.07	0.040	(0.116)	0.022	0.018
282	23.50	0.07	0.040	(0.116)	0.022	0.018
283	23.58	0.07	0.040	(0.115)	0.022	0.018
284	23.67	0.07	0.040	(0.115)	0.022	0.018
285	23.75	0.07	0.040	(0.115)	0.022	0.018
286	23.83	0.07	0.040	(0.115)	0.022	0.018
287	23.92	0.07	0.040	(0.115)	0.022	0.018
288	24.00	0.07	0.040	(0.115)	0.022	0.018

```
                 (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    31.2
       Flood volume = Effective rainfall      2.60(In)
        times area      15.7(Ac.)/[(In)/(Ft.)] =       3.4(Ac.Ft)
       Total soil loss =      2.40(In)
       Total soil loss =     3.132(Ac.Ft)
       Total rainfall =      5.00(In)
       Flood volume =      147596.1 Cubic Feet
       Total soil loss =      136442.7 Cubic Feet
       --------------------------------------------------------------------
        Peak flow rate of this hydrograph =      7.616(CFS)
       --------------------------------------------------------------------
       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           24 - H O U R   S T O R M
                      R u n o f f     H y d r o g r a p h
       --------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

       --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
   0+ 5      0.0008      0.12  Q         |         |         |         |
   0+10      0.0025      0.24  Q         |         |         |         |
   0+15      0.0044      0.27  VQ        |         |         |         |
   0+20      0.0067      0.34  VQ        |         |         |         |
   0+25      0.0095      0.40  VQ        |         |         |         |
   0+30      0.0123      0.41  VQ        |         |         |         |
   0+35      0.0152      0.42  VQ        |         |         |         |
   0+40      0.0181      0.42  VQ        |         |         |         |
   0+45      0.0210      0.42  VQ        |         |         |         |
   0+50      0.0243      0.48  VQ        |         |         |         |
   0+55      0.0280      0.54  V Q       |         |         |         |
   1+ 0      0.0319      0.55  V Q       |         |         |         |
   1+ 5      0.0353      0.50  VQ        |         |         |         |
```

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 1+10      0.0383     0.44  VQ        |         |         |         |
 1+15      0.0412     0.43  VQ        |         |         |         |
 1+20      0.0441     0.42  VQ        |         |         |         |
 1+25      0.0470     0.42  VQ        |         |         |         |
 1+30      0.0499     0.42  VQ        |         |         |         |
 1+35      0.0528     0.42  VQ        |         |         |         |
 1+40      0.0557     0.42  VQ        |         |         |         |
 1+45      0.0586     0.42  VQ        |         |         |         |
 1+50      0.0619     0.48  VQ        |         |         |         |
 1+55      0.0656     0.54  V Q       |         |         |         |
 2+ 0      0.0694     0.55  V Q       |         |         |         |
 2+ 5      0.0733     0.56  V Q       |         |         |         |
 2+10      0.0771     0.56  V Q       |         |         |         |
 2+15      0.0810     0.56  V Q       |         |         |         |
 2+20      0.0848     0.56  |VQ       |         |         |         |
 2+25      0.0887     0.56  |VQ       |         |         |         |
 2+30      0.0925     0.56  |VQ       |         |         |         |
 2+35      0.0968     0.62  |VQ       |         |         |         |
 2+40      0.1015     0.68  |VQ       |         |         |         |
 2+45      0.1063     0.69  |VQ       |         |         |         |
 2+50      0.1111     0.70  |VQ       |         |         |         |
 2+55      0.1159     0.70  |VQ       |         |         |         |
 3+ 0      0.1207     0.70  |VQ       |         |         |         |
 3+ 5      0.1256     0.70  |VQ       |         |         |         |
 3+10      0.1304     0.70  |VQ       |         |         |         |
 3+15      0.1352     0.70  |VQ       |         |         |         |
 3+20      0.1400     0.70  |VQ       |         |         |         |
 3+25      0.1448     0.70  |VQ       |         |         |         |
 3+30      0.1496     0.70  |VQ       |         |         |         |
 3+35      0.1544     0.70  |VQ       |         |         |         |
 3+40      0.1593     0.70  |VQ       |         |         |         |
 3+45      0.1641     0.70  |VQ       |         |         |         |
 3+50      0.1693     0.76  |V Q      |         |         |         |
 3+55      0.1750     0.82  | VQ      |         |         |         |
 4+ 0      0.1807     0.83  | VQ      |         |         |         |
 4+ 5      0.1865     0.84  | VQ      |         |         |         |
 4+10      0.1923     0.84  | VQ      |         |         |         |
 4+15      0.1981     0.84  | VQ      |         |         |         |
 4+20      0.2043     0.90  | VQ      |         |         |         |
 4+25      0.2109     0.96  | VQ      |         |         |         |
 4+30      0.2176     0.97  | VQ      |         |         |         |
 4+35      0.2243     0.98  | VQ      |         |         |         |
 4+40      0.2311     0.98  | VQ      |         |         |         |
 4+45      0.2378     0.98  | VQ      |         |         |         |
 4+50      0.2450     1.04  | V Q     |         |         |         |
 4+55      0.2526     1.10  | V Q     |         |         |         |
 5+ 0      0.2602     1.11  |  VQ     |         |         |         |
 5+ 5      0.2671     1.00  |  Q      |         |         |         |
 5+10      0.2731     0.88  |  Q      |         |         |         |
 5+15      0.2790     0.85  |  Q      |         |         |         |
 5+20      0.2852     0.90  |  Q      |         |         |         |
 5+25      0.2918     0.96  |  Q      |         |         |         |
 5+30      0.2985     0.97  |  Q      |         |         |         |
 5+35      0.3057     1.04  |  VQ     |         |         |         |
 5+40      0.3132     1.10  |  VQ     |         |         |         |
 5+45      0.3209     1.11  |  VQ     |         |         |         |
 5+50      0.3286     1.12  |  VQ     |         |         |         |
 5+55      0.3363     1.12  |  VQ     |         |         |         |
 6+ 0      0.3440     1.12  |   Q     |         |         |         |
 6+ 5      0.3522     1.18  |   Q     |         |         |         |
 6+10      0.3607     1.24  |   Q     |         |         |         |
 6+15      0.3693     1.25  |   VQ    |         |         |         |
 6+20      0.3780     1.26  |   VQ    |         |         |         |
 6+25      0.3867     1.26  |   VQ    |         |         |         |
 6+30      0.3953     1.26  |   VQ    |         |         |         |
 6+35      0.4044     1.32  |   VQ    |         |         |         |
 6+40      0.4139     1.38  |   VQ    |         |         |         |
 6+45      0.4235     1.39  |   VQ    |         |         |         |
 6+50      0.4332     1.40  |    Q    |         |         |         |
 6+55      0.4428     1.40  |    Q    |         |         |         |
 7+ 0      0.4524     1.40  |    Q    |         |         |         |
 7+ 5      0.4621     1.40  |    Q    |         |         |         |
 7+10      0.4717     1.40  |    Q    |         |         |         |
 7+15      0.4813     1.40  |    Q    |         |         |         |
 7+20      0.4914     1.46  |    Q    |         |         |         |
 7+25      0.5019     1.52  |    VQ   |         |         |         |
 7+30      0.5124     1.53  |     Q   |         |         |         |
 7+35      0.5234     1.60  |     Q   |         |         |         |
 7+40      0.5349     1.66  |     Q   |         |         |         |
 7+45      0.5464     1.67  |     Q   |         |         |         |
 7+50      0.5584     1.74  |     Q   |         |         |         |
 7+55      0.5708     1.80  |     VQ  |         |         |         |
 8+ 0      0.5832     1.81  |     VQ  |         |         |         |
 8+ 5      0.5966     1.94  |      Q  |         |         |         |
 8+10      0.6108     2.06  |      VQ |         |         |         |
 8+15      0.6252     2.09  |      VQ |         |         |         |
 8+20      0.6396     2.10  |      VQ |         |         |         |
 8+25      0.6541     2.10  |      VQ |         |         |         |
 8+30      0.6685     2.10  |      VQ |         |         |         |
 8+35      0.6834     2.16  |       Q |         |         |         |
 8+40      0.6987     2.22  |       Q |         |         |         |
 8+45      0.7141     2.23  |       Q |         |         |         |
 8+50      0.7299     2.30  |       VQ|         |         |         |
 8+55      0.7462     2.36  |       VQ|         |         |         |
 9+ 0      0.7625     2.37  |        Q|         |         |         |
 9+ 5      0.7797     2.50  |        VQ         |         |         |
 9+10      0.7978     2.62  |        VQ         |         |         |
 9+15      0.8160     2.65  |        VQ         |         |         |
 9+20      0.8347     2.72  |        VQ         |         |         |
 9+25      0.8539     2.78  |         VQ        |         |         |
 9+30      0.8731     2.79  |         VQ        |         |         |
 9+35      0.8928     2.86  |         VQ        |         |         |
 9+40      0.9129     2.92  |         VQ        |         |         |
 9+45      0.9331     2.93  |         |Q        |         |         |
 9+50      0.9537     3.00  |         |VQ       |         |         |
 9+55      0.9749     3.07  |         |VQ       |         |         |
10+ 0      0.9962     3.10  |         |VQ       |         |         |
10+ 5      1.0146     2.67  |         QV        |         |         |
10+10      1.0299     2.23  |       Q | V       |         |         |
10+15      1.0447     2.14  |       Q | V       |         |         |
10+20      1.0591     2.10  |       Q | V       |         |         |
10+25      1.0736     2.10  |       Q | V       |         |         |
10+30      1.0880     2.10  |       Q | V       |         |         |
10+35      1.1046     2.40  |        Q|  V      |         |         |
10+40      1.1232     2.71  |         Q  V      |         |         |
10+45      1.1423     2.77  |         |Q V      |         |         |
10+50      1.1616     2.80  |         |Q V      |         |         |
10+55      1.1808     2.80  |         |Q V      |         |         |
11+ 0      1.2001     2.80  |         |Q  V     |         |         |
11+ 5      1.2189     2.74  |         Q   V     |         |         |
11+10      1.2374     2.68  |         Q   V     |         |         |
11+15      1.2557     2.66  |         Q   V     |         |         |
11+20      1.2740     2.66  |         Q    V    |         |         |
11+25      1.2923     2.66  |         Q    V    |         |         |
11+30      1.3106     2.66  |         Q    V    |         |         |
11+35      1.3281     2.53  |         Q    V    |         |         |
11+40      1.3447     2.41  |        Q|    V    |         |         |
11+45      1.3612     2.39  |        Q|     V   |         |         |
11+50      1.3780     2.44  |        Q|     V   |         |         |
11+55      1.3952     2.50  |        Q|     V   |         |         |
12+ 0      1.4125     2.51  |         Q     V   |         |         |
12+ 5      1.4358     3.39  |         |  Q  V   |         |         |
12+10      1.4652     4.26  |         |      Q  |         |         |
12+15      1.4958     4.45  |         |      Q  |         |         |
12+20      1.5281     4.69  |         |       Q |         |         |
12+25      1.5614     4.84  |         |       VQ|         |         |
12+30      1.5950     4.88  |         |       VQ|         |         |
12+35      1.6307     5.19  |         |        VQ         |         |
12+40      1.6685     5.48  |         |        V|Q        |         |
12+45      1.7067     5.55  |         |         V Q       |         |
12+50      1.7462     5.73  |         |         V Q       |         |
12+55      1.7867     5.88  |         |         |V Q      |         |
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13+ 0    1.8275    5.93 |         |         |V Q      |         |
13+ 5    1.8733    6.65 |         |         | V   Q   |         |
13+10    1.9239    7.35 |         |         | V      Q|         |
13+15    1.9756    7.50 |         |         |  V      Q         |
13+20    2.0278    7.58 |         |         |  V      Q         |
13+25    2.0802    7.60 |         |         |   V     Q         |
13+30    2.1326    7.62 |         |         |    V    Q         |
13+35    2.1747    6.11 |         |         |   QV    |         |
13+40    2.2066    4.63 |         |       Q |     V   |         |
13+45    2.2365    4.34 |         |      Q  |     V   |         |
13+50    2.2655    4.21 |         |     Q   |     V   |         |
13+55    2.2945    4.22 |         |     Q   |      V  |         |
14+ 0    2.3237    4.24 |         |     Q   |      V  |         |
14+ 5    2.3568    4.81 |         |        Q|      V  |         |
14+10    2.3938    5.37 |         |         |Q      V |         |
14+15    2.4316    5.49 |         |         |Q      V |         |
14+20    2.4690    5.42 |         |         |Q       V|         |
14+25    2.5055    5.30 |         |         |Q       V|         |
14+30    2.5420    5.29 |         |         |Q        V         |
14+35    2.5784    5.29 |         |         |Q        V         |
14+40    2.6150    5.31 |         |         |Q        V         |
14+45    2.6516    5.32 |         |         |Q        |V        |
14+50    2.6874    5.20 |         |         Q         |V        |
14+55    2.7224    5.08 |         |         Q         | V       |
15+ 0    2.7572    5.06 |         |         Q         | V       |
15+ 5    2.7912    4.93 |         |        Q|         | V       |
15+10    2.8243    4.80 |         |        Q|         |  V      |
15+15    2.8573    4.79 |         |        Q|         |  V      |
15+20    2.8893    4.65 |         |       Q |         |   V     |
15+25    2.9205    4.53 |         |       Q |         |   V     |
15+30    2.9517    4.52 |         |       Q |         |   V     |
15+35    2.9790    3.97 |         |    Q    |         |    V    |
15+40    3.0026    3.43 |         |  Q      |         |    V    |
15+45    3.0256    3.34 |         |  Q      |         |    V    |
15+50    3.0483    3.30 |         |  Q      |         |    V    |
15+55    3.0712    3.31 |         |  Q      |         |     V   |
16+ 0    3.0941    3.33 |         |  Q      |         |     V   |
16+ 5    3.1086    2.12 |       Q |         |         |     V   |
16+10    3.1150    0.92 |  Q      |         |         |     V   |
16+15    3.1196    0.68 | Q       |         |         |     V   |
16+20    3.1235    0.56 | Q       |         |         |     V   |
16+25    3.1273    0.56 | Q       |         |         |     V   |
16+30    3.1312    0.56 | Q       |         |         |     V   |
16+35    3.1346    0.50 |Q        |         |         |      V  |
16+40    3.1376    0.44 |Q        |         |         |      V  |
16+45    3.1406    0.43 |Q        |         |         |      V  |
16+50    3.1435    0.42 |Q        |         |         |      V  |
16+55    3.1464    0.42 |Q        |         |         |      V  |
17+ 0    3.1492    0.42 |Q        |         |         |      V  |
17+ 5    3.1530    0.54 | Q       |         |         |      V  |
17+10    3.1575    0.66 | Q       |         |         |      V  |
17+15    3.1623    0.69 | Q       |         |         |      V  |
17+20    3.1671    0.70 | Q       |         |         |      V  |
17+25    3.1719    0.70 | Q       |         |         |      V  |
17+30    3.1767    0.70 | Q       |         |         |      V  |
17+35    3.1815    0.70 | Q       |         |         |      V  |
17+40    3.1864    0.70 | Q       |         |         |      V  |
17+45    3.1912    0.70 | Q       |         |         |      V  |
17+50    3.1956    0.64 | Q       |         |         |      V  |
17+55    3.1996    0.58 | Q       |         |         |      V  |
18+ 0    3.2034    0.57 | Q       |         |         |      V  |
18+ 5    3.2073    0.56 | Q       |         |         |      V  |
18+10    3.2112    0.56 | Q       |         |         |      V  |
18+15    3.2150    0.56 | Q       |         |         |      V  |
18+20    3.2189    0.56 | Q       |         |         |      V  |
18+25    3.2227    0.56 | Q       |         |         |       V |
18+30    3.2266    0.56 | Q       |         |         |       V |
18+35    3.2300    0.50 |Q        |         |         |       V |
18+40    3.2330    0.44 |Q        |         |         |       V |
18+45    3.2359    0.43 |Q        |         |         |       V |
18+50    3.2384    0.36 |Q        |         |         |       V |
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18+55    3.2405    0.30 |Q        |         |         |       V |
19+ 0    3.2424    0.29 |Q        |         |         |       V |
19+ 5    3.2448    0.34 |Q        |         |         |       V |
19+10    3.2475    0.40 |Q        |         |         |       V |
19+15    3.2504    0.41 |Q        |         |         |       V |
19+20    3.2537    0.48 |Q        |         |         |       V |
19+25    3.2574    0.54 | Q       |         |         |       V |
19+30    3.2612    0.55 | Q       |         |         |       V |
19+35    3.2647    0.50 |Q        |         |         |       V |
19+40    3.2677    0.44 |Q        |         |         |       V |
19+45    3.2706    0.43 |Q        |         |         |       V |
19+50    3.2731    0.36 |Q        |         |         |       V |
19+55    3.2751    0.30 |Q        |         |         |       V |
20+ 0    3.2771    0.29 |Q        |         |         |       V |
20+ 5    3.2795    0.34 |Q        |         |         |       V |
20+10    3.2822    0.40 |Q        |         |         |       V |
20+15    3.2851    0.41 |Q        |         |         |       V |
20+20    3.2880    0.42 |Q        |         |         |       V |
20+25    3.2909    0.42 |Q        |         |         |       V |
20+30    3.2937    0.42 |Q        |         |         |       V |
20+35    3.2966    0.42 |Q        |         |         |       V |
20+40    3.2995    0.42 |Q        |         |         |       V |
20+45    3.3024    0.42 |Q        |         |         |       V |
20+50    3.3049    0.36 |Q        |         |         |        V|
20+55    3.3069    0.30 |Q        |         |         |        V|
21+ 0    3.3089    0.29 |Q        |         |         |        V|
21+ 5    3.3112    0.34 |Q        |         |         |        V|
21+10    3.3140    0.40 |Q        |         |         |        V|
21+15    3.3169    0.41 |Q        |         |         |        V|
21+20    3.3193    0.36 |Q        |         |         |        V|
21+25    3.3214    0.30 |Q        |         |         |        V|
21+30    3.3233    0.29 |Q        |         |         |        V|
21+35    3.3257    0.34 |Q        |         |         |        V|
21+40    3.3285    0.40 |Q        |         |         |        V|
21+45    3.3313    0.41 |Q        |         |         |        V|
21+50    3.3338    0.36 |Q        |         |         |        V|
21+55    3.3358    0.30 |Q        |         |         |        V|
22+ 0    3.3378    0.29 |Q        |         |         |        V|
22+ 5    3.3401    0.34 |Q        |         |         |        V|
22+10    3.3429    0.40 |Q        |         |         |        V|
22+15    3.3458    0.41 |Q        |         |         |        V|
22+20    3.3482    0.36 |Q        |         |         |        V|
22+25    3.3503    0.30 |Q        |         |         |        V|
22+30    3.3522    0.29 |Q        |         |         |        V|
22+35    3.3542    0.28 |Q        |         |         |        V|
22+40    3.3561    0.28 |Q        |         |         |        V|
22+45    3.3580    0.28 |Q        |         |         |        V|
22+50    3.3600    0.28 |Q        |         |         |        V|
22+55    3.3619    0.28 |Q        |         |         |        V|
23+ 0    3.3638    0.28 |Q        |         |         |        V|
23+ 5    3.3657    0.28 |Q        |         |         |        V|
23+10    3.3677    0.28 |Q        |         |         |        V|
23+15    3.3696    0.28 |Q        |         |         |        V|
23+20    3.3715    0.28 |Q        |         |         |        V|
23+25    3.3734    0.28 |Q        |         |         |        V|
23+30    3.3754    0.28 |Q        |         |         |        V|
23+35    3.3773    0.28 |Q        |         |         |        V|
23+40    3.3792    0.28 |Q        |         |         |        V|
23+45    3.3811    0.28 |Q        |         |         |        V|
23+50    3.3831    0.28 |Q        |         |         |        V|
23+55    3.3850    0.28 |Q        |         |         |        V|
24+ 0    3.3869    0.28 |Q        |         |         |        V|
24+ 5    3.3880    0.16 Q         |         |         |        V|
24+10    3.3883    0.04 Q         |         |         |        V|
24+15    3.3883    0.01 Q         |         |         |         V
-----------------------------------------------------------------------
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APPENDIX E: STREET CAPACITY NORMAL DEPTH CALCULATIONS

APPENDIX E.1: 36' RIGHT-OF-WAY HALF-STREET TOP-OF-CURB CAPACITY

Rating Table for 36' ROW Street Section-Half Street TC

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.01750	ft/ft
Normal Depth	0.50	ft
Section Definitions		

Station (ft)	Elevation (ft)
0+00.000	0.50
0+00.125	0.00
0+02.125	0.17
0+02.125	0.20
0+18.000	0.52

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.000, 0.50)	(0+18.000, 0.52)	0.015

Channel Slope (ft/ft)	Discharge (ft³/s)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.00500	6.96	2.22	3.14	17.63	17.20
0.00600	7.63	2.43	3.14	17.63	17.20
0.00700	8.24	2.62	3.14	17.63	17.20
0.00800	8.81	2.80	3.14	17.63	17.20
0.00900	9.34	2.98	3.14	17.63	17.20
0.01000	9.85	3.14	3.14	17.63	17.20
0.01100	10.33	3.29	3.14	17.63	17.20
0.01200	10.79	3.44	3.14	17.63	17.20
0.01300	11.23	3.58	3.14	17.63	17.20

Rating Table for 36' ROW Street Section-Half Street TC

Input Data

Channel Slope (ft/ft)	Discharge (ft^3/s)	Velocity (ft/s)	Flow Area (ft^2)	Wetted Perimeter (ft)	Top Width (ft)
0.01400	11.65	3.71	3.14	17.63	17.20
0.01500	12.06	3.84	3.14	17.63	17.20
0.01600	12.46	3.97	3.14	17.63	17.20
0.01700	12.84	4.09	3.14	17.63	17.20
0.01800	13.21	4.21	3.14	17.63	17.20
0.01900	13.58	4.32	3.14	17.63	17.20
0.02000	13.93	4.44	3.14	17.63	17.20
0.02100	14.27	4.54	3.14	17.63	17.20
0.02200	14.61	4.65	3.14	17.63	17.20
0.02300	14.94	4.76	3.14	17.63	17.20
0.02400	15.26	4.86	3.14	17.63	17.20
0.02500	15.57	4.96	3.14	17.63	17.20
0.02600	15.88	5.06	3.14	17.63	17.20
0.02700	16.18	5.15	3.14	17.63	17.20
0.02800	16.48	5.25	3.14	17.63	17.20
0.02900	16.77	5.34	3.14	17.63	17.20
0.03000	17.06	5.43	3.14	17.63	17.20
0.03100	17.34	5.52	3.14	17.63	17.20
0.03200	17.62	5.61	3.14	17.63	17.20
0.03300	17.89	5.70	3.14	17.63	17.20
0.03400	18.16	5.78	3.14	17.63	17.20
0.03500	18.43	5.87	3.14	17.63	17.20
0.03600	18.69	5.95	3.14	17.63	17.20
0.03700	18.95	6.03	3.14	17.63	17.20
0.03800	19.20	6.11	3.14	17.63	17.20
0.03900	19.45	6.19	3.14	17.63	17.20
0.04000	19.70	6.27	3.14	17.63	17.20
0.04100	19.94	6.35	3.14	17.63	17.20
0.04200	20.19	6.43	3.14	17.63	17.20
0.04300	20.42	6.50	3.14	17.63	17.20
0.04400	20.66	6.58	3.14	17.63	17.20
0.04500	20.89	6.65	3.14	17.63	17.20
0.04600	21.13	6.73	3.14	17.63	17.20
0.04700	21.35	6.80	3.14	17.63	17.20
0.04800	21.58	6.87	3.14	17.63	17.20
0.04900	21.80	6.94	3.14	17.63	17.20
0.05000	22.02	7.01	3.14	17.63	17.20

Rating Table for 36' ROW Street Section-Half Street TC

Input Data

Channel Slope (ft/ft)	Discharge (ft^3/s)	Velocity (ft/s)	Flow Area (ft^2)	Wetted Perimeter (ft)	Top Width (ft)
0.05100	22.24	7.08	3.14	17.63	17.20
0.05200	22.46	7.15	3.14	17.63	17.20
0.05300	22.68	7.22	3.14	17.63	17.20
0.05400	22.89	7.29	3.14	17.63	17.20
0.05500	23.10	7.35	3.14	17.63	17.20
0.05600	23.31	7.42	3.14	17.63	17.20
0.05700	23.52	7.49	3.14	17.63	17.20
0.05800	23.72	7.55	3.14	17.63	17.20
0.05900	23.92	7.62	3.14	17.63	17.20
0.06000	24.13	7.68	3.14	17.63	17.20
0.06100	24.33	7.75	3.14	17.63	17.20
0.06200	24.53	7.81	3.14	17.63	17.20
0.06300	24.72	7.87	3.14	17.63	17.20
0.06400	24.92	7.93	3.14	17.63	17.20
0.06500	25.11	8.00	3.14	17.63	17.20
0.06600	25.30	8.06	3.14	17.63	17.20
0.06700	25.50	8.12	3.14	17.63	17.20
0.06800	25.68	8.18	3.14	17.63	17.20
0.06900	25.87	8.24	3.14	17.63	17.20
0.07000	26.06	8.30	3.14	17.63	17.20
0.07100	26.25	8.36	3.14	17.63	17.20
0.07200	26.43	8.41	3.14	17.63	17.20
0.07300	26.61	8.47	3.14	17.63	17.20
0.07400	26.79	8.53	3.14	17.63	17.20
0.07500	26.97	8.59	3.14	17.63	17.20
0.07600	27.15	8.65	3.14	17.63	17.20
0.07700	27.33	8.70	3.14	17.63	17.20
0.07800	27.51	8.76	3.14	17.63	17.20
0.07900	27.68	8.81	3.14	17.63	17.20
0.08000	27.86	8.87	3.14	17.63	17.20
0.08100	28.03	8.93	3.14	17.63	17.20
0.08200	28.20	8.98	3.14	17.63	17.20
0.08300	28.38	9.03	3.14	17.63	17.20
0.08400	28.55	9.09	3.14	17.63	17.20
0.08500	28.72	9.14	3.14	17.63	17.20
0.08600	28.88	9.20	3.14	17.63	17.20
0.08700	29.05	9.25	3.14	17.63	17.20

Rating Table for 36' ROW Street Section-Half Street TC

Input Data

Channel Slope (ft/ft)	Discharge (ft³/s)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.08800	29.22	9.30	3.14	17.63	17.20
0.08900	29.38	9.36	3.14	17.63	17.20
0.09000	29.55	9.41	3.14	17.63	17.20
0.09100	29.71	9.46	3.14	17.63	17.20
0.09200	29.88	9.51	3.14	17.63	17.20
0.09300	30.04	9.56	3.14	17.63	17.20
0.09400	30.20	9.61	3.14	17.63	17.20
0.09500	30.36	9.67	3.14	17.63	17.20
0.09600	30.52	9.72	3.14	17.63	17.20
0.09700	30.68	9.77	3.14	17.63	17.20
0.09800	30.83	9.82	3.14	17.63	17.20
0.09900	30.99	9.87	3.14	17.63	17.20
0.10000	31.15	9.92	3.14	17.63	17.20

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

APPENDIX E.2: 36’ Right-of-way Half-Street 12’ Dry-Lane Capacity (6’ Provided From Centerline On Half-Street)

Rating Table for 36' ROW Street Section-Half Street 12' dry lane

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.01750	ft/ft
Normal Depth	0.40	ft
Section Definitions		

Station (ft)	Elevation (ft)
0+00.000	0.50
0+00.125	0.00
0+02.125	0.17
0+02.125	0.20
0+18.000	0.52

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.000, 0.50)	(0+18.000, 0.52)	0.015

Channel Slope (ft/ft)	Discharge (ft³/s)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.00500	2.94	1.81	1.62	12.33	11.98
0.00600	3.22	1.99	1.62	12.33	11.98
0.00700	3.48	2.14	1.62	12.33	11.98
0.00800	3.72	2.29	1.62	12.33	11.98
0.00900	3.95	2.43	1.62	12.33	11.98
0.01000	4.16	2.56	1.62	12.33	11.98
0.01100	4.36	2.69	1.62	12.33	11.98
0.01200	4.56	2.81	1.62	12.33	11.98
0.01300	4.74	2.92	1.62	12.33	11.98

Rating Table for 36' ROW Street Section-Half Street 12' dry lane

Input Data

Channel Slope (ft/ft)	Discharge (ft³/s)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.01400	4.92	3.03	1.62	12.33	11.98
0.01500	5.10	3.14	1.62	12.33	11.98
0.01600	5.26	3.24	1.62	12.33	11.98
0.01700	5.42	3.34	1.62	12.33	11.98
0.01800	5.58	3.44	1.62	12.33	11.98
0.01900	5.73	3.53	1.62	12.33	11.98
0.02000	5.88	3.62	1.62	12.33	11.98
0.02100	6.03	3.71	1.62	12.33	11.98
0.02200	6.17	3.80	1.62	12.33	11.98
0.02300	6.31	3.89	1.62	12.33	11.98
0.02400	6.45	3.97	1.62	12.33	11.98
0.02500	6.58	4.05	1.62	12.33	11.98
0.02600	6.71	4.13	1.62	12.33	11.98
0.02700	6.84	4.21	1.62	12.33	11.98
0.02800	6.96	4.29	1.62	12.33	11.98
0.02900	7.08	4.36	1.62	12.33	11.98
0.03000	7.21	4.44	1.62	12.33	11.98
0.03100	7.33	4.51	1.62	12.33	11.98
0.03200	7.44	4.59	1.62	12.33	11.98
0.03300	7.56	4.66	1.62	12.33	11.98
0.03400	7.67	4.73	1.62	12.33	11.98
0.03500	7.78	4.80	1.62	12.33	11.98
0.03600	7.89	4.86	1.62	12.33	11.98
0.03700	8.00	4.93	1.62	12.33	11.98
0.03800	8.11	5.00	1.62	12.33	11.98
0.03900	8.22	5.06	1.62	12.33	11.98
0.04000	8.32	5.13	1.62	12.33	11.98
0.04100	8.42	5.19	1.62	12.33	11.98
0.04200	8.53	5.25	1.62	12.33	11.98
0.04300	8.63	5.32	1.62	12.33	11.98
0.04400	8.73	5.38	1.62	12.33	11.98
0.04500	8.83	5.44	1.62	12.33	11.98
0.04600	8.92	5.50	1.62	12.33	11.98
0.04700	9.02	5.56	1.62	12.33	11.98
0.04800	9.12	5.62	1.62	12.33	11.98
0.04900	9.21	5.67	1.62	12.33	11.98
0.05000	9.30	5.73	1.62	12.33	11.98

Rating Table for 36' ROW Street Section-Half Street 12' dry lane

Input Data

Channel Slope (ft/ft)	Discharge (ft³/s)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.05100	9.40	5.79	1.62	12.33	11.98
0.05200	9.49	5.84	1.62	12.33	11.98
0.05300	9.58	5.90	1.62	12.33	11.98
0.05400	9.67	5.96	1.62	12.33	11.98
0.05500	9.76	6.01	1.62	12.33	11.98
0.05600	9.85	6.07	1.62	12.33	11.98
0.05700	9.93	6.12	1.62	12.33	11.98
0.05800	10.02	6.17	1.62	12.33	11.98
0.05900	10.11	6.23	1.62	12.33	11.98
0.06000	10.19	6.28	1.62	12.33	11.98
0.06100	10.28	6.33	1.62	12.33	11.98
0.06200	10.36	6.38	1.62	12.33	11.98
0.06300	10.44	6.43	1.62	12.33	11.98
0.06400	10.53	6.48	1.62	12.33	11.98
0.06500	10.61	6.53	1.62	12.33	11.98
0.06600	10.69	6.58	1.62	12.33	11.98
0.06700	10.77	6.63	1.62	12.33	11.98
0.06800	10.85	6.68	1.62	12.33	11.98
0.06900	10.93	6.73	1.62	12.33	11.98
0.07000	11.01	6.78	1.62	12.33	11.98
0.07100	11.09	6.83	1.62	12.33	11.98
0.07200	11.16	6.88	1.62	12.33	11.98
0.07300	11.24	6.93	1.62	12.33	11.98
0.07400	11.32	6.97	1.62	12.33	11.98
0.07500	11.39	7.02	1.62	12.33	11.98
0.07600	11.47	7.07	1.62	12.33	11.98
0.07700	11.54	7.11	1.62	12.33	11.98
0.07800	11.62	7.16	1.62	12.33	11.98
0.07900	11.69	7.20	1.62	12.33	11.98
0.08000	11.77	7.25	1.62	12.33	11.98
0.08100	11.84	7.29	1.62	12.33	11.98
0.08200	11.91	7.34	1.62	12.33	11.98
0.08300	11.99	7.38	1.62	12.33	11.98
0.08400	12.06	7.43	1.62	12.33	11.98
0.08500	12.13	7.47	1.62	12.33	11.98
0.08600	12.20	7.52	1.62	12.33	11.98
0.08700	12.27	7.56	1.62	12.33	11.98

Rating Table for 36' ROW Street Section-Half Street 12' dry lane

Input Data

Channel Slope (ft/ft)	Discharge (ft³/s)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.08800	12.34	7.60	1.62	12.33	11.98
0.08900	12.41	7.65	1.62	12.33	11.98
0.09000	12.48	7.69	1.62	12.33	11.98
0.09100	12.55	7.73	1.62	12.33	11.98
0.09200	12.62	7.77	1.62	12.33	11.98
0.09300	12.69	7.82	1.62	12.33	11.98
0.09400	12.76	7.86	1.62	12.33	11.98
0.09500	12.82	7.90	1.62	12.33	11.98
0.09600	12.89	7.94	1.62	12.33	11.98
0.09700	12.96	7.98	1.62	12.33	11.98
0.09800	13.02	8.02	1.62	12.33	11.98
0.09900	13.09	8.06	1.62	12.33	11.98
0.10000	13.16	8.11	1.62	12.33	11.98

APPENDIX F: STORM DRAIN NORMAL DEPTH CALCULATIONS

APPENDIX F.1: LINE A1 STORM DRAIN

Worksheet for LINE A1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Diameter	3.00	ft
Discharge	75.80	ft^3/s

Results

Normal Depth	2.28	ft
Flow Area	5.78	ft^2
Wetted Perimeter	6.36	ft
Hydraulic Radius	0.91	ft
Top Width	2.56	ft
Critical Depth	2.73	ft
Percent Full	76.2	%
Critical Slope	0.01129	ft/ft
Velocity	13.12	ft/s
Velocity Head	2.68	ft
Specific Energy	4.96	ft
Froude Number	1.54	
Maximum Discharge	87.87	ft^3/s
Discharge Full	81.68	ft^3/s
Slope Full	0.01292	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	76.16	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE A1

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.28	ft
Critical Depth	2.73	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.01129	ft/ft

APPENDIX F.2: LINE A2 STORM DRAIN

Worksheet for LINE A2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	4.75	ft³/s

Results

Normal Depth	0.71	ft
Flow Area	0.82	ft²
Wetted Perimeter	2.27	ft
Hydraulic Radius	0.36	ft
Top Width	1.50	ft
Critical Depth	0.84	ft
Percent Full	47.2	%
Critical Slope	0.00568	ft/ft
Velocity	5.80	ft/s
Velocity Head	0.52	ft
Specific Energy	1.23	ft
Froude Number	1.38	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00205	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	47.16	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE A2

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.71	ft
Critical Depth	0.84	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00568	ft/ft

APPENDIX F.3: LINE A3 STORM DRAIN

Worksheet for LINE A3 (R1)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.50	ft
Discharge	28.45	ft³/s

Results

Normal Depth	1.53	ft
Flow Area	3.15	ft²
Wetted Perimeter	4.50	ft
Hydraulic Radius	0.70	ft
Top Width	2.44	ft
Critical Depth	1.82	ft
Percent Full	61.3	%
Critical Slope	0.00622	ft/ft
Velocity	9.02	ft/s
Velocity Head	1.26	ft
Specific Energy	2.80	ft
Froude Number	1.40	
Maximum Discharge	44.12	ft³/s
Discharge Full	41.01	ft³/s
Slope Full	0.00481	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	61.28	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE A3 (R1)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.53	ft
Critical Depth	1.82	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00622	ft/ft

Worksheet for LINE A3 (R2)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	22.27	ft³/s

Results

Normal Depth	1.61	ft
Flow Area	2.71	ft²
Wetted Perimeter	4.46	ft
Hydraulic Radius	0.61	ft
Top Width	1.58	ft
Critical Depth	1.68	ft
Percent Full	80.6	%
Critical Slope	0.00926	ft/ft
Velocity	8.21	ft/s
Velocity Head	1.05	ft
Specific Energy	2.66	ft
Froude Number	1.10	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00969	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	80.59	%
Downstream Velocity	Infinity	ft/s

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Worksheet for LINE A3 (R2)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.61	ft
Critical Depth	1.68	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00926	ft/ft

Worksheet for LINE A3 (R3)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	16.35	ft^3/s

Results

Normal Depth	1.26	ft
Flow Area	2.08	ft^2
Wetted Perimeter	3.67	ft
Hydraulic Radius	0.57	ft
Top Width	1.93	ft
Critical Depth	1.46	ft
Percent Full	63.0	%
Critical Slope	0.00672	ft/ft
Velocity	7.84	ft/s
Velocity Head	0.96	ft
Specific Energy	2.22	ft
Froude Number	1.33	
Maximum Discharge	24.33	ft^3/s
Discharge Full	22.62	ft^3/s
Slope Full	0.00522	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	62.99	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE A3 (R3)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.26	ft
Critical Depth	1.46	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00672	ft/ft

Worksheet for LINE A3 (R4)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	11.57	ft³/s

Results

Normal Depth	1.01	ft
Flow Area	1.60	ft²
Wetted Perimeter	3.17	ft
Hydraulic Radius	0.50	ft
Top Width	2.00	ft
Critical Depth	1.22	ft
Percent Full	50.7	%
Critical Slope	0.00549	ft/ft
Velocity	7.24	ft/s
Velocity Head	0.82	ft
Specific Energy	1.83	ft
Froude Number	1.43	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00262	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	50.66	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE A3 (R4)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.01	ft
Critical Depth	1.22	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00549	ft/ft

Worksheet for LINE A3 (R5)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	6.04	ft³/s

Results

Normal Depth	0.82	ft
Flow Area	0.98	ft²
Wetted Perimeter	2.49	ft
Hydraulic Radius	0.39	ft
Top Width	1.49	ft
Critical Depth	0.95	ft
Percent Full	54.4	%
Critical Slope	0.00624	ft/ft
Velocity	6.15	ft/s
Velocity Head	0.59	ft
Specific Energy	1.40	ft
Froude Number	1.34	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00331	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	54.38	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE A3 (R5)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.82	ft
Critical Depth	0.95	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00624	ft/ft

APPENDIX F.4: LATERAL A3-A STORM DRAIN

Worksheet for LAT A3-A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	6.53	ft³/s

Results

Normal Depth	0.86	ft
Flow Area	1.04	ft²
Wetted Perimeter	2.57	ft
Hydraulic Radius	0.41	ft
Top Width	1.48	ft
Critical Depth	0.99	ft
Percent Full	57.1	%
Critical Slope	0.00649	ft/ft
Velocity	6.26	ft/s
Velocity Head	0.61	ft
Specific Energy	1.47	ft
Froude Number	1.32	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00386	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	57.09	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT A3-A

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.86	ft
Critical Depth	0.99	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00649	ft/ft

APPENDIX F.5: LATERAL A3-B STORM DRAIN

Worksheet for LAT A3-B

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	6.64	ft³/s

Results

Normal Depth	0.87	ft
Flow Area	1.06	ft²
Wetted Perimeter	2.59	ft
Hydraulic Radius	0.41	ft
Top Width	1.48	ft
Critical Depth	1.00	ft
Percent Full	57.7	%
Critical Slope	0.00656	ft/ft
Velocity	6.29	ft/s
Velocity Head	0.61	ft
Specific Energy	1.48	ft
Froude Number	1.31	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00400	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	57.70	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT A3-B

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.87	ft
Critical Depth	1.00	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00656	ft/ft

APPENDIX F.6: LATERAL A3-C STORM DRAIN

Worksheet for LAT A3-C

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	4.78	ft³/s

Results

Normal Depth	0.71	ft
Flow Area	0.82	ft²
Wetted Perimeter	2.28	ft
Hydraulic Radius	0.36	ft
Top Width	1.50	ft
Critical Depth	0.84	ft
Percent Full	47.3	%
Critical Slope	0.00569	ft/ft
Velocity	5.80	ft/s
Velocity Head	0.52	ft
Specific Energy	1.23	ft
Froude Number	1.38	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00207	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	47.33	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT A3-C

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.71	ft
Critical Depth	0.84	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00569	ft/ft

APPENDIX F.7: LATERAL A3-D STORM DRAIN

Worksheet for LAT A3-D

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	5.53	ft³/s

Results

Normal Depth	0.77	ft
Flow Area	0.92	ft²
Wetted Perimeter	2.40	ft
Hydraulic Radius	0.38	ft
Top Width	1.50	ft
Critical Depth	0.91	ft
Percent Full	51.6	%
Critical Slope	0.00600	ft/ft
Velocity	6.02	ft/s
Velocity Head	0.56	ft
Specific Energy	1.34	ft
Froude Number	1.36	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00277	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	51.55	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT A3-D

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.77	ft
Critical Depth	0.91	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00600	ft/ft

APPENDIX F.8: LINE A4 STORM DRAIN

Worksheet for LINE A4

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	17.30	ft^3/s

Results

Normal Depth	1.31	ft
Flow Area	2.18	ft^2
Wetted Perimeter	3.77	ft
Hydraulic Radius	0.58	ft
Top Width	1.90	ft
Critical Depth	1.50	ft
Percent Full	65.5	%
Critical Slope	0.00704	ft/ft
Velocity	7.93	ft/s
Velocity Head	0.98	ft
Specific Energy	2.29	ft
Froude Number	1.31	
Maximum Discharge	24.33	ft^3/s
Discharge Full	22.62	ft^3/s
Slope Full	0.00585	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	65.51	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE A4

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.31	ft
Critical Depth	1.50	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00704	ft/ft

APPENDIX F.9: LINE B1 STORM DRAIN

Worksheet for LINE B1 (R1)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Diameter	2.50	ft
Discharge	41.20	ft³/s

Results

Normal Depth	1.72	ft
Flow Area	3.61	ft²
Wetted Perimeter	4.90	ft
Hydraulic Radius	0.74	ft
Top Width	2.31	ft
Critical Depth	2.15	ft
Percent Full	68.9	%
Critical Slope	0.00932	ft/ft
Velocity	11.42	ft/s
Velocity Head	2.03	ft
Specific Energy	3.75	ft
Froude Number	1.61	
Maximum Discharge	54.04	ft³/s
Discharge Full	50.23	ft³/s
Slope Full	0.01009	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	68.92	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B1 (R1)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.72	ft
Critical Depth	2.15	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.00932	ft/ft

Worksheet for LINE B1 (R2)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Diameter	3.00	ft
Discharge	67.48	ft³/s

Results

Normal Depth	2.08	ft
Flow Area	5.23	ft²
Wetted Perimeter	5.90	ft
Hydraulic Radius	0.89	ft
Top Width	2.77	ft
Critical Depth	2.62	ft
Percent Full	69.3	%
Critical Slope	0.00928	ft/ft
Velocity	12.91	ft/s
Velocity Head	2.59	ft
Specific Energy	4.67	ft
Froude Number	1.66	
Maximum Discharge	87.87	ft³/s
Discharge Full	81.68	ft³/s
Slope Full	0.01024	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	69.29	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B1 (R2)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.08	ft
Critical Depth	2.62	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.00928	ft/ft

Worksheet for LINE B1 (R3)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Diameter	3.00	ft
Discharge	63.43	ft³/s

Results

Normal Depth	1.99	ft
Flow Area	4.97	ft²
Wetted Perimeter	5.70	ft
Hydraulic Radius	0.87	ft
Top Width	2.84	ft
Critical Depth	2.56	ft
Percent Full	66.2	%
Critical Slope	0.00847	ft/ft
Velocity	12.77	ft/s
Velocity Head	2.53	ft
Specific Energy	4.52	ft
Froude Number	1.70	
Maximum Discharge	87.87	ft³/s
Discharge Full	81.68	ft³/s
Slope Full	0.00904	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	66.22	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B1 (R3)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.99	ft
Critical Depth	2.56	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.00847	ft/ft

Worksheet for LINE B1 (R4)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Diameter	3.00	ft
Discharge	56.77	ft³/s

Results

Normal Depth	1.84	ft
Flow Area	4.55	ft²
Wetted Perimeter	5.40	ft
Hydraulic Radius	0.84	ft
Top Width	2.92	ft
Critical Depth	2.44	ft
Percent Full	61.4	%
Critical Slope	0.00734	ft/ft
Velocity	12.48	ft/s
Velocity Head	2.42	ft
Specific Energy	4.26	ft
Froude Number	1.76	
Maximum Discharge	87.87	ft³/s
Discharge Full	81.68	ft³/s
Slope Full	0.00725	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	61.36	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B1 (R4)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.84	ft
Critical Depth	2.44	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.00734	ft/ft

Worksheet for LINE B1 (R5)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Diameter	3.00	ft
Discharge	50.66	ft³/s

Results

Normal Depth	1.71	ft
Flow Area	4.16	ft²
Wetted Perimeter	5.13	ft
Hydraulic Radius	0.81	ft
Top Width	2.97	ft
Critical Depth	2.32	ft
Percent Full	57.0	%
Critical Slope	0.00650	ft/ft
Velocity	12.17	ft/s
Velocity Head	2.30	ft
Specific Energy	4.01	ft
Froude Number	1.81	
Maximum Discharge	87.87	ft³/s
Discharge Full	81.68	ft³/s
Slope Full	0.00577	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	57.00	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B1 (R5)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.71	ft
Critical Depth	2.32	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.00650	ft/ft

Worksheet for LINE B1 (R6)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Diameter	2.50	ft
Discharge	42.01	ft³/s

Results

Normal Depth	1.75	ft
Flow Area	3.67	ft²
Wetted Perimeter	4.95	ft
Hydraulic Radius	0.74	ft
Top Width	2.29	ft
Critical Depth	2.17	ft
Percent Full	69.9	%
Critical Slope	0.00959	ft/ft
Velocity	11.46	ft/s
Velocity Head	2.04	ft
Specific Energy	3.79	ft
Froude Number	1.60	
Maximum Discharge	54.04	ft³/s
Discharge Full	50.23	ft³/s
Slope Full	0.01049	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	69.93	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B1 (R6)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.75	ft
Critical Depth	2.17	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.00959	ft/ft

Worksheet for LINE B1 (R7)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Diameter	2.50	ft
Discharge	29.46	ft³/s

Results

Normal Depth	1.38	ft
Flow Area	2.77	ft²
Wetted Perimeter	4.18	ft
Hydraulic Radius	0.66	ft
Top Width	2.49	ft
Critical Depth	1.85	ft
Percent Full	55.0	%
Critical Slope	0.00640	ft/ft
Velocity	10.64	ft/s
Velocity Head	1.76	ft
Specific Energy	3.14	ft
Froude Number	1.78	
Maximum Discharge	54.04	ft³/s
Discharge Full	50.23	ft³/s
Slope Full	0.00516	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	55.04	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B1 (R7)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.38	ft
Critical Depth	1.85	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.00640	ft/ft

APPENDIX F.10: LATERAL B1-A STORM DRAIN

Worksheet for LAT B1-A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	5.47	ft³/s

Results

Normal Depth	0.77	ft
Flow Area	0.91	ft²
Wetted Perimeter	2.39	ft
Hydraulic Radius	0.38	ft
Top Width	1.50	ft
Critical Depth	0.90	ft
Percent Full	51.2	%
Critical Slope	0.00597	ft/ft
Velocity	6.00	ft/s
Velocity Head	0.56	ft
Specific Energy	1.33	ft
Froude Number	1.36	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00271	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	51.22	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B1-A

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.77	ft
Critical Depth	0.90	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00597	ft/ft

APPENDIX F.11: LATERAL B1-B STORM DRAIN

Worksheet for LAT B1-B

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	6.79	ft³/s

Results

Normal Depth	0.88	ft
Flow Area	1.07	ft²
Wetted Perimeter	2.61	ft
Hydraulic Radius	0.41	ft
Top Width	1.48	ft
Critical Depth	1.01	ft
Percent Full	58.5	%
Critical Slope	0.00664	ft/ft
Velocity	6.32	ft/s
Velocity Head	0.62	ft
Specific Energy	1.50	ft
Froude Number	1.31	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00418	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	58.53	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B1-B

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.88	ft
Critical Depth	1.01	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00664	ft/ft

APPENDIX F.12: LATERAL B1-C STORM DRAIN

Worksheet for LAT B1-C (R1)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	2.83	ft³/s

Results

Normal Depth	0.53	ft
Flow Area	0.56	ft²
Wetted Perimeter	1.91	ft
Hydraulic Radius	0.29	ft
Top Width	1.44	ft
Critical Depth	0.64	ft
Percent Full	35.5	%
Critical Slope	0.00509	ft/ft
Velocity	5.04	ft/s
Velocity Head	0.40	ft
Specific Energy	0.93	ft
Froude Number	1.42	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00073	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	35.46	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B1-C (R1)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.53	ft
Critical Depth	0.64	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00509	ft/ft

Worksheet for LAT B1-C (R2)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	1.43	ft³/s

Results

Normal Depth	0.37	ft
Flow Area	0.34	ft²
Wetted Perimeter	1.57	ft
Hydraulic Radius	0.22	ft
Top Width	1.30	ft
Critical Depth	0.45	ft
Percent Full	24.9	%
Critical Slope	0.00490	ft/ft
Velocity	4.16	ft/s
Velocity Head	0.27	ft
Specific Energy	0.64	ft
Froude Number	1.42	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00019	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	24.92	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B1-C (R2)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.37	ft
Critical Depth	0.45	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00490	ft/ft

APPENDIX F.13: LATERAL B1-D STORM DRAIN

Worksheet for LAT B1-D

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	4.12	ft^3/s

Results

Normal Depth	0.65	ft
Flow Area	0.74	ft^2
Wetted Perimeter	2.16	ft
Hydraulic Radius	0.34	ft
Top Width	1.49	ft
Critical Depth	0.78	ft
Percent Full	43.5	%
Critical Slope	0.00545	ft/ft
Velocity	5.58	ft/s
Velocity Head	0.48	ft
Specific Energy	1.14	ft
Froude Number	1.40	
Maximum Discharge	11.30	ft^3/s
Discharge Full	10.50	ft^3/s
Slope Full	0.00154	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	43.51	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B1-D

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.65	ft
Critical Depth	0.78	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00545	ft/ft

APPENDIX F.14: LATERAL B1-E STORM DRAIN

Worksheet for LAT B1-E

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	9.20	ft³/s

Results

Normal Depth	1.09	ft
Flow Area	1.37	ft²
Wetted Perimeter	3.06	ft
Hydraulic Radius	0.45	ft
Top Width	1.34	ft
Critical Depth	1.17	ft
Percent Full	72.5	%
Critical Slope	0.00841	ft/ft
Velocity	6.70	ft/s
Velocity Head	0.70	ft
Specific Energy	1.79	ft
Froude Number	1.17	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00767	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	72.53	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B1-E

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.09	ft
Critical Depth	1.17	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00841	ft/ft

APPENDIX F.15: LATERAL B1-F STORM DRAIN

Worksheet for LAT B1-F

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	12.58	ft³/s

Results

Normal Depth	1.07	ft
Flow Area	1.70	ft²
Wetted Perimeter	3.27	ft
Hydraulic Radius	0.52	ft
Top Width	2.00	ft
Critical Depth	1.28	ft
Percent Full	53.3	%
Critical Slope	0.00571	ft/ft
Velocity	7.39	ft/s
Velocity Head	0.85	ft
Specific Energy	1.91	ft
Froude Number	1.41	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00309	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	53.28	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B1-F

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.07	ft
Critical Depth	1.28	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00571	ft/ft

APPENDIX F.16: CONNECTOR PIPE B1-C1 STORM DRAIN

Worksheet for CP B1-C1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	1.48	ft³/s

Results

Normal Depth	0.38	ft
Flow Area	0.35	ft²
Wetted Perimeter	1.58	ft
Hydraulic Radius	0.22	ft
Top Width	1.31	ft
Critical Depth	0.46	ft
Percent Full	25.4	%
Critical Slope	0.00490	ft/ft
Velocity	4.20	ft/s
Velocity Head	0.27	ft
Specific Energy	0.65	ft
Froude Number	1.42	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00020	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	25.36	%
Downstream Velocity	Infinity	ft/s

Worksheet for CP B1-C1

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.38	ft
Critical Depth	0.46	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00490	ft/ft

APPENDIX F.17: LINE B2 STORM DRAIN

Worksheet for LINE B2 (R1)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Diameter	3.50	ft
Discharge	90.10	ft³/s

Results

Normal Depth	2.22	ft
Flow Area	6.44	ft²
Wetted Perimeter	6.45	ft
Hydraulic Radius	1.00	ft
Top Width	3.37	ft
Critical Depth	2.94	ft
Percent Full	63.5	%
Critical Slope	0.00767	ft/ft
Velocity	13.98	ft/s
Velocity Head	3.04	ft
Specific Energy	5.26	ft
Froude Number	1.78	
Maximum Discharge	132.54	ft³/s
Discharge Full	123.21	ft³/s
Slope Full	0.00802	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	63.50	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B2 (R1)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.22	ft
Critical Depth	2.94	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.00767	ft/ft

Worksheet for LINE B2 (R2)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Diameter	4.00	ft
Discharge	147.82	ft³/s

Results

Normal Depth	2.81	ft
Flow Area	9.42	ft²
Wetted Perimeter	7.95	ft
Hydraulic Radius	1.19	ft
Top Width	3.66	ft
Critical Depth	3.58	ft
Percent Full	70.2	%
Critical Slope	0.00937	ft/ft
Velocity	15.68	ft/s
Velocity Head	3.82	ft
Specific Energy	6.63	ft
Froude Number	1.72	
Maximum Discharge	189.23	ft³/s
Discharge Full	175.92	ft³/s
Slope Full	0.01059	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	70.20	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B2 (R2)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.81	ft
Critical Depth	3.58	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.00937	ft/ft

Worksheet for LINE B2 (R3)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Diameter	4.00	ft
Discharge	142.25	ft³/s

Results

Normal Depth	2.73	ft
Flow Area	9.13	ft²
Wetted Perimeter	7.77	ft
Hydraulic Radius	1.17	ft
Top Width	3.73	ft
Critical Depth	3.53	ft
Percent Full	68.2	%
Critical Slope	0.00879	ft/ft
Velocity	15.58	ft/s
Velocity Head	3.77	ft
Specific Energy	6.50	ft
Froude Number	1.76	
Maximum Discharge	189.23	ft³/s
Discharge Full	175.92	ft³/s
Slope Full	0.00981	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	68.19	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B2 (R3)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.73	ft
Critical Depth	3.53	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.00879	ft/ft

Worksheet for LINE B2 (R4)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01500	ft/ft
Diameter	4.00	ft
Discharge	136.70	ft³/s

Results

Normal Depth	2.65	ft
Flow Area	8.84	ft²
Wetted Perimeter	7.61	ft
Hydraulic Radius	1.16	ft
Top Width	3.78	ft
Critical Depth	3.48	ft
Percent Full	66.3	%
Critical Slope	0.00826	ft/ft
Velocity	15.47	ft/s
Velocity Head	3.72	ft
Specific Energy	6.37	ft
Froude Number	1.78	
Maximum Discharge	189.23	ft³/s
Discharge Full	175.92	ft³/s
Slope Full	0.00906	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	66.25	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B2 (R4)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.65	ft
Critical Depth	3.48	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.00826	ft/ft

APPENDIX F.18: LATERAL B2-A STORM DRAIN

Worksheet for LAT B2-A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	6.54	ft³/s

Results

Normal Depth	0.86	ft
Flow Area	1.04	ft²
Wetted Perimeter	2.57	ft
Hydraulic Radius	0.41	ft
Top Width	1.48	ft
Critical Depth	0.99	ft
Percent Full	57.1	%
Critical Slope	0.00650	ft/ft
Velocity	6.27	ft/s
Velocity Head	0.61	ft
Specific Energy	1.47	ft
Froude Number	1.32	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00388	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	57.14	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B2-A

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.86	ft
Critical Depth	0.99	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00650	ft/ft

APPENDIX F.19: LATERAL B2-B STORM DRAIN

Worksheet for LAT B2-B

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	6.92	ft³/s

Results

Normal Depth	0.89	ft
Flow Area	1.09	ft²
Wetted Perimeter	2.64	ft
Hydraulic Radius	0.41	ft
Top Width	1.47	ft
Critical Depth	1.02	ft
Percent Full	59.2	%
Critical Slope	0.00672	ft/ft
Velocity	6.35	ft/s
Velocity Head	0.63	ft
Specific Energy	1.51	ft
Froude Number	1.30	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00434	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	59.25	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B2-B

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.89	ft
Critical Depth	1.02	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00672	ft/ft

APPENDIX F.20: LINE B3 STORM DRAIN

Worksheet for LINE B3 (R1)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.50	ft
Discharge	35.46	ft³/s

Results

Normal Depth	1.79	ft
Flow Area	3.77	ft²
Wetted Perimeter	5.05	ft
Hydraulic Radius	0.75	ft
Top Width	2.25	ft
Critical Depth	2.02	ft
Percent Full	71.8	%
Critical Slope	0.00766	ft/ft
Velocity	9.40	ft/s
Velocity Head	1.37	ft
Specific Energy	3.17	ft
Froude Number	1.28	
Maximum Discharge	44.12	ft³/s
Discharge Full	41.01	ft³/s
Slope Full	0.00747	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	71.77	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B3 (R1)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.79	ft
Critical Depth	2.02	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00766	ft/ft

Worksheet for LINE B3 (R2)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.50	ft
Discharge	26.07	ft³/s

Results

Normal Depth	1.45	ft
Flow Area	2.95	ft²
Wetted Perimeter	4.32	ft
Hydraulic Radius	0.68	ft
Top Width	2.47	ft
Critical Depth	1.74	ft
Percent Full	57.9	%
Critical Slope	0.00585	ft/ft
Velocity	8.85	ft/s
Velocity Head	1.22	ft
Specific Energy	2.66	ft
Froude Number	1.43	
Maximum Discharge	44.12	ft³/s
Discharge Full	41.01	ft³/s
Slope Full	0.00404	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	57.90	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B3 (R2)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.45	ft
Critical Depth	1.74	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00585	ft/ft

Worksheet for LINE B3 (R3)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	16.68	ft³/s

Results

Normal Depth	1.28	ft
Flow Area	2.12	ft²
Wetted Perimeter	3.70	ft
Hydraulic Radius	0.57	ft
Top Width	1.92	ft
Critical Depth	1.47	ft
Percent Full	63.9	%
Critical Slope	0.00683	ft/ft
Velocity	7.88	ft/s
Velocity Head	0.96	ft
Specific Energy	2.24	ft
Froude Number	1.32	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00544	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	63.85	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B3 (R3)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.28	ft
Critical Depth	1.47	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00683	ft/ft

Worksheet for LINE B3 (R4)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	13.55	ft³/s

Results

Normal Depth	1.12	ft
Flow Area	1.80	ft²
Wetted Perimeter	3.37	ft
Hydraulic Radius	0.53	ft
Top Width	1.99	ft
Critical Depth	1.33	ft
Percent Full	55.8	%
Critical Slope	0.00594	ft/ft
Velocity	7.52	ft/s
Velocity Head	0.88	ft
Specific Energy	2.00	ft
Froude Number	1.39	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00359	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	55.77	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B3 (R4)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.12	ft
Critical Depth	1.33	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00594	ft/ft

Worksheet for LINE B3 (R5)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	7.93	ft³/s

Results

Normal Depth	0.97	ft
Flow Area	1.21	ft²
Wetted Perimeter	2.81	ft
Hydraulic Radius	0.43	ft
Top Width	1.43	ft
Critical Depth	1.09	ft
Percent Full	64.9	%
Critical Slope	0.00738	ft/ft
Velocity	6.53	ft/s
Velocity Head	0.66	ft
Specific Energy	1.64	ft
Froude Number	1.25	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00570	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	64.92	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B3 (R5)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.97	ft
Critical Depth	1.09	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00738	ft/ft

Worksheet for LINE B3 (R6)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	3.56	ft³/s

Results

Normal Depth	0.60	ft
Flow Area	0.66	ft²
Wetted Perimeter	2.06	ft
Hydraulic Radius	0.32	ft
Top Width	1.47	ft
Critical Depth	0.72	ft
Percent Full	40.1	%
Critical Slope	0.00528	ft/ft
Velocity	5.37	ft/s
Velocity Head	0.45	ft
Specific Energy	1.05	ft
Froude Number	1.41	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00115	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	40.13	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B3 (R6)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.60	ft
Critical Depth	0.72	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00528	ft/ft

APPENDIX F.21: LATERAL B3-A STORM DRAIN

Worksheet for LAT B3-A (R1)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	10.95	ft³/s

Results

Normal Depth	0.98	ft
Flow Area	1.53	ft²
Wetted Perimeter	3.10	ft
Hydraulic Radius	0.49	ft
Top Width	2.00	ft
Critical Depth	1.19	ft
Percent Full	49.1	%
Critical Slope	0.00537	ft/ft
Velocity	7.14	ft/s
Velocity Head	0.79	ft
Specific Energy	1.77	ft
Froude Number	1.44	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00234	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	49.07	%
Downstream Velocity	Infinity	ft/s

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Worksheet for LAT B3-A (R1)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.98	ft
Critical Depth	1.19	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00537	ft/ft

Worksheet for LAT B3-A (R2)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	3.88	ft³/s

Results

Normal Depth	0.63	ft
Flow Area	0.71	ft²
Wetted Perimeter	2.12	ft
Hydraulic Radius	0.33	ft
Top Width	1.48	ft
Critical Depth	0.75	ft
Percent Full	42.1	%
Critical Slope	0.00537	ft/ft
Velocity	5.50	ft/s
Velocity Head	0.47	ft
Specific Energy	1.10	ft
Froude Number	1.40	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00136	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	42.07	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B3-A (R2)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.63	ft
Critical Depth	0.75	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00537	ft/ft

Worksheet for LAT B3-A (R3)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	2.12	ft³/s

Results

Normal Depth	0.46	ft
Flow Area	0.46	ft²
Wetted Perimeter	1.75	ft
Hydraulic Radius	0.26	ft
Top Width	1.38	ft
Critical Depth	0.55	ft
Percent Full	30.5	%
Critical Slope	0.00497	ft/ft
Velocity	4.65	ft/s
Velocity Head	0.34	ft
Specific Energy	0.79	ft
Froude Number	1.43	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00041	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	30.47	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B3-A (R3)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.46	ft
Critical Depth	0.55	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00497	ft/ft

APPENDIX F.22: Connector Pipe B3-A1 Storm Drain

Worksheet for CP B3-A1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	4.07	ft³/s

Results

Normal Depth	0.65	ft
Flow Area	0.73	ft²
Wetted Perimeter	2.15	ft
Hydraulic Radius	0.34	ft
Top Width	1.49	ft
Critical Depth	0.77	ft
Percent Full	43.2	%
Critical Slope	0.00544	ft/ft
Velocity	5.56	ft/s
Velocity Head	0.48	ft
Specific Energy	1.13	ft
Froude Number	1.40	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00150	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	43.22	%
Downstream Velocity	Infinity	ft/s

Worksheet for CP B3-A1

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.65	ft
Critical Depth	0.77	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00544	ft/ft

APPENDIX F.23: CONNECTOR PIPE B3-A2 STORM DRAIN

Worksheet for CP B3-A2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	3.00	ft³/s

Results

Normal Depth	0.55	ft
Flow Area	0.59	ft²
Wetted Perimeter	1.95	ft
Hydraulic Radius	0.30	ft
Top Width	1.44	ft
Critical Depth	0.66	ft
Percent Full	36.6	%
Critical Slope	0.00513	ft/ft
Velocity	5.13	ft/s
Velocity Head	0.41	ft
Specific Energy	0.96	ft
Froude Number	1.42	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00082	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	36.58	%
Downstream Velocity	Infinity	ft/s

Worksheet for CP B3-A2

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.55	ft
Critical Depth	0.66	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00513	ft/ft

APPENDIX F.24: CONNECTOR PIPE B3-A3 STORM DRAIN

Worksheet for CP B3-A3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	1.76	ft³/s

Results

Normal Depth	0.42	ft
Flow Area	0.40	ft²
Wetted Perimeter	1.66	ft
Hydraulic Radius	0.24	ft
Top Width	1.34	ft
Critical Depth	0.50	ft
Percent Full	27.7	%
Critical Slope	0.00491	ft/ft
Velocity	4.41	ft/s
Velocity Head	0.30	ft
Specific Energy	0.72	ft
Froude Number	1.43	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00028	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	27.69	%
Downstream Velocity	Infinity	ft/s

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Worksheet for CP B3-A3

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.42	ft
Critical Depth	0.50	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00491	ft/ft

APPENDIX F.25: LATERAL B3-B STORM DRAIN

Worksheet for LAT B3-B (R1)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	9.39	ft³/s

Results

Normal Depth	1.11	ft
Flow Area	1.40	ft²
Wetted Perimeter	3.10	ft
Hydraulic Radius	0.45	ft
Top Width	1.32	ft
Critical Depth	1.18	ft
Percent Full	73.8	%
Critical Slope	0.00859	ft/ft
Velocity	6.72	ft/s
Velocity Head	0.70	ft
Specific Energy	1.81	ft
Froude Number	1.15	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00799	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	73.75	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B3-B (R1)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.11	ft
Critical Depth	1.18	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00859	ft/ft

Worksheet for LAT B3-B (R2)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	8.52	ft³/s

Results

Normal Depth	1.03	ft
Flow Area	1.29	ft²
Wetted Perimeter	2.92	ft
Hydraulic Radius	0.44	ft
Top Width	1.40	ft
Critical Depth	1.13	ft
Percent Full	68.4	%
Critical Slope	0.00782	ft/ft
Velocity	6.62	ft/s
Velocity Head	0.68	ft
Specific Energy	1.71	ft
Froude Number	1.22	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00658	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	68.35	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B3-B (R2)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.03	ft
Critical Depth	1.13	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00782	ft/ft

Worksheet for LAT B3-B (R3)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	5.29	ft³/s

Results

Normal Depth	0.75	ft
Flow Area	0.89	ft²
Wetted Perimeter	2.36	ft
Hydraulic Radius	0.38	ft
Top Width	1.50	ft
Critical Depth	0.89	ft
Percent Full	50.2	%
Critical Slope	0.00589	ft/ft
Velocity	5.96	ft/s
Velocity Head	0.55	ft
Specific Energy	1.30	ft
Froude Number	1.36	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00254	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	50.20	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B3-B (R3)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.75	ft
Critical Depth	0.89	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00589	ft/ft

APPENDIX F.26: LATERAL B3-C STORM DRAIN

Worksheet for LAT B3-C

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	1.84	ft³/s

Results

Normal Depth	0.42	ft
Flow Area	0.41	ft²
Wetted Perimeter	1.68	ft
Hydraulic Radius	0.24	ft
Top Width	1.35	ft
Critical Depth	0.51	ft
Percent Full	28.3	%
Critical Slope	0.00493	ft/ft
Velocity	4.47	ft/s
Velocity Head	0.31	ft
Specific Energy	0.74	ft
Froude Number	1.43	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00031	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	28.32	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B3-C

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.42	ft
Critical Depth	0.51	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00493	ft/ft

APPENDIX F.27: LATERAL B3-D STORM DRAIN

Worksheet for LAT B3-D

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	1.29	ft³/s

Results

Normal Depth	0.35	ft
Flow Area	0.32	ft²
Wetted Perimeter	1.52	ft
Hydraulic Radius	0.21	ft
Top Width	1.27	ft
Critical Depth	0.43	ft
Percent Full	23.6	%
Critical Slope	0.00490	ft/ft
Velocity	4.04	ft/s
Velocity Head	0.25	ft
Specific Energy	0.61	ft
Froude Number	1.42	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00015	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	23.65	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B3-D

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.35	ft
Critical Depth	0.43	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00490	ft/ft

APPENDIX F.28: LATERAL B3-E STORM DRAIN

Worksheet for LAT B3-E

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	1.64	ft³/s

Results

Normal Depth	0.40	ft
Flow Area	0.38	ft²
Wetted Perimeter	1.63	ft
Hydraulic Radius	0.23	ft
Top Width	1.33	ft
Critical Depth	0.48	ft
Percent Full	26.7	%
Critical Slope	0.00491	ft/ft
Velocity	4.33	ft/s
Velocity Head	0.29	ft
Specific Energy	0.69	ft
Froude Number	1.43	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00024	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	26.71	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B3-E

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.40	ft
Critical Depth	0.48	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00491	ft/ft

APPENDIX F.29: LATERAL B3-F STORM DRAIN

Worksheet for LAT B3-F

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	3.98	ft³/s

Results

Normal Depth	0.64	ft
Flow Area	0.72	ft²
Wetted Perimeter	2.14	ft
Hydraulic Radius	0.34	ft
Top Width	1.48	ft
Critical Depth	0.76	ft
Percent Full	42.7	%
Critical Slope	0.00541	ft/ft
Velocity	5.53	ft/s
Velocity Head	0.48	ft
Specific Energy	1.12	ft
Froude Number	1.40	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00144	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	42.66	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B3-F

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.64	ft
Critical Depth	0.76	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00541	ft/ft

APPENDIX F.30: LATERAL B3-G STORM DRAIN

Worksheet for LAT B3-G

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	4.37	ft³/s

Results

Normal Depth	0.67	ft
Flow Area	0.77	ft²
Wetted Perimeter	2.21	ft
Hydraulic Radius	0.35	ft
Top Width	1.49	ft
Critical Depth	0.80	ft
Percent Full	45.0	%
Critical Slope	0.00554	ft/ft
Velocity	5.67	ft/s
Velocity Head	0.50	ft
Specific Energy	1.17	ft
Froude Number	1.39	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00173	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	44.98	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B3-G

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.67	ft
Critical Depth	0.80	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00554	ft/ft

APPENDIX F.31: LINE B4 STORM DRAIN

Worksheet for LINE B4 (R1)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	1.13	ft³/s

Results

Normal Depth	0.33	ft
Flow Area	0.29	ft²
Wetted Perimeter	1.47	ft
Hydraulic Radius	0.20	ft
Top Width	1.25	ft
Critical Depth	0.40	ft
Percent Full	22.1	%
Critical Slope	0.00492	ft/ft
Velocity	3.88	ft/s
Velocity Head	0.23	ft
Specific Energy	0.57	ft
Froude Number	1.42	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00012	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	22.15	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B4 (R1)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.33	ft
Critical Depth	0.40	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00492	ft/ft

Worksheet for LINE B4 (R2)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	0.70	ft³/s

Results

Normal Depth	0.26	ft
Flow Area	0.21	ft²
Wetted Perimeter	1.29	ft
Hydraulic Radius	0.16	ft
Top Width	1.14	ft
Critical Depth	0.31	ft
Percent Full	17.5	%
Critical Slope	0.00504	ft/ft
Velocity	3.37	ft/s
Velocity Head	0.18	ft
Specific Energy	0.44	ft
Froude Number	1.39	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00004	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	17.48	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B4 (R2)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.26	ft
Critical Depth	0.31	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00504	ft/ft

APPENDIX F.32: LINE B5 STORM DRAIN

Worksheet for LINE B5

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	6.68	ft³/s

Results

Normal Depth	0.87	ft
Flow Area	1.06	ft²
Wetted Perimeter	2.59	ft
Hydraulic Radius	0.41	ft
Top Width	1.48	ft
Critical Depth	1.00	ft
Percent Full	57.9	%
Critical Slope	0.00658	ft/ft
Velocity	6.30	ft/s
Velocity Head	0.62	ft
Specific Energy	1.48	ft
Froude Number	1.31	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00404	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	57.92	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B5

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.87	ft
Critical Depth	1.00	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00658	ft/ft

APPENDIX F.33: LINE B6 STORM DRAIN

Worksheet for LINE B6 (R1)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	3.00	ft
Discharge	34.64	ft³/s

Results

Normal Depth	1.53	ft
Flow Area	3.64	ft²
Wetted Perimeter	4.78	ft
Hydraulic Radius	0.76	ft
Top Width	3.00	ft
Critical Depth	1.91	ft
Percent Full	51.1	%
Critical Slope	0.00498	ft/ft
Velocity	9.53	ft/s
Velocity Head	1.41	ft
Specific Energy	2.94	ft
Froude Number	1.53	
Maximum Discharge	71.74	ft³/s
Discharge Full	66.69	ft³/s
Slope Full	0.00270	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	51.13	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B6 (R1)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.53	ft
Critical Depth	1.91	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00498	ft/ft

Worksheet for LINE B6 (R2)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.50	ft
Discharge	22.37	ft³/s

Results

Normal Depth	1.32	ft
Flow Area	2.62	ft²
Wetted Perimeter	4.06	ft
Hydraulic Radius	0.65	ft
Top Width	2.50	ft
Critical Depth	1.61	ft
Percent Full	52.7	%
Critical Slope	0.00535	ft/ft
Velocity	8.54	ft/s
Velocity Head	1.13	ft
Specific Energy	2.45	ft
Froude Number	1.47	
Maximum Discharge	44.12	ft³/s
Discharge Full	41.01	ft³/s
Slope Full	0.00297	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	52.65	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B6 (R2)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.32	ft
Critical Depth	1.61	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00535	ft/ft

Worksheet for LINE B6 (R3)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.50	ft
Discharge	21.69	ft³/s

Results

Normal Depth	1.29	ft
Flow Area	2.56	ft²
Wetted Perimeter	4.01	ft
Hydraulic Radius	0.64	ft
Top Width	2.50	ft
Critical Depth	1.58	ft
Percent Full	51.7	%
Critical Slope	0.00527	ft/ft
Velocity	8.47	ft/s
Velocity Head	1.12	ft
Specific Energy	2.41	ft
Froude Number	1.48	
Maximum Discharge	44.12	ft³/s
Discharge Full	41.01	ft³/s
Slope Full	0.00280	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	51.69	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B6 (R3)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.29	ft
Critical Depth	1.58	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00527	ft/ft

Worksheet for LINE B6 (R4)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	17.58	ft³/s

Results

Normal Depth	1.32	ft
Flow Area	2.21	ft²
Wetted Perimeter	3.80	ft
Hydraulic Radius	0.58	ft
Top Width	1.89	ft
Critical Depth	1.51	ft
Percent Full	66.2	%
Critical Slope	0.00714	ft/ft
Velocity	7.96	ft/s
Velocity Head	0.98	ft
Specific Energy	2.31	ft
Froude Number	1.30	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00604	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	66.25	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B6 (R4)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.32	ft
Critical Depth	1.51	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00714	ft/ft

Worksheet for LINE B6 (R5)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	12.57	ft³/s

Results

Normal Depth	1.07	ft
Flow Area	1.70	ft²
Wetted Perimeter	3.27	ft
Hydraulic Radius	0.52	ft
Top Width	2.00	ft
Critical Depth	1.27	ft
Percent Full	53.3	%
Critical Slope	0.00571	ft/ft
Velocity	7.39	ft/s
Velocity Head	0.85	ft
Specific Energy	1.91	ft
Froude Number	1.41	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00309	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	53.25	%
Downstream Velocity	Infinity	ft/s

Worksheet for LINE B6 (R5)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.07	ft
Critical Depth	1.27	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00571	ft/ft

APPENDIX F.34: LATERAL B6-A STORM DRAIN

Worksheet for LAT B6-A (R1)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	12.34	ft³/s

Results

Normal Depth	1.05	ft
Flow Area	1.68	ft²
Wetted Perimeter	3.25	ft
Hydraulic Radius	0.52	ft
Top Width	2.00	ft
Critical Depth	1.26	ft
Percent Full	52.7	%
Critical Slope	0.00566	ft/ft
Velocity	7.36	ft/s
Velocity Head	0.84	ft
Specific Energy	1.89	ft
Froude Number	1.42	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00298	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	52.66	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B6-A (R1)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.05	ft
Critical Depth	1.26	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00566	ft/ft

Worksheet for LAT B6-A (R2)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	7.45	ft³/s

Results

Normal Depth	0.93	ft
Flow Area	1.16	ft²
Wetted Perimeter	2.73	ft
Hydraulic Radius	0.42	ft
Top Width	1.45	ft
Critical Depth	1.06	ft
Percent Full	62.2	%
Critical Slope	0.00705	ft/ft
Velocity	6.45	ft/s
Velocity Head	0.65	ft
Specific Energy	1.58	ft
Froude Number	1.28	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00503	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	62.21	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B6-A (R2)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.93	ft
Critical Depth	1.06	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00705	ft/ft

Worksheet for LAT B6-A (R3)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	3.32	ft³/s

Results

Normal Depth	0.58	ft
Flow Area	0.63	ft²
Wetted Perimeter	2.01	ft
Hydraulic Radius	0.31	ft
Top Width	1.46	ft
Critical Depth	0.69	ft
Percent Full	38.6	%
Critical Slope	0.00521	ft/ft
Velocity	5.27	ft/s
Velocity Head	0.43	ft
Specific Energy	1.01	ft
Froude Number	1.41	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00100	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	38.63	%
Downstream Velocity	Infinity	ft/s

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Worksheet for LAT B6-A (R3)

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.58	ft
Critical Depth	0.69	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00521	ft/ft

APPENDIX F.35: CONNECTOR PIPE B6-A1 STORM DRAIN

Worksheet for CP B6-A1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	2.49	ft³/s

Results

Normal Depth	0.50	ft
Flow Area	0.51	ft²
Wetted Perimeter	1.84	ft
Hydraulic Radius	0.28	ft
Top Width	1.41	ft
Critical Depth	0.60	ft
Percent Full	33.1	%
Critical Slope	0.00502	ft/ft
Velocity	4.87	ft/s
Velocity Head	0.37	ft
Specific Energy	0.87	ft
Froude Number	1.43	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00056	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	33.12	%
Downstream Velocity	Infinity	ft/s

Worksheet for CP B6-A1

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.50	ft
Critical Depth	0.60	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00502	ft/ft

APPENDIX F.36: CONNECTOR PIPE B6-A2 STORM DRAIN

Worksheet for CP B6-A2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	2.77	ft³/s

Results

Normal Depth	0.53	ft
Flow Area	0.55	ft²
Wetted Perimeter	1.90	ft
Hydraulic Radius	0.29	ft
Top Width	1.43	ft
Critical Depth	0.63	ft
Percent Full	35.1	%
Critical Slope	0.00508	ft/ft
Velocity	5.01	ft/s
Velocity Head	0.39	ft
Specific Energy	0.92	ft
Froude Number	1.42	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00070	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	35.05	%
Downstream Velocity	Infinity	ft/s

Worksheet for CP B6-A2

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.53	ft
Critical Depth	0.63	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00508	ft/ft

APPENDIX F.37: CONNECTOR PIPE B6-A3 STORM DRAIN

Worksheet for CP B6-A3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	4.13	ft³/s

Results

Normal Depth	0.65	ft
Flow Area	0.74	ft²
Wetted Perimeter	2.16	ft
Hydraulic Radius	0.34	ft
Top Width	1.49	ft
Critical Depth	0.78	ft
Percent Full	43.6	%
Critical Slope	0.00545	ft/ft
Velocity	5.59	ft/s
Velocity Head	0.48	ft
Specific Energy	1.14	ft
Froude Number	1.40	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00155	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	43.57	%
Downstream Velocity	Infinity	ft/s

Worksheet for CP B6-A3

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.65	ft
Critical Depth	0.78	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00545	ft/ft

APPENDIX F.38: LATERAL B6-B STORM DRAIN

Worksheet for LAT B6-B

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	0.68	ft³/s

Results

Normal Depth	0.26	ft
Flow Area	0.20	ft²
Wetted Perimeter	1.28	ft
Hydraulic Radius	0.16	ft
Top Width	1.13	ft
Critical Depth	0.31	ft
Percent Full	17.2	%
Critical Slope	0.00503	ft/ft
Velocity	3.35	ft/s
Velocity Head	0.17	ft
Specific Energy	0.43	ft
Froude Number	1.39	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00004	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	17.24	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B6-B

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.26	ft
Critical Depth	0.31	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00503	ft/ft

APPENDIX F.39: LATERAL B6-C STORM DRAIN

Worksheet for LAT B6-C

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	1.10	ft³/s

Results

Normal Depth	0.33	ft
Flow Area	0.29	ft²
Wetted Perimeter	1.46	ft
Hydraulic Radius	0.20	ft
Top Width	1.24	ft
Critical Depth	0.39	ft
Percent Full	21.9	%
Critical Slope	0.00491	ft/ft
Velocity	3.85	ft/s
Velocity Head	0.23	ft
Specific Energy	0.56	ft
Froude Number	1.42	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00011	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	21.85	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B6-C

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.33	ft
Critical Depth	0.39	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00491	ft/ft

APPENDIX F.40: LATERAL B6-D STORM DRAIN

Worksheet for LAT B6-D

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	4.33	ft³/s

Results

Normal Depth	0.67	ft
Flow Area	0.77	ft²
Wetted Perimeter	2.20	ft
Hydraulic Radius	0.35	ft
Top Width	1.49	ft
Critical Depth	0.80	ft
Percent Full	44.7	%
Critical Slope	0.00552	ft/ft
Velocity	5.66	ft/s
Velocity Head	0.50	ft
Specific Energy	1.17	ft
Froude Number	1.39	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00170	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	44.74	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B6-D

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.67	ft
Critical Depth	0.80	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00552	ft/ft

APPENDIX F.41: LATERAL B6-E STORM DRAIN

Worksheet for LAT B6-E

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	5.01	ft^3/s

Results

Normal Depth	0.73	ft
Flow Area	0.85	ft^2
Wetted Perimeter	2.31	ft
Hydraulic Radius	0.37	ft
Top Width	1.50	ft
Critical Depth	0.86	ft
Percent Full	48.6	%
Critical Slope	0.00578	ft/ft
Velocity	5.88	ft/s
Velocity Head	0.54	ft
Specific Energy	1.27	ft
Froude Number	1.37	
Maximum Discharge	11.30	ft^3/s
Discharge Full	10.50	ft^3/s
Slope Full	0.00228	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	48.62	%
Downstream Velocity	Infinity	ft/s

Worksheet for LAT B6-E

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.73	ft
Critical Depth	0.86	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00578	ft/ft

APPENDIX F.42: LINE B7 STORM DRAIN

Worksheet for LINE B7

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	3.68	ft³/s

Results

Normal Depth	0.61	ft
Flow Area	0.68	ft²
Wetted Perimeter	2.08	ft
Hydraulic Radius	0.33	ft
Top Width	1.47	ft
Critical Depth	0.73	ft
Percent Full	40.9	%
Critical Slope	0.00531	ft/ft
Velocity	5.42	ft/s
Velocity Head	0.46	ft
Specific Energy	1.07	ft
Froude Number	1.41	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00123	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	40.86	%
Downstream Velocity	Infinity	ft/s

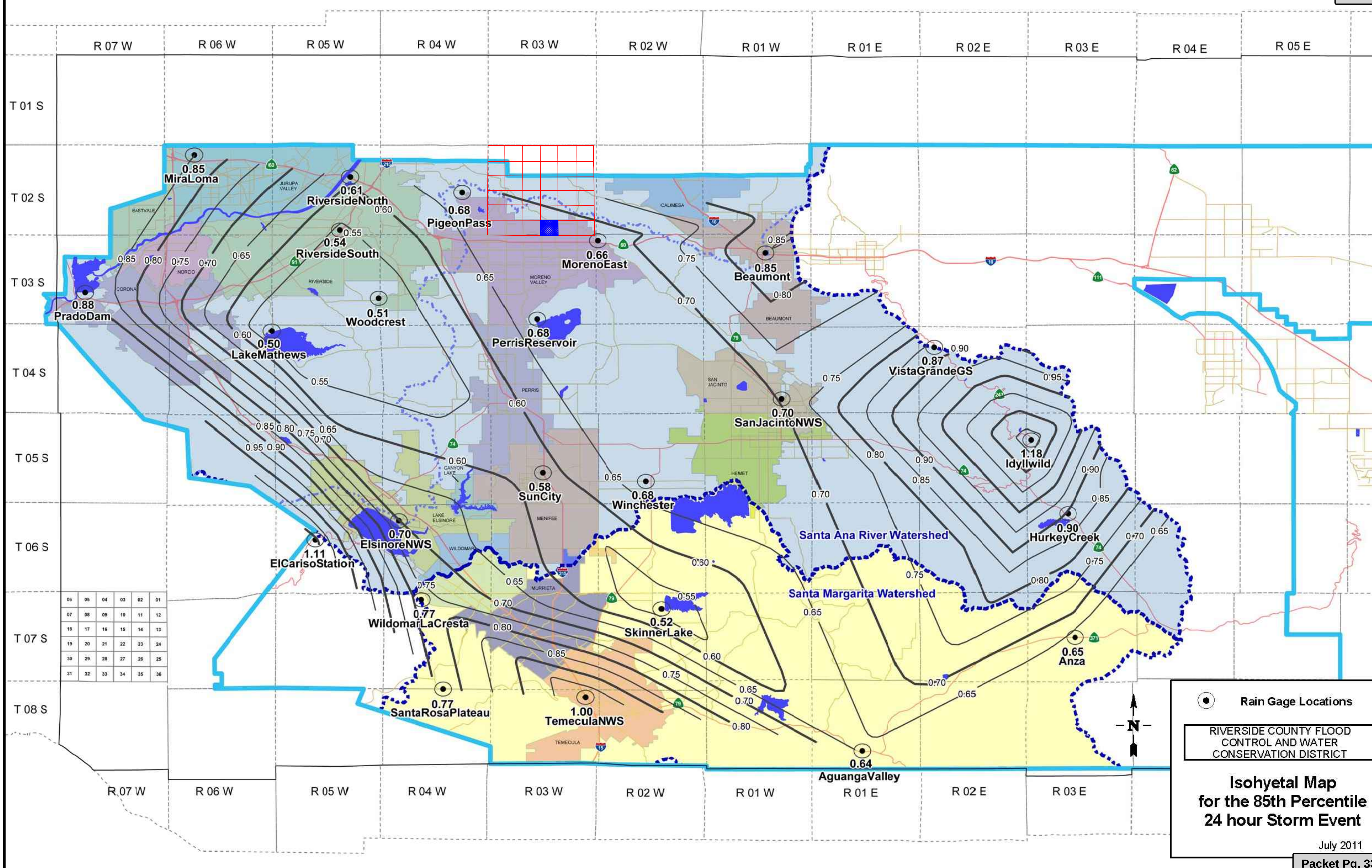
Worksheet for LINE B7

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.61	ft
Critical Depth	0.73	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00531	ft/ft

APPENDIX G: WATER QUALITY AND INCREASED RUNOFF ANALYSIS

APPENDIX G.1: ISOHYETAL MAP FOR THE 85TH PERCENTILE 24-HOUR STORM EVENT



Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

APPENDIX G.2: SANTA ANA WATERSHED DESIGN VOLUME SPREADSHEETS

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries | Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name JLC Engineering and Consulting, Inc. Date 5/16/2016
Designed by Jilleen Ferris Case No
Company Project Number/Name Ironwood

BMP Identification

BMP NAME / ID Basin A1

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.70 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA A-1	*1095534*	*Mixed Surface Types*	*0.55*	*0.37*	*408086.1*			
	1095534		***Total***		408086.1	0.70	*23805*	*45932.14*

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: JLC Engineering and Consulting, Inc.
Date: 5/16/2016
Designed by: Jilleen Ferris
Case No:
Company Project Number/Name: Ironwood

BMP Identification

BMP NAME / ID: Basin A2

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.70 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA A-2	*1293732*	*Mixed Surface Types*	*0.55*	*0.37*	*481914.8*			
	1293732	***Total***			481914.8	0.70	*28111.7*	*35158.5*

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: JLC Engineering and Consulting, Inc. | Date: 5/16/2016
Designed by: Jilleen Ferris | Case No:
Company Project Number/Name: Ironwood

BMP Identification

BMP NAME / ID: Basin B

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.70 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA B	*681714*	*Mixed Surface Types*	*0.486*	*0.33*	*225253.3*			
	681714	*Total*			225253.3	0.70	*13139.8*	*50949.3*

Notes:

APPENDIX G.3: BIORETENTION BASIN SIZING SPREADSHEETS

Bioretention Facility - Design Procedure (Irregular Shaped Facility)	BMP ID: Basin A1	Legend:	Required Entries / Calculated Cells

Company Name:	JLC Engineering & Consulting	Date:	5/16/2016
Designed By:	Jilleen Ferris	County/City Case No.:	Ironwood

Design Volume

Enter the area tributary to this feature		$A_T =$	25.15	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook		$V_{BMP} =$	23805	ft^3

Type of Bioretention Facility Design

(●) Irregular shaped with side slopes required (parallel to parking spaces or adjacent to walkways)

( ) Irregular shaped with no side slopes required (perpendicular to parking space or planter boxes)

Bioretention Facility Surface Area

Proposed Bottom Surface Area of Irregular Shaped Facility		$A_P =$	25518	ft^2
Depth of Soil Filter Media Layer		$d_S =$	3	ft
Total Volume within Soil Media, V_S	$V_S = (A_P * d_S * 0.3) + (A_P * 0.4)$	$V_S =$	33173.4	ft^3
Total Surcharge Storage Volume above Soil Media, V_P		$V_P =$	12759	ft^3
Total Effective Storage Volume, V_E	$V_E = V_S + V_P$	$V_E =$	45932.4	ft^3
Total Effective Depth, d_E	$d_E = \frac{V_E}{A_P}$	$d_E =$	1.80	ft
Minimum Surface Area, A_M	$A_M = \frac{V_{BMP}}{d_E}$	$A_M =$	13225	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0.001	%
6" Check Dam Spacing		0	feet

Describe Vegetation:

Notes: Basin side slopes include 50% at 2:1.

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Bioretention Facility - Design Procedure (Irregular Shaped Facility)	BMP ID: Basin A2	Legend:	Required Entries / Calculated Cells

Company Name: JLC Engineering & Consulting — Date: 5/16/2016

Designed By: Jilleen Ferris — County/City Case No.: Ironwood

Design Volume

Enter the area tributary to this feature	$A_T =$	29.7	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	$V_{BMP} =$	28111.7	ft^3

Type of Bioretention Facility Design

- (●) Irregular shaped with side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) Irregular shaped with no side slopes required (perpendicular to parking space or planter boxes)

Bioretention Facility Surface Area

Proposed Bottom Surface Area of Irregular Shaped Facility		$A_P =$	19532.5	ft^2
Depth of Soil Filter Media Layer		$d_S =$	3	ft
Total Volume within Soil Media, V_S	$V_S = (A_P * d_S * 0.3)+(A_P * 0.4)$	$V_S =$	25392.2	ft^3
Total Surcharge Storage Volume above Soil Media, V_P		$V_P =$	9766.24	ft^3
Total Effective Storage Volume, V_E	$V_E = V_S + V_P$	$V_E =$	35158.5	ft^3
Total Effective Depth, d_E	$d_E = \frac{V_E}{A_P}$	$d_E =$	1.80	ft
Minimum Surface Area, A_M	$A_M = \frac{V_{BMP}}{d_E}$	$A_M =$	15618	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0.001	%
6" Check Dam Spacing		0	feet

Describe Vegetation:

Notes: Basin side slopes include 50% at 2:1.

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Bioretention Facility - Design Procedure (Irregular Shaped Facility)	BMP ID	Legend:	Required Entries
	Basin B		Calculated Cells

Company Name:	JLC Engineering & Consulting	Date:	5/16/2016
Designed By:	Jilleen Ferris	County/City Case No.:	Ironwood

Design Volume

Enter the area tributary to this feature		A_T =	15.65 acres
Enter V_{BMP} determined from Section 2.1 of this Handbook		V_{BMP} =	13139.8 ft^3

Type of Bioretention Facility Design

- (●) Irregular shaped with side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) Irregular shaped with no side slopes required (perpendicular to parking space or planter boxes)

Bioretention Facility Surface Area

Proposed Bottom Surface Area of Irregular Shaped Facility		A_P =	28305.2 ft^2
Depth of Soil Filter Media Layer		d_S =	3 ft
Total Volume within Soil Media, V_S	$V_S = (A_P * d_S * 0.3)+(A_P * 0.4)$	V_S =	36796.7 ft^3
Total Surcharge Storage Volume above Soil Media, V_P		V_P =	14152.6 ft^3
Total Effective Storage Volume, V_E	$V_E = V_S + V_P$	V_E =	50949.3 ft^3
Total Effective Depth, d_E	$d_E = \frac{V_E}{A_P}$	d_E =	1.80 ft
Minimum Surface Area, A_M	$A_M = \frac{V_{BMP}}{d_E}$	A_M =	7300 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4 :1
Diameter of Underdrain		6 inches
Longitudinal Slope of Site (3% maximum)		0.001 %
6" Check Dam Spacing		0 feet

Describe Vegetation:

Notes: Basin side slopes include 50% at 2:1.

APPENDIX G.4: BIORETENTION BASIN STORAGE VOLUME SPREADSHEETS

BASIN "A1"

Elevation	Contour Area (sf)	Contour Area (ac)	Contour Interval Volume (ac-ft)	Total Basin Volume (ac-ft)	Total Basin Volume (ft^3)
35	25518	0.586		0	0.00
			0.631		
36	29506.45	0.677		0.631	27488.10
			0.724		
37	33631.46	0.772		1.355	59034.57
			0.821		
38	37896.13	0.870		2.176	94777.16
			0.920		
39	42301.04	0.971		3.096	134855.57
			1.023		
40	46846.98	1.075		4.119	179410.25

BASIN "A2"

Elevation	Contour Area (sf)	Contour Area (ac)	Contour Interval Volume (ac-ft)	Total Basin Volume (ac-ft)	Total Basin Volume (ft^3)
26	19532.48	0.448		0	0.00
			0.490		
27	23218.75	0.533		0.490	21349.08
			0.576		
28	27025.81	0.620		1.066	46447.28
			0.665		
29	30953.67	0.711		1.731	75414.82

BASIN "B"

Elevation	Contour Area (sf)	Contour Area (ac)	Contour Interval Volume (ac-ft)	Total Basin Volume (ac-ft)	Total Basin Volume (ft^3)
26	28305.19	0.650		0	0.00
			0.703		
27	33031.21	0.758		0.703	30637.81
			0.813		
28	37884.98	0.870		1.517	66068.19
			0.926		
29	42862.09	0.984		2.443	106416.13

BASIN "A2" & "B"

Elevation	Contour Area (sf)	Contour Area (ac)	Contour Interval Volume (ac-ft)	Total Basin Volume (ac-ft)	Total Basin Volume (ft^3)
26	47837.67	1.098		0	0.00
			1.193		
27	56249.96	1.291		1.193	51987.07
			1.390		
28	64910.79	1.490		2.583	112515.78
			1.591		
29	73815.76	1.695		4.174	181831.37
			1.803		
30	83330.48	1.913		5.977	260356.44
			2.014		
31	92161.19	2.116		7.990	348065.22
			2.218		
32	101114.75	2.321		10.208	444668.61

APPENDIX G.5: VOLUME SUMMARY TABLES FOR HYDROLOGIC CONDITIONS OF CONCERN

Area	Pre-Project 2-Year, 24-Hour Volume	Post-Project 2-Year, 24-Hour Volume	Basin Volume Provided
A1	0.4191 ac-ft	2.0957 ac-ft	3.0960 ac-ft
A2	0.4950 ac-ft	2.4749 ac-ft	7.9900 ac-ft [1]
B	0.2608 ac-ft	1.1560 ac-ft	7.9900 ac-ft [1]

1 - Area A2 and B will be mitigated within Basins A2 and B, which will function together for addressing the hydrologic conditions of concern and increased runoff mitigation. The total 2-year, 24-hour volume to both basins from Areas A2 and B is 3.6309 ac-ft, and the basin has a total available volume of 7.9900 ac-ft, therefore the basins have sufficient volume to address the hydrologic conditions of concern.

APPENDIX G.6: VOLUME SUMMARY TABLES FOR INCREASED RUNOFF MITIGATION

Basin A1 (Unit Hydrograph Summary)

	100-Year Storm Events			
	1-Hour	3-Hour	6-Hour	24-Hour
Onsite Flow Rate	41.6 ft^3/s	25.5 ft^3/s	21.8 ft^3/s	8.1 ft^3/s
Offsite Flow Rate	74.7 ft^3/s	44.0 ft^3/s	34.4 ft^3/s	16.2 ft^3/s
Allowable Offsite Flow-By	45.6 ft^3/s	45.6 ft^3/s	45.6 ft^3/s	45.6 ft^3/s
Onsite Volume Generated	1.3901 ac-ft	1.8294 ac-ft	2.2213 ac-ft	3.9417 ac-ft
Offsite Volume Generated	2.6284 ac-ft	3.5390 ac-ft	3.828 ac-ft	6.3263 ac-ft
Basin Storage Volume	3.0960 ac-ft	3.0960 ac-ft	3.0960 ac-ft	3.0960 ac-ft
Onsite Volume Retained [1]	1.3901 ac-ft	1.8294 ac-ft	2.2213 ac-ft	3.0960 ac-ft
Offsite Volume Retained [2]	1.3661 ac-ft	0 ac-ft	0 ac-ft	0 ac-ft
Total Volume Retained	2.7892 ac-ft	1.8294 ac-ft	2.2213 ac-ft	3.0960 ac-ft
Maximum Basin Outflow [3]	45.6 ft^3/s	44.0 ft^3/s	34.4 ft^3/s	21.7 ft^3/s

1 - The onsite volume retained equals the total onsite volume generated, with the exception of the 24-hour storm duration. This duration resulted in a larger volume than available to store within the basin, therefore a corresponding flow rate was calculated on the recess limb of the hydrograph where the calculations reached 3.0960 ac-ft of volume generated, equaling 5.5 cfs of outflow.

2 - The offsite volume retained for the basin was determined in the previous summary tables by taking the delta volume difference between the rising and recess limbs of the hydrograph where approximately 45.6 cfs occurs. The 3-hour, 6-hour and 24-hour durations have peak flows less than the 45.6 cfs allowable, therefore the entire flow rates for these durations will flow-by.

3 - The maximum basin outflow equals the maximum flow-by for the 1-hour storm duration, the peak flow rate for the 3-hour and 6-hour storm durations, and the peak offsite flow rate plus the Basin A1 onsite outflow of 5.5 cfs.

Basin A2 and Basin B (Unit Hydrograph Summary)

	100-Year Storm Events			
	1-Hour	3-Hour	6-Hour	24-Hour
Onsite Flow Rate [4]	96.7 ft^3/s	56.5 ft^3/s	48.4 ft^3/s	17.7 ft^3/s
Offsite Flow Rate	159.9 ft^3/s	98.6 ft^3/s	82.6 ft^3/s	36.0 ft^3/s
Allowable Offsite Flow-By	97.5 ft^3/s	97.5 ft^3/s	97.5 ft^3/s	97.5 ft^3/s
Onsite Volume Generated [4]	3.0274 ac-ft	3.9614 ac-ft	4.7718 ac-ft	8.4048 ac-ft
Offsite Volume Generated	6.0253 ac-ft	7.7868 ac-ft	8.0310 ac-ft	12.9052 ac-ft
Basin Storage Volume	7.9900 ac-ft	7.9900 ac-ft	7.9900 ac-ft	7.9900 ac-ft
Onsite Volume Retained [1]	3.0274 ac-ft	3.9614 ac-ft	4.7718 ac-ft	7.9900 ac-ft
Offsite Volume Retained [2]	3.1096 ac-ft	1.2671 ac-ft	0 ac-ft	0 ac-ft
Total Volume Retained	6.1370 ac-ft	5.2285 ac-ft	4.7718 ac-ft	7.9900 ac-ft
Maximum Basin Outflow [3]	97.5 ft^3/s	97.5 ft^3/s	82.6 ft^3/s	38.9 ft^3/s

1 - The onsite volume retained equals the total onsite volume generated, with the exception of the 24-hour storm duration. This duration resulted in a larger volume than available to store within the basin, therefore a corresponding flow rate was calculated on the recess limb of the hydrograph where the calculations reached 7.9900 ac-ft of volume generated, equaling 2.9 cfs of outflow.

2 - The offsite volume retained for the basin was determined in the previous summary tables by taking the delta volume difference between the rising and recess limbs of the hydrograph where approximately 97.5 cfs occurs. The 6-hour and 24-hour durations have peak flows less than the 97.5 cfs allowable, therefore the entire flow rates for these durations will flow-by.

3 - The maximum basin outflow equals the maximum flow-by for the 1-hour and 3-hour storm durations, the peak flow rate for the 6-hour storm duration, and the peak offsite flow rate plus the Basin A2 and Basin B onsite outflow of 2.9 cfs.

4 - The onsite flow rate and volume is equal to the summation of Onsite Area A1 and Onsite Area B flow rates and volumes.

APPENDIX H: HEC-RAS ANALYSIS

APPENDIX H.0: EXISTING AND POST-PROJECT LINE D STORM DRAIN WATER SURFACE PROFILE GRADIENT PROGRAM CALCULATIONS

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T3 FILENAME: EXLINED
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WE   1420.0001772.000  2      .250
SH   1420.0001772.000  2                          1772.000
CD   1  4   2    .000   5.000     .000  .000  .000   .00
CD   2  2   0    .000   8.860   15.000  .000  .000   .00
Q           414.500   .0
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                           EXISTING LINE D
                             FILENAME: EXLINED
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 Station |  Elev   |  (FT)  |  Elev    |  (CFS)   | (FPS)    Head  | Grd.El.|  Elev  | Depth  | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
        -|-       -|-      -|-        -|-        -|-      -|-     -|-       -|-      -|-      -|-      -|-     -|-     -|-    -|
 L/Elem  |Ch Slope |        |          |          |         SF Ave|    HF   |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch
*********|*********|********|*********|*********|*******|*******|*********|*******|********|********|*******|*******|***** |*******
         |         |        |          |          |               |         |        |        |        |       |       |      |
  985.000  1767.650    3.381  1771.031    414.50   14.67    3.34  1774.37      .00    4.10     4.68   5.000    .000   .00   2   .0
        -|-       -|-      -|-        -|-        -|-      -|-     -|-       -|-      -|-      -|-      -|-     -|-     -|-    |-
  157.832    .0100                                         .0098     1.55     3.38    1.05     3.37    .013     .00   .00  PIPE
         |         |        |          |          |               |         |        |        |        |       |       |      |
 1142.832  1769.228    3.405  1772.633    414.50   14.55    3.29  1775.92      .00    4.10     4.66   5.000    .000   .00   2   .0
        -|-       -|-      -|-        -|-        -|-      -|-     -|-       -|-      -|-      -|-      -|-     -|-     -|-    |-
  183.794    .0100                                         .0092     1.69     3.40    1.04     3.37    .013     .00   .00  PIPE
         |         |        |          |          |               |         |        |        |        |       |       |      |
 1326.626  1771.066    3.556  1774.622    414.50   13.88    2.99  1777.61      .00    4.10     4.53   5.000    .000   .00   2   .0
        -|-       -|-      -|-        -|-        -|-      -|-     -|-       -|-      -|-      -|-      -|-     -|-     -|-    |-
   60.524    .0100                                         .0082      .50     3.56     .95     3.37    .013     .00   .00  PIPE
         |         |        |          |          |               |         |        |        |        |       |       |      |
 1387.150  1771.672    3.720  1775.391    414.50   13.23    2.72  1778.11      .00    4.10     4.36   5.000    .000   .00   2   .0
        -|-       -|-      -|-        -|-        -|-      -|-     -|-       -|-      -|-      -|-      -|-     -|-     -|-    |-
   25.671    .0100                                         .0074      .19     3.72     .87     3.37    .013     .00   .00  PIPE
         |         |        |          |          |               |         |        |        |        |       |       |      |
 1412.821  1771.928    3.899  1775.828    414.50   12.61    2.47  1778.30      .00    4.10     4.14   5.000    .000   .00   2   .0
        -|-       -|-      -|-        -|-        -|-      -|-     -|-       -|-      -|-      -|-      -|-     -|-     -|-    |-
    7.179    .0100                                         .0067      .05     3.90     .79     3.37    .013     .00   .00  PIPE
         |         |        |          |          |               |         |        |        |        |       |       |      |
 1420.000  1772.000    4.101  1776.101    414.50   12.02    2.25  1778.35      .00    4.10     3.84   5.000    .000   .00   2   .0
        -|-       -|-      -|-        -|-        -|-      -|-     -|-       -|-      -|-      -|-      -|-     -|-     -|-    |-
 WALL  ENTRANCE
         |         |        |          |          |               |         |        |        |        |       |       |      |
 1420.000  1772.000   11.682  1783.682    414.50    2.37     .09  1783.77      .00    2.87    15.00   8.860  15.000   .00   0   .0
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WE   1420.0001772.000  2      .250
SH   1420.0001772.000  2                          1772.000
CD   1  4   2    .000   5.000     .000  .000  .000   .00
CD   2  2   0    .000   8.860   15.000  .000  .000   .00
Q           256.500   .0
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Program Package Serial Number: 7028

WATER SURFACE PROFILE LISTING Date: 6-17-2016 Time: 8: 9: 6

TRACT NO. 21958 - PACIFIC RANCH II

EXISTING LINE D

FILENAME: EXLINED

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/ Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
985.000	1767.650	2.478	1770.128	256.50	13.21	2.71	1772.84	.00	3.24	5.00	5.000	.000	.00	2 .0
12.513	.0100					.0100	.13	2.48	1.18	2.48	.013	.00	.00	PIPE
997.513	1767.775	2.478	1770.253	256.50	13.21	2.71	1772.96	.00	3.24	5.00	5.000	.000	.00	2 .0
255.689	.0100					.0095	2.42	2.48	1.18	2.48	.013	.00	.00	PIPE
1253.203	1770.332	2.559	1772.891	256.50	12.68	2.50	1775.39	.00	3.24	5.00	5.000	.000	.00	2 .0
82.091	.0100					.0084	.69	2.56	1.11	2.48	.013	.00	.00	PIPE
1335.294	1771.153	2.657	1773.810	256.50	12.09	2.27	1776.08	.00	3.24	4.99	5.000	.000	.00	2 .0
40.069	.0100					.0074	.30	2.66	1.03	2.48	.013	.00	.00	PIPE
1375.363	1771.554	2.761	1774.315	256.50	11.53	2.06	1776.38	.00	3.24	4.97	5.000	.000	.00	2 .0
22.784	.0100					.0066	.15	2.76	.96	2.48	.013	.00	.00	PIPE
1398.147	1771.781	2.871	1774.652	256.50	10.99	1.88	1776.53	.00	3.24	4.94	5.000	.000	.00	2 .0
13.118	.0100					.0058	.08	2.87	.89	2.48	.013	.00	.00	PIPE
1411.265	1771.913	2.986	1774.899	256.50	10.48	1.71	1776.61	.00	3.24	4.90	5.000	.000	.00	2 .0
6.729	.0100					.0051	.03	2.99	.83	2.48	.013	.00	.00	PIPE
1417.994	1771.980	3.109	1775.089	256.50	10.00	1.55	1776.64	.00	3.24	4.85	5.000	.000	.00	2 .0
2.006	.0100					.0046	.01	3.11	.77	2.48	.013	.00	.00	PIPE
1420.000	1772.000	3.240	1775.240	256.50	9.53	1.41	1776.65	.00	3.24	4.78	5.000	.000	.00	2 .0
WALL ENTRANCE														

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                           EXISTING LINE D
                             FILENAME: EXLINED
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         | Invert  |  Depth |  Water   |    Q     |  Vel     Vel  |  Energy | Super |Critical|Flow Top|Height/|Base Wt|      |No Wth
 Station |  Elev   |  (FT)  |  Elev    |  (CFS)   | (FPS)    Head |  Grd.El.|  Elev |  Depth | Width  |Dia.-FT|or I.D.|  ZL  |Prs/Pip
        -|-       -|-      -|-        -|-        -|-      -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-    -|
 L/Elem  |Ch Slope |        |          |          |         SF Ave|    HF   |SE Dpth|Froude N|Norm Dp |  "N"  | X-Fall|  ZR  |Type Ch
*********|*********|********|*********|*********|*******|*******|*********|*******|********|********|*******|*******|***** |*******
         |         |        |          |          |               |         |       |        |        |       |       |       |
 1420.000  1772.000    6.960  1778.960    256.50    2.46      .09  1779.05     .00    2.09    15.00    8.860   15.000   .00   0   .0
        -|-       -|-      -|-        -|-        -|-      -|-     -|-       -|-     -|-      -|-      -|-     -|-     -|-     |-
```

APPENDIX H.1: EXISTING CONDITION HEC-RAS CALCULATIONS

```
                   HEC-RAS Version 4.1.0 Jan 2010
                    U.S. Army Corps of Engineers
                   Hydrologic Engineering Center
                         609 Second Street
                         Davis, California

       X     X  XXXXXX    XXXX        XXXX       XX      XXXX
       X     X  X        X    X       X   X     X  X    X
       X     X  X        X            X   X    X    X   X
       XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
       X     X  X        X            X  X     X    X        X
       X     X  X        X    X       X   X    X    X        X
       X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: ExistingCondition
Project File : ExistingCondition.prj
Run Date and Time: 7/6/2016 3:45:33 PM

Project in English units

Project Description:
HEC-RAS Project and Geometry created by SmartDraft

PLAN DATA

Plan Title: ExistingCondition
Plan File : o:\150.06.14\Engineering\HEC-RAS\HEC-RAS Models\HEC-RAS Models-WSPG DS WSE\Existing Condition\ExistingCondition.p01

Geometry Title: ExistingCondition
Geometry File : o:\150.06.14\Engineering\HEC-RAS\HEC-RAS Models\HEC-RAS Models-WSPG DS WSE\Existing Condition\ExistingCondition.g02

Flow Title : ExistingCondition
Flow File : o:\150.06.14\Engineering\HEC-RAS\HEC-RAS Models\HEC-RAS Models-WSPG DS WSE\Existing Condition\ExistingCondition.f01

Plan Summary Information:

Number of:	Cross Sections	= 30	Multiple Openings	=	0
	Culverts	= 4	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01

Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: ExistingCondition
Flow File : o:\150.06.14\Engineering\HEC-RAS\HEC-RAS Models\HEC-RAS Models-WSPG DS WSE\Existing Condition\ExistingCondition.f01

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2
MainChannel	MainChannel	3127.87	241.6	241.6
MainChannel	MainChannel	2817.46	241.6	131.3
MainChannel	MainChannel	2687.17	317.4	317.4
MainChannel	MainChannel	2494.33	317.4	167.87
MainChannel-Junc	MainChannel-JX	2064.94	317.4	317.4
WesterlyChannel	WesterlyChannel	11045.7	75.8	75.8
WesterlyChannel	WesterlyChannel	10639.81	87.2	87.2
WesterlyChannel	WesterlyChannel	10322.51	87.2	46
WesterlyChannel	WesterlyChannel	10209.63	46	46

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
MainChannel	MainChannel	PF 1	Normal S = 0.01	
MainChannel-Junc	MainChannel-JX	PF 1		Known WS = 1783.682
WesterlyChannel	WesterlyChannel	PF 1	Normal S = 0.0288	

GEOMETRY DATA

Geometry Title: ExistingCondition
Geometry File : o:\150.06.14\Engineering\HEC-RAS\HEC-RAS Models\HEC-RAS Models-WSPG DS WSE\Existing Condition\ExistingCondition.g02

Reach Connection Table

River Reach Upstream Boundary Downstream Boundary

MainChannel	MainChannel		JS1
MainChannel-Junc	MainChannel-JX	JS1	
WesterlyChannel	WesterlyChannel		JS1

JUNCTION INFORMATION

Name: JS1
Description:
Energy computation Method

Length across Junction River	Reach		Tributary River	Reach	Length	Angle
MainChannel	MainChannel	to	MainChannel-Junc	MainChannel-JX	160.16	0
WesterlyChannel	WesterlyChannel	to	MainChannel-Junc	MainChannel-JX	0	0

CROSS SECTION

RIVER: MainChannel
REACH: MainChannel   RS: 3127.87

INPUT
Description:
Station Elevation Data   num=   79

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1840	3.47	1839.35	5.45	1839	9.23	1838.34	11.22	1838
12.69	1837.75	17.3	1837	21.94	1836.34	24.26	1836	29.48	1835.34
31.65	1835.05	32.01	1835	36.29	1834.52	40.81	1834	45.92	1833.83
46.7	1833.81	60.75	1833.62	70.41	1833.56	70.79	1833.54	72.34	1833.62
74.74	1833.72	74.92	1833.72	76.31	1833.76	79.15	1833.82	80.6	1833.88
85.78	1833.92	86.4	1833.94	91.4	1834	96.34	1834.06	97.34	1834.08
106.37	1834.22	106.89	1834.23	110.13	1834.24	111.4	1834.26	117.68	1834.23
118.17	1834.24	118.69	1834.24	126.46	1834.15	127.05	1834.15	127.6	1834.14
134.76	1834	139.52	1833.92	140.23	1833.92	140.95	1833.92	148.9	1833.77
152.09	1833.73	155.55	1833.72	157.41	1833.72	160.2	1833.72	170.4	1833.84
171.73	1833.84	175.41	1833.88	176.48	1833.88	179.86	1833.89	187.36	1833.85
189.08	1833.87	192.75	1833.99	193.1	1833.99	197.13	1833.99	200.49	1833.99
201.91	1833.99	206.11	1834	207.76	1834	208.81	1834.09	209.87	1834.18
218.46	1834.99	218.58	1835	220.88	1835.36	225.65	1836	230.33	1836.99
230.39	1837	230.43	1837.01	230.45	1837.01	236.18	1838	237.45	1838.18
238.78	1838.4	242.47	1839	244.32	1839.25	249.36	1840		

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	31.65	.03	218.46	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
31.65	218.46	110.03	120.59	140.72	.1	.3

CROSS SECTION

RIVER: MainChannel

REACH: MainChannel RS: 3007.28

INPUT
Description:
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1837	4.98	1836.3	7.16	1836	12.59	1835.25	14.2	1835.03
14.38	1835	16.04	1834.77	21.75	1834	22.73	1833.86	28.75	1833
29.18	1832.94	31.68	1832.57	35.61	1832	39.41	1831.45	42.65	1831
52.77	1830.51	55.69	1830.39	57.5	1830.32	59.16	1830.25	64.72	1830.05
65.48	1830.02	65.51	1830.02	65.55	1830.02	66.3	1830	74.63	1829.85
75.37	1829.84	84.3	1829.7	88.51	1829.66	95.32	1829.57	96.24	1829.56
98.32	1829.53	103.97	1829.44	110.95	1829.35	114.97	1829.29	115.15	1829.29
119.12	1829.25	120.48	1829.24	121.08	1829.24	121.69	1829.23	123.4	1829.23
124.59	1829.24	128.03	1829.24	134.46	1829.27	140.51	1829.28	142.09	1829.28
143.05	1829.28	148.76	1829.41	166.02	1829.86	170.27	1829.99	170.57	1830
171.26	1830	171.4	1830	171.58	1830.01	181.29	1830.4	191.38	1830.75
195.21	1830.86	199.49	1831	201.69	1831.08	206.49	1831.28	219.95	1831.83
220	1831.83	223.5	1832	224.94	1832.08	234.96	1832.65	240.24	1833
250.73	1833.54	259.99	1834	279.9	1834.81	280.77	1834.84	281.4	1834.86
283.1	1834.9	285.32	1835	295.65	1835.47	304.66	1836	315.1	1836.62
322.09	1837								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	29.18	.03	224.94	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
29.18	224.94	61.87	96.39	160.58	.1	.3

CROSS SECTION

RIVER: MainChannel
REACH: MainChannel RS: 2910.89

INPUT
Description:
Station Elevation Data num= 106

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1837	1.91	1836.85	11.12	1836	12.85	1835.85	15.78	1835.57
19.75	1835.2	21.79	1835	29.64	1834.13	30.9	1834	32.95	1833.73
38.59	1833	40.5	1832.74	45.86	1832	47.32	1831.8	48.61	1831.62
52.72	1831	53.11	1830.96	59.77	1830	62.17	1829.83	70.5	1829
77.46	1828.54	80.31	1828.37	82.8	1828.24	83.67	1828.2	84.31	1828.18
85.03	1828.17	85.28	1828.16	85.81	1828.16	86.89	1828.17	91.3	1828.22
92.97	1828.22	93.58	1828.22	100.36	1828.08	100.45	1828.08	106.04	1828.01
106.93	1828	107.06	1828	107.64	1827.93	113.58	1827	113.9	1827
113.95	1827	116.18	1826.99	125.28	1826.71	131.99	1826.54	132.96	1826.55
134.9	1826.54	137	1826.53	139.06	1826.53	146.72	1826.62	147.97	1826.64
148.19	1826.64	151.5	1826.68	152.04	1826.69	156.05	1826.75	168.87	1826.9
172.24	1826.96	173.86	1827	174.35	1827	176.09	1827.1	184.26	1827.5
192.25	1827.9	194.52	1828	194.91	1828	196.7	1828.06	199.73	1828.14
201.96	1828.17	210.08	1828.27	210.72	1828.29	211.44	1828.31	214.31	1828.36

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  220.48 1828.56  221.07 1828.57  221.61 1828.59  222.59 1828.62  233.83    1829
   233.9    1829  239.84 1829.06  245.57 1829.04  245.75 1829.04  250.35 1829.04
   250.7 1829.04  252.33 1829.06  252.65 1829.07  253.13 1829.09  253.96 1829.12
  265.68    1830   265.9 1830.02  268.76 1830.24  278.14    1831  280.52 1831.16
  282.64  1831.3  286.22 1831.52  286.72 1831.55  289.87 1831.73   291.2 1831.81
  294.29    1832  308.21 1832.81  310.38    1833  317.48 1833.83  318.81    1834
  319.83 1834.13  326.63    1835  331.27  1835.6  334.38    1836   340.6 1836.91
  341.26    1837

Manning's n Values         num=       3
     Sta    n Val      Sta    n Val      Sta    n Val
       0      .03    47.32      .03    265.9      .03

Bank Sta: Left   Right     Lengths: Left Channel   Right      Coeff Contr.   Expan.
         47.32   265.9             92.46   93.43  116.74              .1       .3

CROSS SECTION


RIVER: MainChannel
REACH: MainChannel         RS: 2817.46

INPUT
Description:
Station Elevation Data    num=     177
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0    1835      .31    1835      .41    1835      .46    1835     4.97    1835
    5.23    1835     5.27    1835     7.38 1834.96     7.43 1834.96     7.58 1834.96
   15.08 1834.72    21.17 1834.45     26.6 1834.21    30.06  1834.1    32.16 1834.06
   32.38 1834.05    36.56 1834.02    36.67 1834.01    44.72 1834.04    45.05 1834.04
   53.54 1834.07    53.85 1834.06    58.37 1834.04     58.4 1834.04    60.93 1834.05
   61.61 1834.01    62.05 1834.06    65.09  1834.1     67.8 1834.14    68.43 1834.03
   70.93 1834.02    71.86 1834.02    73.37 1834.02    73.68 1834.02    73.82 1834.02
   75.68 1834.02    76.21 1834.02     76.6 1834.02    81.02 1834.04    86.12 1834.02
   88.31 1834.01    91.14 1834.01    91.51 1834.01    92.52    1834    95.26    1834
   99.82 1833.72   102.03 1833.53   104.03 1833.34      105 1833.26   106.94    1833
  111.28 1832.77   123.07 1832.02   123.42    1832    127.9 1831.45   131.75    1831
  135.13  1830.1   135.31 1830.04   135.47    1830    135.6 1829.97   135.86 1829.91
  139.44    1829   142.28 1828.26   143.15    1828   144.65 1827.62   147.14    1827
  147.28 1826.99   147.58 1826.98   148.79 1826.85   151.56 1826.74   153.92 1826.68
  161.69 1826.18   162.82 1826.16   164.13    1826   165.71 1825.77   165.85 1825.75
  168.22 1825.37    171.4    1825   172.53    1825   173.05    1825   173.05 1822.42
   176.6 1822.42   178.29    1825   186.46    1825   189.28    1825   193.04    1825
  194.04    1825   195.17    1825   196.94    1825   197.21    1825   197.39    1825
  199.58  1825.2   200.26  1825.3   208.45 1825.93   219.83 1825.94   221.51 1825.95
  225.96 1825.91   227.75 1825.92   228.82 1825.93   228.91 1825.93   230.34 1825.94
   230.9 1825.95   233.66 1825.96   234.33 1825.97   237.89 1825.95   243.71 1825.96
  246.41 1825.98   249.91 1825.97   254.49    1826   255.25    1826   255.37    1826
  255.98    1826   264.69 1826.76   265.95 1826.86   266.15 1826.87   269.39 1826.98
  280.33 1826.98   280.64 1826.96   283.47 1826.98   283.62 1826.98   283.69 1826.98
   283.7 1826.98   289.15 1826.99   289.85 1826.99   289.94 1826.99    293.7    1827
   296.5 1827.15   298.71 1827.16   300.31 1827.26   300.92 1827.32    304.8 1827.35
  305.42 1827.39   305.96 1827.43   307.45 1827.56   309.21  1827.6   311.29 1827.66
  320.54 1827.97   321.51    1828    321.6 1828.01    321.7 1828.02   324.81 1828.28
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  329.05 1828.33  335.55 1828.64  336.55 1828.67  337.43 1828.68  338.01 1828.67
  338.64 1828.66  339.44 1828.64  339.63 1828.64  341.89 1828.66  343.43  1828.7
  344.32  1828.7  344.67 1828.71  349.64    1829   352.7 1829.37   357.7 1829.53
  358.45 1829.61  360.99 1829.75  363.63 1829.99  363.73 1829.99  363.92    1830
  366.34 1830.32  367.09 1830.35  369.32 1830.64  372.83 1830.96  373.48 1830.95
  374.24 1830.96  374.74    1831  384.54 1831.83  386.45    1832   394.7 1832.56
  399.17 1832.92  400.83 1832.96  401.65    1833  403.54 1833.25     409    1834
  412.98 1834.65  415.28    1835

Manning's n Values        num=       3
     Sta    n Val      Sta    n Val      Sta    n Val
       0      .03   123.07      .03   320.54      .03

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
        123.07  320.54            133.24  130.29  175.48                .1       .3

CULVERT


RIVER: MainChannel
REACH: MainChannel        RS: 2752.32

INPUT
Description:
Distance from Upstream XS =    3.51
Deck/Roadway Width        =      56
Weir Coefficient          =     2.8
Upstream  Deck/Roadway Coordinates
    num=       9
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0    1833    1820   70.51    1833    1820  117.73  1832.6    1820
  192.53  1832.6    1820  264.83  1832.8    1820  297.93    1833    1820
  350.92  1833.5    1820  401.31    1834    1820  415.28    1834    1820

Upstream Bridge Cross Section Data
Station Elevation Data    num=     177
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    1835     .31    1835     .41    1835     .46    1835    4.97    1835
    5.23    1835    5.27    1835    7.38 1834.96    7.43 1834.96    7.58 1834.96
   15.08 1834.72   21.17 1834.45    26.6 1834.21   30.06  1834.1   32.16 1834.06
   32.38 1834.05   36.56 1834.02   36.67 1834.01   44.72 1834.04   45.05 1834.04
   53.54 1834.07   53.85 1834.06   58.37 1834.04    58.4 1834.04   60.93 1834.05
   61.61 1834.01   62.05 1834.06   65.09  1834.1    67.8 1834.14   68.43 1834.03
   70.93 1834.02   71.86 1834.02   73.37 1834.02   73.68 1834.02   73.82 1834.02
   75.68 1834.02   76.21 1834.02    76.6 1834.02   81.02 1834.04   86.12 1834.02
   88.31 1834.01   91.14 1834.01   91.51 1834.01   92.52    1834   95.26    1834
   99.82 1833.72  102.03 1833.53  104.03 1833.34     105 1833.26  106.94    1833
  111.28 1832.77  123.07 1832.02  123.42    1832   127.9 1831.45  131.75    1831
  135.13  1830.1  135.31 1830.04  135.47    1830   135.6 1829.97  135.86 1829.91
  139.44    1829  142.28 1828.26  143.15    1828  144.65 1827.62  147.14    1827
  147.28 1826.99  147.58 1826.98  148.79 1826.85  151.56 1826.74  153.92 1826.68
  161.69 1826.18  162.82 1826.16  164.13    1826  165.71 1825.77  165.85 1825.75
  168.22 1825.37   171.4    1825  172.53    1825  173.05    1825  173.05 1822.42
   176.6 1822.42  178.29    1825  186.46    1825  189.28    1825  193.04    1825
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194.04	1825	195.17	1825	196.94	1825	197.21	1825	197.39	1825
199.58	1825.2	200.26	1825.3	208.45	1825.93	219.83	1825.94	221.51	1825.95
225.96	1825.91	227.75	1825.92	228.82	1825.93	228.91	1825.93	230.34	1825.94
230.9	1825.95	233.66	1825.96	234.33	1825.97	237.89	1825.95	243.71	1825.96
246.41	1825.98	249.91	1825.97	254.49	1826	255.25	1826	255.37	1826
255.98	1826	264.69	1826.76	265.95	1826.86	266.15	1826.87	269.39	1826.98
280.33	1826.98	280.64	1826.96	283.47	1826.98	283.62	1826.98	283.69	1826.98
283.7	1826.98	289.15	1826.99	289.85	1826.99	289.94	1826.99	293.7	1827
296.5	1827.15	298.71	1827.16	300.31	1827.26	300.92	1827.32	304.8	1827.35
305.42	1827.39	305.96	1827.43	307.45	1827.56	309.21	1827.6	311.29	1827.66
320.54	1827.97	321.51	1828	321.6	1828.01	321.7	1828.02	324.81	1828.28
329.05	1828.33	335.55	1828.64	336.55	1828.67	337.43	1828.68	338.01	1828.67
338.64	1828.66	339.44	1828.64	339.63	1828.64	341.89	1828.66	343.43	1828.7
344.32	1828.7	344.67	1828.71	349.64	1829	352.7	1829.37	357.7	1829.53
358.45	1829.61	360.99	1829.75	363.63	1829.99	363.73	1829.99	363.92	1830
366.34	1830.32	367.09	1830.35	369.32	1830.64	372.83	1830.96	373.48	1830.95
374.24	1830.96	374.74	1831	384.54	1831.83	386.45	1832	394.7	1832.56
399.17	1832.92	400.83	1832.96	401.65	1833	403.54	1833.25	409	1834
412.98	1834.65	415.28	1835						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	123.07	.03	320.54	.03

Bank Sta: Left	Right	Coeff Contr.	Expan.
123.07	320.54	.1	.3

Downstream Deck/Roadway Coordinates
num= 7

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1833	1810	80.16	1833	1810	127.8	1832.6	1810
202.42	1832.6	1810	274.55	1832.8	1810	307.51	1834	1810
331.07	1834	1810						

Downstream Bridge Cross Section Data
Station Elevation Data num= 144

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1820	7.3	1819.54	16.41	1819	40.67	1818.11	42.44	1818.06
43.24	1818.05	43.79	1818	44	1818	44.09	1818	44.92	1818
52.68	1817.99	53.96	1817.99	59.39	1817.98	61.17	1817.98	63.53	1817.99
64.43	1817.99	72.16	1817.86	80.75	1817.92	83.16	1817.94	86.76	1817.88
89.87	1818	94.73	1818.31	99.01	1818.67	100.57	1818.79	101.69	1818.85
106.35	1818.98	106.4	1818.99	106.56	1819	106.75	1819.07	109.71	1820
110.36	1820.29	112.22	1821	112.4	1821.07	113.51	1821.34	115.36	1821.61
116.43	1821.77	117.02	1821.8	119.8	1821.88	121.02	1822	123.35	1822.06
123.53	1822.06	125.84	1822.03	127.53	1822.05	128.28	1822.07	130.81	1822.16
135.87	1822.34	136.79	1822.34	140.03	1822.28	144.26	1822.14	145.28	1822.11
148.08	1822	152.09	1821.76	152.57	1821.76	153.99	1821.73	155.03	1821.75
156.85	1821.82	159.83	1822	161.16	1822.08	161.44	1822.08	163.76	1822.14
166.28	1822.08	168.35	1822.01	168.78	1822	169.17	1821.98	169.24	1821.98
169.38	1821.97	169.67	1821.96	181.12	1821	183.64	1820.02	183.71	1820
184.52	1819.77	187.16	1819	187.34	1818.94	187.58	1818.89	190.72	1818
191.46	1818	191.59	1818	192.51	1818	193.18	1818	194.22	1818
195.24	1818	195.5	1818	196.36	1818.13	196.7	1818.23	198.64	1819

```
  199.01 1819.15  200.86    1820  201.82 1820.07  202.56 1820.09  205.58 1820.25
  206.48 1820.41   206.6 1820.41  208.63 1820.46  210.23 1820.39   211.9 1820.35
  213.63    1820  216.97  1819.3  218.29    1819  224.61 1818.97  228.94 1818.95
  231.33 1818.96  233.24 1818.96  235.58 1818.97  238.96 1818.98  239.36 1818.98
  242.18 1818.99  242.83 1818.99     244 1818.99  244.29    1819  245.46    1819
  245.78    1819  246.18 1818.99  248.32 1818.99   248.7    1819  249.99    1819
  250.67 1818.99   250.7 1818.99  251.84    1819  254.08 1819.05  254.47 1819.05
  255.34 1819.08     256 1819.08  260.96 1819.24  263.14 1819.24  265.88 1819.32
  288.35 1819.74   291.3 1819.74  294.39 1819.75  297.83 1819.77  303.26 1819.84
  305.91 1819.87  313.74    1820  314.68 1820.74  314.91    1821  316.06 1821.89
  316.17    1822  317.08 1822.66  317.55    1823  319.78 1823.71  320.63 1823.98
   320.7    1824  321.09 1824.04  330.39 1824.94  331.07    1825

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03  130.81     .03   206.6     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
        130.81   206.6             .1       .3

Upstream Embankment side slope              =    1830 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular     3.5
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
               5.06   103.3     .024     .024        0                   .5                1
Upstream   Elevation =  1822.42
           Centerline Station =  174.81
Downstream Elevation =  1819.21
           Centerline Station =  190.72

CULVERT OUTPUT  Profile #PF 1  Culv Group:  Culvert #1

  Q Culv Group (cfs)        131.26    Culv Full Len (ft)        103.30
  # Barrels                      1    Culv Vel US (ft/s)         13.64
  Q Barrel (cfs)            131.26    Culv Vel DS (ft/s)         13.64
  E.G. US. (ft)            1833.04    Culv Inv El Up (ft)      1822.42
  W.S. US. (ft)            1833.04    Culv Inv El Dn (ft)      1819.21
  E.G. DS (ft)             1819.34    Culv Frctn Ls (ft)          5.99
  W.S. DS (ft)             1819.18    Culv Exit Loss (ft)         6.27
  Delta EG (ft)              13.70    Culv Entr Loss (ft)         1.45
  Delta WS (ft)              13.86    Q Weir (cfs)              111.07
  E.G. IC (ft)             1833.02    Weir Sta Lft (ft)         106.65
```

```
  E.G. OC (ft)            1833.04    Weir Sta Rgt (ft)        302.10
  Culvert Control          Outlet    Weir Submerg               0.00
  Culv WS Inlet (ft)      1825.92    Weir Max Depth (ft)        0.44
  Culv WS Outlet (ft)     1822.71    Weir Avg Depth (ft)        0.33
  Culv Nml Depth (ft)        3.50    Weir Flow Area (sq ft)    65.30
  Culv Crt Depth (ft)        3.50    Min El Weir Flow (ft)   1832.61
```

Note: The normal depth exceeds the height of the culvert. The program assumes that the normal depth is equal to the height of the culvert.
Note: Culvert critical depth exceeds the height of the culvert.

CULVERT OUTPUT Profile #PF 2 Culv Group: Culvert #1

```
  Q Culv Group (cfs)       128.85    Culv Full Len (ft)       103.30
  # Barrels                     1    Culv Vel US (ft/s)        13.39
  Q Barrel (cfs)           128.85    Culv Vel DS (ft/s)        13.39
  E.G. US. (ft)           1832.66    Culv Inv El Up (ft)     1822.42
  W.S. US. (ft)           1832.66    Culv Inv El Dn (ft)     1819.21
  E.G. DS (ft)            1819.24    Culv Frctn Ls (ft)         5.78
  W.S. DS (ft)            1818.88    Culv Exit Loss (ft)        6.26
  Delta EG (ft)             13.42    Culv Entr Loss (ft)        1.39
  Delta WS (ft)             13.78    Q Weir (cfs)               2.45
  E.G. IC (ft)            1832.12    Weir Sta Lft (ft)        113.20
  E.G. OC (ft)            1832.66    Weir Sta Rgt (ft)        209.91
  Culvert Control          Outlet    Weir Submerg               0.00
  Culv WS Inlet (ft)      1825.92    Weir Max Depth (ft)        0.05
  Culv WS Outlet (ft)     1822.71    Weir Avg Depth (ft)        0.04
  Culv Nml Depth (ft)        3.50    Weir Flow Area (sq ft)     4.15
  Culv Crt Depth (ft)        3.50    Min El Weir Flow (ft)   1832.61
```

Warning: During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet energy grade answer may not be valid.
Note: The normal depth exceeds the height of the culvert. The program assumes that the normal depth is equal to the height of the culvert.
Note: Culvert critical depth exceeds the height of the culvert.

CROSS SECTION

RIVER: MainChannel
REACH: MainChannel   RS: 2687.17

INPUT
Description:
Station Elevation Data   num=   144

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1820	7.3	1819.54	16.41	1819	40.67	1818.11	42.44	1818.06
43.24	1818.05	43.79	1818	44	1818	44.09	1818	44.92	1818
52.68	1817.99	53.96	1817.99	59.39	1817.98	61.17	1817.98	63.53	1817.99

```
   64.43 1817.99   72.16 1817.86   80.75 1817.92   83.16 1817.94   86.76 1817.88
   89.87    1818   94.73 1818.31   99.01 1818.67  100.57 1818.79  101.69 1818.85
  106.35 1818.98   106.4 1818.99  106.56    1819  106.75 1819.07  109.71    1820
  110.36 1820.29  112.22    1821   112.4 1821.07  113.51 1821.34  115.36 1821.61
  116.43 1821.77  117.02  1821.8   119.8 1821.88  121.02    1822  123.35 1822.06
  123.53 1822.06  125.84 1822.03  127.53 1822.05  128.28 1822.07  130.81 1822.16
  135.87 1822.34  136.79 1822.34  140.03 1822.28  144.26 1822.14  145.28 1822.11
  148.08    1822  152.09 1821.76  152.57 1821.76  153.99 1821.73  155.03 1821.75
  156.85 1821.82  159.83    1822  161.16 1822.08  161.44 1822.08  163.76 1822.14
  166.28 1822.08  168.35 1822.01  168.78    1822  169.17 1821.98  169.24 1821.98
  169.38 1821.97  169.67 1821.96  181.12    1821  183.64 1820.02  183.71    1820
  184.52 1819.77  187.16    1819  187.34 1818.94  187.58 1818.89  190.72    1818
  191.46    1818  191.59    1818  192.51    1818  193.18    1818  194.22    1818
  195.24    1818   195.5    1818  196.36 1818.13   196.7 1818.23  198.64    1819
  199.01 1819.15  200.86    1820  201.82 1820.07  202.56 1820.09  205.58 1820.25
  206.48 1820.41   206.6 1820.41  208.63 1820.46  210.23 1820.39   211.9 1820.35
  213.63    1820  216.97  1819.3  218.29    1819  224.61 1818.97  228.94 1818.95
  231.33 1818.96  233.24 1818.96  235.58 1818.97  238.96 1818.98  239.36 1818.98
  242.18 1818.99  242.83 1818.99     244 1818.99  244.29    1819  245.46    1819
  245.78    1819  246.18 1818.99  248.32 1818.99   248.7    1819  249.99    1819
  250.67 1818.99   250.7 1818.99  251.84    1819  254.08 1819.05  254.47 1819.05
  255.34 1819.08     256 1819.08  260.96 1819.24  263.14 1819.24  265.88 1819.32
  288.35 1819.74   291.3 1819.74  294.39 1819.75  297.83 1819.77  303.26 1819.84
  305.91 1819.87  313.74    1820  314.68 1820.74  314.91    1821  316.06 1821.89
  316.17    1822  317.08 1822.66  317.55    1823  319.78 1823.71  320.63 1823.98
   320.7    1824  321.09 1824.04  330.39 1824.94  331.07    1825

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03  130.81     .03   206.6     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        130.81   206.6             86.28   82.95   85.76              .1       .3

CROSS SECTION


RIVER: MainChannel
REACH: MainChannel        RS: 2604.22

INPUT
Description:
Station Elevation Data    num=     143
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    1826     .94  1825.6    2.47    1825    4.27 1824.48    5.76    1824
    15.8 1821.71   18.85    1821    23.1 1820.34   24.94    1820    26.8 1819.21
   27.21 1819.03   27.28    1819   27.44 1818.93   29.58    1818   31.64 1817.44
    33.4    1817   33.45    1817    34.2 1816.99   34.38 1816.99   34.81 1816.99
   35.73 1816.99    41.2  1816.9    44.1 1816.86   59.48 1816.27   62.79 1816.22
   65.14 1816.18   67.54 1816.14   71.52 1816.06   73.83 1816.02   74.74 1816.03
   75.53    1816   77.28 1815.99   83.95 1815.99   88.06 1815.99   88.56 1815.99
    90.7 1815.98   91.98 1815.98   94.33 1815.98   95.19 1815.98  103.74    1816
  106.63 1816.89  106.96    1817  107.69 1817.01  107.99 1817.02  109.16 1817.03
  110.26 1817.02  110.73 1817.01  111.55 1817.01  112.79 1817.02  113.71 1817.03
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  114.84 1817.04  115.09 1817.04  117.46 1817.01  118.57 1817.01  118.84 1817.04
  119.93 1817.18  120.51 1817.33  120.88 1817.38  123.03 1817.27  123.56 1817.24
  124.35 1817.31  127.04 1817.83   127.3 1817.89  127.66    1818  127.71    1818
  127.74    1818  127.81 1818.01  129.61 1818.32  133.65    1819  134.09    1819
  134.44 1818.92  137.22    1818  139.29 1817.32  140.26    1817  143.23 1816.01
  143.26    1816  143.52 1815.99  145.64 1815.94  146.18 1815.95  146.59 1815.97
  146.87 1815.96  147.27 1815.96  148.89 1815.71  150.48 1815.54  152.53 1815.35
  154.93    1815  156.25 1814.84  160.74 1814.29  161.76 1814.16  163.15    1814
  164.41    1814  164.83    1814  165.56    1814  165.95    1814  169.04 1814.33
  171.41 1814.61  174.43 1814.97  174.78 1814.97  175.87    1815  180.88 1815.41
  184.09 1815.67  186.67 1815.94  189.12 1815.99  189.35    1816  189.55 1816.02
  189.69 1816.03  189.72 1816.03  192.07 1816.46  194.97    1817  195.55  1817.1
  196.83 1817.37  199.47 1817.93  199.76    1818  200.17  1818.1  200.23 1818.11
  201.97 1818.48  204.38    1819  207.87 1819.25  209.53 1819.38  211.15 1819.53
  218.41    1820  221.28 1820.01  226.66 1820.01  231.21 1820.01  235.43 1820.01
  235.83 1820.01  237.15 1820.01  237.58 1820.01   239.1 1820.01  243.75 1820.02
  245.47 1820.02  250.15 1820.02  257.38 1820.03  265.18 1820.02  270.51 1820.02
  270.77 1820.02  271.02 1820.02  285.32 1821.47  297.06 1822.65  300.49    1823
  300.76 1823.11  301.24 1823.37  302.46    1824

Manning's n Values         num=       3
     Sta    n Val     Sta    n Val     Sta    n Val
       0      .03  107.69      .03  200.17      .03

Bank Sta: Left   Right     Lengths: Left Channel   Right     Coeff Contr.   Expan.
        107.69  200.17           119.35  109.89  103.93              .1       .3

CROSS SECTION


RIVER: MainChannel
REACH: MainChannel         RS: 2494.33

INPUT
Description:
Station Elevation Data    num=     112
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
       0     1821     2.8 1820.59    3.66 1820.48    4.27 1820.44     5.9  1820.4
   12.75 1820.57   17.61 1820.53   18.35 1820.51   19.19 1820.48   22.37 1820.29
   23.46 1820.26   25.21 1820.16   26.42 1820.11   26.59  1820.1   29.33 1820.04
   30.26    1820   30.93 1819.97   31.19 1819.96   31.85 1819.93   39.43 1819.55
   40.86 1819.46   46.83 1819.07   47.53 1819.01   47.79    1819   49.09 1818.98
   58.44 1818.15   59.48 1818.07   60.86    1818   61.15 1817.97   61.46 1817.97
   68.91 1817.57   69.21 1817.56   70.16 1817.54   70.97 1817.52   71.73  1817.5
   71.83  1817.5   75.02 1817.38   77.49 1817.44   78.05 1817.43    78.3 1817.42
   84.17 1817.21   84.65 1817.18   86.61 1817.03   86.69 1817.02   86.94    1817
   89.89 1816.69   90.82 1816.58   93.34 1816.33    94.9 1816.15   95.41 1816.11
    95.6  1816.1   97.15    1816    98.2 1815.92   98.61 1815.89  101.46 1815.75
  111.23  1815.2  112.56 1815.04  112.59 1815.03   113.3    1815  113.31    1815
  116.42    1814   118.1 1813.13  118.44    1813  118.71 1812.96  120.52 1812.76
  121.04 1812.76  123.11    1813  123.74 1813.15  124.34  1813.1  124.34 1811.44
   136.5 1811.31   136.5  1812.7  137.25 1812.85   137.7    1813  138.55 1813.14
  141.01  1813.3  141.71 1813.44  143.15    1814  146.49 1814.83  147.23    1815
  147.52 1815.07  149.96 1815.66  150.81 1815.87  151.27    1816  151.59 1816.04
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156.82	1816.74	158.63	1816.97	158.88	1817	159.91	1817.08	160.24	1817.1
162.94	1817.2	166.32	1817.38	168.38	1817.47	175.08	1817.77	179.78	1818
179.86	1818	180.67	1818.04	181.35	1818.06	183.37	1818.13	186.5	1818.25
189.56	1818.36	193.1	1818.5	207.24	1819	211.54	1819.24	213.65	1819.25
216.07	1819.35	222.58	1819.45	236.8	1819.76	238.53	1819.81	245.24	1820
249.98	1820.37	256.43	1821						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	78.3	.03	159.91	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
78.3	159.91	101.83	102.12	158.09	.1	.3

CULVERT

RIVER: MainChannel
REACH: MainChannel RS: 2443.27

INPUT
Description:
Distance from Upstream XS = 5.65
Deck/Roadway Width = 60.11
Weir Coefficient = 2.8
Upstream Deck/Roadway Coordinates
num= 9

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1820.2	1805	12.97	1820	1805	51.21	1819	1805
80.7	1818.6	1805	147.588	1818.5	1805	163.31	1819	1805
212.7	1820	1805	241.95	1821	1805	256.43	1821	1805

Upstream Bridge Cross Section Data
Station Elevation Data num= 112

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1821	2.8	1820.59	3.66	1820.48	4.27	1820.44	5.9	1820.4
12.75	1820.57	17.61	1820.53	18.35	1820.51	19.19	1820.48	22.37	1820.29
23.46	1820.26	25.21	1820.16	26.42	1820.11	26.59	1820.1	29.33	1820.04
30.26	1820	30.93	1819.97	31.19	1819.96	31.85	1819.93	39.43	1819.55
40.86	1819.46	46.83	1819.07	47.53	1819.01	47.79	1819	49.09	1818.98
58.44	1818.15	59.48	1818.07	60.86	1818	61.15	1817.97	61.46	1817.97
68.91	1817.57	69.21	1817.56	70.16	1817.54	70.97	1817.52	71.73	1817.5
71.83	1817.5	75.02	1817.38	77.49	1817.44	78.05	1817.43	78.3	1817.42
84.17	1817.21	84.65	1817.18	86.61	1817.03	86.69	1817.02	86.94	1817
89.89	1816.69	90.82	1816.58	93.34	1816.33	94.9	1816.15	95.41	1816.11
95.6	1816.1	97.15	1816	98.2	1815.92	98.61	1815.89	101.46	1815.75
111.23	1815.2	112.56	1815.04	112.59	1815.03	113.3	1815	113.31	1815
116.42	1814	118.1	1813.13	118.44	1813	118.71	1812.96	120.52	1812.76
121.04	1812.76	123.11	1813	123.74	1813.15	124.34	1813.1	124.34	1811.44
136.5	1811.31	136.5	1812.7	137.25	1812.85	137.7	1813	138.55	1813.14
141.01	1813.3	141.71	1813.44	143.15	1814	146.49	1814.83	147.23	1815
147.52	1815.07	149.96	1815.66	150.81	1815.87	151.27	1816	151.59	1816.04
156.82	1816.74	158.63	1816.97	158.88	1817	159.91	1817.08	160.24	1817.1
162.94	1817.2	166.32	1817.38	168.38	1817.47	175.08	1817.77	179.78	1818

179.86	1818	180.67	1818.04	181.35	1818.06	183.37	1818.13	186.5	1818.25
189.56	1818.36	193.1	1818.5	207.24	1819	211.54	1819.24	213.65	1819.25
216.07	1819.35	222.58	1819.45	236.8	1819.76	238.53	1819.81	245.24	1820
249.98	1820.37	256.43	1821						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	78.3	.03	159.91	.03

Bank Sta: Left	Right	Coeff Contr.	Expan.
78.3	159.91	.1	.3

Downstream Deck/Roadway Coordinates
num= 11

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1820.2	1805	11.48	1820	1805	50.08	1819	1805
79.61	1818.6	1805	146.45	1818.5	1805	167.19	1819	1805
211.24	1820	1805	240.97	1821	1805	263.66	1822	1805
283.06	1823	1805	287.87	1823	1805			

Downstream Bridge Cross Section Data
Station Elevation Data num= 134

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1820	3.35	1819.53	6.51	1819	17.78	1818.14	19.21	1818
21.23	1817.86	34.56	1817	35.54	1816.98	37.97	1816.97	45.21	1816.94
50.5	1816.94	55.61	1816.94	63.46	1816.97	65.9	1816.98	67.79	1817
69.03	1817.06	69.92	1817.08	71.45	1817.02	71.85	1817	72.16	1816.87
74.02	1816	75.11	1815.35	75.66	1815	77.15	1814.06	77.24	1814
78.79	1813.06	78.88	1813	79.19	1812.83	79.32	1812.73	80.56	1812
81.55	1811.81	83.83	1811.69	83.86	1811.68	85.69	1811.64	86.21	1811.61
91.34	1811.39	94.71	1811.31	95.93	1811.22	96.19	1811.23	97.19	1811.3
99.01	1811.39	101.68	1811.34	103.22	1811.33	105.04	1811.2	107.06	1811
109.13	1810.85	110.87	1810.54	112.96	1810.21	114.16	1810	115.06	1809.85
117.71	1809.5	117.98	1809.46	118.7	1809.39	128.89	1809.23	132.17	1809
132.27	1809	132.49	1809	132.6	1809	132.67	1809	132.76	1809
134.23	1808.85	135.66	1808.72	136.44	1808.61	140.03	1808.22	140.55	1808.26
141.49	1808.41	144.49	1809	145.72	1809.3	150.19	1810	150.2	1810
152.03	1810.25	152.25	1810.25	152.46	1810.25	152.78	1810.26	156.12	1810.71
158.48	1810.79	160.09	1810.8	160.22	1810.8	171.56	1810.72	172.06	1810.71
174.87	1814.16	178.7	1814.4	183.06	1814.73	192.15	1815.32	195.83	1815.94
201.42	1816	202.44	1816.04	203.13	1816.06	210.35	1816.31	212.39	1816
212.81	1815.92	213.15	1815.88	213.16	1815.88	213.21	1815.88	213.29	1815.88
218.03	1815.94	218.79	1815.94	220.14	1815.94	220.26	1815.94	220.8	1815.94
221.77	1815.95	223.66	1815.95	223.95	1815.95	225.7	1815.95	228.07	1815.95
228.13	1815.95	232.31	1815.96	233.21	1815.96	235.06	1815.96	236.19	1815.96
242.94	1815.97	243.55	1815.97	245.69	1815.98	254.19	1815.98	266.47	1815.99
269.57	1816	270.34	1816	271.78	1816	271.89	1816	271.96	1816
275.07	1816.35	277.79	1816.69	278.51	1816.76	279.56	1816.83	279.64	1816.84
279.66	1816.84	280.15	1817	280.55	1817.15	283.07	1818	284.48	1818.6
285.48	1819	286.98	1819.6	287.79	1820	287.87	1820.03		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	83.83	.03	279.64	.03

```
Bank Sta: Left   Right    Coeff Contr.   Expan.
         83.83  279.64             .1       .3

Upstream Embankment side slope             =       0 horiz. to 1.0 vertical
Downstream Embankment side slope           =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins        =
Energy head used in spillway design        =
Spillway height used in design             =
Weir crest shape                           = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular       5
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
               6.23   82.07     .024     .024        0                  .5                 1
Upstream   Elevation =  1807.71
           Centerline Station =  130.32
Downstream Elevation =  1812.05
           Centerline Station =  136.21

CULVERT OUTPUT  Profile #PF 1  Culv Group:  Culvert #1

  Q Culv Group (cfs)        167.87    Culv Full Len (ft)         72.51
  # Barrels                      1    Culv Vel US (ft/s)          8.55
  Q Barrel (cfs)            167.87    Culv Vel DS (ft/s)         10.73
  E.G. US. (ft)            1819.27    Culv Inv El Up (ft)      1807.71
  W.S. US. (ft)            1819.27    Culv Inv El Dn (ft)      1812.05
  E.G. DS (ft)             1811.10    Culv Frctn Ls (ft)          1.15
  W.S. DS (ft)             1810.50    Culv Exit Loss (ft)         6.45
  Delta EG (ft)               8.17    Culv Entr Loss (ft)         0.57
  Delta WS (ft)               8.77    Q Weir (cfs)              149.53
  E.G. IC (ft)             1818.90    Weir Sta Lft (ft)          44.20
  E.G. OC (ft)             1819.27    Weir Sta Rgt (ft)         175.23
  Culvert Control           Outlet    Weir Submerg                0.00
  Culv WS Inlet (ft)       1812.71    Weir Max Depth (ft)         0.74
  Culv WS Outlet (ft)      1815.76    Weir Avg Depth (ft)         0.53
  Culv Nml Depth (ft)                 Weir Flow Area (sq ft)     69.42
  Culv Crt Depth (ft)         3.71    Min El Weir Flow (ft)    1818.51


CULVERT OUTPUT  Profile #PF 2  Culv Group:  Culvert #1

  Q Culv Group (cfs)        153.49    Culv Full Len (ft)         70.32
  # Barrels                      1    Culv Vel US (ft/s)          7.82
  Q Barrel (cfs)            153.49    Culv Vel DS (ft/s)         10.29
  E.G. US. (ft)            1818.69    Culv Inv El Up (ft)      1807.71
  W.S. US. (ft)            1818.68    Culv Inv El Dn (ft)      1812.05
  E.G. DS (ft)             1810.45    Culv Frctn Ls (ft)          0.96
```

W.S. DS (ft)	1810.01	Culv Exit Loss (ft)	6.79
Delta EG (ft)	8.23	Culv Entr Loss (ft)	0.47
Delta WS (ft)	8.68	Q Weir (cfs)	14.38
E.G. IC (ft)	1814.09	Weir Sta Lft (ft)	71.75
E.G. OC (ft)	1818.69	Weir Sta Rgt (ft)	154.55
Culvert Control	Outlet	Weir Submerg	0.00
Culv WS Inlet (ft)	1812.71	Weir Max Depth (ft)	0.22
Culv WS Outlet (ft)	1815.60	Weir Avg Depth (ft)	0.15
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	12.78
Culv Crt Depth (ft)	3.55	Min El Weir Flow (ft)	1818.51

Warning: During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet
energy grade answer may not be valid.

CROSS SECTION

RIVER: MainChannel
REACH: MainChannel RS: 2392.21

INPUT
Description:
Station Elevation Data num= 134

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1820	3.35	1819.53	6.51	1819	17.78	1818.14	19.21	1818
21.23	1817.86	34.56	1817	35.54	1816.98	37.97	1816.97	45.21	1816.94
50.5	1816.94	55.61	1816.94	63.46	1816.97	65.9	1816.98	67.79	1817
69.03	1817.06	69.92	1817.08	71.45	1817.02	71.85	1817	72.16	1816.87
74.02	1816	75.11	1815.35	75.66	1815	77.15	1814.06	77.24	1814
78.79	1813.06	78.88	1813	79.19	1812.83	79.32	1812.73	80.56	1812
81.55	1811.81	83.83	1811.69	83.86	1811.68	85.69	1811.64	86.21	1811.61
91.34	1811.39	94.71	1811.31	95.93	1811.22	96.19	1811.23	97.19	1811.3
99.01	1811.39	101.68	1811.34	103.22	1811.33	105.04	1811.2	107.06	1811
109.13	1810.85	110.87	1810.54	112.96	1810.21	114.16	1810	115.06	1809.85
117.71	1809.5	117.98	1809.46	118.7	1809.39	128.89	1809.23	132.17	1809
132.27	1809	132.49	1809	132.6	1809	132.67	1809	132.76	1809
134.23	1808.85	135.66	1808.72	136.44	1808.61	140.03	1808.22	140.55	1808.26
141.49	1808.41	144.49	1809	145.72	1809.3	150.19	1810	150.2	1810
152.03	1810.25	152.25	1810.25	152.46	1810.25	152.78	1810.26	156.12	1810.71
158.48	1810.79	160.09	1810.8	160.22	1810.8	171.56	1810.72	172.06	1810.71
174.87	1814.16	178.7	1814.4	183.06	1814.73	192.15	1815.32	195.83	1815.94
201.42	1816	202.44	1816.04	203.13	1816.06	210.35	1816.31	212.39	1816
212.81	1815.92	213.15	1815.88	213.16	1815.88	213.21	1815.88	213.29	1815.88
218.03	1815.94	218.79	1815.94	220.14	1815.94	220.26	1815.94	220.8	1815.94
221.77	1815.95	223.66	1815.95	223.95	1815.95	225.7	1815.95	228.07	1815.95
228.13	1815.95	232.31	1815.96	233.21	1815.96	235.06	1815.96	236.19	1815.96
242.94	1815.97	243.55	1815.97	245.69	1815.98	254.19	1815.98	266.47	1815.99
269.57	1816	270.34	1816	271.78	1816	271.89	1816	271.96	1816
275.07	1816.35	277.79	1816.69	278.51	1816.76	279.56	1816.83	279.64	1816.84
279.66	1816.84	280.15	1817	280.55	1817.15	283.07	1818	284.48	1818.6
285.48	1819	286.98	1819.6	287.79	1820	287.87	1820.03		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	83.83	.03	279.64	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
83.83	279.64	91.84	87.37	77.44	.1	.3

CROSS SECTION

RIVER: MainChannel
REACH: MainChannel RS: 2304.84

INPUT
Description:
Station Elevation Data num= 96

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1820	2.22	1819.58	5.96	1819	11.98	1818.53	18.65	1818
29.78	1817.6	37.32	1817.2	40.95	1817	41.98	1816.7	44.46	1816
45.48	1815.17	45.7	1815	46.37	1814.47	46.96	1814	47.14	1813.87
48.24	1813	48.76	1812.57	49.46	1812	50.31	1811.32	50.73	1811
51.04	1810.76	51.99	1810	53.13	1809.09	53.24	1809	54.7	1808.83
55.07	1808.79	61.92	1808	70.66	1807.44	77.21	1807	78.51	1806.97
80.43	1806.95	81.79	1806.95	84.16	1806.97	85.83	1806.98	86.78	1806.98
89.03	1807	93.55	1807.03	96.24	1807.02	96.85	1807.02	97.04	1807
101.77	1806.53	102.07	1806.51	105.42	1806.46	110.35	1806.75	111.88	1807
118.78	1807.86	120.53	1808	122.41	1808.1	122.81	1808.11	131.66	1808.49
134.1	1808.53	137.56	1808.62	140.38	1808.62	141.04	1808.59	145.77	1808.73
146.14	1808.72	146.53	1808.72	147.52	1808.69	150.26	1808.7	156	1808.69
158.38	1808.73	161.15	1808.81	162.66	1808.83	163.6	1808.85	168.98	1808.94
169.36	1808.96	169.75	1808.98	169.79	1808.98	170.94	1809	170.95	1809
170.96	1809	173.95	1809.2	174.1	1809.21	174.42	1809.28	179.34	1810.04
182.83	1809.63	185.72	1809.05	186.14	1809	187.21	1808.97	189.85	1808.92
190.56	1808.91	190.78	1808.91	190.95	1808.92	193.24	1809	212.91	1812.07
215.73	1812.13	218.74	1812.37	222.43	1812.83	222.72	1812.87	234.32	1816.62
236.46	1816.55	236.94	1816.55	238.04	1817.31	241.87	1819	242.34	1819.37
243.24	1820								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	55.07	.03	243.24	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
55.07	243.24	85.72	79.73	75.07	.1	.3

CROSS SECTION

RIVER: MainChannel
REACH: MainChannel RS: 2225.1

INPUT
Description:
Station Elevation Data num= 64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1812.01	.04	1812	1.84	1811.64	4.57	1811	9.1	1810.14
9.87	1810	10.62	1809.87	15.49	1809	21.29	1808.09	21.89	1808
22.75	1807.9	23	1807.87	25.1	1807.64	30.53	1807	37.36	1806.19
39.06	1806	40.5	1805.73	44.65	1805	47.97	1804.92	51.05	1804.87
52.15	1804.88	54.31	1804.91	55.04	1804.92	57.68	1804.94	58.64	1804.96
60.47	1805	67.56	1805.43	75.99	1806	78.12	1806.09	78.27	1806.09
78.44	1806.09	90.23	1806.39	97.73	1806.42	102.08	1806.4	107.8	1806.31
110.35	1806.31	113.83	1806.27	116.51	1806.28	118.11	1806.27	124.79	1806.3
128.85	1806.29	135.38	1806.32	138.1	1806.33	143.51	1806.35	146.9	1806.39
148.73	1806.43	149.66	1806.44	150.14	1806.45	150.66	1806.46	163.09	1806.84
165.05	1806.91	166.43	1806.96	166.9	1806.97	167.52	1807	169.64	1807.83
170.19	1808	170.66	1808.17	172.9	1809	174.63	1809.7	175.45	1810
177	1810.59	178.22	1811	180.82	1811.84	181.55	1812		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	22.75	.03	166.43	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
22.75	166.43	150.23	160.16	150.47	.1	.3

CROSS SECTION

RIVER: MainChannel-Junc
REACH: MainChannel-JX RS: 2064.94

INPUT
Description:
Station Elevation Data num= 64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1809.99	1.96	1809.63	5.14	1809	9.46	1808.37	12.18	1808
15.88	1807.42	18.88	1807	25.1	1806.12	25.9	1806	26.2	1805.95
32.85	1805	33.94	1804.88	34.4	1804.83	37.2	1804.48	40.87	1804
48.68	1803.25	51.65	1803	68.62	1802.06	69.7	1802	85.68	1801.97
93.8	1801.96	94.63	1801.95	94.98	1801.95	95.85	1801.95	108.7	1801.98
110.23	1801.98	112.81	1801.98	118.4	1802	118.55	1802	118.61	1802
118.64	1802	118.7	1802	119.05	1802.06	121.04	1802.44	124.05	1803
124.06	1803	124.39	1803	127.09	1803.03	134.91	1803.11	157.39	1803.69
160.55	1803.74	173.81	1803.98	175.44	1803.98	175.82	1803.98	175.97	1803.98
177.34	1803.99	178.4	1804	179.14	1804.03	182.67	1804.29	184.88	1804.45
189.02	1804.75	189.92	1804.82	192.09	1805	203.2	1805.53	212.86	1806
214.66	1806.18	223.05	1807	228.03	1808.59	228.52	1808.77	229.32	1809
231.81	1809.66	232.01	1809.69	232.23	1809.73	233.43	1810		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	34.4	.03	184.88	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
34.4	184.88	155.05	151.4	154.55	.1	.3

CROSS SECTION

RIVER: MainChannel-Junc
REACH: MainChannel-JX   RS: 1913.54

INPUT
Description:
Station Elevation Data   num=   73

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1808.99	5.92	1808.47	11.82	1808	15.4	1807.7	23.77	1807
24.64	1806.89	28.62	1806	28.68	1805.99	32.77	1805	34.59	1804.56
36.96	1804	38.31	1803.73	41.4	1803	45.66	1802.39	47.67	1802.08
48.16	1802	51.34	1801.57	56.52	1801	62.5	1800.35	65.65	1800
77.66	1799.25	80.66	1799.13	84.31	1799	84.47	1799	84.5	1799
85.67	1799	86.09	1798.99	87.27	1798.99	88.16	1798.99	88.87	1798.99
94.39	1798.93	101.84	1798.91	103.02	1798.9	105.22	1798.88	114.64	1798.86
125.47	1798.92	132.26	1798.98	133.81	1799	133.91	1799	136	1799.01
140.85	1799.12	148.05	1799.26	163.54	1799.63	174.23	1799.85	177.48	1799.89
177.61	1799.89	178.85	1800	182.93	1800.48	187.58	1801	193.71	1801.88
194.58	1802	198.66	1802.7	200.15	1802.97	200.31	1803	203.01	1803.55
204.19	1803.77	205.71	1804	205.85	1804.01	205.95	1804.01	206.26	1804.05
207.85	1804.23	210.64	1805	212.74	1805.57	214.71	1806	216.54	1806.56
218.63	1807	221.45	1807.2	224.75	1807.39	232.26	1808	232.74	1808
253.94	1808.77	256.92	1808.87	260.79	1809				

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	47.67	.03	200.15	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
47.67	200.15	150.29	151.23	152.75	.1	.3

CROSS SECTION

RIVER: MainChannel-Junc
REACH: MainChannel-JX   RS: 1762.31

INPUT
Description:
Station Elevation Data   num=   96

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1805	2.29	1804.36	3.5	1804	5.12	1803.53	6.98	1803
9.37	1802.5	11.84	1802	13.98	1801.57	16.62	1801	19.78	1800.34
21.44	1800	24.71	1799.52	27.93	1799	32.25	1798.67	34	1798.55
42.13	1798	47.91	1797.51	54.48	1797	60.59	1796.4	63.64	1796.13
64.13	1796.09	65.44	1796	65.74	1796	66.64	1795.99	66.73	1795.99
67.51	1795.99	68.05	1795.98	73.55	1795.88	85.49	1795.9	86	1795.9
86.21	1795.9	86.5	1795.89	86.88	1795.88	88.67	1795.87	90.1	1795.81
91.85	1795.78	96.06	1795.59	97.68	1795.53	100.43	1795.41	108.98	1795
110.93	1794.97	111.19	1794.97	111.49	1794.97	115.23	1794.97	120.52	1795
123.9	1795.03	125.97	1795.03	129.03	1795.06	134.1	1795.01	134.86	1795
137.84	1794.79	148.28	1794	148.34	1793.99	148.54	1793.99	148.95	1793.99
149.27	1794	150.41	1794.29	153.25	1795	155.41	1795.23	168.31	1795.78

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  171.31 1795.94  171.86 1795.96  173.95    1796  177.96 1796.07  181.02  1796.1
   189.3 1796.14  189.77 1796.15  194.86 1796.16  195.64 1796.17  196.11 1796.17
  197.12 1796.18  197.81 1796.19  198.35  1796.2  198.79 1796.21  201.72 1796.26
  206.88 1796.37  212.12 1796.55  223.55 1796.95   224.9    1797  224.94    1797
  225.74 1797.08  234.91    1798   239.2 1798.51  243.15    1799   244.3 1799.23
  248.49    1800  252.23 1800.59  254.72    1801  256.66 1801.27  261.93    1802
  263.41 1802.33  266.72    1803  270.06 1803.81  270.91    1804  271.58 1804.15
  274.95 1804.98

Manning's n Values        num=       3
     Sta    n Val     Sta    n Val     Sta    n Val
       0      .03      34      .03  223.55      .03

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
            34  223.55           153.08   151.7  150.74              .1       .3

CROSS SECTION


RIVER: MainChannel-Junc
REACH: MainChannel-JX     RS: 1610.6

INPUT
Description:
Station Elevation Data    num=      54
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
       0     1799    4.25 1798.12    4.88     1798    5.97 1797.77    9.84     1797
   13.01 1796.32   14.43     1796    16.4 1795.61   19.36     1795   20.09 1794.98
   25.05 1794.53   27.72 1794.32   31.07     1794   45.37 1793.04   46.02     1793
    46.8 1792.99   50.36 1792.85   53.34 1792.73   58.79 1792.54   62.53 1792.44
   65.11 1792.38   66.42 1792.35   71.58 1792.29   72.82 1792.28   84.86 1792.16
   90.63 1792.04   91.71 1792.01   93.21     1792  103.92 1791.43  106.49 1791.31
  108.14 1791.24  108.96 1791.19  110.85 1791.13  111.41 1791.16  112.34 1791.22
  115.89     1792  124.67 1792.33  137.39 1792.78  139.99 1792.86   141.3 1792.88
  142.27   1792.9  143.02 1792.91  143.58 1792.92  144.67     1793  148.69 1793.03
  154.82 1793.06  156.46 1793.06  160.85 1793.11  174.83 1793.19  188.67 1793.63
  194.95 1793.89  197.63     1794  218.32 1798.46  220.34     1799

Manning's n Values        num=       3
     Sta    n Val     Sta    n Val     Sta    n Val
       0      .03   50.36      .03  194.95      .03

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
         50.36  194.95           156.27  151.26  159.94              .1       .3

CROSS SECTION


RIVER: MainChannel-Junc
REACH: MainChannel-JX     RS: 1459.34

INPUT
Description:
Station Elevation Data    num=      94
```

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1800	3.81	1799.05	4	1799	7.68	1798.19	8.53	1798
11.43	1797.37	13.21	1797	15.51	1796.53	17.99	1796	20.6	1795.44
22.89	1795	24.68	1794.69	27.94	1794	29.01	1793.84	33.65	1793.52
38.6	1793	42.1	1792.71	51.81	1792	54.24	1791.85	55.05	1791.78
57.3	1791.61	62.33	1791.21	65.47	1791	70.88	1790.69	74.54	1790.58
78.12	1790.42	79.48	1790.38	80.7	1790.32	83.1	1790.19	86.21	1790
95.53	1789.62	99.54	1789.55	102.92	1789.53	106.27	1789.41	107.75	1789.37
108.34	1789.36	111.04	1789.28	120.19	1789.25	132.58	1789.02	133.3	1789
133.37	1789	133.39	1789	133.42	1789	133.56	1789	133.63	1789
133.69	1789	147.42	1789.25	156.28	1789.38	157.29	1789.42	158.56	1789.47
164.23	1789.42	164.92	1789.47	165.84	1789.47	167.85	1789.58	176.81	1789.93
177.82	1789.95	178.93	1790	181.27	1790.63	182.77	1791	185.44	1791.72
186.62	1792	187.96	1792.31	188.68	1792.48	190.48	1792.81	191.92	1793
203.44	1793.18	205.38	1793.31	206.87	1793.4	211.86	1793.54	214.01	1793.7
216.32	1793.82	217.64	1793.88	220.32	1794	221.26	1794	222.73	1794
222.76	1794	222.81	1794	223.27	1794.02	225.96	1794.03	230.37	1794.07
233.61	1794.1	234.93	1794	300.03	1794.88	304.98	1794.95	306.86	1794.96
308.8	1794.98	309.9	1795	309.98	1795	310.73	1795	311.04	1795
311.41	1795	311.42	1795	311.63	1795	311.91	1795		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	55.05	.03	187.96	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
55.05	187.96	158.18	150.13	150.13	.1	.3

CROSS SECTION

RIVER: MainChannel-Junc
REACH: MainChannel-JX RS: 1309.22

INPUT
Description:
Station Elevation Data num= 107

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1800	1.84	1799.23	2.4	1799	4.68	1798.07	4.83	1798
7.54	1797.04	7.63	1797	15.91	1796.01	15.97	1796	26.68	1795.39
31.72	1795.25	35.58	1795.1	37.84	1795	37.97	1795	39.56	1794.52
41.61	1794	44.13	1793.28	45	1793	45.36	1792.88	47.99	1792
49.39	1791.53	51.07	1791	53.94	1790.37	55.81	1790	65.01	1789.04
65.47	1789	79.48	1788.14	81.16	1788	95.19	1787.09	96.62	1787
99.79	1786.8	111.45	1786	117.7	1785.81	118.93	1785.78	121.13	1785.72
124.94	1785.62	136.25	1785.3	147.29	1785	150.63	1784.98	157.62	1784.83
171.13	1784.6	172.53	1784.59	174.59	1784.57	175.25	1784.55	180.18	1784.47
181.84	1784.46	183.42	1784.45	187.28	1784.48	193.61	1784.52	195.73	1784.57
203.15	1784.67	208.46	1784.82	208.91	1784.83	209.76	1784.84	210.48	1784.85
211.43	1784.85	216.08	1785	219.61	1785.19	224.82	1785.68	226.76	1785.84
228.28	1786	231.5	1786.4	235.42	1787	238.71	1787.89	239.17	1788
239.47	1788.07	242.88	1789	244.92	1789.09	245.63	1789.12	245.65	1789.12
265.74	1790.56	266.35	1790.5	269.69	1790.25	273.17	1790.04	273.68	1790.04
274.07	1790	274.15	1790	282.96	1790.1	283.93	1790.11	285.41	1790.14

286.17	1790.15	293.51	1790.32	295.79	1790.34	298.48	1790.38	304.78	1790.5
310.76	1790.62	319.49	1790.83	325.61	1790.99	326.88	1791	334.85	1791.55
341.24	1792	346.68	1792.87	347.49	1793	348.09	1793.14	351.8	1794
353.98	1794.54	355.94	1795	359.13	1795.77	359.93	1796	360.75	1796.23
363.78	1797	365.09	1797.37	367.35	1798	369.86	1798.73	370.87	1799
372.73	1799.38	376.24	1800						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	65.47	.03	245.63	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
65.47	245.63	153.67	150.58	155.09	.1	.3

CROSS SECTION

RIVER: MainChannel-Junc
REACH: MainChannel-JX RS: 1158.64

INPUT
Description:
Station Elevation Data num= 89

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1794	4.71	1793.07	5.21	1793	6.88	1792.65	10.09	1792
12.13	1791.54	14.53	1791	15.92	1790.68	19.18	1790	22.16	1789.35
23.8	1789	27.15	1788.31	28.65	1788	29.97	1787.77	34.3	1787
39.34	1786.54	46.04	1786	66.09	1785.12	68.75	1785	70.46	1784.9
80.84	1784.28	85.5	1784	86.27	1783.96	105.84	1783	108.32	1782.89
108.81	1782.87	118.59	1782.47	129.59	1782.17	130.87	1782.13	132.53	1782.09
136.25	1782	144.77	1781.88	147.34	1781.84	157.68	1781.69	158.29	1781.68
167.2	1781.57	173.88	1781.51	175.11	1781.5	176.54	1781.48	180.68	1781.45
182.13	1781.44	183.54	1781.43	188.06	1781.41	188.67	1781.41	192.77	1781.39
193.43	1781.4	196.76	1781.41	200.33	1781.43	207.11	1781.51	207.87	1781.51
209.84	1781.54	212.06	1781.58	224.41	1781.84	226.36	1781.87	226.82	1781.88
228.03	1781.89	229.01	1781.9	233.44	1782	240.76	1782.57	243.43	1783
246.5	1783.63	248.32	1784	250.25	1784.3	254.4	1785	256.19	1785.31
257.06	1785.46	257.59	1785.45	265.46	1785.65	270.44	1786	278.53	1786.31
286.42	1787.47	294.04	1787	307.7	1787.84	310.6	1788	313.22	1788.31
314.63	1788.47	316.4	1788.66	317.63	1788.78	319.7	1789	321.85	1789.38
325.59	1790	328.19	1790.4	331.82	1791	334.55	1791.47	337.45	1792
340.87	1792.62	342.92	1793	345.36	1793.46	348.22	1794		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	70.46	.03	256.19	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
70.46	256.19	124.4	139.17	157.04	.1	.3

CROSS SECTION

RIVER: MainChannel-Junc

REACH: MainChannel-JX RS: 1019.47

INPUT
Description:
Station Elevation Data num= 102

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1785.01	.06	1785	7.91	1784.74	11.49	1784.64	11.81	1784.64
19	1784.45	32	1784.11	35.54	1784.01	35.65	1784.01	35.76	1784.01
36.34	1784.01	37.77	1784.01	39.45	1784.01	47.84	1784	49.54	1783.96
50	1783.95	61.15	1783.77	69.51	1783.71	72.97	1783.75	75.08	1783.7
78.93	1783.74	81.28	1783.68	82.91	1783.68	84.32	1783.66	88.02	1783.56
89.22	1783.53	94.54	1783.2	95.02	1783.18	95.07	1783.18	97.77	1783
99.95	1782.29	100.77	1782	102.26	1781.47	103.61	1781	105.99	1780.75
107	1780.66	109.85	1780.37	115.26	1780	122.18	1779.75	123.12	1779.7
135.46	1779.47	135.52	1779.45	135.61	1778.82	136.26	1774.34	140.02	1774.57
142.62	1774.77	143.3	1774.8	144.01	1774.81	151.2	1774.76	153.16	1774.75
155.52	1774.81	156.51	1774.92	156.94	1775	159.64	1775.67	160.69	1776
162.61	1776.67	163.56	1777	164.04	1777.12	164.95	1777.31	166.71	1777.45
167.83	1777.57	169.06	1778.9	169.2	1779	169.44	1779.08	172.47	1780
173.07	1780.28	173.64	1780.51	174.69	1781	176.43	1781.85	176.71	1782
176.79	1782.04	177.78	1782.52	178.78	1783	180.37	1783.5	186.44	1783.82
188	1783.87	190.24	1783.86	193.94	1783.82	222.09	1783.47	229.1	1783.38
232.16	1783.38	232.33	1783.38	235.3	1783.39	235.37	1783.39	239.06	1783.45
240.04	1783.47	255.34	1783.72	262.69	1784	266.78	1784.19	269.34	1784.2
275.72	1784.4	279.64	1784.53	282.21	1784.6	301.96	1784.99	302.41	1784.99
304.6	1784.99	305.89	1784.99	313.96	1784.99	314	1784.99	314.61	1784.99
314.92	1784.98	320.59	1784.87						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	95.07	.03	177.78	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
95.07	177.78	0	0	0	.1	.3

CROSS SECTION

RIVER: WesterlyChannel
REACH: WesterlyChannel RS: 11045.7

INPUT
Description:
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1850	.02	1850	11.33	1849.34	16.72	1849	34.98	1848.18
37.47	1848.08	38.25	1848.06	38.97	1848	44.46	1847.72	59	1847
62.35	1846.79	65.32	1846.62	67.27	1846.52	76.27	1846	85.07	1845.17
86.87	1845	91.43	1844.05	91.64	1844	91.73	1844	91.81	1843.99
95.1	1843.87	96.02	1843.85	97.32	1843.9	99.21	1844	103.1	1844.39
104.02	1844.44	106.36	1844.57	112.31	1844.86	113.99	1844.96	114.21	1844.97
114.36	1844.98	114.57	1844.98	115.62	1845	116.79	1845	117.54	1845
117.93	1845	118.29	1845	118.9	1845	119.02	1844.99	119.85	1845
120.13	1845	124.42	1845.28	134.95	1846	136.21	1846.13	142.41	1846.71

144.85	1846.94	145.73	1847	146.85	1847.03	148.04	1847.06		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	148.04	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	148.04	98.67	84.98	76.64	.1	.3

CROSS SECTION

RIVER: WesterlyChannel
REACH: WesterlyChannel RS: 10960.72

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1846	2.1	1845.8	15.95	1845	18.33	1844.87	18.69	1844.85
23.08	1844.67	30.13	1844.34	32.46	1844.21	38.04	1844	40.16	1843.89
43.05	1843.75	49.84	1843.4	51.28	1843.31	52.5	1843	55.1	1842.22
55.88	1842	56.01	1841.99	56.22	1841.98	56.56	1841.96	56.95	1842
58.27	1842.83	58.58	1842.87	59.04	1842.83	59.87	1842.91	60.3	1842.91
60.45	1842.91	66.05	1842.69	70.51	1842.45	74.31	1842.26	78.92	1842
82.3	1841.86	84.08	1841.93	88.07	1841.87	92.6	1841.94	94.36	1842
95.52	1842.52	96.6	1843	98.64	1843.95	98.78	1844	99.3	1844.05
111.11	1845								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	111.11	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	111.11	77.87	65.48	58.73	.1	.3

CROSS SECTION

RIVER: WesterlyChannel
REACH: WesterlyChannel RS: 10895.24

INPUT
Description:
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1843	6.3	1842.26	8.43	1842	9.23	1841.91	10.23	1841.8
18.19	1841	18.51	1840.99	18.81	1840.97	21.43	1840.84	22.36	1840.81
23.38	1840.78	29.2	1840.57	30.93	1840.52	32.64	1840.49	47.53	1840
48.04	1839.99	58.79	1839.79	65.37	1839.74	68.41	1839.83	83.02	1840
83.04	1840	85.68	1840.05	91.01	1840.13	91.38	1840.12	93.16	1840.16
96.96	1840.27	105.42	1840.38	114.41	1840.99	114.44	1840.99	114.46	1840.99
114.53	1841	114.58	1841.02	116.64	1842	118.31	1842.74	118.85	1843

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	118.85	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	118.85	245.7	124.53	7.2	.1	.3

CROSS SECTION

RIVER: WesterlyChannel
REACH: WesterlyChannel RS: 10770.72

INPUT
Description:
Station Elevation Data num= 102

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1847	.88	1846.9	2.39	1846.8	4.26	1846.78	10.23	1846.59
11.27	1846.56	13.22	1846.47	22.43	1846.04	22.68	1846.03	23.08	1846
24.04	1845.88	25.28	1845.71	30.17	1845	30.92	1844.89	33.39	1844.46
36.8	1844	43.29	1843.17	44.48	1843	52.01	1842.17	53.98	1842
56.47	1841.64	60.17	1841	63.52	1840.54	67.19	1840	74.92	1839.15
75.94	1839	76.11	1838.99	76.32	1838.99	83.16	1838.36	86.14	1838.15
87.26	1838	87.38	1838	87.47	1838	87.66	1838	87.93	1838
88.22	1837.99	89.25	1837.99	89.56	1837.99	90.78	1837.99	90.89	1837.99
91.23	1837.99	96.06	1837.46	97.07	1837.32	97.87	1837.27	100.96	1837.28
105.09	1837	106.31	1836.97	107.72	1836.99	108.89	1836.85	109.48	1836.73
111.3	1836.41	113.88	1836	114.08	1836	114.23	1836	114.57	1836
115.93	1836	116.31	1836	120.58	1836	121.83	1836	123.85	1835.78
124.24	1835.78	125.62	1835.8	128.74	1836	130.06	1836	132	1836
136.96	1836	137.42	1836	138.76	1836	138.77	1836	138.8	1836
147.46	1836.99	147.54	1836.99	151.52	1837	155.32	1837.36	156.75	1837.55
157.32	1837.62	160.57	1838	167.2	1838.8	167.65	1838.84	169.22	1839
173.21	1839.35	173.99	1839.43	180.95	1839.89	181.98	1839.96	182.7	1840
189.43	1840.14	191.42	1840.29	196.82	1840.38	198.79	1840.49	202.56	1840.57
207.14	1840.56	211.54	1840.54	217.13	1840.62	222.19	1840.61	225.16	1840.67
230.78	1840.66	233.3	1840.73	239.36	1840.76	240.99	1840.81	248.01	1840.91
248.11	1840.92	251.18	1841						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	251.18	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	251.18	120.33	130.91	131.26	.1	.3

CULVERT

RIVER: WesterlyChannel
REACH: WesterlyChannel RS: 10705.27

INPUT
Description:

```
Distance from Upstream XS =    19.9
Deck/Roadway Width        =   43.73
Weir Coefficient          =     2.8
Upstream  Deck/Roadway Coordinates
    num=       8
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0 1827.95    1825    5.51    1838    1825   55.65    1839    1825
  108.92    1840    1825  157.24    1841    1825  194.16    1842    1825
  238.02    1843    1825  251.18 1843.35    1825

Upstream Bridge Cross Section Data
Station Elevation Data    num=     102
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    1847     .88  1846.9    2.39  1846.8    4.26 1846.78   10.23 1846.59
   11.27 1846.56   13.22 1846.47   22.43 1846.04   22.68 1846.03   23.08    1846
   24.04 1845.88   25.28 1845.71   30.17    1845   30.92 1844.89   33.39 1844.46
    36.8    1844   43.29 1843.17   44.48    1843   52.01 1842.17   53.98    1842
   56.47 1841.64   60.17    1841   63.52 1840.54   67.19    1840   74.92 1839.15
   75.94    1839   76.11 1838.99   76.32 1838.99   83.16 1838.36   86.14 1838.15
   87.26    1838   87.38    1838   87.47    1838   87.66    1838   87.93    1838
   88.22 1837.99   89.25 1837.99   89.56 1837.99   90.78 1837.99   90.89 1837.99
   91.23 1837.99   96.06 1837.46   97.07 1837.32   97.87 1837.27  100.96 1837.28
  105.09    1837  106.31 1836.97  107.72 1836.99  108.89 1836.85  109.48 1836.73
   111.3 1836.41  113.88    1836  114.08    1836  114.23    1836  114.57    1836
  115.93    1836  116.31    1836  120.58    1836  121.83    1836  123.85 1835.78
  124.24 1835.78  125.62  1835.8  128.74    1836  130.06    1836     132    1836
  136.96    1836  137.42    1836  138.76    1836  138.77    1836   138.8    1836
  147.46 1836.99  147.54 1836.99  151.52    1837  155.32 1837.36  156.75 1837.55
  157.32 1837.62  160.57    1838   167.2  1838.8  167.65 1838.84  169.22    1839
  173.21 1839.35  173.99 1839.43  180.95 1839.89  181.98 1839.96   182.7    1840
  189.43 1840.14  191.42 1840.29  196.82 1840.38  198.79 1840.49  202.56 1840.57
  207.14 1840.56  211.54 1840.54  217.13 1840.62  222.19 1840.61  225.16 1840.67
  230.78 1840.66   233.3 1840.73  239.36 1840.76  240.99 1840.81  248.01 1840.91
  248.11 1840.92  251.18    1841

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03       0     .03  251.18     .03

Bank Sta: Left   Right     Coeff Contr.   Expan.
             0  251.18             .1        .3

Downstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0 1838.25    1824   37.68    1839    1824   90.73    1840    1824
  138.88    1841    1824  175.67    1842    1824  216.07    1843    1824

Downstream Bridge Cross Section Data
Station Elevation Data    num=      79
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    1838    2.81 1837.81    5.83  1837.6   10.29  1837.3   14.63    1837
   18.54 1836.63   24.72    1836   27.92 1835.68   33.01    1835   33.76  1834.9
    39.9    1834   40.86 1833.86   46.98    1833   47.52 1832.93   47.95 1832.87
```

```
   51.19 1832.35   53.97    1832   58.54 1831.39   61.49    1831   62.02 1830.93
   62.37 1830.89   66.31 1830.47   71.86    1830   77.85 1829.52   81.04 1829.28
    84.6    1829   88.82 1828.68   90.08 1828.55   91.26 1828.39   93.69    1828
   94.42 1827.47   95.26    1827   96.45  1826.1   96.69    1826   96.92 1825.87
  100.71 1825.79  101.67    1826   102.5 1826.16  103.85 1826.27   104.9 1826.34
   108.4 1826.53  114.81 1826.93  115.36 1826.95  115.93    1827   125.5 1827.61
  128.54    1828  131.49 1828.64  133.12 1828.91  133.71    1829  138.46 1829.84
  139.55    1830  141.22 1830.13   148.2 1830.52  155.22    1831  159.02 1831.09
  159.99 1831.11  160.98 1831.15  163.12 1831.24  164.19 1831.29  168.76 1831.43
  170.97 1831.48  172.93 1831.59   176.7 1831.67  178.47  1831.8  180.38  1831.9
  181.17 1831.93  183.87    1832  188.63 1832.17  190.31 1832.31  194.78 1832.68
  201.73 1832.83  202.29 1832.85  203.16 1832.86  206.15 1832.95  206.96    1833
  207.85 1833.07  211.64 1833.46  215.01 1833.86  216.07    1834

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03       0     .03  216.07     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
             0  216.07             .1       .3

Upstream Embankment side slope             =       0 horiz. to 1.0 vertical
Downstream Embankment side slope           =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins        =
Energy head used in spillway design        =
Spillway height used in design             =
Weir crest shape                           = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular     3.5
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
               4.43  107.19     .024     .024        0                    .5                1
Upstream   Elevation =  1834
           Centerline Station =  121.79
Downstream Elevation =  1826.09
           Centerline Station =  108.47

CULVERT OUTPUT  Profile #PF 1  Culv Group:  Culvert #1

  Q Culv Group (cfs)         75.80    Culv Full Len (ft)
  # Barrels                      1    Culv Vel US (ft/s)         9.43
  Q Barrel (cfs)             75.80    Culv Vel DS (ft/s)        15.50
  E.G. US. (ft)            1838.80    Culv Inv El Up (ft)      1834.00
  W.S. US. (ft)            1838.79    Culv Inv El Dn (ft)      1826.09
  E.G. DS (ft)             1827.59    Culv Frctn Ls (ft)         6.51
  W.S. DS (ft)             1827.22    Culv Exit Loss (ft)        4.00
  Delta EG (ft)              11.20    Culv Entr Loss (ft)        0.69
  Delta WS (ft)              11.57    Q Weir (cfs)
```

```
  E.G. IC (ft)             1838.69    Weir Sta Lft (ft)
  E.G. OC (ft)             1838.80    Weir Sta Rgt (ft)
  Culvert Control           Outlet    Weir Submerg
  Culv WS Inlet (ft)       1836.72    Weir Max Depth (ft)
  Culv WS Outlet (ft)      1827.86    Weir Avg Depth (ft)
  Culv Nml Depth (ft)         1.77    Weir Flow Area (sq ft)
  Culv Crt Depth (ft)         2.72    Min El Weir Flow (ft)    1839.34
```

Note: During the supercritical calculations a hydraulic jump occurred at the outlet of (leaving) the culvert.
Warning: During the supercritical analysis, the program could not converge on a supercritical answer in the downstream cross
section. The program used the solution with the least error.
Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal
depth at the outlet.
Note: The flow in the culvert is entirely supercritical.

CULVERT OUTPUT Profile #PF 2 Culv Group: Culvert #1

```
  Q Culv Group (cfs)         75.80    Culv Full Len (ft)
  # Barrels                      1    Culv Vel US (ft/s)          9.43
  Q Barrel (cfs)             75.80    Culv Vel DS (ft/s)         15.50
  E.G. US. (ft)            1838.80    Culv Inv El Up (ft)      1834.00
  W.S. US. (ft)            1838.79    Culv Inv El Dn (ft)      1826.09
  E.G. DS (ft)             1827.59    Culv Frctn Ls (ft)          6.51
  W.S. DS (ft)             1827.22    Culv Exit Loss (ft)         4.00
  Delta EG (ft)              11.20    Culv Entr Loss (ft)         0.69
  Delta WS (ft)              11.57    Q Weir (cfs)
  E.G. IC (ft)             1838.69    Weir Sta Lft (ft)
  E.G. OC (ft)             1838.80    Weir Sta Rgt (ft)
  Culvert Control           Outlet    Weir Submerg
  Culv WS Inlet (ft)       1836.72    Weir Max Depth (ft)
  Culv WS Outlet (ft)      1827.86    Weir Avg Depth (ft)
  Culv Nml Depth (ft)         1.77    Weir Flow Area (sq ft)
  Culv Crt Depth (ft)         2.72    Min El Weir Flow (ft)    1839.34
```

Note: During the supercritical calculations a hydraulic jump occurred at the outlet of (leaving) the culvert.
Warning: During the supercritical analysis, the program could not converge on a supercritical answer in the downstream cross
section. The program used the solution with the least error.
Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal
depth at the outlet.
Note: The flow in the culvert is entirely supercritical.

CROSS SECTION

RIVER: WesterlyChannel
REACH: WesterlyChannel   RS: 10639.81

INPUT

Description:
Station Elevation Data   num=   79

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1838	2.81	1837.81	5.83	1837.6	10.29	1837.3	14.63	1837
18.54	1836.63	24.72	1836	27.92	1835.68	33.01	1835	33.76	1834.9
39.9	1834	40.86	1833.86	46.98	1833	47.52	1832.93	47.95	1832.87
51.19	1832.35	53.97	1832	58.54	1831.39	61.49	1831	62.02	1830.93
62.37	1830.89	66.31	1830.47	71.86	1830	77.85	1829.52	81.04	1829.28
84.6	1829	88.82	1828.68	90.08	1828.55	91.26	1828.39	93.69	1828
94.42	1827.47	95.26	1827	96.45	1826.1	96.69	1826	96.92	1825.87
100.71	1825.79	101.67	1826	102.5	1826.16	103.85	1826.27	104.9	1826.34
108.4	1826.53	114.81	1826.93	115.36	1826.95	115.93	1827	125.5	1827.61
128.54	1828	131.49	1828.64	133.12	1828.91	133.71	1829	138.46	1829.84
139.55	1830	141.22	1830.13	148.2	1830.52	155.22	1831	159.02	1831.09
159.99	1831.11	160.98	1831.15	163.12	1831.24	164.19	1831.29	168.76	1831.43
170.97	1831.48	172.93	1831.59	176.7	1831.67	178.47	1831.8	180.38	1831.9
181.17	1831.93	183.87	1832	188.63	1832.17	190.31	1832.31	194.78	1832.68
201.73	1832.83	202.29	1832.85	203.16	1832.86	206.15	1832.95	206.96	1833
207.85	1833.07	211.64	1833.46	215.01	1833.86	216.07	1834		

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	216.07	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	216.07	52.27	83.61	119.35	.1	.3

CROSS SECTION

RIVER: WesterlyChannel
REACH: WesterlyChannel   RS: 10556.2

INPUT
Description:
Station Elevation Data   num=   51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1833	1.87	1832.76	6.62	1832.16	7.78	1832	8.88	1831.86
15.89	1831	22.63	1830.12	23.65	1830	25.28	1829.7	29.54	1829
31.55	1828.74	37.56	1828	47.81	1827.17	49.92	1827	51.14	1826.8
52.67	1826.58	57.16	1826	58.49	1825.77	63.2	1825	65.88	1824.5
68.3	1824	71.23	1823.47	74.49	1823.42	77.6	1823.45	87.16	1824
89.77	1824.28	95.06	1824.59	98.26	1824.83	102.34	1825	107.98	1825.25
109.78	1825.33	121.73	1825.93	122.61	1825.98	122.99	1826	147.25	1826.79
151.71	1827	154.55	1827.34	160.29	1828	161.08	1828.12	165.55	1829
169.4	1829.75	170.69	1830	174.76	1830.8	175.8	1831	180.09	1831.93
180.45	1832	181.1	1832.16	182.11	1832.4	184	1832.84	184.76	1833
184.77	1833								

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	184.77	.03

Bank Sta: Left   Right   Lengths: Left Channel   Right   Coeff Contr.   Expan.

0	184.77	76.46	72.31	78.74	.1	.3

CROSS SECTION

RIVER: WesterlyChannel
REACH: WesterlyChannel RS: 10483.89

INPUT
Description:
Station Elevation Data num= 43

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1828	3.21	1827.36	5.03	1827	5.69	1826.9	10.91	1826
17.31	1825.16	18.47	1825	18.71	1824.93	22.81	1824	26.82	1823.21
27.87	1823	29.47	1822.7	33.29	1822	35.9	1821.74	36.19	1821.74
39.66	1821.42	46.01	1821.38	52.83	1821.45	61.33	1821.52	66.29	1822
69.82	1822.37	78.73	1823	86.22	1823.42	96.36	1824	100.05	1824.36
104.08	1825	105.23	1825.2	108.13	1825.75	108.9	1825.9	108.95	1825.92
109.38	1826	110.05	1826.16	113.83	1827	117.42	1827.83	118.17	1828
118.64	1828.12	122.21	1829	124.03	1829.48	126.07	1830	127.6	1830.35
130.32	1831	132.2	1831.46	134.5	1832				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	134.5	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	134.5	71.53	76.52	86.43	.1	.3

CROSS SECTION

RIVER: WesterlyChannel
REACH: WesterlyChannel RS: 10407.38

INPUT
Description:
Station Elevation Data num= 53

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1827	1.51	1826.44	2.62	1826	3.42	1825.68	4.98	1825
7.54	1824.1	7.77	1824	7.95	1823.93	10.48	1823	11.47	1822.63
13.12	1822	13.74	1821.83	25.37	1821.09	29.32	1821.07	34.3	1821
35.39	1820.9	42.62	1820.33	46.84	1820	56.38	1819.35	60.04	1819.1
61.32	1819	61.34	1819	62.66	1818.83	63.62	1818.7	68.3	1818
69.97	1818	70.86	1818	72.14	1818	73.24	1818.02	76.62	1818.15
93.44	1818.83	98.44	1818.92	99.96	1818.95	101.91	1819	101.92	1819
102.27	1819.1	103.07	1819.31	117.04	1823	122.3	1823.09	122.51	1823.1
125.77	1823.16	132.89	1823.32	137.19	1823.4	142.79	1823.49	159.39	1825.38
163.22	1825.54	178.49	1825.8	180.17	1825.8	181.82	1825.8	181.86	1825.8
190.72	1826	192.75	1826.22	200.08	1827				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	122.51	.03

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  122.51             67.69   84.87   141.5              .1       .3

CROSS SECTION


RIVER: WesterlyChannel
REACH: WesterlyChannel    RS: 10322.51

INPUT
Description:
Station Elevation Data    num=      55
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    1822    2.14 1821.11    2.37    1821     2.6 1820.88    4.63    1820
    6.41 1819.26    6.95    1819    7.41 1818.71       9    1818   18.28 1817.28
   20.13    1817   22.37 1816.99   23.06 1816.98   24.12 1816.97   47.98 1816.01
   48.21    1816    53.4 1815.34   55.35    1815      56 1815.03   57.01 1814.84
   58.32 1813.91   60.98 1813.91   61.05    1815   61.12 1815.01   61.17 1815.01
   63.12 1815.09   64.78 1815.16   65.12 1815.18   69.99 1815.51   73.37  1815.8
   77.33 1815.82   77.57 1815.82   78.88 1815.84   79.69 1815.84   83.51 1815.86
   87.11  1815.9   88.24  1815.9   90.78 1815.91   91.06 1815.91   94.98    1816
  132.92    1816  136.56 1816.41  141.57  1816.8  144.12    1817  144.75 1817.12
  149.49    1818  154.07  1818.7  155.72 1818.81  156.17 1818.88  156.38 1818.91
  156.49 1818.92  156.97 1818.93  157.37 1818.93   157.5 1818.92  168.09    1819

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .03  168.09     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  168.09            109.86  112.88  116.31              .1       .3

CULVERT


RIVER: WesterlyChannel
REACH: WesterlyChannel    RS: 10266.07

INPUT
Description:
Distance from Upstream XS =      30
Deck/Roadway Width        =   41.23
Weir Coefficient          =     2.8
Upstream  Deck/Roadway Coordinates
    num=       7
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  1823.8    1810   17.75    1823    1810   41.05    1822    1810
   63.16    1821    1810      92    1820    1810  129.98    1819    1810
  168.09 1818.25    1810

Upstream Bridge Cross Section Data
Station Elevation Data    num=      55
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
```

```
       0    1822     2.14 1821.11     2.37    1821      2.6 1820.88     4.63    1820
    6.41 1819.26     6.95    1819     7.41 1818.71        9    1818    18.28 1817.28
   20.13    1817    22.37 1816.99    23.06 1816.98    24.12 1816.97    47.98 1816.01
   48.21    1816     53.4 1815.34    55.35    1815       56 1815.03    57.01 1814.84
   58.32 1813.91    60.98 1813.91    61.05    1815    61.12 1815.01    61.17 1815.01
   63.12 1815.09    64.78 1815.16    65.12 1815.18    69.99 1815.51    73.37  1815.8
   77.33 1815.82    77.57 1815.82    78.88 1815.84    79.69 1815.84    83.51 1815.86
   87.11  1815.9    88.24  1815.9    90.78 1815.91    91.06 1815.91    94.98    1816
  132.92    1816   136.56 1816.41   141.57  1816.8   144.12    1817   144.75 1817.12
  149.49    1818   154.07  1818.7   155.72 1818.81   156.17 1818.88   156.38 1818.91
  156.49 1818.92   156.97 1818.93   157.37 1818.93    157.5 1818.92   168.09    1819

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .03  168.09     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
             0  168.09             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       8
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  1824.1    1809    3.02    1824    1809   25.08    1823    1809
    48.4    1822    1809   70.51    1821    1809   99.36    1820    1809
  137.35    1819    1809  141.77  1818.8    1809

Downstream Bridge Cross Section Data
Station Elevation Data    num=      52
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0    1815      2.1 1814.85     8.45 1814.55    16.52 1814.18    19.56    1814
   22.46 1813.91    24.61 1813.85    30.62 1813.52     35.2 1813.27     38.7  1813.1
    38.9  1813.1    40.19 1813.02    40.36 1813.02    40.62    1813    51.22 1812.53
    56.4 1812.27    57.37 1812.24       58 1812.23    62.72    1812    69.17 1811.74
   72.13 1811.64    73.21 1811.62    74.23 1811.61    74.85 1811.56    75.62  1811.5
   80.52 1811.19    80.92    1811    84.14 1810.31     84.3  1810.3    85.46 1810.45
   86.32 1810.46    90.94 1811.08    91.11    1811     91.9 1811.17    92.04 1811.17
   92.49 1811.18    93.78 1811.29    94.79 1811.35    96.03  1811.4    98.16 1811.46
  105.67 1811.67   107.11 1811.73   109.48 1811.85   112.72    1812    121.8 1812.73
   124.5    1813   134.16 1813.85   135.47    1814   137.86 1814.48   141.23 1814.99
  141.35 1814.99   141.77    1815

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03       0     .03  141.77     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
             0  141.77             .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
```

```
Weir crest shape                             = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular     2.5
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
              4.58   95.79     .013     .013        0                   .5                1
Upstream   Elevation =  1813.46
           Centerline Station =  59.37
Downstream Elevation =  1810.27
           Centerline Station =  84.18

CULVERT OUTPUT  Profile #PF 1  Culv Group:  Culvert #1

  Q Culv Group (cfs)         50.40    Culv Full Len (ft)
  # Barrels                      1    Culv Vel US (ft/s)        10.27
  Q Barrel (cfs)             50.40    Culv Vel DS (ft/s)        15.90
  E.G. US. (ft)            1819.29    Culv Inv El Up (ft)     1813.46
  W.S. US. (ft)            1819.29    Culv Inv El Dn (ft)     1810.27
  E.G. DS (ft)             1811.77    Culv Frctn Ls (ft)         2.74
  W.S. DS (ft)             1811.53    Culv Exit Loss (ft)        3.96
  Delta EG (ft)               7.51    Culv Entr Loss (ft)        0.82
  Delta WS (ft)               7.76    Q Weir (cfs)              36.80
  E.G. IC (ft)             1819.29    Weir Sta Lft (ft)        118.69
  E.G. OC (ft)             1818.41    Weir Sta Rgt (ft)        168.09
  Culvert Control            Inlet    Weir Submerg               0.00
  Culv WS Inlet (ft)       1815.96    Weir Max Depth (ft)        0.75
  Culv WS Outlet (ft)      1811.81    Weir Avg Depth (ft)        0.40
  Culv Nml Depth (ft)         1.50    Weir Flow Area (sq ft)    19.63
  Culv Crt Depth (ft)         2.30    Min El Weir Flow (ft)   1818.81


Warning: The flow through the culvert is supercritical.  However, since there is flow over the road (weir flow), the
program cannot
         determine if the downstream cross section should be subcritical or supercritical.  The program used the
downstream
         subcritical answer, even though it may not be valid.
Note:    The flow in the culvert is entirely supercritical.

CULVERT OUTPUT  Profile #PF 2  Culv Group:  Culvert #1

  Q Culv Group (cfs)         46.00    Culv Full Len (ft)
  # Barrels                      1    Culv Vel US (ft/s)         9.37
  Q Barrel (cfs)             46.00    Culv Vel DS (ft/s)        15.35
  E.G. US. (ft)            1818.59    Culv Inv El Up (ft)     1813.46
  W.S. US. (ft)            1818.59    Culv Inv El Dn (ft)     1810.27
  E.G. DS (ft)             1811.77    Culv Frctn Ls (ft)         2.51
  W.S. DS (ft)             1811.53    Culv Exit Loss (ft)        3.62
  Delta EG (ft)               6.81    Culv Entr Loss (ft)        0.68
  Delta WS (ft)               7.06    Q Weir (cfs)
```

E.G. IC (ft)	1818.59	Weir Sta Lft (ft)	
E.G. OC (ft)	1817.99	Weir Sta Rgt (ft)	
Culvert Control	Inlet	Weir Submerg	
Culv WS Inlet (ft)	1815.96	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1811.74	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.42	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.24	Min El Weir Flow (ft)	1818.81

Note: During the supercritical calculations a hydraulic jump occurred at the outlet of (leaving) the culvert.
Warning: During the supercritical analysis, the program could not converge on a supercritical answer in the downstream cross section. The program used the solution with the least error.
Note: The flow in the culvert is entirely supercritical.

CROSS SECTION

RIVER: WesterlyChannel
REACH: WesterlyChannel RS: 10209.63

INPUT
Description:
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1815	2.1	1814.85	8.45	1814.55	16.52	1814.18	19.56	1814
22.46	1813.91	24.61	1813.85	30.62	1813.52	35.2	1813.27	38.7	1813.1
38.9	1813.1	40.19	1813.02	40.36	1813.02	40.62	1813	51.22	1812.53
56.4	1812.27	57.37	1812.24	58	1812.23	62.72	1812	69.17	1811.74
72.13	1811.64	73.21	1811.62	74.23	1811.61	74.85	1811.56	75.62	1811.5
80.52	1811.19	80.92	1811	84.14	1810.31	84.3	1810.3	85.46	1810.45
86.32	1810.46	90.94	1811.08	91.11	1811	91.9	1811.17	92.04	1811.17
92.49	1811.18	93.78	1811.29	94.79	1811.35	96.03	1811.4	98.16	1811.46
105.67	1811.67	107.11	1811.73	109.48	1811.85	112.72	1812	121.8	1812.73
124.5	1813	134.16	1813.85	135.47	1814	137.86	1814.48	141.23	1814.99
141.35	1814.99	141.77	1815						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	141.77	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	141.77	48	46.64	48.79	.1	.3

CROSS SECTION

RIVER: WesterlyChannel
REACH: WesterlyChannel RS: 10162.99

INPUT
Description:
Station Elevation Data num= 59

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	1814	1.26	1813.95	1.39	1813.94	5.22	1813.79	6.57	1813.68
11.62	1813.22	14.14	1813	14.78	1812.98	19.92	1812.54	21.41	1812.41
22.79	1812.29	23.75	1812.22	27.68	1812	28.72	1811.93	29.2	1811.92
29.51	1811.92	31.94	1811.61	35.11	1811.26	37.22	1811	38.21	1810.81
44.03	1810	46.65	1809.6	56.14	1809.12	57.22	1809.06	59.4	1809
60	1808.98	63.21	1808.94	63.67	1808.95	66.6	1808.87	70.38	1808.73
72.74	1808.71	74.26	1808.59	78.05	1808.28	78.76	1808.24	81.59	1808
83.29	1807.98	84.28	1807.98	84.54	1807.99	84.71	1808	87.91	1808.55
90.45	1809	92.51	1809.04	97.4	1809.3	102.52	1809.51	103.37	1809.51
110.25	1809.84	110.62	1809.86	111.07	1809.88	113.32	1810	122.22	1810.94
122.44	1811	122.69	1811.07	126.05	1812	129.58	1812.97	129.68	1813
129.74	1813.02	133.29	1814	135.5	1814.6	136.85	1814.99		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	21.41	.03	136.85	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
21.41	136.85	44.32	44.1	45.57	.1	.3

CROSS SECTION

RIVER: WesterlyChannel
REACH: WesterlyChannel RS: 10118.89

INPUT
Description:
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1813	8.57	1812.12	9.12	1812.07	9.42	1812.05	9.59	1812.04
9.72	1812.03	9.85	1812	10.07	1811.93	10.39	1811.86	12.04	1811.47
14.08	1811	19.13	1809.25	23.16	1808	43.52	1807.11	43.56	1807.1
47.04	1807.01	50.39	1807	50.59	1806.99	54.86	1806.86	59.33	1806.86
64.14	1806.92	64.88	1806.96	65.85	1806.98	65.86	1806.98	71.26	1806.94
73.86	1806.99	74.25	1806.99	75.17	1807	75.35	1807	78.98	1807.11
79.51	1807.13	80.3	1807.16	84.68	1807.32	85.11	1807.34	86.45	1807.37
87.63	1807.42	94.25	1807.49	99.58	1807.65	100.76	1807.68	103.63	1807.8
105.68	1807.81	106.63	1807.84	109.87	1807.85	111.1	1807.87	117.32	1808

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	12.04	.03	117.32	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
12.04	117.32	0	0	0	.1	.3

SUMMARY OF MANNING'S N VALUES

River:MainChannel

Reach	River Sta.	n1	n2	n3

MainChannel	3127.87	.03	.03	.03
MainChannel	3007.28	.03	.03	.03
MainChannel	2910.89	.03	.03	.03
MainChannel	2817.46	.03	.03	.03
MainChannel	2752.32	Culvert		
MainChannel	2687.17	.03	.03	.03
MainChannel	2604.22	.03	.03	.03
MainChannel	2494.33	.03	.03	.03
MainChannel	2443.27	Culvert		
MainChannel	2392.21	.03	.03	.03
MainChannel	2304.84	.03	.03	.03
MainChannel	2225.1	.03	.03	.03

River:MainChannel-Junc

Reach	River Sta.	n1	n2	n3
MainChannel-JX	2064.94	.03	.03	.03
MainChannel-JX	1913.54	.03	.03	.03
MainChannel-JX	1762.31	.03	.03	.03
MainChannel-JX	1610.6	.03	.03	.03
MainChannel-JX	1459.34	.03	.03	.03
MainChannel-JX	1309.22	.03	.03	.03
MainChannel-JX	1158.64	.03	.03	.03
MainChannel-JX	1019.47	.03	.03	.03

River:WesterlyChannel

Reach	River Sta.	n1	n2	n3
WesterlyChannel	11045.7	.03	.03	.03
WesterlyChannel	10960.72	.03	.03	.03
WesterlyChannel	10895.24	.03	.03	.03
WesterlyChannel	10770.72	.03	.03	.03
WesterlyChannel	10705.27	Culvert		
WesterlyChannel	10639.81	.03	.03	.03
WesterlyChannel	10556.2	.03	.03	.03
WesterlyChannel	10483.89	.03	.03	.03
WesterlyChannel	10407.38	.03	.03	.03
WesterlyChannel	10322.51	.03	.03	
WesterlyChannel	10266.07	Culvert		
WesterlyChannel	10209.63	.03	.03	.03
WesterlyChannel	10162.99	.03	.03	.03
WesterlyChannel	10118.89	.03	.03	.03

SUMMARY OF REACH LENGTHS

River: MainChannel

Reach	River Sta.	Left	Channel	Right
MainChannel	3127.87	110.03	120.59	140.72
MainChannel	3007.28	61.87	96.39	160.58
MainChannel	2910.89	92.46	93.43	116.74
MainChannel	2817.46	133.24	130.29	175.48
MainChannel	2752.32	Culvert		
MainChannel	2687.17	86.28	82.95	85.76
MainChannel	2604.22	119.35	109.89	103.93
MainChannel	2494.33	101.83	102.12	158.09
MainChannel	2443.27	Culvert		
MainChannel	2392.21	91.84	87.37	77.44
MainChannel	2304.84	85.72	79.73	75.07
MainChannel	2225.1	150.23	160.16	150.47

River: MainChannel-Junc

Reach	River Sta.	Left	Channel	Right
MainChannel-JX	2064.94	155.05	151.4	154.55
MainChannel-JX	1913.54	150.29	151.23	152.75
MainChannel-JX	1762.31	153.08	151.7	150.74
MainChannel-JX	1610.6	156.27	151.26	159.94
MainChannel-JX	1459.34	158.18	150.13	150.13
MainChannel-JX	1309.22	153.67	150.58	155.09
MainChannel-JX	1158.64	124.4	139.17	157.04
MainChannel-JX	1019.47	0	0	0

River: WesterlyChannel

Reach	River Sta.	Left	Channel	Right
WesterlyChannel	11045.7	98.67	84.98	76.64
WesterlyChannel	10960.72	77.87	65.48	58.73
WesterlyChannel	10895.24	245.7	124.53	7.2
WesterlyChannel	10770.72	120.33	130.91	131.26
WesterlyChannel	10705.27	Culvert		
WesterlyChannel	10639.81	52.27	83.61	119.35
WesterlyChannel	10556.2	76.46	72.31	78.74
WesterlyChannel	10483.89	71.53	76.52	86.43
WesterlyChannel	10407.38	67.69	84.87	141.5
WesterlyChannel	10322.51	109.86	112.88	116.31
WesterlyChannel	10266.07	Culvert		
WesterlyChannel	10209.63	48	46.64	48.79
WesterlyChannel	10162.99	44.32	44.1	45.57
WesterlyChannel	10118.89	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: MainChannel

Reach	River Sta.	Contr.	Expan.
MainChannel	3127.87	.1	.3
MainChannel	3007.28	.1	.3
MainChannel	2910.89	.1	.3
MainChannel	2817.46	.1	.3
MainChannel	2752.32	Culvert	
MainChannel	2687.17	.1	.3
MainChannel	2604.22	.1	.3
MainChannel	2494.33	.1	.3
MainChannel	2443.27	Culvert	
MainChannel	2392.21	.1	.3
MainChannel	2304.84	.1	.3
MainChannel	2225.1	.1	.3

River: MainChannel-Junc

Reach	River Sta.	Contr.	Expan.
MainChannel-JX	2064.94	.1	.3
MainChannel-JX	1913.54	.1	.3
MainChannel-JX	1762.31	.1	.3
MainChannel-JX	1610.6	.1	.3
MainChannel-JX	1459.34	.1	.3
MainChannel-JX	1309.22	.1	.3
MainChannel-JX	1158.64	.1	.3
MainChannel-JX	1019.47	.1	.3

River: WesterlyChannel

Reach	River Sta.	Contr.	Expan.
WesterlyChannel	11045.7	.1	.3
WesterlyChannel	10960.72	.1	.3
WesterlyChannel	10895.24	.1	.3
WesterlyChannel	10770.72	.1	.3
WesterlyChannel	10705.27	Culvert	
WesterlyChannel	10639.81	.1	.3
WesterlyChannel	10556.2	.1	.3
WesterlyChannel	10483.89	.1	.3
WesterlyChannel	10407.38	.1	.3
WesterlyChannel	10322.51	.1	.3
WesterlyChannel	10266.07	Culvert	
WesterlyChannel	10209.63	.1	.3
WesterlyChannel	10162.99	.1	.3
WesterlyChannel	10118.89	.1	.3

Profile Output Table - Standard Table 1

River / E.G. Slope (ft/ft)	Reach / Vel Chnl (ft/s)	Flow Area (sq ft)	River Sta / Top Width (ft)	Profile / Froude # Chl	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)
MainChannel	MainChannel		2225.1	PF 1	317.40	1804.87	1806.58	1806.59	1806.89
0.016861	4.50	70.56	120.45	1.04					
MainChannel	MainChannel		2225.1	PF 2	167.87	1804.87	1806.14	1806.14	1806.54
0.014448	5.04	33.30	42.61	1.00					
MainChannel	MainChannel		2304.84	PF 1	317.40	1806.46	1807.69	1808.10	1809.00
0.057649	9.20	34.49	50.56	1.96					
MainChannel	MainChannel		2304.84	PF 2	167.87	1806.46	1807.45	1807.70	1808.26
0.051880	7.24	23.18	44.96	1.78					
MainChannel	MainChannel		2392.21	PF 1	317.40	1808.22	1810.50	1810.50	1811.10
0.013021	6.25	50.82	43.42	1.02					
MainChannel	MainChannel		2392.21	PF 2	167.87	1808.22	1810.01	1810.01	1810.45
0.014430	5.38	31.23	36.11	1.02					
MainChannel	MainChannel		2443.27		Culvert				
MainChannel	MainChannel		2494.33	PF 1	317.40	1811.31	1819.27	1813.96	1819.27
0.000037	0.79	459.32	170.17	0.07					
MainChannel	MainChannel		2494.33	PF 2	167.87	1811.31	1818.68	1813.32	1818.69
0.000018	0.50	367.34	145.76	0.04					
MainChannel	MainChannel		2604.22	PF 1	317.40	1814.00	1819.27		1819.28
0.000038	0.63	513.00	181.50	0.06					
MainChannel	MainChannel		2604.22	PF 2	317.40	1814.00	1818.68	1816.30	1818.69
0.000077	0.80	408.72	171.49	0.09					
MainChannel	MainChannel		2687.17	PF 1	317.40	1818.00	1819.18		1819.34
0.004792	2.99	103.89	147.75	0.58					
MainChannel	MainChannel		2687.17	PF 2	317.40	1818.00	1818.88	1818.88	1819.24
0.014827	4.49	66.45	94.04	0.98					
MainChannel	MainChannel		2752.32		Culvert				
MainChannel	MainChannel		2817.46	PF 1	241.60	1822.42	1833.04	1826.07	1833.04
0.000001	0.17	1506.67	295.29	0.01					

MainChannel	MainChannel	2817.46	PF 2	131.30	1822.42	1832.66	1825.50	1832.66
0.000000	0.10	1397.87	282.99	0.01				
MainChannel	MainChannel	2910.89	PF 1	241.60	1826.53	1833.04		1833.04
0.000002	0.22	1141.47	272.42	0.02				
MainChannel	MainChannel	2910.89	PF 2	241.60	1826.53	1832.66		1832.66
0.000003	0.24	1040.14	264.60	0.02				
MainChannel	MainChannel	3007.28	PF 1	241.60	1829.23	1833.04	1830.08	1833.04
0.000019	0.43	560.96	212.49	0.05				
MainChannel	MainChannel	3007.28	PF 2	241.60	1829.23	1832.66	1830.08	1832.66
0.000031	0.50	482.38	204.05	0.06				
MainChannel	MainChannel	3127.87	PF 1	241.60	1833.54	1834.31	1834.31	1834.51
0.017909	3.55	67.99	173.16	1.00				
MainChannel	MainChannel	3127.87	PF 2	241.60	1833.54	1834.31	1834.31	1834.51
0.017909	3.55	67.99	173.16	1.00				
MainChannel-Junc	MainChannel-JX	1019.47	PF 1	317.40	1774.34	1783.68	1776.58	1783.69
0.000027	0.73	445.15	150.60	0.06				
MainChannel-Junc	MainChannel-JX	1019.47	PF 2	317.40	1774.34	1783.68	1776.58	1783.69
0.000027	0.73	445.15	150.60	0.06				
MainChannel-Junc	MainChannel-JX	1158.64	PF 1	317.40	1781.39	1783.68	1782.33	1783.70
0.000327	1.25	254.61	154.76	0.17				
MainChannel-Junc	MainChannel-JX	1158.64	PF 2	317.40	1781.39	1783.68	1782.33	1783.70
0.000327	1.25	254.61	154.76	0.17				
MainChannel-Junc	MainChannel-JX	1309.22	PF 1	317.40	1784.45	1785.32	1785.55	1786.04
0.042468	6.81	46.62	85.56	1.63				
MainChannel-Junc	MainChannel-JX	1309.22	PF 2	317.40	1784.45	1785.32	1785.55	1786.04
0.042468	6.81	46.62	85.56	1.63				
MainChannel-Junc	MainChannel-JX	1459.34	PF 1	317.40	1789.00	1790.04	1790.12	1790.49
0.021623	5.36	59.18	93.61	1.19				
MainChannel-Junc	MainChannel-JX	1459.34	PF 2	317.40	1789.00	1790.04	1790.12	1790.49
0.021623	5.36	59.18	93.61	1.19				
MainChannel-Junc	MainChannel-JX	1610.6	PF 1	317.40	1791.13	1792.88	1792.88	1793.26
0.015594	4.92	64.57	91.74	1.03				
MainChannel-Junc	MainChannel-JX	1610.6	PF 2	317.40	1791.13	1792.88	1792.88	1793.26
0.015594	4.92	64.57	91.74	1.03				
MainChannel-Junc	MainChannel-JX	1762.31	PF 1	317.40	1793.99	1795.63	1795.92	1796.42
0.037547	7.12	44.61	69.69	1.57				

MainChannel-Junc	MainChannel-JX	1762.31	PF 2	317.40	1793.99	1795.67	1795.92	1796.37	0.031827	6.70	47.35	71.46	1.45
MainChannel-Junc	MainChannel-JX	1913.54	PF 1	317.40	1798.86	1799.79	1799.82	1800.16	0.017134	4.82	65.82	102.58	1.06
MainChannel-Junc	MainChannel-JX	1913.54	PF 2	317.40	1798.86	1799.76	1799.82	1800.16	0.020001	5.10	62.28	100.33	1.14
MainChannel-Junc	MainChannel-JX	2064.94	PF 1	317.40	1801.95	1802.81	1802.98	1803.47	0.027256	6.53	48.59	67.95	1.36
MainChannel-Junc	MainChannel-JX	2064.94	PF 2	317.40	1801.95	1802.86	1802.98	1803.44	0.022719	6.15	51.63	68.99	1.25
WesterlyChannel	WesterlyChannel	10118.89	PF 1	46.00	1806.86	1807.31	1807.33	1807.49	0.023599	3.39	13.57	45.60	1.10
WesterlyChannel	WesterlyChannel	10118.89	PF 2	46.00	1806.86	1807.31	1807.33	1807.49	0.023656	3.39	13.56	45.59	1.10
WesterlyChannel	WesterlyChannel	10162.99	PF 1	46.00	1807.98	1808.59	1808.96	1809.90	0.134939	9.21	5.00	13.81	2.70
WesterlyChannel	WesterlyChannel	10162.99	PF 2	46.00	1807.98	1808.59	1808.96	1809.87	0.130004	9.08	5.07	13.90	2.65
WesterlyChannel	WesterlyChannel	10209.63	PF 1	46.00	1810.30	1811.53	1811.53	1811.77	0.018379	3.96	11.62	25.46	1.03
WesterlyChannel	WesterlyChannel	10209.63	PF 2	46.00	1810.30	1811.53	1811.53	1811.77	0.018379	3.96	11.62	25.46	1.03
WesterlyChannel	WesterlyChannel	10266.07		Culvert									
WesterlyChannel	WesterlyChannel	10322.51	PF 1	87.20	1813.91	1819.29	1816.03	1819.29	0.000004	0.19	449.51	161.75	0.02
WesterlyChannel	WesterlyChannel	10322.51	PF 2	46.00	1813.91	1818.59	1815.54	1818.59	0.000002	0.13	341.64	145.66	0.02
WesterlyChannel	WesterlyChannel	10407.38	PF 1	87.20	1818.00	1818.73	1819.01	1819.59	0.071485	7.47	11.68	27.53	2.02
WesterlyChannel	WesterlyChannel	10407.38	PF 2	87.20	1818.00	1818.73	1819.01	1819.59	0.071485	7.47	11.68	27.53	2.02
WesterlyChannel	WesterlyChannel	10483.89	PF 1	87.20	1821.38	1822.09	1822.15	1822.45	0.022059	4.81	18.14	34.29	1.16
WesterlyChannel	WesterlyChannel	10483.89	PF 2	87.20	1821.38	1822.09	1822.15	1822.45	0.022059	4.81	18.14	34.29	1.16

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  WesterlyChannel    WesterlyChannel   10556.2       PF 1        87.20     1823.42     1824.19     1824.51     1825.19
  0.065631      8.01       10.88        21.60           1.99
  WesterlyChannel    WesterlyChannel   10556.2       PF 2        87.20     1823.42     1824.19     1824.51     1825.19
  0.065631      8.01       10.88        21.60           1.99


  WesterlyChannel    WesterlyChannel   10639.81      PF 1        87.20     1825.79     1827.22     1827.22     1827.59
  0.015427      4.90       17.79        24.52           1.01
  WesterlyChannel    WesterlyChannel   10639.81      PF 2        87.20     1825.79     1827.22     1827.22     1827.59
  0.015427      4.90       17.79        24.52           1.01


  WesterlyChannel    WesterlyChannel   10705.27                Culvert


  WesterlyChannel    WesterlyChannel   10770.72      PF 1        75.80     1835.78     1838.79     1836.59     1838.80
  0.000045      0.48      157.03        88.69           0.06
  WesterlyChannel    WesterlyChannel   10770.72      PF 2        75.80     1835.78     1838.79     1836.59     1838.80
  0.000045      0.48      157.03        88.69           0.06


  WesterlyChannel    WesterlyChannel   10895.24      PF 1        75.80     1839.74     1840.24     1840.36     1840.60
  0.050978      4.82       15.74        55.71           1.60
  WesterlyChannel    WesterlyChannel   10895.24      PF 2        75.80     1839.74     1840.24     1840.36     1840.60
  0.050978      4.82       15.74        55.71           1.60


  WesterlyChannel    WesterlyChannel   10960.72      PF 1        75.80     1841.86     1842.58     1842.67     1842.96
  0.026583      4.94       15.34        31.63           1.25
  WesterlyChannel    WesterlyChannel   10960.72      PF 2        75.80     1841.86     1842.58     1842.67     1842.96
  0.026583      4.94       15.34        31.63           1.25


  WesterlyChannel    WesterlyChannel   11045.7       PF 1        75.80     1843.85     1844.86     1845.02     1845.35
  0.028805      5.60       13.53        24.73           1.34
  WesterlyChannel    WesterlyChannel   11045.7       PF 2        75.80     1843.85     1844.86     1845.02     1845.35
  0.028805      5.60       13.53        24.73           1.34


Profile Output Table - Standard Table 2

  River              Reach             River Sta     Profile   E.G. Elev   W.S. Elev   Vel Head   Frctn Loss   C & E
Loss   Q Left   Q Channel   Q Right   Top Width
                                                                   (ft)        (ft)       (ft)         (ft)
(ft)    (cfs)       (cfs)     (cfs)        (ft)

  MainChannel        MainChannel       2225.1        PF 1        1806.89     1806.58       0.31         2.47
0.01               317.40               120.45
```

```
  MainChannel         MainChannel        2225.1       PF 2         1806.54     1806.14       0.39          2.29
0.00              167.87                  42.61


  MainChannel         MainChannel        2304.84      PF 1         1809.00     1807.69       1.31          2.03
0.07              317.40                  50.56
  MainChannel         MainChannel        2304.84      PF 2         1808.26     1807.45       0.81          2.16
0.04              167.87                  44.96


  MainChannel         MainChannel        2392.21      PF 1         1811.10     1810.50       0.61          1.17
0.04              317.40                  43.42
  MainChannel         MainChannel        2392.21      PF 2         1810.45     1810.01       0.45          1.30
0.03              167.87                  36.11


  MainChannel         MainChannel        2443.27                   Culvert


  MainChannel         MainChannel        2494.33      PF 1         1819.27     1819.27       0.01
    12.81       287.41      17.17      170.17
  MainChannel         MainChannel        2494.33      PF 2         1818.69     1818.68       0.00
     4.06       158.75       5.06      145.76


  MainChannel         MainChannel        2604.22      PF 1         1819.28     1819.27       0.01          0.00
0.00   138.84     177.93      0.63      181.50
  MainChannel         MainChannel        2604.22      PF 2         1818.69     1818.68       0.01          0.00
0.00   135.62     181.63      0.15      171.49


  MainChannel         MainChannel        2687.17      PF 1         1819.34     1819.18       0.16          0.01
0.05   277.74      31.48      8.17      147.75
  MainChannel         MainChannel        2687.17      PF 2         1819.24     1818.88       0.35          0.02
0.10   285.60      31.80                  94.04


  MainChannel         MainChannel        2752.32                   Culvert


  MainChannel         MainChannel        2817.46      PF 1         1833.04     1833.04       0.00
     0.26       217.43      23.90      295.29
  MainChannel         MainChannel        2817.46      PF 2         1832.66     1832.66       0.00
     0.05       119.07      12.18      282.99


  MainChannel         MainChannel        2910.89      PF 1         1833.04     1833.04       0.00          0.00
0.00     0.31     234.99      6.30      272.42
  MainChannel         MainChannel        2910.89      PF 2         1832.66     1832.66       0.00          0.00
0.00     0.13     236.58      4.88      264.60
```

```
  MainChannel        MainChannel       3007.28       PF 1        1833.04     1833.04      0.00        0.00
0.00     0.00      240.53      1.07      212.49
  MainChannel        MainChannel       3007.28       PF 2        1832.66     1832.66      0.00        0.00
0.00               241.24      0.36      204.05


  MainChannel        MainChannel       3127.87       PF 1        1834.51     1834.31      0.20        0.01
0.06               241.60                173.16
  MainChannel        MainChannel       3127.87       PF 2        1834.51     1834.31      0.20        0.01
0.06               241.60                173.16


  MainChannel-Junc   MainChannel-JX    1019.47       PF 1        1783.69     1783.68      0.01
   0.19      316.36      0.85      150.60
  MainChannel-Junc   MainChannel-JX    1019.47       PF 2        1783.69     1783.68      0.01
   0.19      316.36      0.85      150.60


  MainChannel-Junc   MainChannel-JX    1158.64       PF 1        1783.70     1783.68      0.02        0.01
0.00               317.40                154.76
  MainChannel-Junc   MainChannel-JX    1158.64       PF 2        1783.70     1783.68      0.02        0.01
0.00               317.40                154.76


  MainChannel-Junc   MainChannel-JX    1309.22       PF 1        1786.04     1785.32      0.72        4.42
0.03               317.40                 85.56
  MainChannel-Junc   MainChannel-JX    1309.22       PF 2        1786.04     1785.32      0.72        4.42
0.03               317.40                 85.56


  MainChannel-Junc   MainChannel-JX    1459.34       PF 1        1790.49     1790.04      0.45        2.76
0.01               317.40                 93.61
  MainChannel-Junc   MainChannel-JX    1459.34       PF 2        1790.49     1790.04      0.45        2.76
0.01               317.40                 93.61


  MainChannel-Junc   MainChannel-JX    1610.6        PF 1        1793.26     1792.88      0.38
   0.00      317.40                 91.74
  MainChannel-Junc   MainChannel-JX    1610.6        PF 2        1793.26     1792.88      0.38
   0.00      317.40                 91.74


  MainChannel-Junc   MainChannel-JX    1762.31       PF 1        1796.42     1795.63      0.79        3.69
0.04               317.40                 69.69
  MainChannel-Junc   MainChannel-JX    1762.31       PF 2        1796.37     1795.67      0.70        3.76
0.03               317.40                 71.46


  MainChannel-Junc   MainChannel-JX    1913.54       PF 1        1800.16     1799.79      0.36        3.23
0.09               317.40                102.58
  MainChannel-Junc   MainChannel-JX    1913.54       PF 2        1800.16     1799.76      0.40        3.22
0.06               317.40                100.33
```

```
  MainChannel-Junc   MainChannel-JX    2064.94      PF 1        1803.47     1802.81       0.66         3.38
0.03               317.40                67.95
  MainChannel-Junc   MainChannel-JX    2064.94      PF 2        1803.44     1802.86       0.59         3.07
0.02               317.40                68.99


  WesterlyChannel    WesterlyChannel   10118.89     PF 1        1807.49     1807.31       0.18         2.07
0.34                46.00                45.60
  WesterlyChannel    WesterlyChannel   10118.89     PF 2        1807.49     1807.31       0.18         2.05
0.33                46.00                45.59


  WesterlyChannel    WesterlyChannel   10162.99     PF 1        1809.90     1808.59       1.32         1.76
0.11                46.00                13.81
  WesterlyChannel    WesterlyChannel   10162.99     PF 2        1809.87     1808.59       1.28         1.79
0.10                46.00                13.90


  WesterlyChannel    WesterlyChannel   10209.63     PF 1        1811.77     1811.53       0.24         0.84
0.01                46.00                25.46
  WesterlyChannel    WesterlyChannel   10209.63     PF 2        1811.77     1811.53       0.24         0.84
0.01                46.00                25.46


  WesterlyChannel    WesterlyChannel   10266.07                 Culvert


  WesterlyChannel    WesterlyChannel   10322.51     PF 1        1819.29     1819.29       0.00
              87.20                161.75
  WesterlyChannel    WesterlyChannel   10322.51     PF 2        1818.59     1818.59       0.00
              46.00                145.66


  WesterlyChannel    WesterlyChannel   10407.38     PF 1        1819.59     1818.73       0.87         2.79
0.05                87.20                27.53
  WesterlyChannel    WesterlyChannel   10407.38     PF 2        1819.59     1818.73       0.87         2.79
0.05                87.20                27.53


  WesterlyChannel    WesterlyChannel   10483.89     PF 1        1822.45     1822.09       0.36         2.56
0.19                87.20                34.29
  WesterlyChannel    WesterlyChannel   10483.89     PF 2        1822.45     1822.09       0.36         2.56
0.19                87.20                34.29


  WesterlyChannel    WesterlyChannel   10556.2      PF 1        1825.19     1824.19       1.00         2.34
0.06                87.20                21.60
  WesterlyChannel    WesterlyChannel   10556.2      PF 2        1825.19     1824.19       1.00         2.34
0.06                87.20                21.60


  WesterlyChannel    WesterlyChannel   10639.81     PF 1        1827.59     1827.22       0.37         1.28
0.01                87.20                24.52
```

WesterlyChannel WesterlyChannel 10639.81 PF 2 1827.59 1827.22 0.37 1.28
0.01 87.20 24.52

WesterlyChannel WesterlyChannel 10705.27 Culvert

WesterlyChannel WesterlyChannel 10770.72 PF 1 1838.80 1838.79 0.00
75.80 88.69
WesterlyChannel WesterlyChannel 10770.72 PF 2 1838.80 1838.79 0.00
75.80 88.69

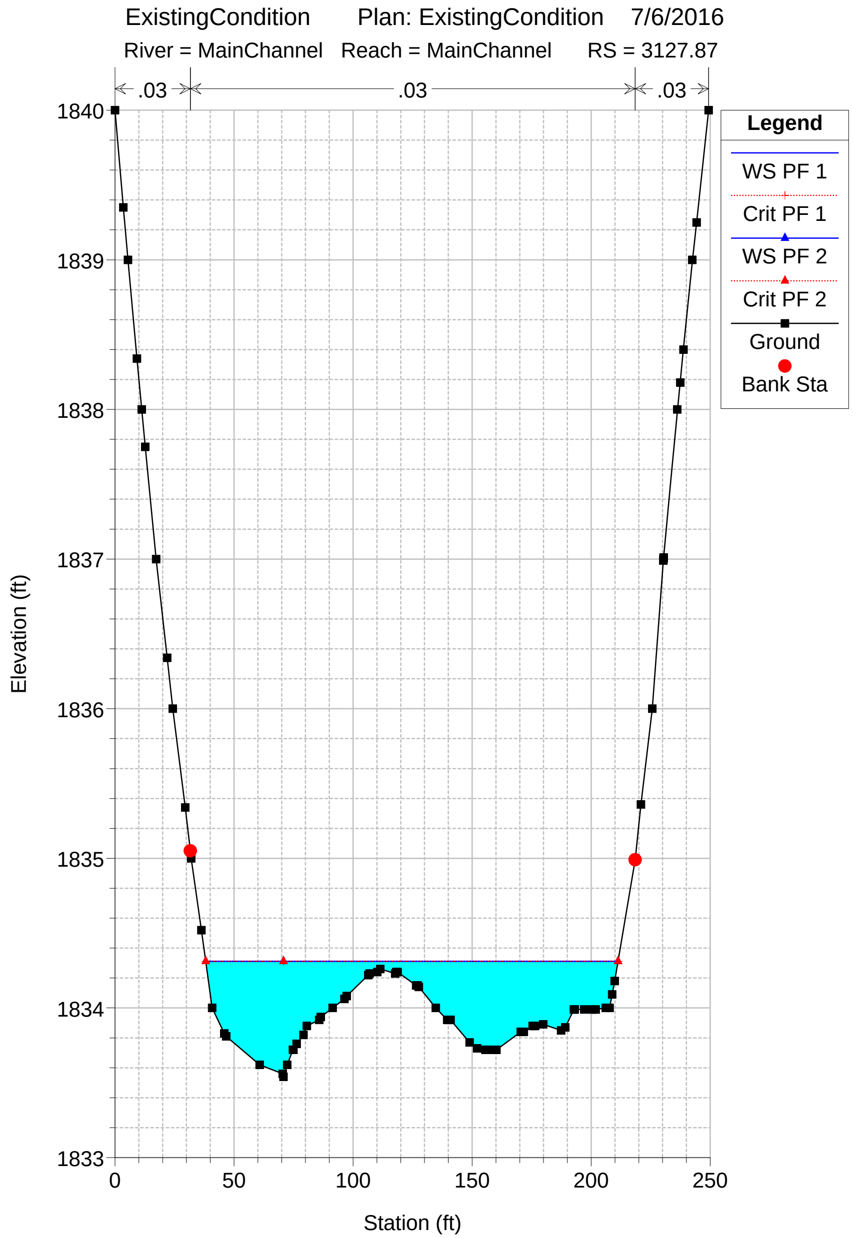
WesterlyChannel WesterlyChannel 10895.24 PF 1 1840.60 1840.24 0.36 2.35
0.01 75.80 55.71
WesterlyChannel WesterlyChannel 10895.24 PF 2 1840.60 1840.24 0.36 2.35
0.01 75.80 55.71

WesterlyChannel WesterlyChannel 10960.72 PF 1 1842.96 1842.58 0.38 2.35
0.03 75.80 31.63
WesterlyChannel WesterlyChannel 10960.72 PF 2 1842.96 1842.58 0.38 2.35
0.03 75.80 31.63

WesterlyChannel WesterlyChannel 11045.7 PF 1 1845.35 1844.86 0.49
75.80 24.73
WesterlyChannel WesterlyChannel 11045.7 PF 2 1845.35 1844.86 0.49
75.80 24.73

HEC-RAS Plan: ExistingCond River: WesterlyChannel Reach: WesterlyChannel

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
WesterlyChannel	10118.89	PF 1	46.00	1806.86	1807.31	1807.33	1807.49	0.023599	3.39	13.57	45.60	1.10
WesterlyChannel	10118.89	PF 2	46.00	1806.86	1807.31	1807.33	1807.49	0.023656	3.39	13.56	45.59	1.10
WesterlyChannel	10162.99	PF 1	46.00	1807.98	1808.59	1808.96	1809.90	0.134939	9.21	5.00	13.81	2.70
WesterlyChannel	10162.99	PF 2	46.00	1807.98	1808.59	1808.96	1809.87	0.130004	9.08	5.07	13.90	2.65
WesterlyChannel	10209.63	PF 1	46.00	1810.30	1811.53	1811.53	1811.77	0.018379	3.96	11.62	25.46	1.03
WesterlyChannel	10209.63	PF 2	46.00	1810.30	1811.53	1811.53	1811.77	0.018379	3.96	11.62	25.46	1.03
WesterlyChannel	10266.07		Culvert									
WesterlyChannel	10322.51	PF 1	87.20	1813.91	1819.29	1816.03	1819.29	0.000004	0.19	449.51	161.75	0.02
WesterlyChannel	10322.51	PF 2	46.00	1813.91	1818.59	1815.54	1818.59	0.000002	0.13	341.64	145.66	0.02
WesterlyChannel	10407.38	PF 1	87.20	1818.00	1818.73	1819.01	1819.59	0.071485	7.47	11.68	27.53	2.02
WesterlyChannel	10407.38	PF 2	87.20	1818.00	1818.73	1819.01	1819.59	0.071485	7.47	11.68	27.53	2.02
WesterlyChannel	10483.89	PF 1	87.20	1821.38	1822.09	1822.15	1822.45	0.022059	4.81	18.14	34.29	1.16
WesterlyChannel	10483.89	PF 2	87.20	1821.38	1822.09	1822.15	1822.45	0.022059	4.81	18.14	34.29	1.16
WesterlyChannel	10556.2	PF 1	87.20	1823.42	1824.19	1824.51	1825.19	0.065631	8.01	10.88	21.60	1.99
WesterlyChannel	10556.2	PF 2	87.20	1823.42	1824.19	1824.51	1825.19	0.065631	8.01	10.88	21.60	1.99
WesterlyChannel	10639.81	PF 1	87.20	1825.79	1827.22	1827.22	1827.59	0.015427	4.90	17.79	24.52	1.01
WesterlyChannel	10639.81	PF 2	87.20	1825.79	1827.22	1827.22	1827.59	0.015427	4.90	17.79	24.52	1.01
WesterlyChannel	10705.27		Culvert									
WesterlyChannel	10770.72	PF 1	75.80	1835.78	1838.79	1836.59	1838.80	0.000045	0.48	157.03	88.69	0.06
WesterlyChannel	10770.72	PF 2	75.80	1835.78	1838.79	1836.59	1838.80	0.000045	0.48	157.03	88.69	0.06
WesterlyChannel	10895.24	PF 1	75.80	1839.74	1840.24	1840.36	1840.60	0.050978	4.82	15.74	55.71	1.60
WesterlyChannel	10895.24	PF 2	75.80	1839.74	1840.24	1840.36	1840.60	0.050978	4.82	15.74	55.71	1.60
WesterlyChannel	10960.72	PF 1	75.80	1841.86	1842.58	1842.67	1842.96	0.026583	4.94	15.34	31.63	1.25
WesterlyChannel	10960.72	PF 2	75.80	1841.86	1842.58	1842.67	1842.96	0.026583	4.94	15.34	31.63	1.25
WesterlyChannel	11045.7	PF 1	75.80	1843.85	1844.86	1845.02	1845.35	0.028805	5.60	13.53	24.73	1.34
WesterlyChannel	11045.7	PF 2	75.80	1843.85	1844.86	1845.02	1845.35	0.028805	5.60	13.53	24.73	1.34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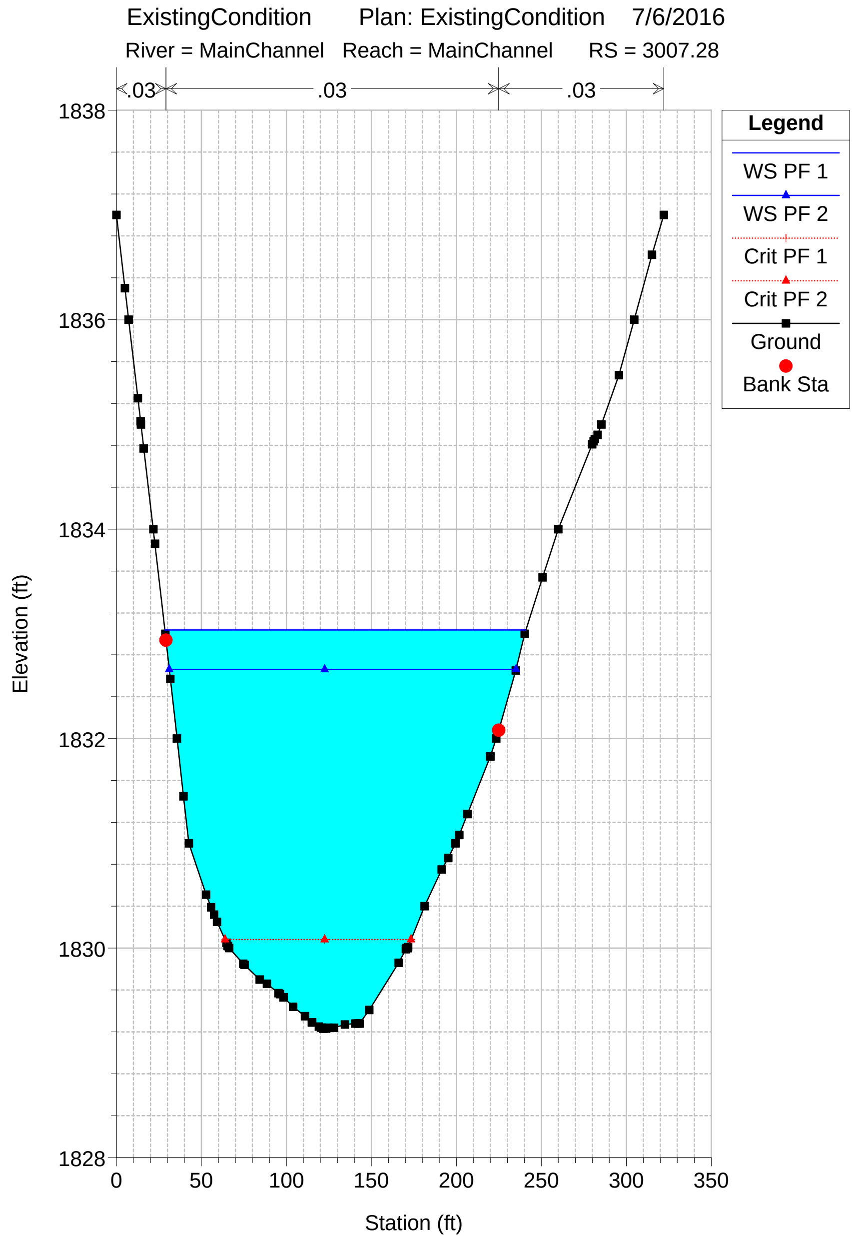
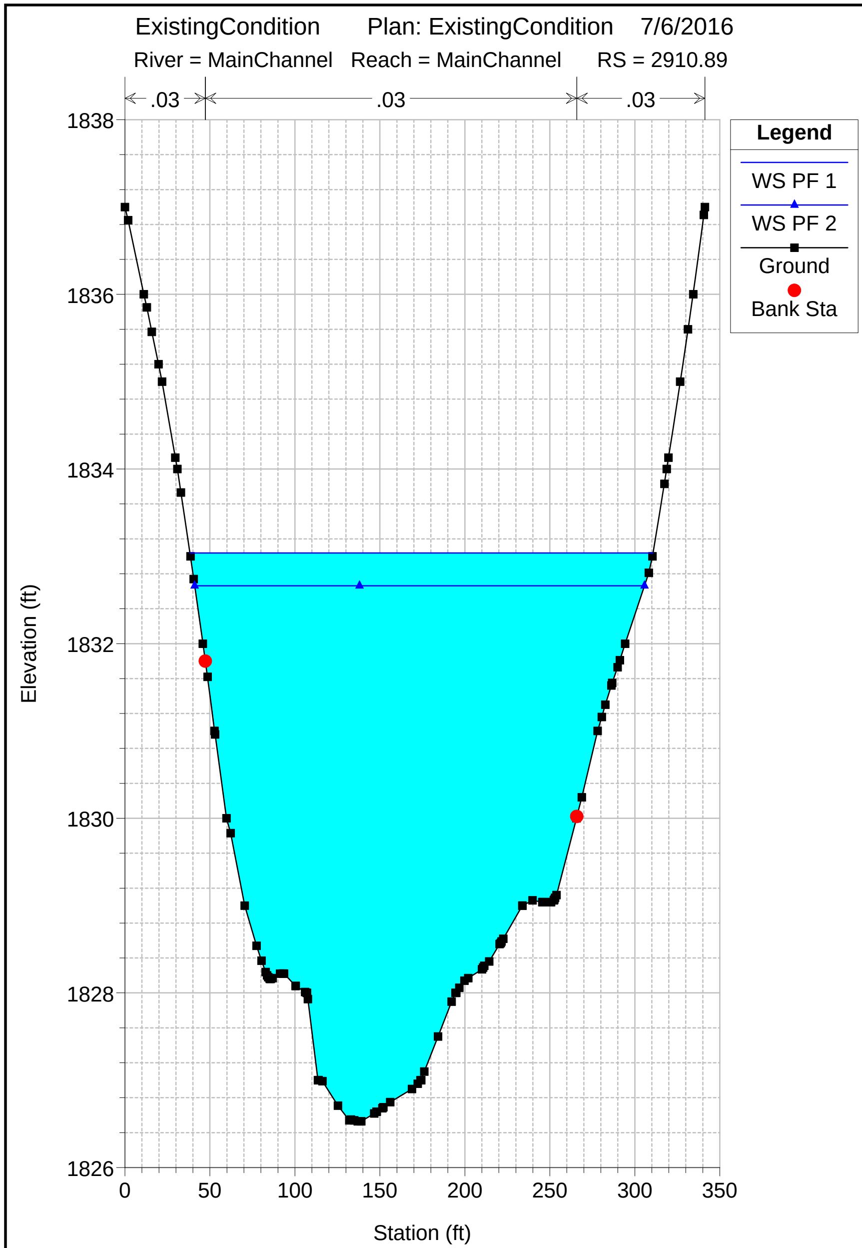
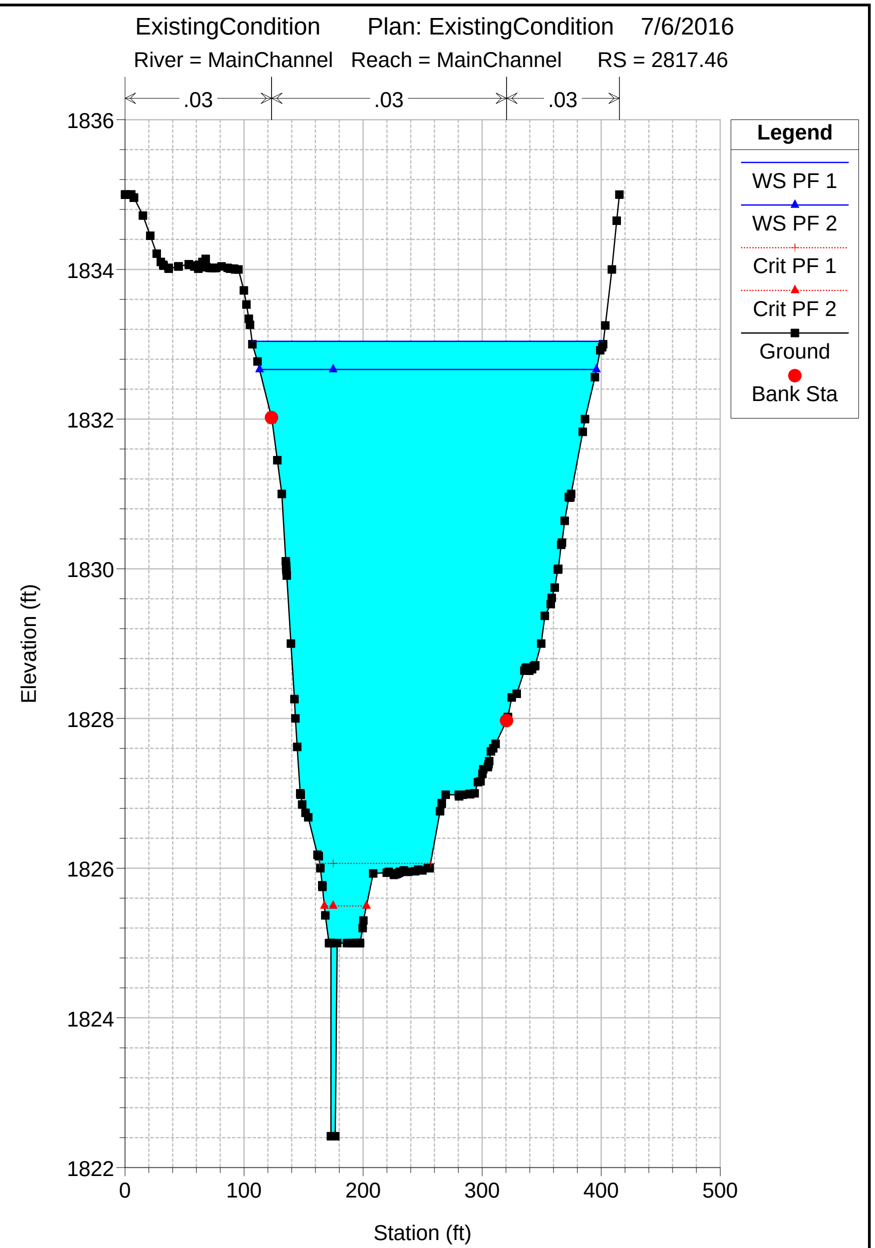
River = MainChannel Reach = MainChannel RS = 3127.87
.03
.03
.03
Legend
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

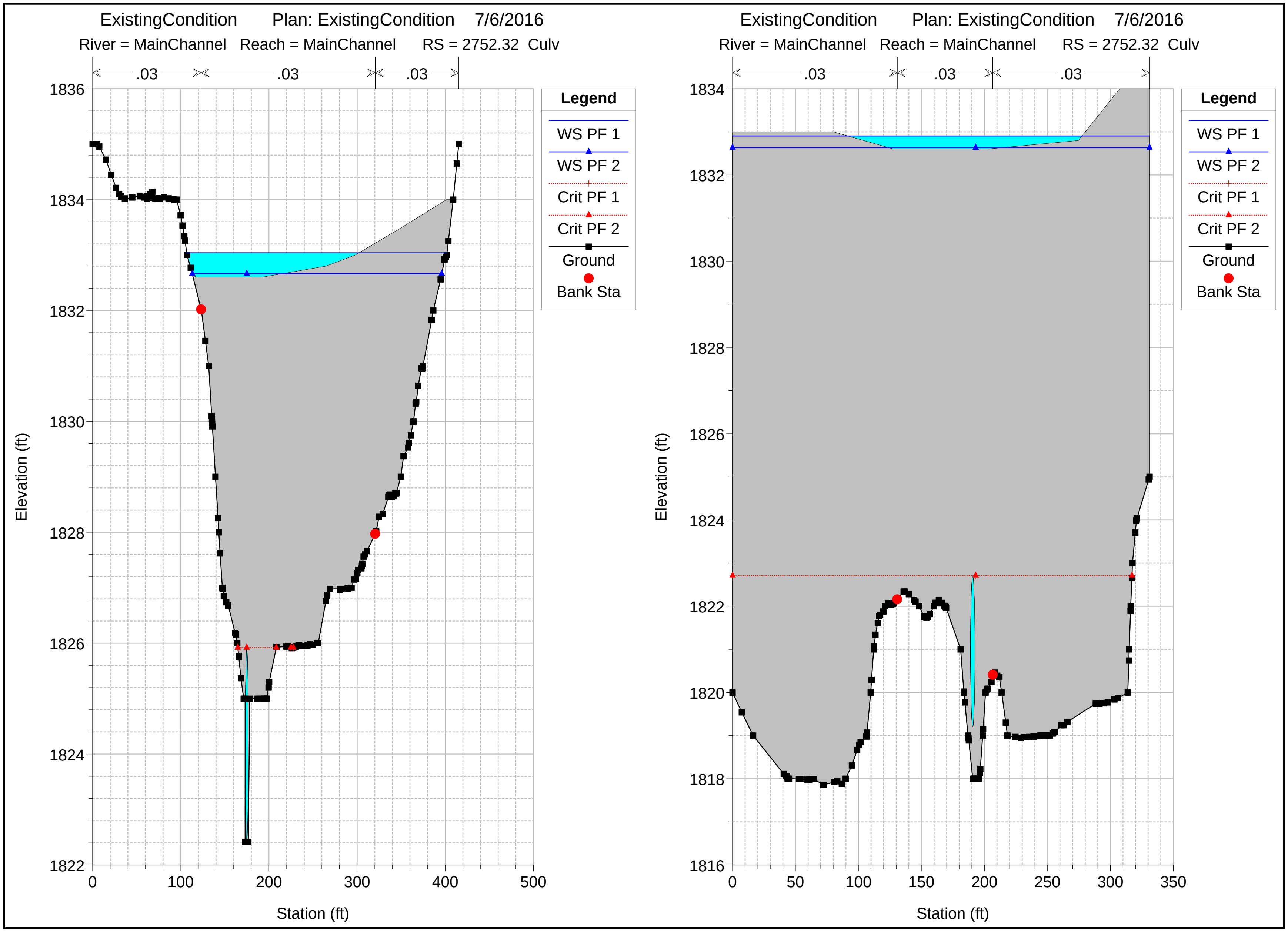

ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel Reach = MainChannel RS = 3007.28
.03
.03
.03
Legend
WS PF 1
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

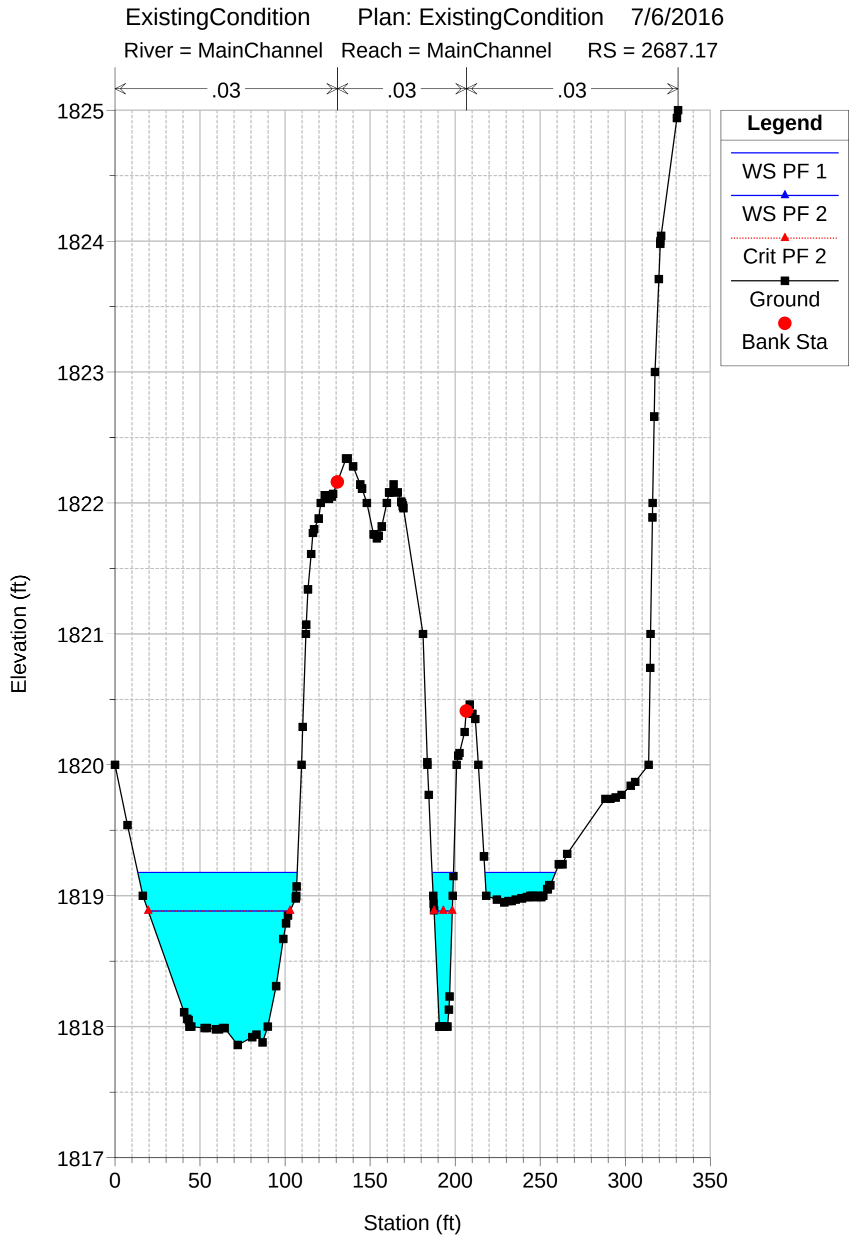


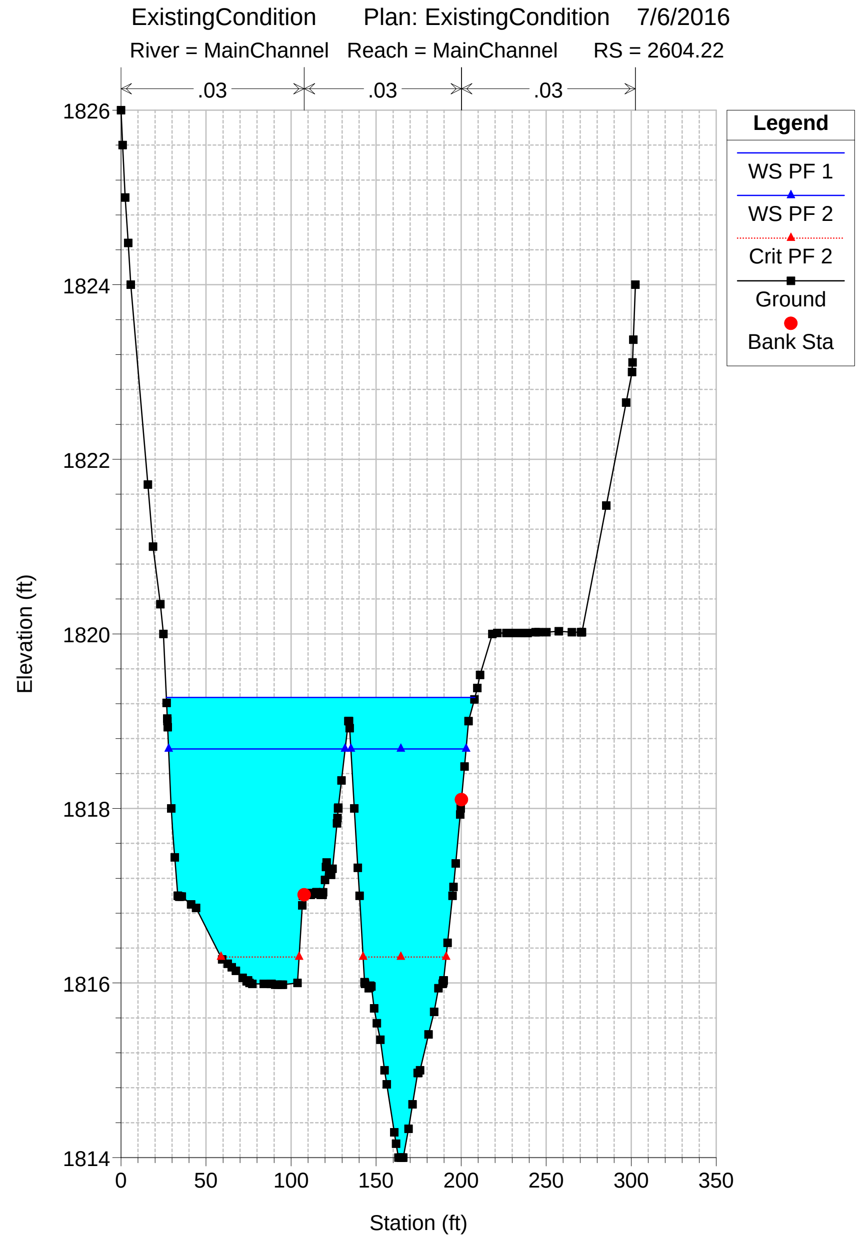


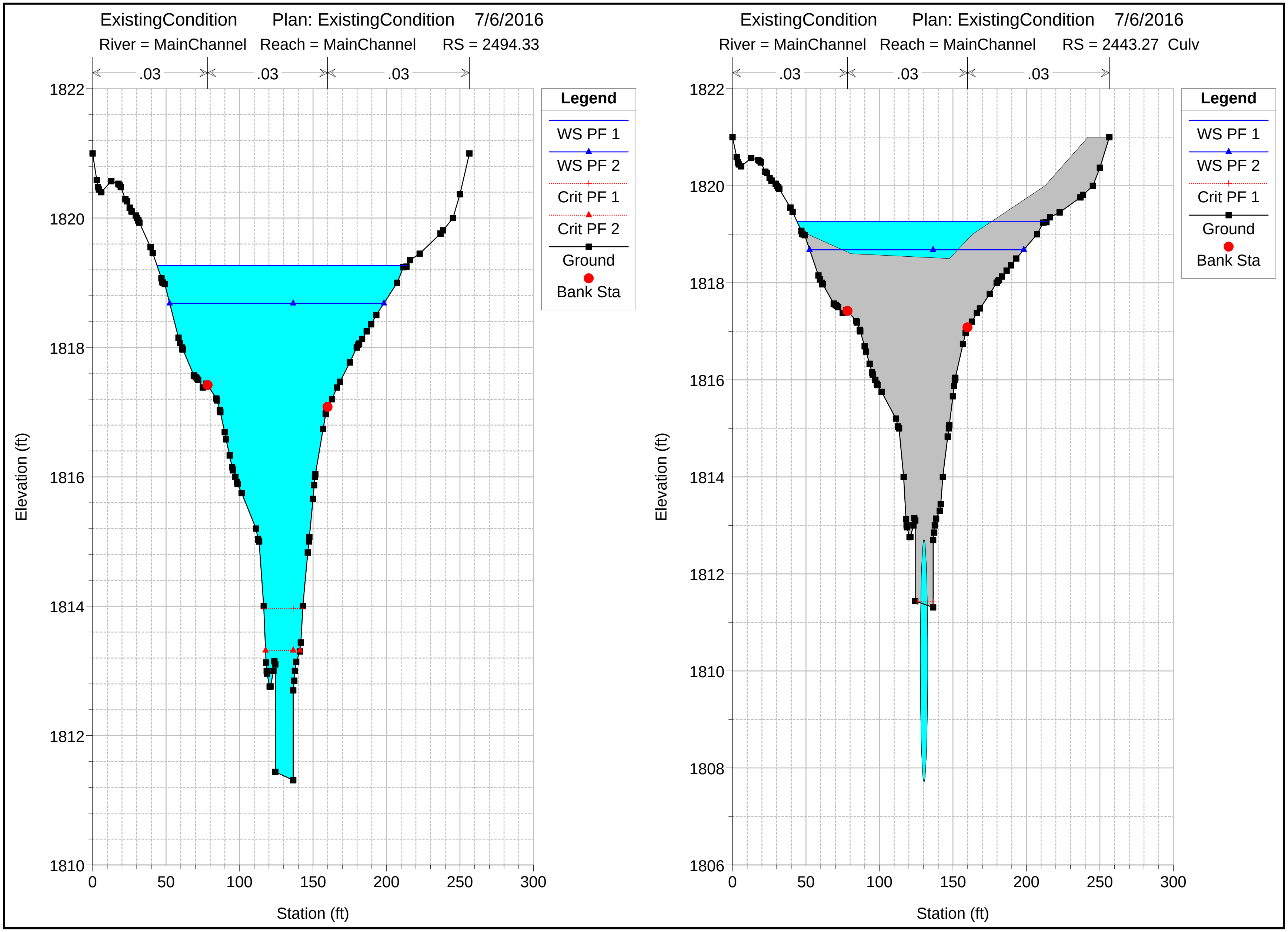
Packet Pg. 3429

4.ae

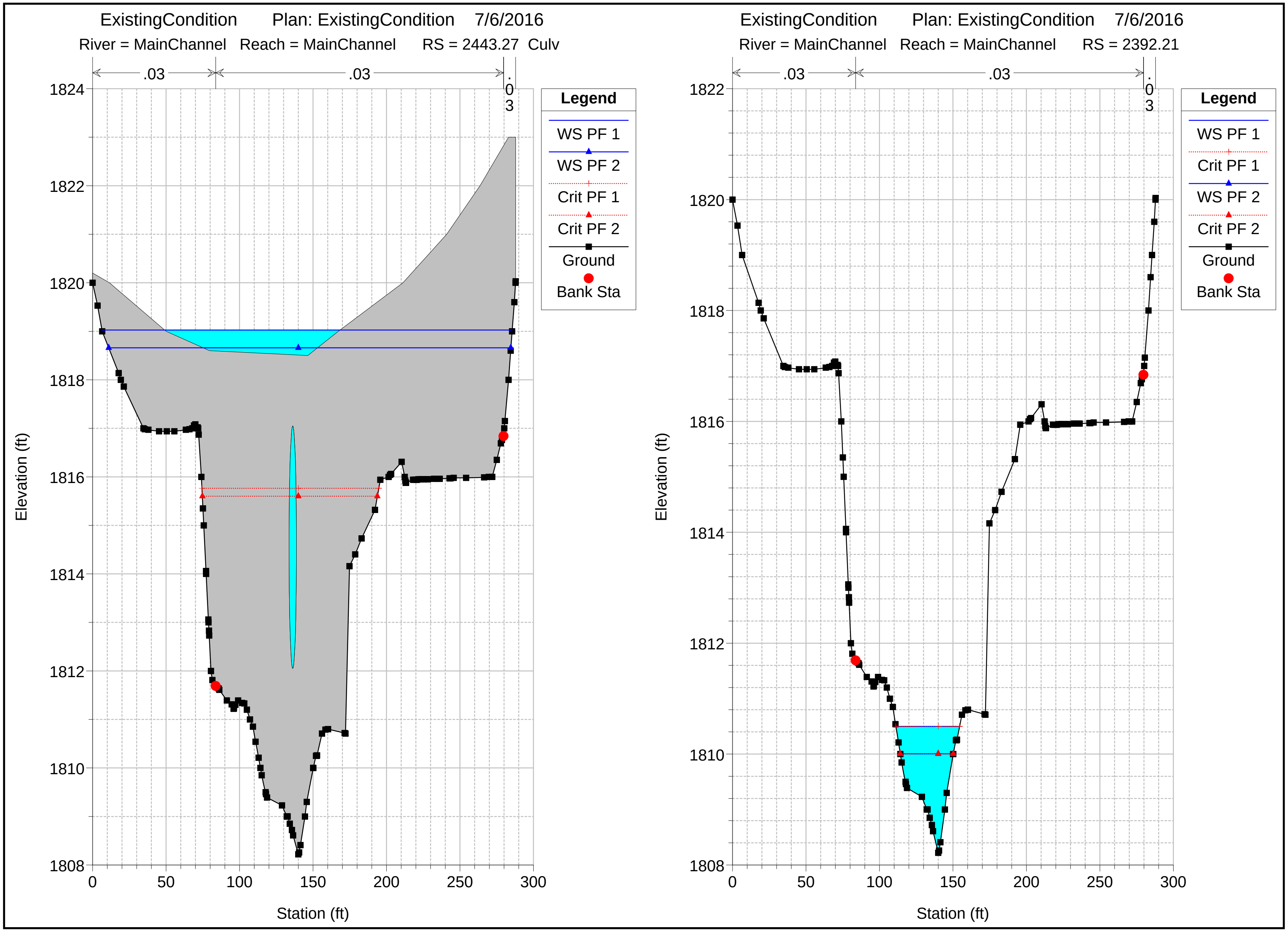

ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel Reach = MainChannel RS = 2752.32 Culv
.03
.03
.03
Legend
WS PF 1
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel Reach = MainChannel RS = 2752.32 Culv
.03
.03
.03
Legend
WS PF 1
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

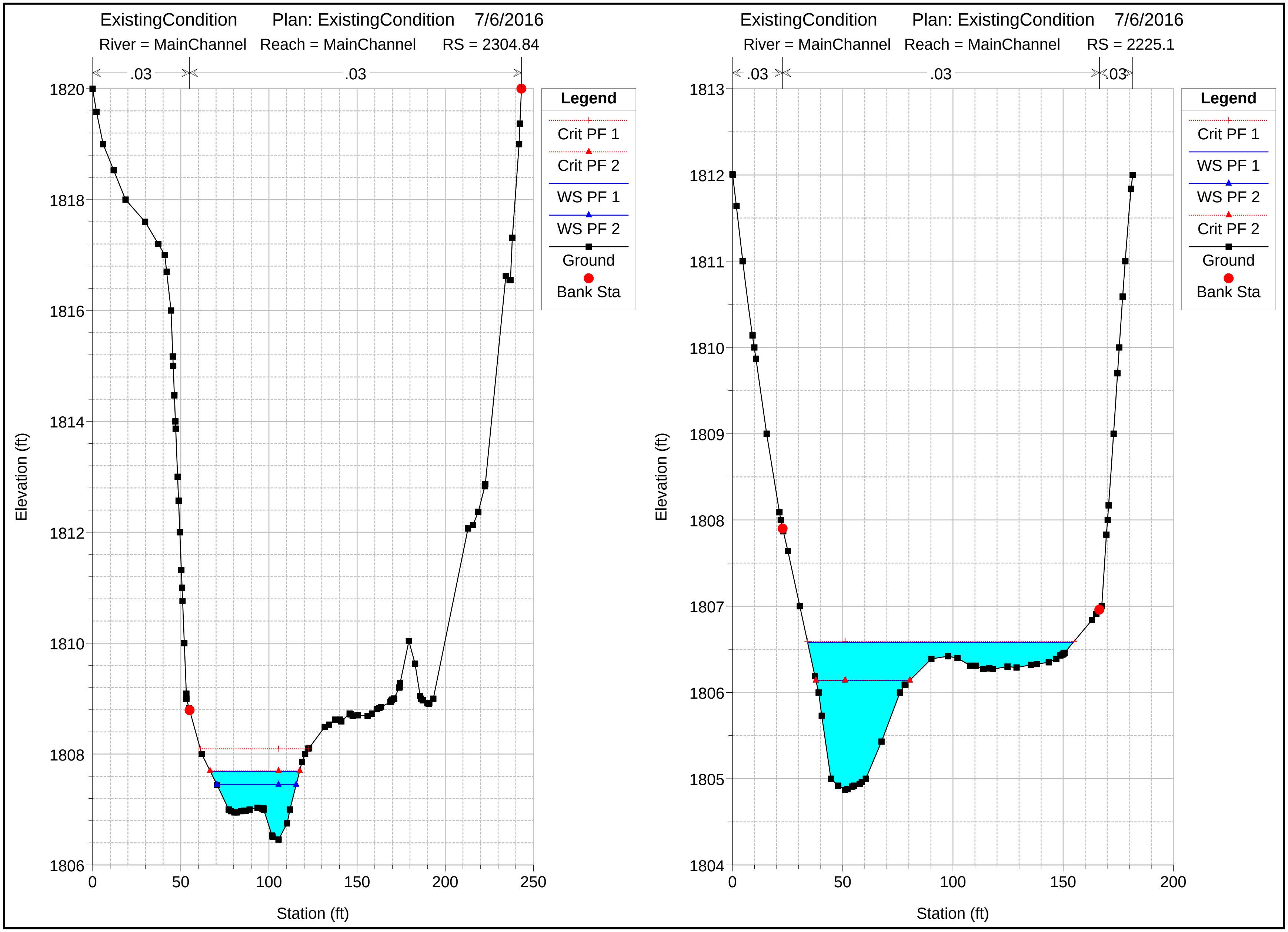

ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel Reach = MainChannel RS = 2687.17
.03
.03
.03
Legend
WS PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
1825
1824
1823
1822
1821
1820
1819
1818
1817
0
50
100
150
200
250
300
350
Station (ft)


ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel Reach = MainChannel RS = 2604.22
.03
.03
.03
Legend
WS PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
1826
1824
1822
1820
1818
1816
1814
0
50
100
150
200
250
300
350
Station (ft)

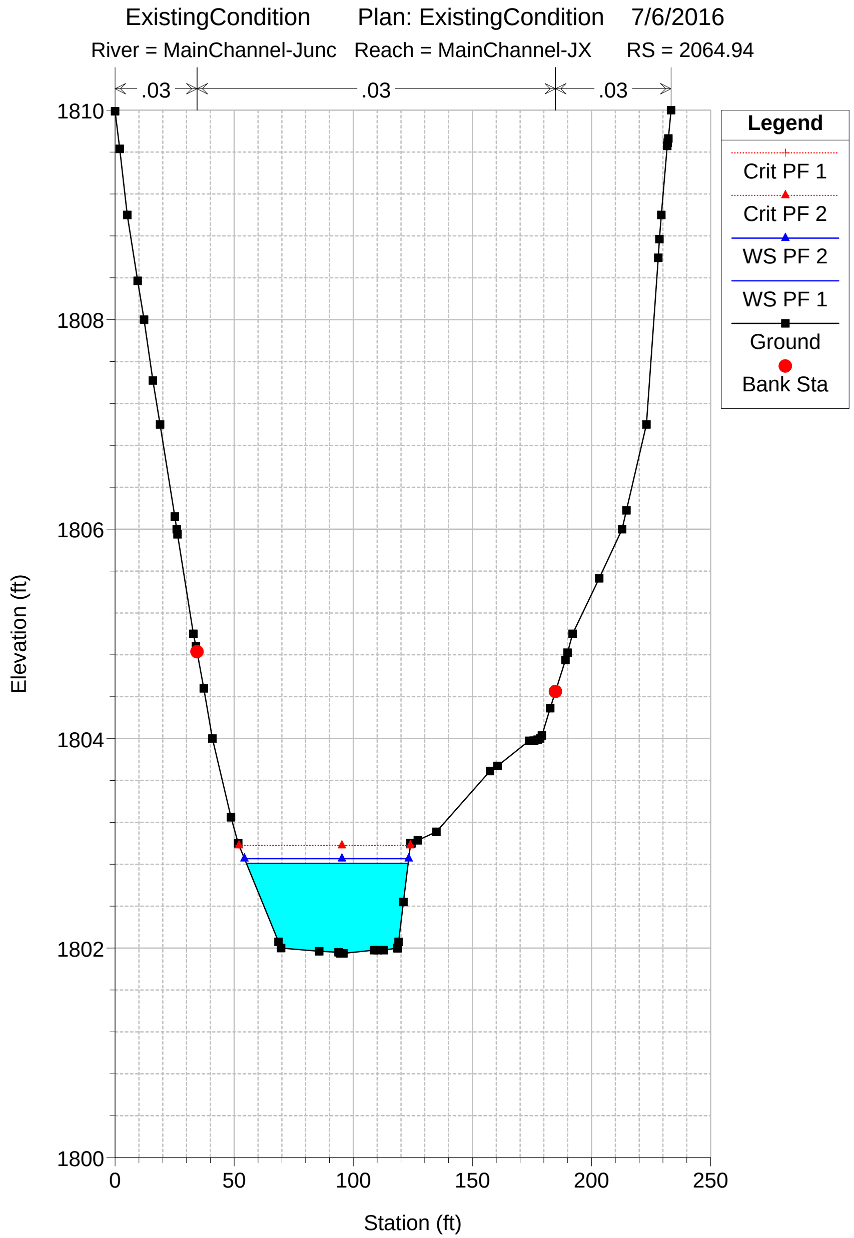


ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel Reach = MainChannel RS = 2494.33
.03
.03
.03
Legend
WS PF 1
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
1810
1812
1814
1816
1818
1820
1822
0
50
100
150
200
250
300
ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel Reach = MainChannel RS = 2443.27 Culv
.03
.03
.03
Legend
WS PF 1
WS PF 2
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1806
1808
1810
1812
1814
1816
1818
1820
1822
0
50
100
150
200
250
300

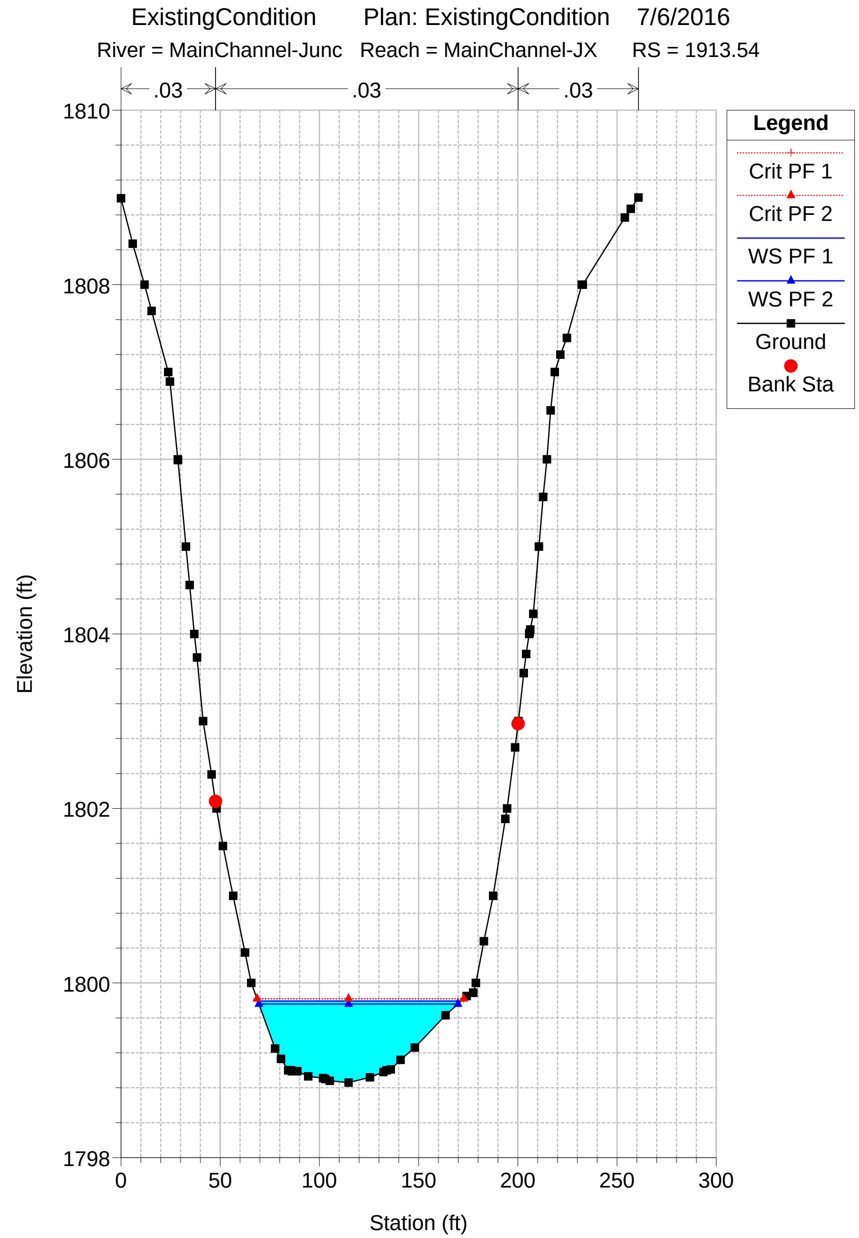

ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel Reach = MainChannel RS = 2443.27 Culv
.03
.03
0
3
Legend
WS PF 1
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
1824
1822
1820
1818
1816
1814
1812
1810
1808
0
50
100
150
200
250
300
ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel Reach = MainChannel RS = 2392.21
.03
.03
0
3
Legend
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
1822
1820
1818
1816
1814
1812
1810
1808
0
50
100
150
200
250
300



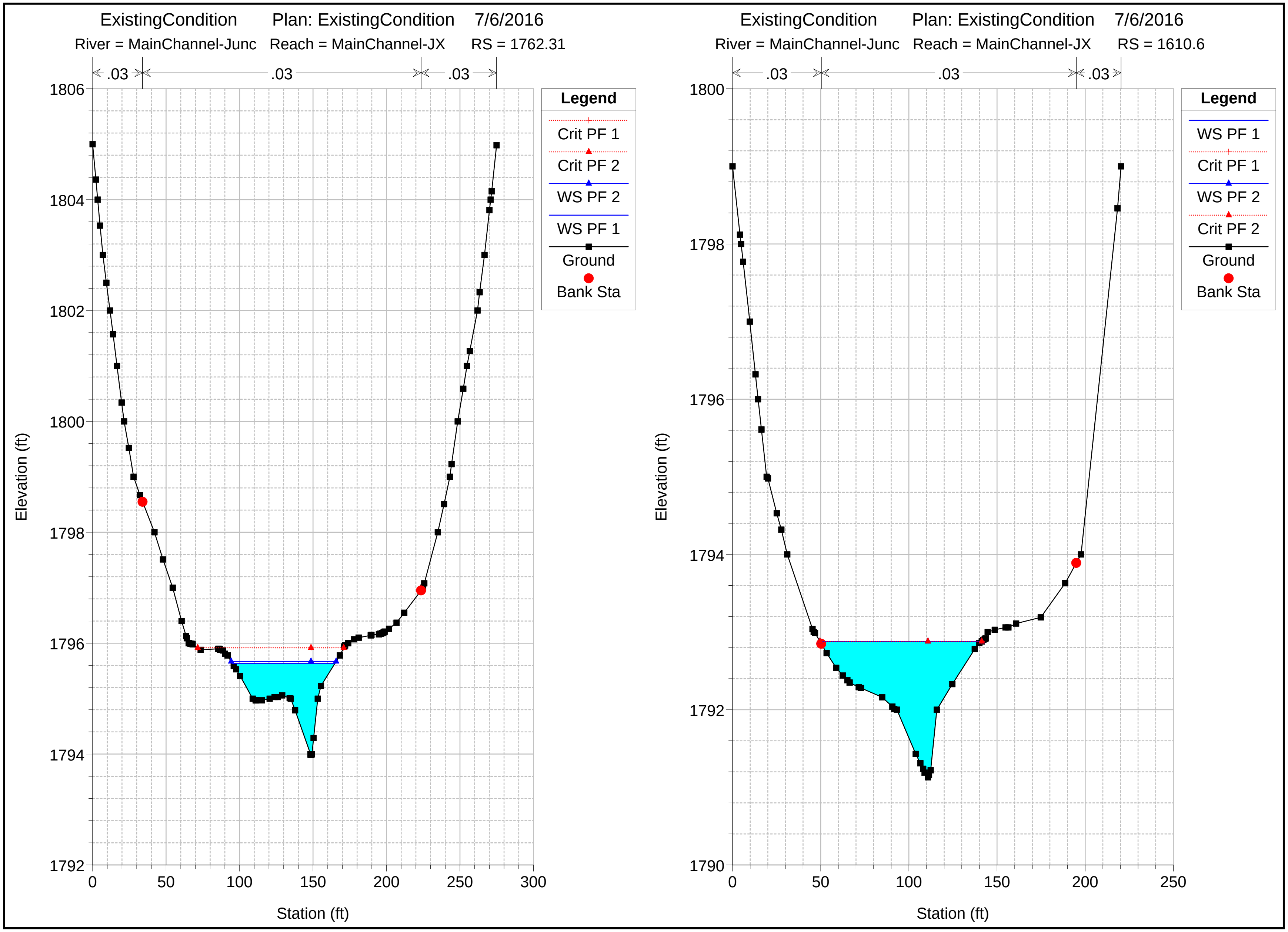
ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel Reach = MainChannel RS = 2304.84
.03
.03
Legend
Crit PF 1
Crit PF 2
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
1806
1808
1810
1812
1814
1816
1818
1820
0
50
100
150
200
250
ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel Reach = MainChannel RS = 2225.1
.03
.03
.03
Legend
Crit PF 1
WS PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
1804
1805
1806
1807
1808
1809
1810
1811
1812
1813
0
50
100
150
200



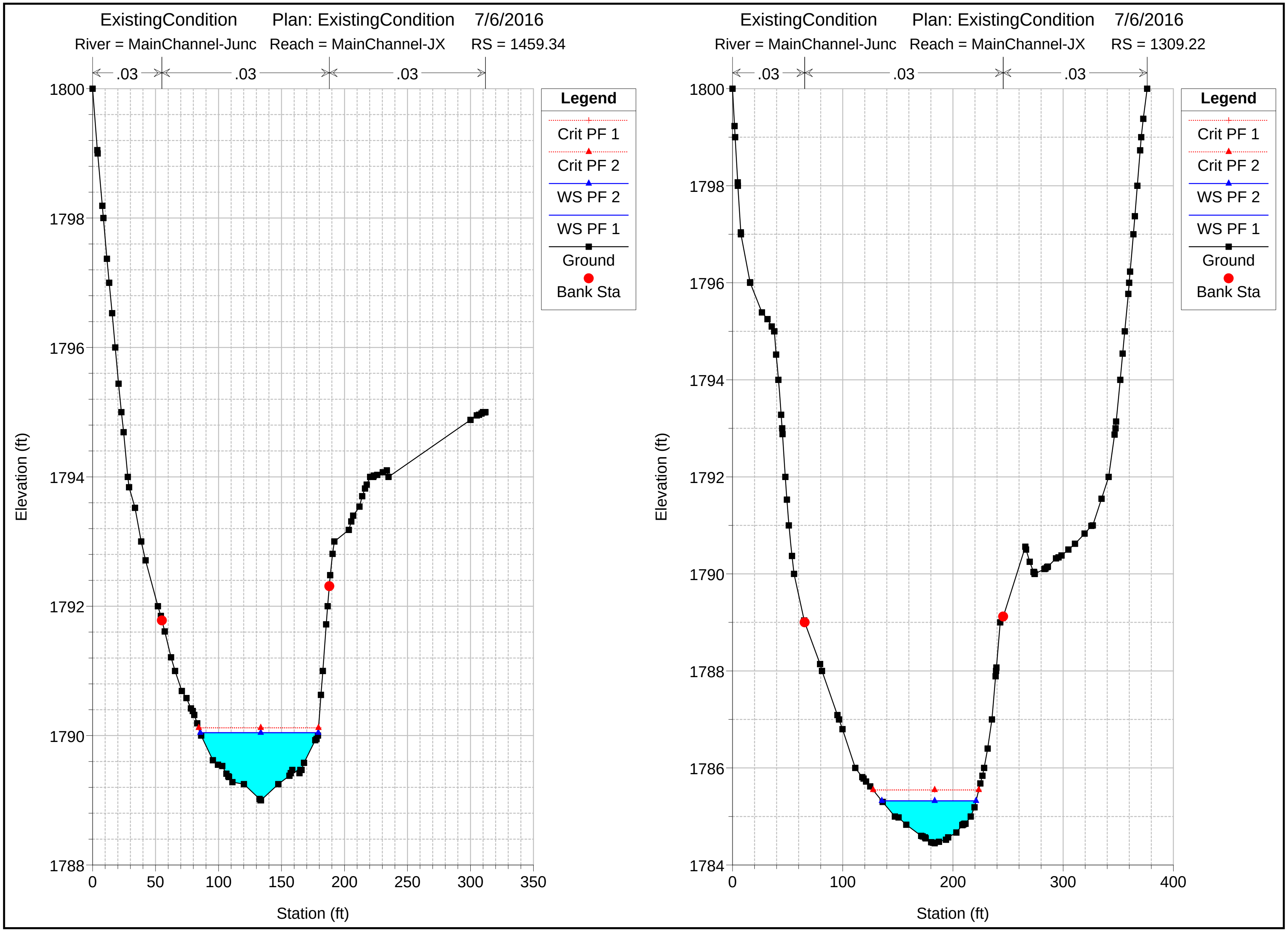
ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel-Junc Reach = MainChannel-JX RS = 2064.94
.03 .03 .03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)



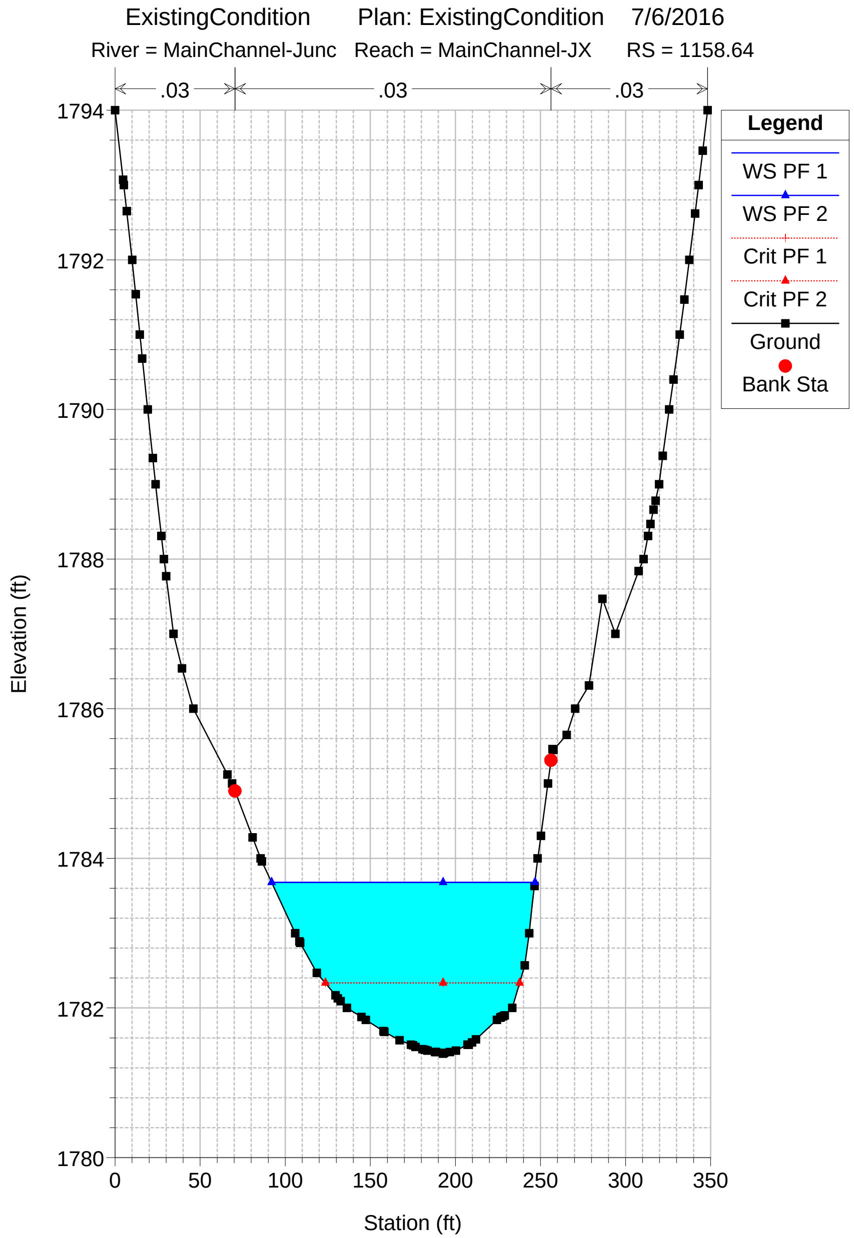
ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel-Junc Reach = MainChannel-JX RS = 1913.54
.03 .03 .03
Legend
Crit PF 1
Crit PF 2
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

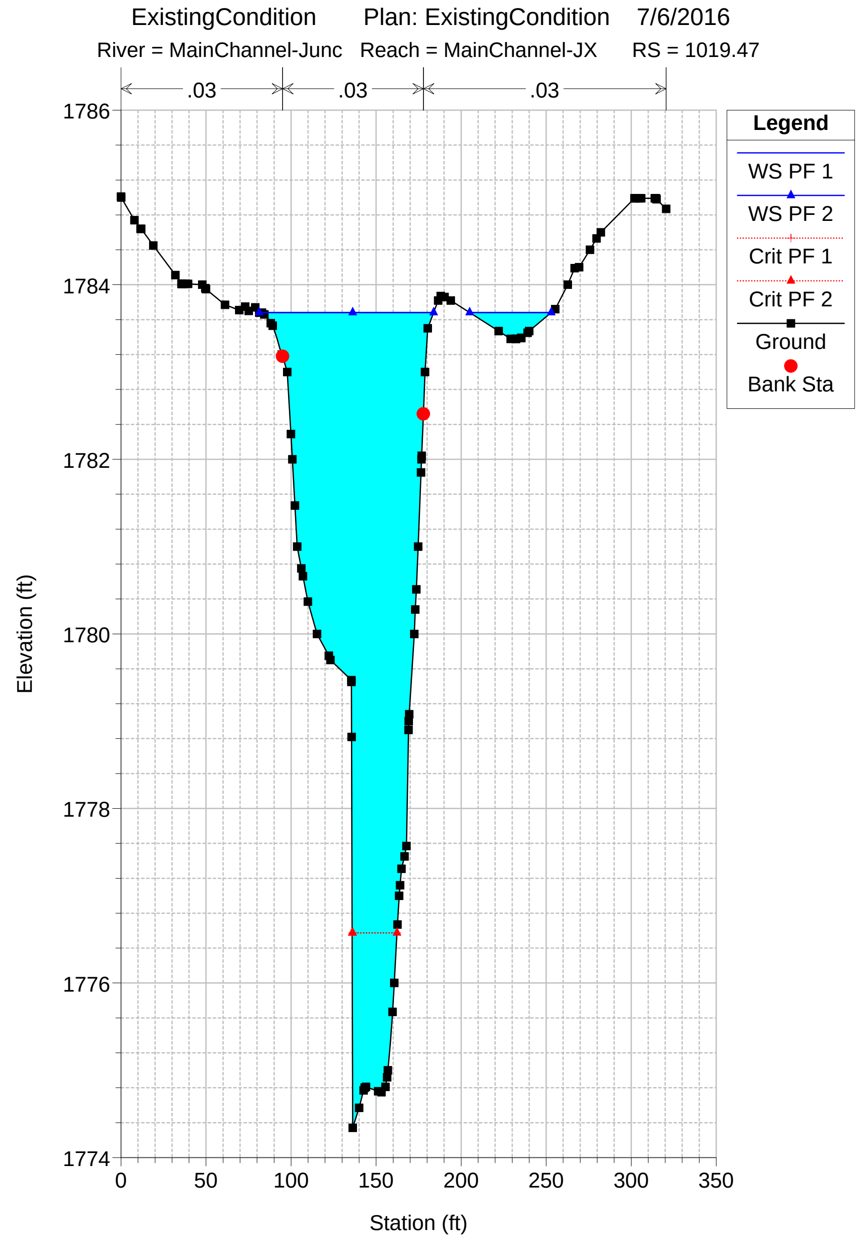


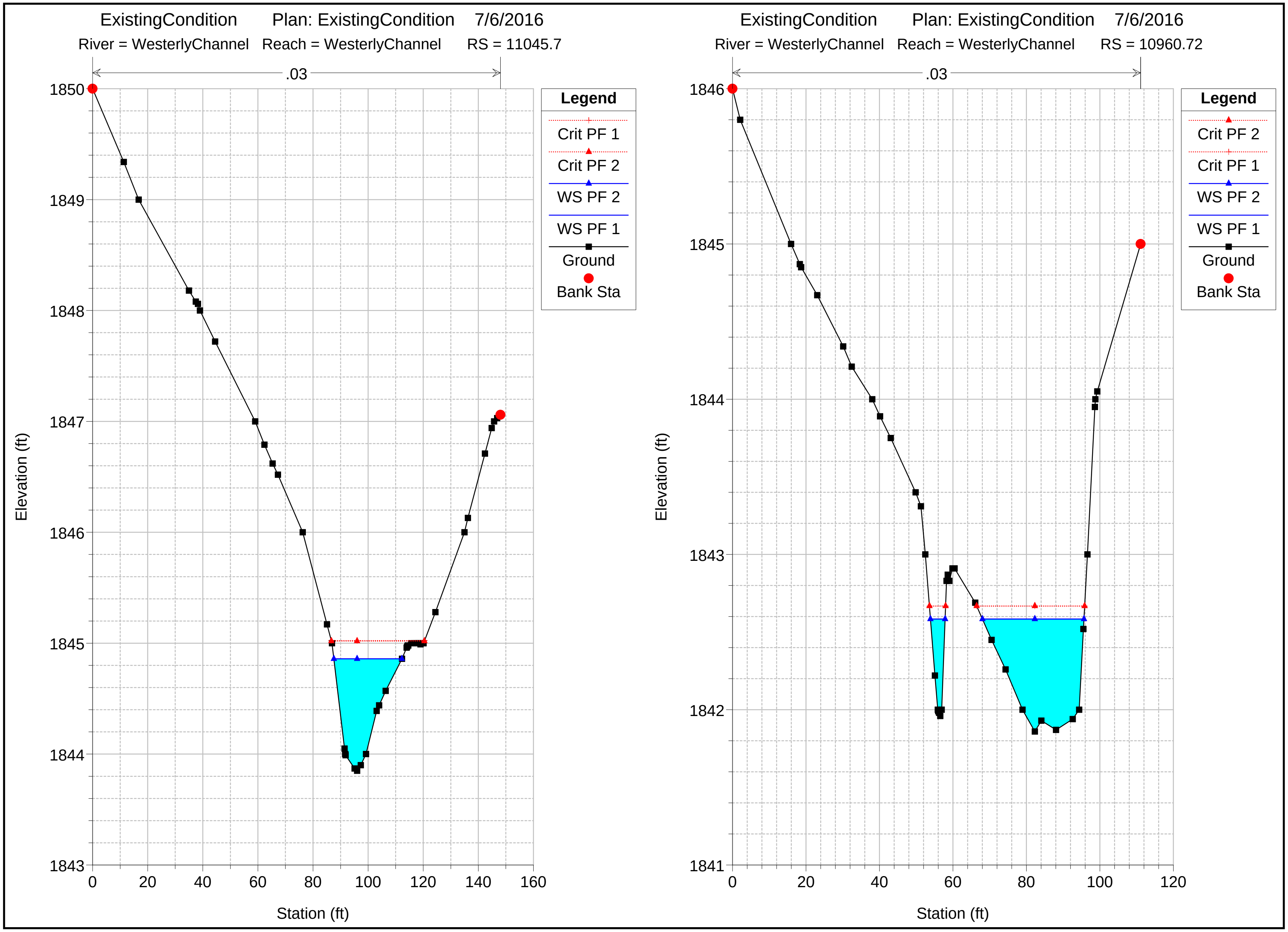
Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

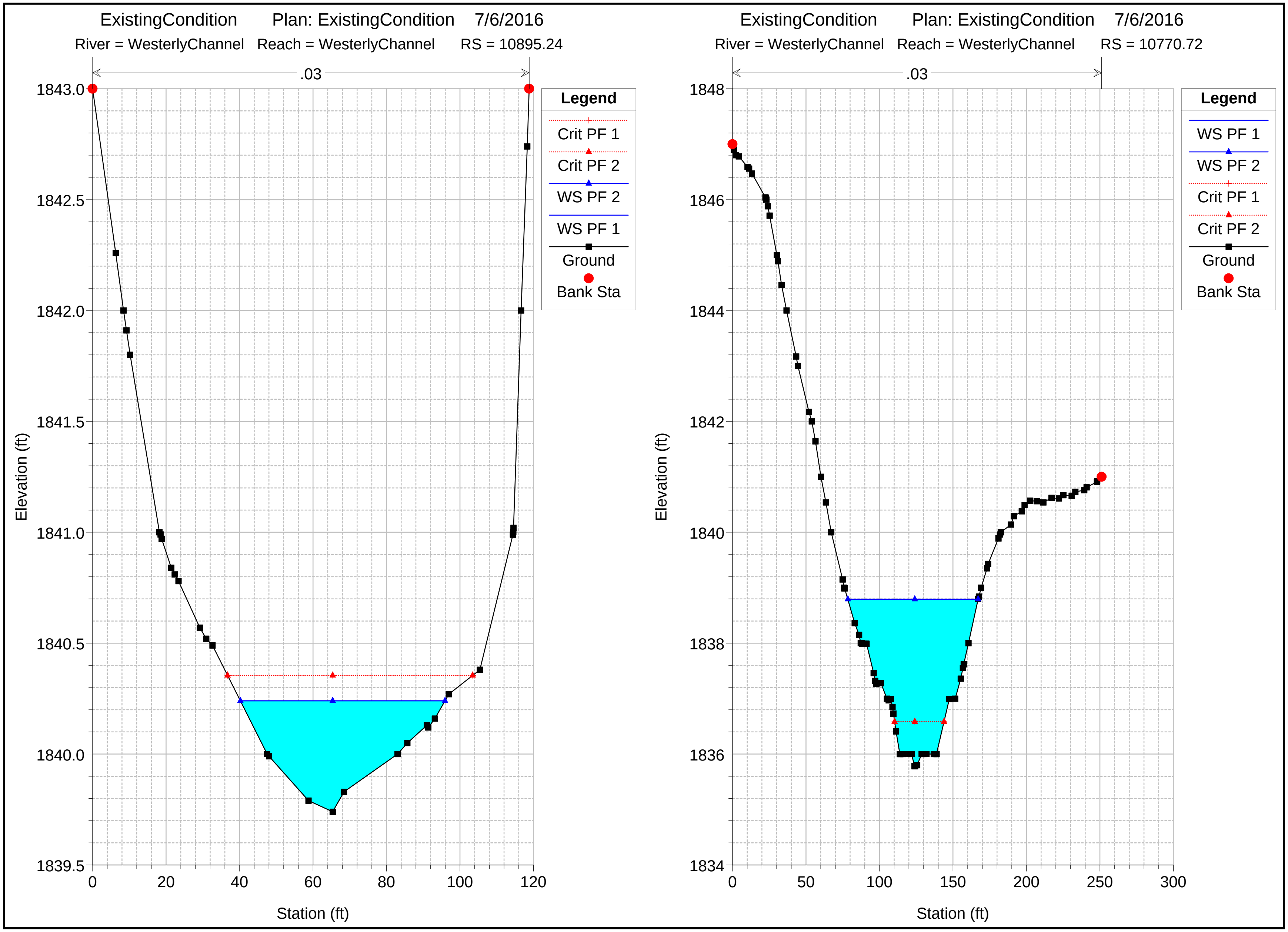


ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel-Junc Reach = MainChannel-JX RS = 1459.34
.03 .03 .03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel-Junc Reach = MainChannel-JX RS = 1309.22
.03 .03 .03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

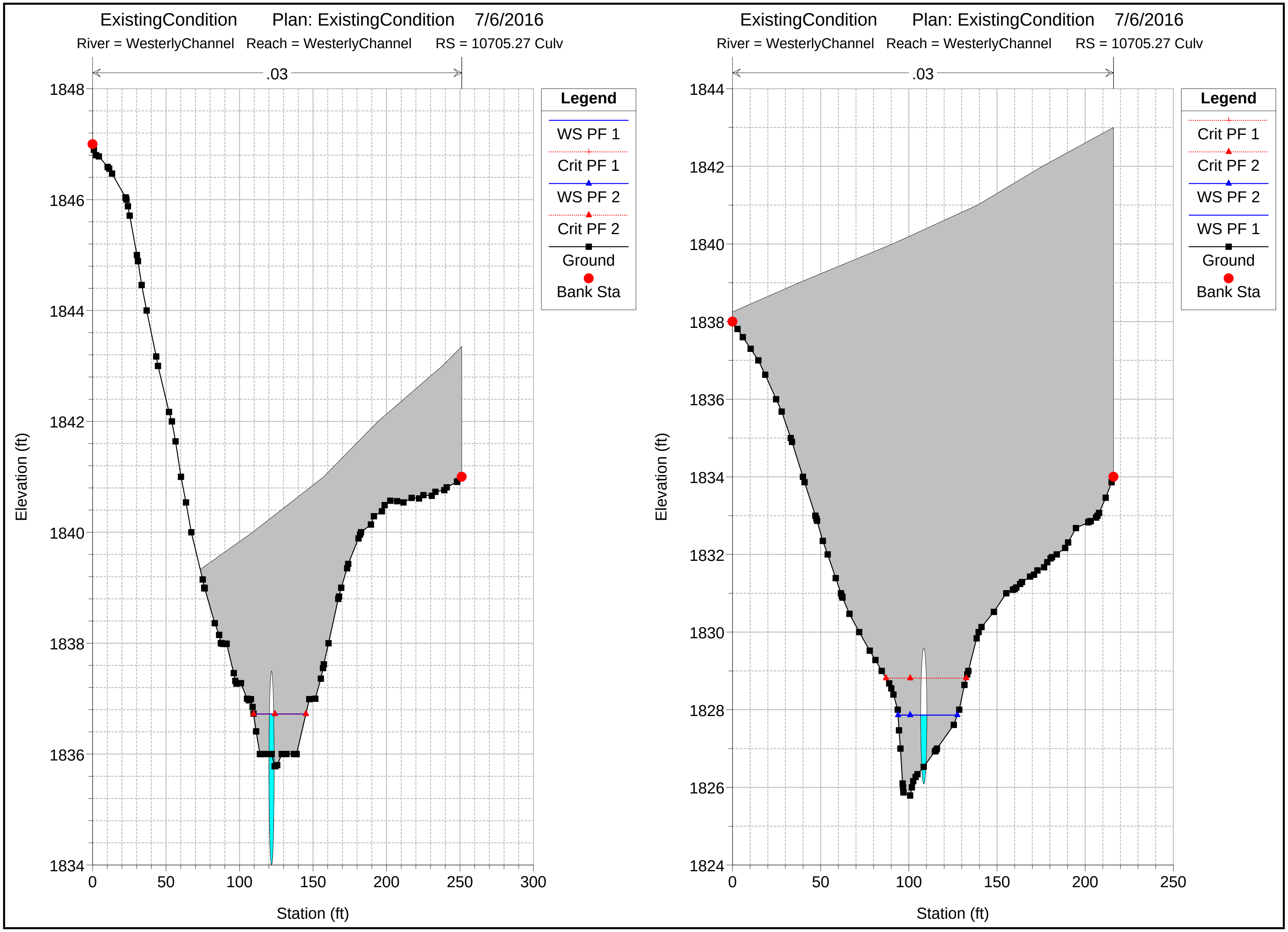

ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel-Junc Reach = MainChannel-JX RS = 1158.64
.03
.03
.03
Legend
WS PF 1
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
1794
1792
1790
1788
1786
1784
1782
1780
0
50
100
150
200
250
300
350

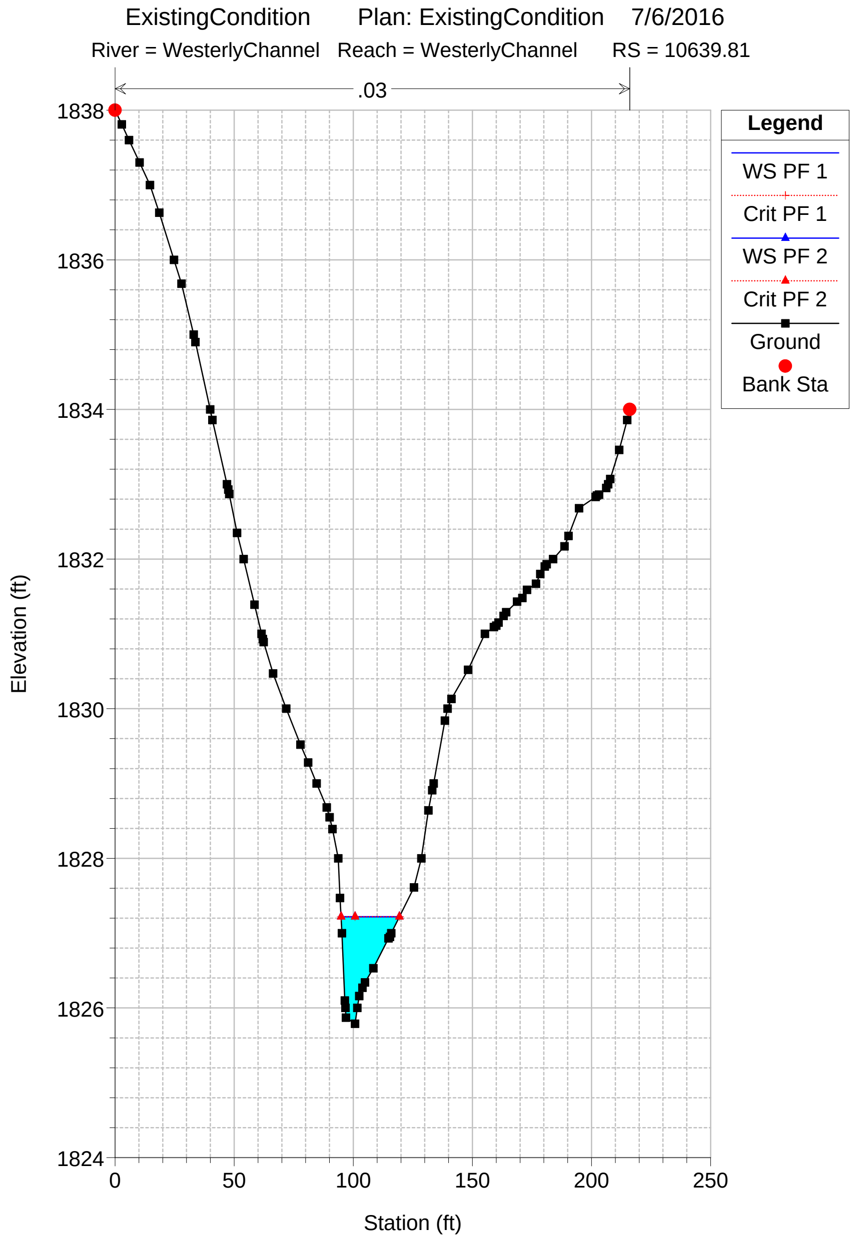

ExistingCondition Plan: ExistingCondition 7/6/2016
River = MainChannel-Junc Reach = MainChannel-JX RS = 1019.47
.03
.03
.03
Legend
WS PF 1
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
1786
1784
1782
1780
1778
1776
1774
0
50
100
150
200
250
300
350

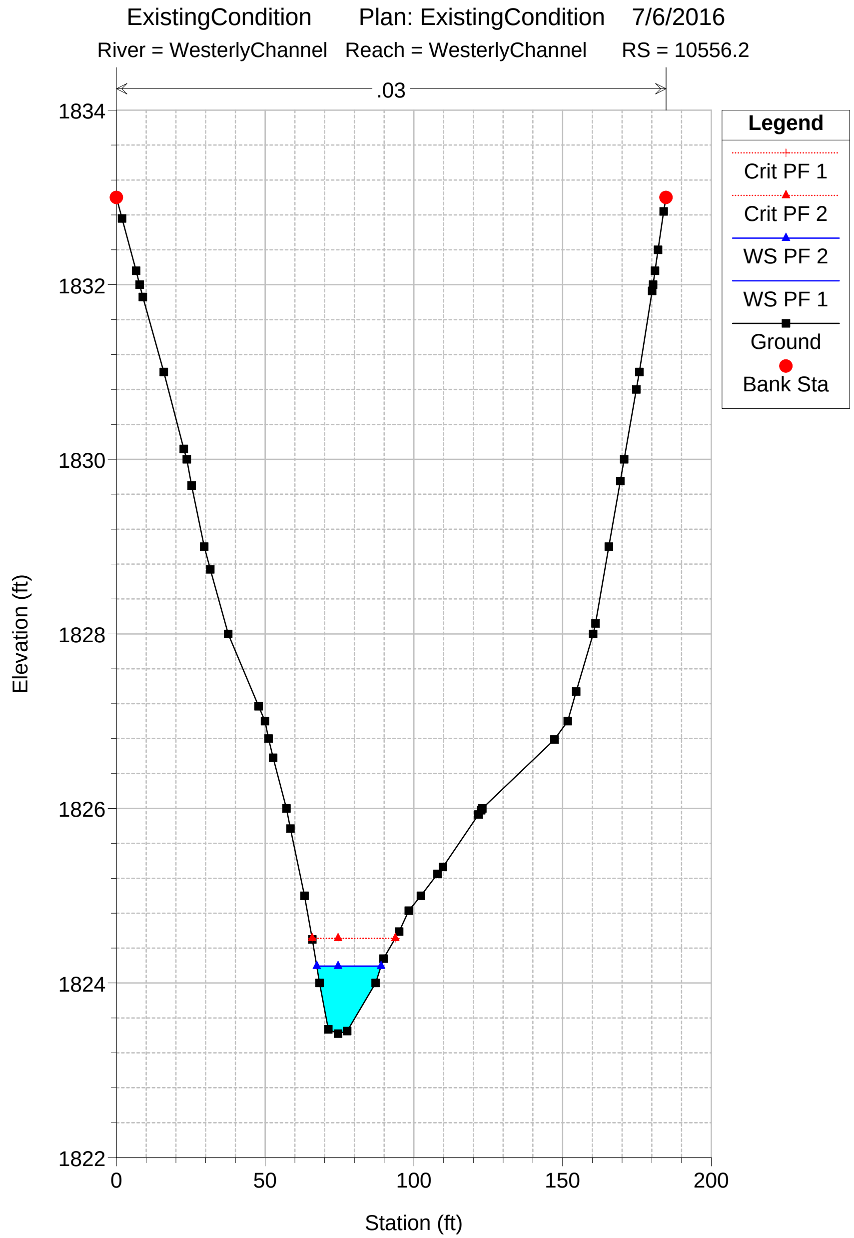

ExistingCondition Plan: ExistingCondition 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 11045.7
.03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
ExistingCondition Plan: ExistingCondition 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10960.72
.03
Legend
Crit PF 2
Crit PF 1
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

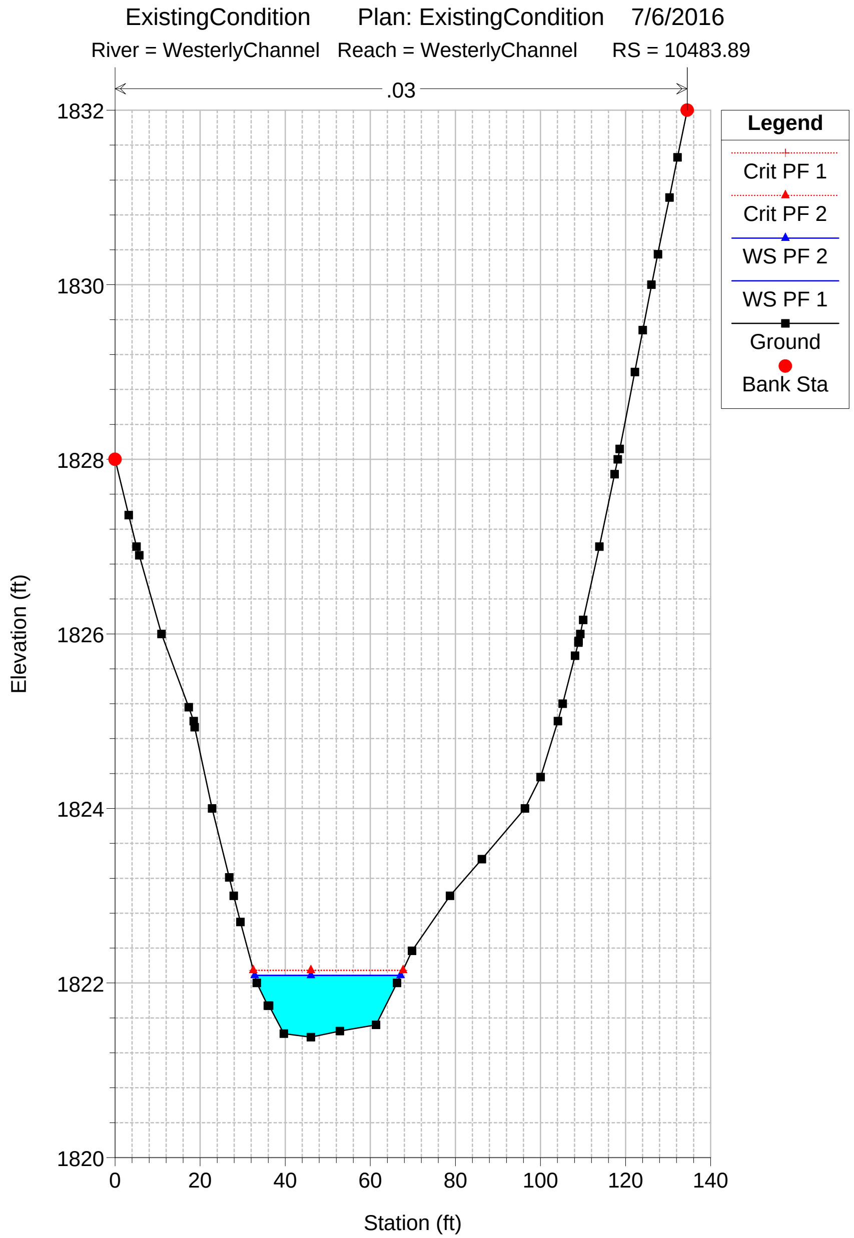


ExistingCondition Plan: ExistingCondition 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10895.24
.03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
ExistingCondition Plan: ExistingCondition 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10770.72
.03
Legend
WS PF 1
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

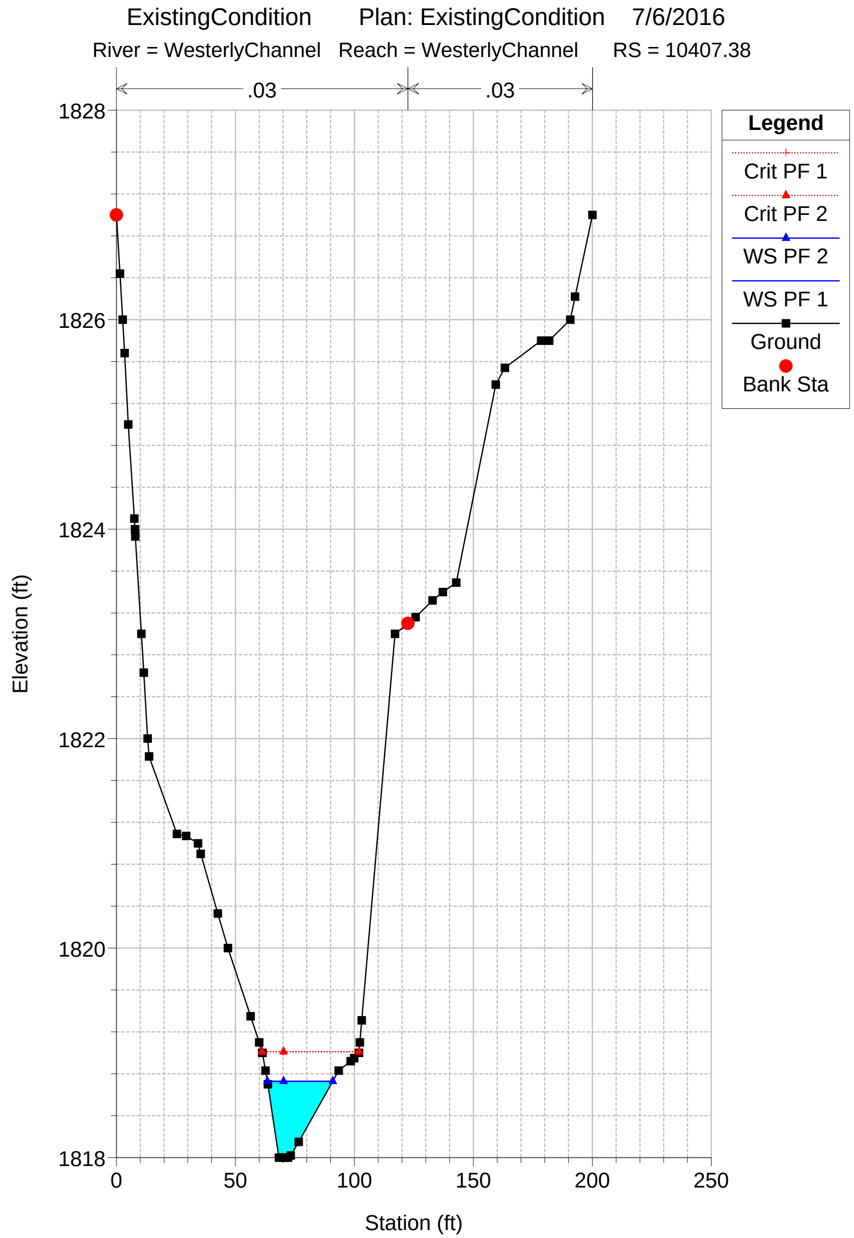

ExistingCondition Plan: ExistingCondition 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10705.27 Culv
.03
Legend
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
ExistingCondition Plan: ExistingCondition 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10705.27 Culv
.03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


ExistingCondition Plan: ExistingCondition 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10639.81
.03
Legend
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
1838
1836
1834
1832
1830
1828
1826
1824
0
50
100
150
200
250

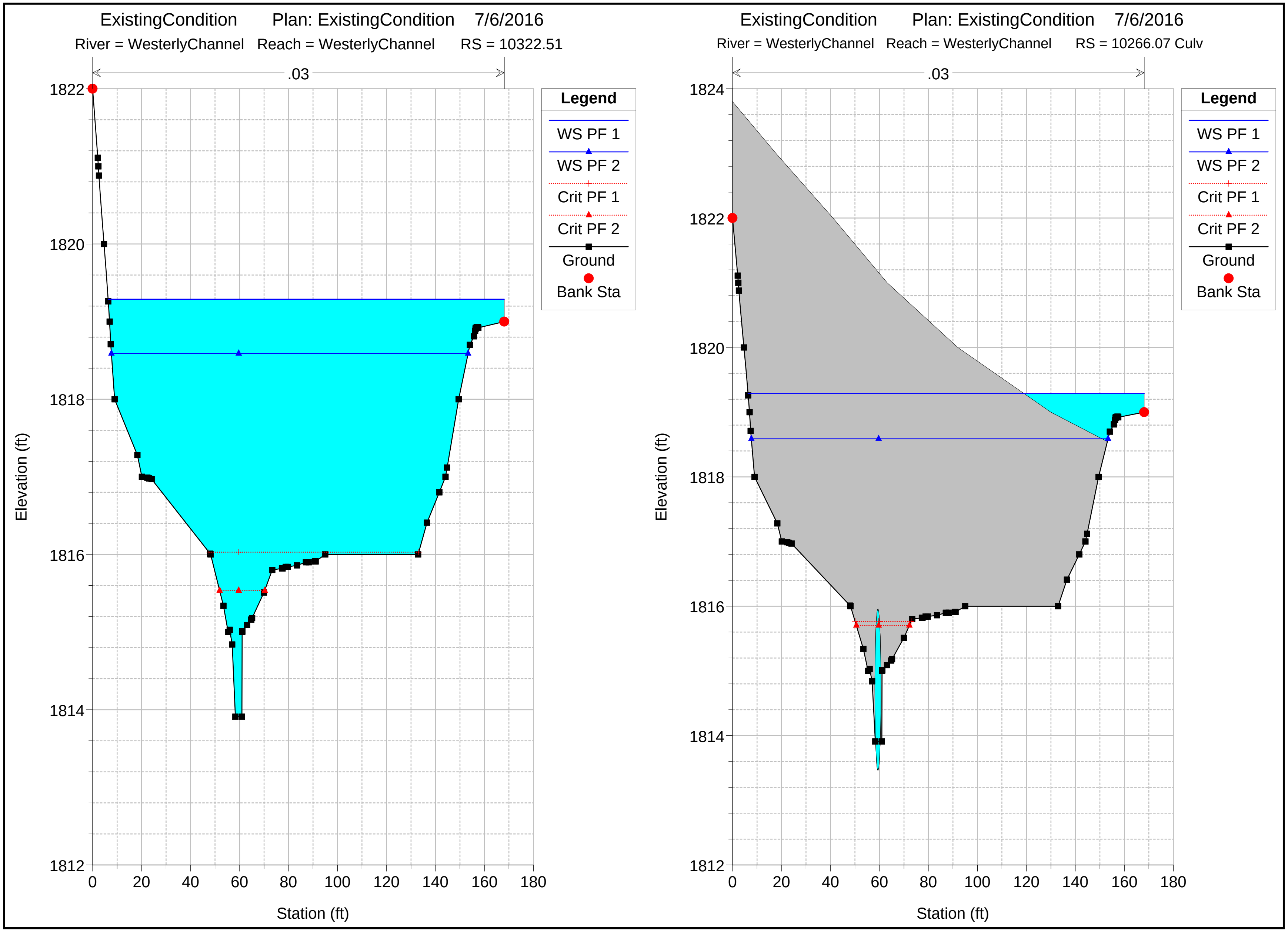

ExistingCondition Plan: ExistingCondition 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10556.2
.03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1834
1832
1830
1828
1826
1824
1822
0
50
100
150
200



ExistingCondition Plan: ExistingCondition 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10483.89
.03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1832
1830
1828
1826
1824
1822
1820
0
20
40
60
80
100
120
140

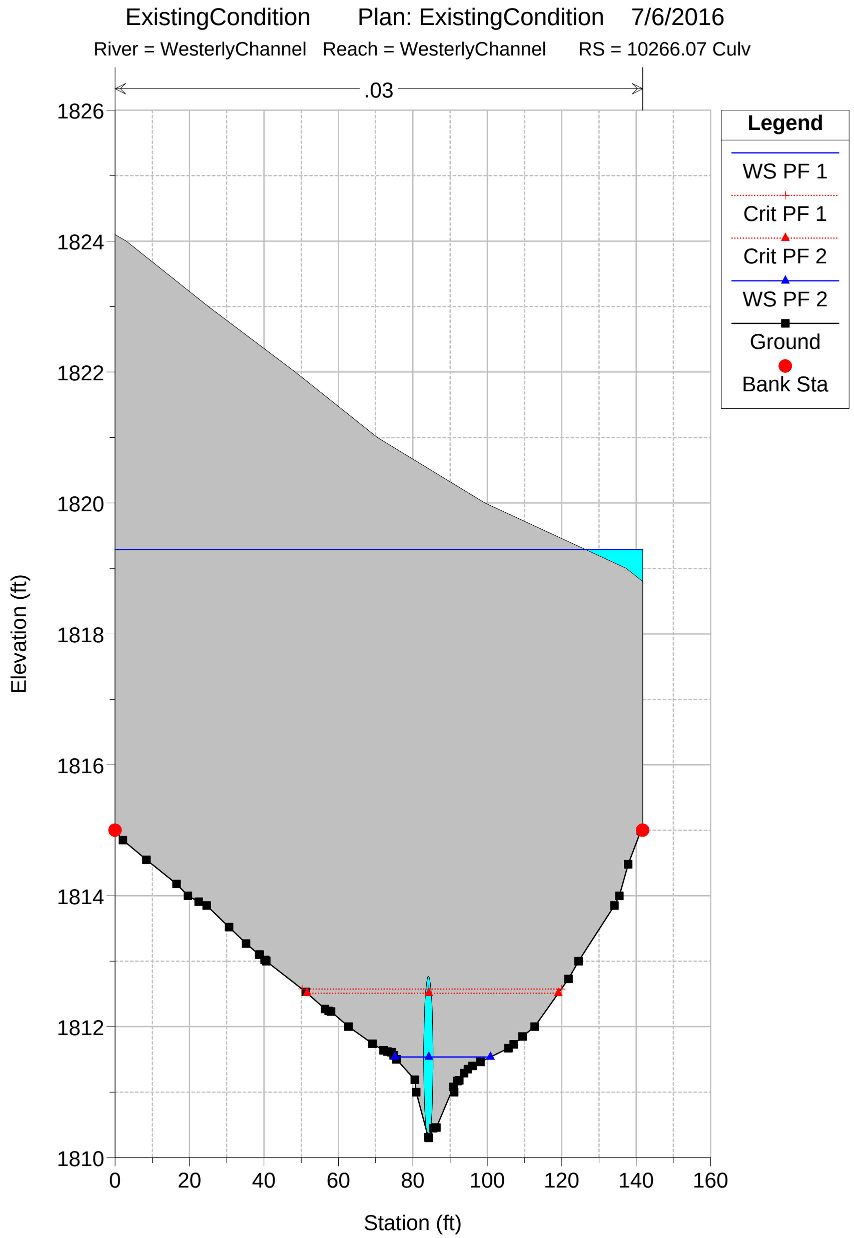


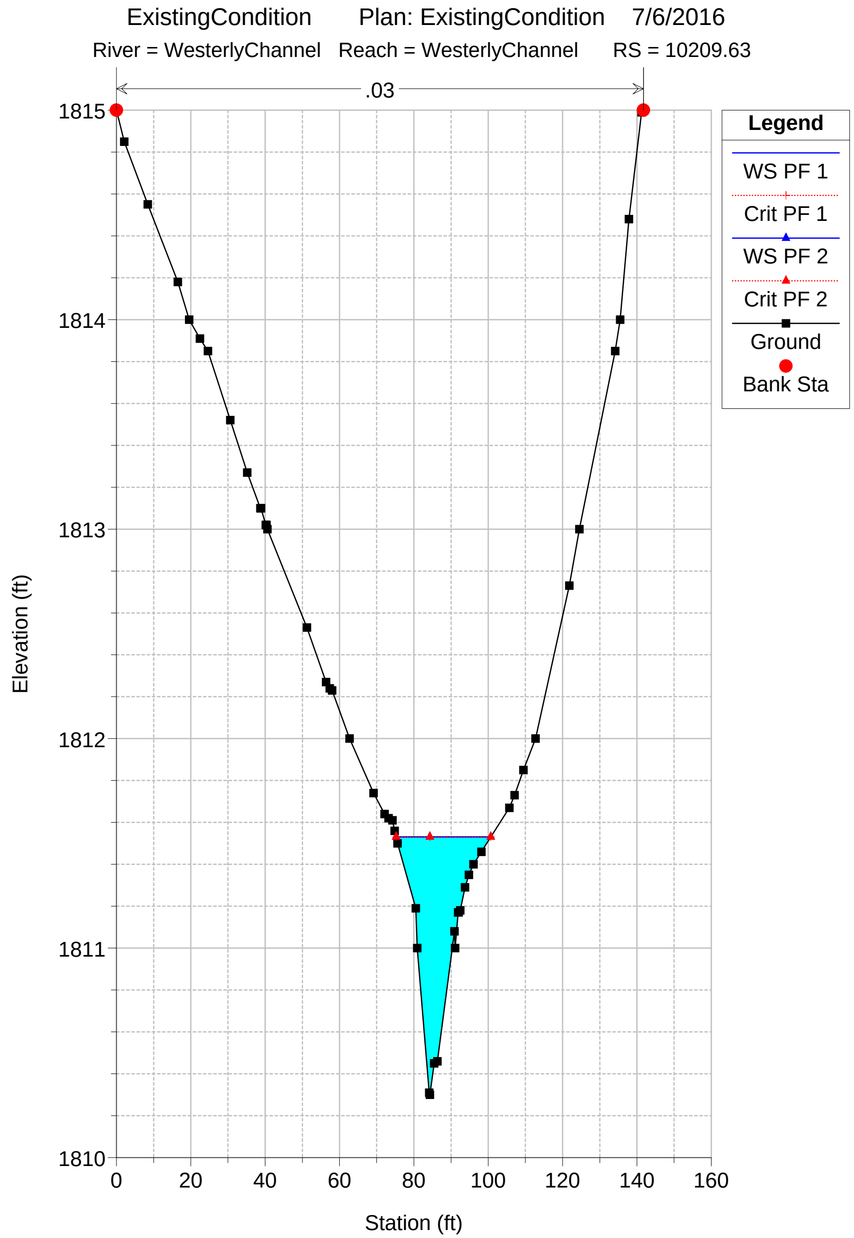
ExistingCondition Plan: ExistingCondition 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10407.38
.03
.03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1828
1826
1824
1822
1820
1818
0
50
100
150
200
250

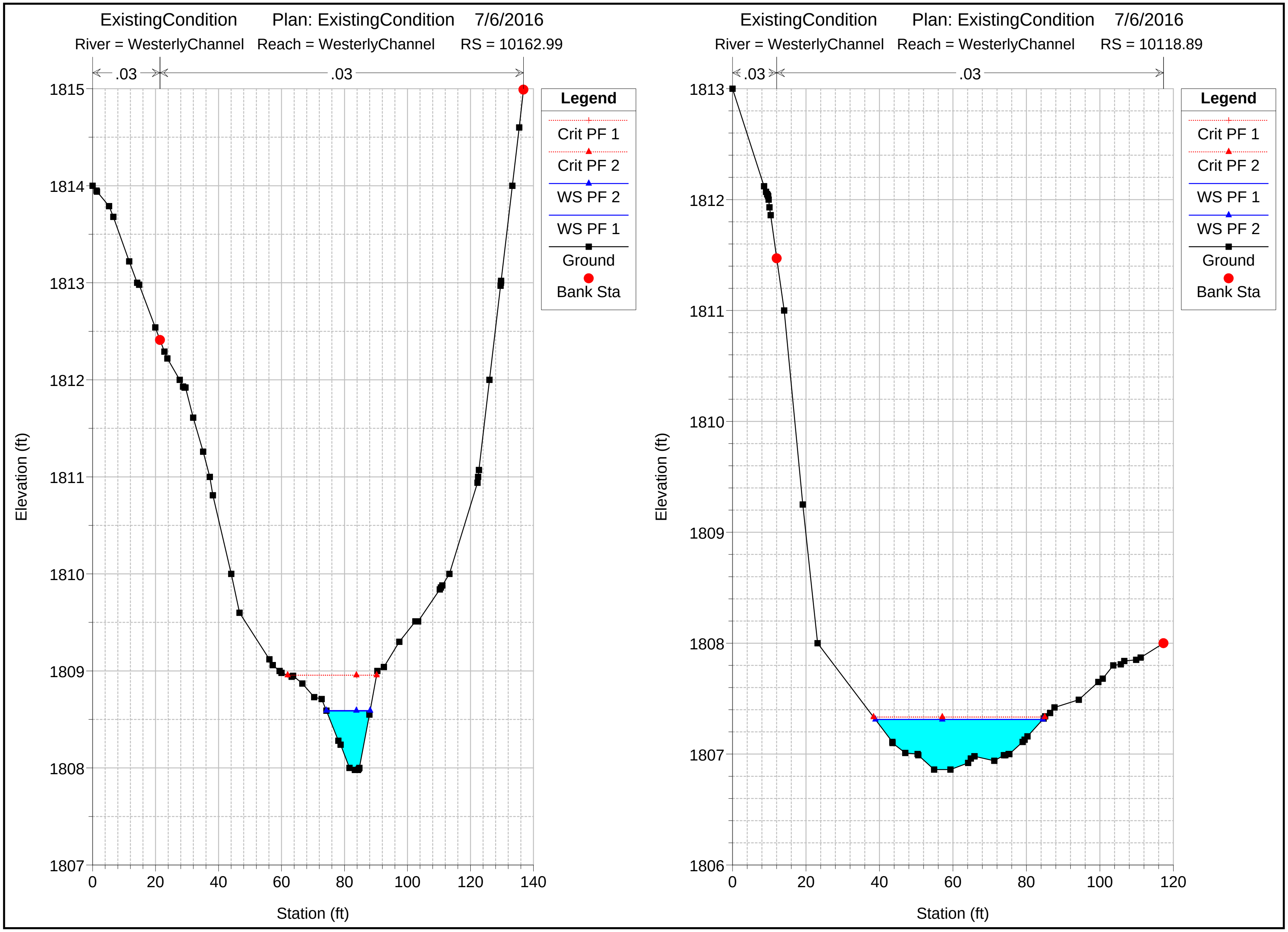


Packet Pg. 3444

4.ae


ExistingCondition Plan: ExistingCondition 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10266.07 Culv
.03
Legend
WS PF 1
Crit PF 1
Crit PF 2
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)


ExistingCondition Plan: ExistingCondition 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10209.63
.03
Legend
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)



Packet Pg. 3446

4.ae

APPENDIX H.2: POST-PROJECT CONDITION HEC-RAS CALCULATIONS

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX      XX      XXXX
X     X  X        X    X       X   X    X  X    X
X     X  X        X            X   X   X    X   X
XXXXXXX  XXXX     X       XXX  XXXX    XXXXXX    XXXX
X     X  X        X            X  X    X    X        X
X     X  X        X    X       X   X   X    X        X
X     X  XXXXXX    XXXX        X    X  X    X   XXXXX
```

PROJECT DATA
Project Title: Post-Project
Project File : Post-Project.prj
Run Date and Time: 7/6/2016 3:58:12 PM

Project in English units

Project Description:
5.8HEC-RAS Project and Geometry created by SmartDraft

PLAN DATA

Plan Title: Post-Project
Plan File : o:\150.06.14\Engineering\HEC-RAS\HEC-RAS Models\HEC-RAS Models-WSPG DS WSE\Post-Project Condition\Post-Project.p02

Geometry Title: Post-Project
Geometry File : o:\150.06.14\Engineering\HEC-RAS\HEC-RAS Models\HEC-RAS Models-WSPG DS WSE\Post-Project Condition\Post-Project.g03

Flow Title   : Post-Project
Flow File   : o:\150.06.14\Engineering\HEC-RAS\HEC-RAS Models\HEC-RAS Models-WSPG DS WSE\Post-Project Condition\Post-Project.f02

Plan Summary Information:
```
Number of:  Cross Sections =   22    Multiple Openings  =    0
            Culverts       =    2    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0
```

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: Post-Project
Flow File : o:\150.06.14\Engineering\HEC-RAS\HEC-RAS Models\HEC-RAS Models-WSPG DS WSE\Post-Project Condition\Post-Project.f02

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2
MainChannel	MainChannel	2687.17	151.6	151.6
MainChannel	MainChannel	2494.33	151.6	150.5
MainChannel-Junc	MainChannel-JX	2064.94	256.5	256.5
WesterlyChannel	WesterlyChannel	10639.81	87.2	87.2
WesterlyChannel	WesterlyChannel	10322.51	87.2	46
WesterlyChannel	WesterlyChannel	10209.63	46	46

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
MainChannel	MainChannel	PF 1	Normal S = 0.0353	
MainChannel-Junc	MainChannel-JX	PF 1		Known WS = 1778.96
WesterlyChannel	WesterlyChannel	PF 1	Normal S = 0.0292	

GEOMETRY DATA

Geometry Title: Post-Project
Geometry File : o:\150.06.14\Engineering\HEC-RAS\HEC-RAS Models\HEC-RAS Models-WSPG DS WSE\Post-Project Condition\Post-Project.g03

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
MainChannel	MainChannel		JS1
MainChannel-Junc	MainChannel-JX	JS1	
WesterlyChannel	WesterlyChannel		JS1

JUNCTION INFORMATION

Name: JS1
Description:
Energy computation Method

Length across Junction			Tributary			
River	Reach		River	Reach	Length	Angle
MainChannel	MainChannel	to	MainChannel-Junc	MainChannel-JX	160.16	0
WesterlyChannel	WesterlyChannel	to	MainChannel-Junc	MainChannel-JX	0	0

CROSS SECTION

RIVER: MainChannel
REACH: MainChannel   RS: 2687.17

INPUT
Description:
Station Elevation Data   num=   144

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1820	7.3	1819.54	16.41	1819	40.67	1818.11	42.44	1818.06
43.24	1818.05	43.79	1818	44	1818	44.09	1818	44.92	1818
52.68	1817.99	53.96	1817.99	59.39	1817.98	61.17	1817.98	63.53	1817.99
64.43	1817.99	72.16	1817.86	80.75	1817.92	83.16	1817.94	86.76	1817.88
89.87	1818	94.73	1818.31	99.01	1818.67	100.57	1818.79	101.69	1818.85
106.35	1818.98	106.4	1818.99	106.56	1819	106.75	1819.07	109.71	1820
110.36	1820.29	112.22	1821	112.4	1821.07	113.51	1821.34	115.36	1821.61
116.43	1821.77	117.02	1821.8	119.8	1821.88	121.02	1822	123.35	1822.06
123.53	1822.06	125.84	1822.03	127.53	1822.05	128.28	1822.07	130.81	1822.16
135.87	1822.34	136.79	1822.34	140.03	1822.28	144.26	1822.14	145.28	1822.11
148.08	1822	152.09	1821.76	152.57	1821.76	153.99	1821.73	155.03	1821.75
156.85	1821.82	159.83	1822	161.16	1822.08	161.44	1822.08	163.76	1822.14
166.28	1822.08	168.35	1822.01	168.78	1822	169.17	1821.98	169.24	1821.98
169.38	1821.97	169.67	1821.96	181.12	1821	183.64	1820.02	183.71	1820
184.52	1819.77	187.16	1819	187.34	1818.94	187.58	1818.89	190.72	1818
191.46	1818	191.59	1818	192.51	1818	193.18	1818	194.22	1818
195.24	1818	195.5	1818	196.36	1818.13	196.7	1818.23	198.64	1819
199.01	1819.15	200.86	1820	201.82	1820.07	202.56	1820.09	205.58	1820.25
206.48	1820.41	206.6	1820.41	208.63	1820.46	210.23	1820.39	211.9	1820.35
213.63	1820	216.97	1819.3	218.29	1819	224.61	1818.97	228.94	1818.95
231.33	1818.96	233.24	1818.96	235.58	1818.97	238.96	1818.98	239.36	1818.98

242.18	1818.99	242.83	1818.99	244	1818.99	244.29	1819	245.46	1819
245.78	1819	246.18	1818.99	248.32	1818.99	248.7	1819	249.99	1819
250.67	1818.99	250.7	1818.99	251.84	1819	254.08	1819.05	254.47	1819.05
255.34	1819.08	256	1819.08	260.96	1819.24	263.14	1819.24	265.88	1819.32
288.35	1819.74	291.3	1819.74	294.39	1819.75	297.83	1819.77	303.26	1819.84
305.91	1819.87	313.74	1820	314.68	1820.74	314.91	1821	316.06	1821.89
316.17	1822	317.08	1822.66	317.55	1823	319.78	1823.71	320.63	1823.98
320.7	1824	321.09	1824.04	330.39	1824.94	331.07	1825		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	130.81	.03	206.6	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
130.81	206.6	86.28	82.95	85.76	.1	.3

CROSS SECTION

RIVER: MainChannel
REACH: MainChannel RS: 2604.22

INPUT
Description:
Station Elevation Data num= 143

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1826	.94	1825.6	2.47	1825	4.27	1824.48	5.76	1824
15.8	1821.71	18.85	1821	23.1	1820.34	24.94	1820	26.8	1819.21
27.21	1819.03	27.28	1819	27.44	1818.93	29.58	1818	31.64	1817.44
33.4	1817	33.45	1817	34.2	1816.99	34.38	1816.99	34.81	1816.99
35.73	1816.99	41.2	1816.9	44.1	1816.86	59.48	1816.27	62.79	1816.22
65.14	1816.18	67.54	1816.14	71.52	1816.06	73.83	1816.02	74.74	1816.03
75.53	1816	77.28	1815.99	83.95	1815.99	88.06	1815.99	88.56	1815.99
90.7	1815.98	91.98	1815.98	94.33	1815.98	95.19	1815.98	103.74	1816
106.63	1816.89	106.96	1817	107.69	1817.01	107.99	1817.02	109.16	1817.03
110.26	1817.02	110.73	1817.01	111.55	1817.01	112.79	1817.02	113.71	1817.03
114.84	1817.04	115.09	1817.04	117.46	1817.01	118.57	1817.01	118.84	1817.04
119.93	1817.18	120.51	1817.33	120.88	1817.38	123.03	1817.27	123.56	1817.24
124.35	1817.31	127.04	1817.83	127.3	1817.89	127.66	1818	127.71	1818
127.74	1818	127.81	1818.01	129.61	1818.32	133.65	1819	134.09	1819
134.44	1818.92	137.22	1818	139.29	1817.32	140.26	1817	143.23	1816.01
143.26	1816	143.52	1815.99	145.64	1815.94	146.18	1815.95	146.59	1815.97
146.87	1815.96	147.27	1815.96	148.89	1815.71	150.48	1815.54	152.53	1815.35
154.93	1815	156.25	1814.84	160.74	1814.29	161.76	1814.16	163.15	1814
164.41	1814	164.83	1814	165.56	1814	165.95	1814	169.04	1814.33
171.41	1814.61	174.43	1814.97	174.78	1814.97	175.87	1815	180.88	1815.41
184.09	1815.67	186.67	1815.94	189.12	1815.99	189.35	1816	189.55	1816.02
189.69	1816.03	189.72	1816.03	192.07	1816.46	194.97	1817	195.55	1817.1
196.83	1817.37	199.47	1817.93	199.76	1818	200.17	1818.1	200.23	1818.11
201.97	1818.48	204.38	1819	207.87	1819.25	209.53	1819.38	211.15	1819.53

218.41	1820	221.28	1820.01	226.66	1820.01	231.21	1820.01	235.43	1820.01
235.83	1820.01	237.15	1820.01	237.58	1820.01	239.1	1820.01	243.75	1820.02
245.47	1820.02	250.15	1820.02	257.38	1820.03	265.18	1820.02	270.51	1820.02
270.77	1820.02	271.02	1820.02	285.32	1821.47	297.06	1822.65	300.49	1823
300.76	1823.11	301.24	1823.37	302.46	1824				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	107.69	.03	200.17	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
107.69	200.17	119.35	109.89	103.93	.1	.3

CROSS SECTION

RIVER: MainChannel
REACH: MainChannel RS: 2494.33

INPUT
Description:
Station Elevation Data num= 112

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1821	2.8	1820.59	3.66	1820.48	4.27	1820.44	5.9	1820.4
12.75	1820.57	17.61	1820.53	18.35	1820.51	19.19	1820.48	22.37	1820.29
23.46	1820.26	25.21	1820.16	26.42	1820.11	26.59	1820.1	29.33	1820.04
30.26	1820	30.93	1819.97	31.19	1819.96	31.85	1819.93	39.43	1819.55
40.86	1819.46	46.83	1819.07	47.53	1819.01	47.79	1819	49.09	1818.98
58.44	1818.15	59.48	1818.07	60.86	1818	61.15	1817.97	61.46	1817.97
68.91	1817.57	69.21	1817.56	70.16	1817.54	70.97	1817.52	71.73	1817.5
71.83	1817.5	75.02	1817.38	77.49	1817.44	78.05	1817.43	78.3	1817.42
84.17	1817.21	84.65	1817.18	86.61	1817.03	86.69	1817.02	86.94	1817
89.89	1816.69	90.82	1816.58	93.34	1816.33	94.9	1816.15	95.41	1816.11
95.6	1816.1	97.15	1816	98.2	1815.92	98.61	1815.89	101.46	1815.75
111.23	1815.2	112.56	1815.04	112.59	1815.03	113.3	1815	113.31	1815
116.42	1814	118.1	1813.13	118.44	1813	118.71	1812.96	120.52	1812.76
121.04	1812.76	123.11	1813	123.74	1813.15	124.34	1813.1	124.34	1811.44
136.5	1811.31	136.5	1812.7	137.25	1812.85	137.7	1813	138.55	1813.14
141.01	1813.3	141.71	1813.44	143.15	1814	146.49	1814.83	147.23	1815
147.52	1815.07	149.96	1815.66	150.81	1815.87	151.27	1816	151.59	1816.04
156.82	1816.74	158.63	1816.97	158.88	1817	159.91	1817.08	160.24	1817.1
162.94	1817.2	166.32	1817.38	168.38	1817.47	175.08	1817.77	179.78	1818
179.86	1818	180.67	1818.04	181.35	1818.06	183.37	1818.13	186.5	1818.25
189.56	1818.36	193.1	1818.5	207.24	1819	211.54	1819.24	213.65	1819.25
216.07	1819.35	222.58	1819.45	236.8	1819.76	238.53	1819.81	245.24	1820
249.98	1820.37	256.43	1821						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	78.3	.03	159.91	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
78.3	159.91	101.83	102.12	158.09	.1	.3

CULVERT

RIVER: MainChannel
REACH: MainChannel RS: 2443.27

INPUT
Description:
Distance from Upstream XS = 5.65
Deck/Roadway Width = 60.11
Weir Coefficient = 2.8
Upstream Deck/Roadway Coordinates
num= 9

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1820.2	1805	12.97	1820	1805	51.21	1819	1805
80.7	1818.6	1805	147.588	1818.5	1805	163.31	1819	1805
212.7	1820	1805	241.95	1821	1805	256.43	1821	1805

Upstream Bridge Cross Section Data
Station Elevation Data num= 112

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1821	2.8	1820.59	3.66	1820.48	4.27	1820.44	5.9	1820.4
12.75	1820.57	17.61	1820.53	18.35	1820.51	19.19	1820.48	22.37	1820.29
23.46	1820.26	25.21	1820.16	26.42	1820.11	26.59	1820.1	29.33	1820.04
30.26	1820	30.93	1819.97	31.19	1819.96	31.85	1819.93	39.43	1819.55
40.86	1819.46	46.83	1819.07	47.53	1819.01	47.79	1819	49.09	1818.98
58.44	1818.15	59.48	1818.07	60.86	1818	61.15	1817.97	61.46	1817.97
68.91	1817.57	69.21	1817.56	70.16	1817.54	70.97	1817.52	71.73	1817.5
71.83	1817.5	75.02	1817.38	77.49	1817.44	78.05	1817.43	78.3	1817.42
84.17	1817.21	84.65	1817.18	86.61	1817.03	86.69	1817.02	86.94	1817
89.89	1816.69	90.82	1816.58	93.34	1816.33	94.9	1816.15	95.41	1816.11
95.6	1816.1	97.15	1816	98.2	1815.92	98.61	1815.89	101.46	1815.75
111.23	1815.2	112.56	1815.04	112.59	1815.03	113.3	1815	113.31	1815
116.42	1814	118.1	1813.13	118.44	1813	118.71	1812.96	120.52	1812.76
121.04	1812.76	123.11	1813	123.74	1813.15	124.34	1813.1	124.34	1811.44
136.5	1811.31	136.5	1812.7	137.25	1812.85	137.7	1813	138.55	1813.14
141.01	1813.3	141.71	1813.44	143.15	1814	146.49	1814.83	147.23	1815
147.52	1815.07	149.96	1815.66	150.81	1815.87	151.27	1816	151.59	1816.04
156.82	1816.74	158.63	1816.97	158.88	1817	159.91	1817.08	160.24	1817.1
162.94	1817.2	166.32	1817.38	168.38	1817.47	175.08	1817.77	179.78	1818
179.86	1818	180.67	1818.04	181.35	1818.06	183.37	1818.13	186.5	1818.25
189.56	1818.36	193.1	1818.5	207.24	1819	211.54	1819.24	213.65	1819.25
216.07	1819.35	222.58	1819.45	236.8	1819.76	238.53	1819.81	245.24	1820
249.98	1820.37	256.43	1821						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	78.3	.03	159.91	.03

Bank Sta: Left	Right	Coeff Contr.	Expan.
78.3	159.91	.1	.3

Downstream Deck/Roadway Coordinates
num= 11

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1820.2	1805	11.48	1820	1805	50.08	1819	1805
79.61	1818.6	1805	146.45	1818.5	1805	167.19	1819	1805
211.24	1820	1805	240.97	1821	1805	263.66	1822	1805
283.06	1823	1805	287.87	1823	1805			

Downstream Bridge Cross Section Data
Station Elevation Data num= 134

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1820	3.35	1819.53	6.51	1819	17.78	1818.14	19.21	1818
21.23	1817.86	34.56	1817	35.54	1816.98	37.97	1816.97	45.21	1816.94
50.5	1816.94	55.61	1816.94	63.46	1816.97	65.9	1816.98	67.79	1817
69.03	1817.06	69.92	1817.08	71.45	1817.02	71.85	1817	72.16	1816.87
74.02	1816	75.11	1815.35	75.66	1815	77.15	1814.06	77.24	1814
78.79	1813.06	78.88	1813	79.19	1812.83	79.32	1812.73	80.56	1812
81.55	1811.81	83.83	1811.69	83.86	1811.68	85.69	1811.64	86.21	1811.61
91.34	1811.39	94.71	1811.31	95.93	1811.22	96.19	1811.23	97.19	1811.3
99.01	1811.39	101.68	1811.34	103.22	1811.33	105.04	1811.2	107.06	1811
109.13	1810.85	110.87	1810.54	112.96	1810.21	114.16	1810	115.06	1809.85
117.71	1809.5	117.98	1809.46	118.7	1809.39	128.89	1809.23	132.17	1809
132.27	1809	132.49	1809	132.6	1809	132.67	1809	132.76	1809
134.23	1808.85	135.66	1808.72	136.44	1808.61	140.03	1808.22	140.55	1808.26
141.49	1808.41	144.49	1809	145.72	1809.3	150.19	1810	150.2	1810
152.03	1810.25	152.25	1810.25	152.46	1810.25	152.78	1810.26	156.12	1810.71
158.48	1810.79	160.09	1810.8	160.22	1810.8	171.56	1810.72	172.06	1810.71
174.87	1814.16	178.7	1814.4	183.06	1814.73	192.15	1815.32	195.83	1815.94
201.42	1816	202.44	1816.04	203.13	1816.06	210.35	1816.31	212.39	1816
212.81	1815.92	213.15	1815.88	213.16	1815.88	213.21	1815.88	213.29	1815.88
218.03	1815.94	218.79	1815.94	220.14	1815.94	220.26	1815.94	220.8	1815.94
221.77	1815.95	223.66	1815.95	223.95	1815.95	225.7	1815.95	228.07	1815.95
228.13	1815.95	232.31	1815.96	233.21	1815.96	235.06	1815.96	236.19	1815.96
242.94	1815.97	243.55	1815.97	245.69	1815.98	254.19	1815.98	266.47	1815.99
269.57	1816	270.34	1816	271.78	1816	271.89	1816	271.96	1816
275.07	1816.35	277.79	1816.69	278.51	1816.76	279.56	1816.83	279.64	1816.84
279.66	1816.84	280.15	1817	280.55	1817.15	283.07	1818	284.48	1818.6
285.48	1819	286.98	1819.6	287.79	1820	287.87	1820.03		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	83.83	.03	279.64	.03

Bank Sta: Left Right Coeff Contr. Expan.

```
         83.83  279.64             .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular      5
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
               6.23   82.07     .024     .024        0                   .5                1
Upstream   Elevation =  1807.71
           Centerline Station =  130.32
Downstream Elevation =  1812.05
           Centerline Station =  136.21

CULVERT OUTPUT  Profile #PF 1  Culv Group:  Culvert #1

  Q Culv Group (cfs)        150.50    Culv Full Len (ft)         70.00
  # Barrels                      1    Culv Vel US (ft/s)          7.66
  Q Barrel (cfs)            150.50    Culv Vel DS (ft/s)         10.20
  E.G. US. (ft)            1818.58    Culv Inv El Up (ft)      1807.71
  W.S. US. (ft)            1818.57    Culv Inv El Dn (ft)      1812.05
  E.G. DS (ft)             1810.37    Culv Frctn Ls (ft)          0.94
  W.S. DS (ft)             1809.94    Culv Exit Loss (ft)         6.81
  Delta EG (ft)               8.21    Culv Entr Loss (ft)         0.46
  Delta WS (ft)               8.63    Q Weir (cfs)                1.10
  E.G. IC (ft)             1813.58    Weir Sta Lft (ft)          96.79
  E.G. OC (ft)             1818.58    Weir Sta Rgt (ft)         149.98
  Culvert Control           Outlet    Weir Submerg                0.00
  Culv WS Inlet (ft)       1812.71    Weir Max Depth (ft)         0.08
  Culv WS Outlet (ft)      1815.57    Weir Avg Depth (ft)         0.04
  Culv Nml Depth (ft)                 Weir Flow Area (sq ft)      2.02
  Culv Crt Depth (ft)         3.52    Min El Weir Flow (ft)    1818.51


Warning: During the culvert inlet control computations, the program could not balance the culvert/weir flow.  The reported
inlet
         energy grade answer may not be valid.

CULVERT OUTPUT  Profile #PF 2  Culv Group:  Culvert #1
```

Q Culv Group (cfs)	149.89	Culv Full Len (ft)	70.00
# Barrels	1	Culv Vel US (ft/s)	7.63
Q Barrel (cfs)	149.89	Culv Vel DS (ft/s)	10.18
E.G. US. (ft)	1818.56	Culv Inv El Up (ft)	1807.71
W.S. US. (ft)	1818.56	Culv Inv El Dn (ft)	1812.05
E.G. DS (ft)	1810.36	Culv Frctn Ls (ft)	0.94
W.S. DS (ft)	1809.94	Culv Exit Loss (ft)	6.81
Delta EG (ft)	8.20	Culv Entr Loss (ft)	0.45
Delta WS (ft)	8.62	Q Weir (cfs)	0.61
E.G. IC (ft)	1813.55	Weir Sta Lft (ft)	107.65
E.G. OC (ft)	1818.56	Weir Sta Rgt (ft)	149.47
Culvert Control	Outlet	Weir Submerg	0.00
Culv WS Inlet (ft)	1812.71	Weir Max Depth (ft)	0.06
Culv WS Outlet (ft)	1815.56	Weir Avg Depth (ft)	0.03
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	1.25
Culv Crt Depth (ft)	3.51	Min El Weir Flow (ft)	1818.51

Warning: During the culvert inlet control computations, the program could not balance the culvert/weir flow. The reported inlet
energy grade answer may not be valid.

CROSS SECTION

RIVER: MainChannel
REACH: MainChannel RS: 2392.21

INPUT
Description:
Station Elevation Data num= 134

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1820	3.35	1819.53	6.51	1819	17.78	1818.14	19.21	1818
21.23	1817.86	34.56	1817	35.54	1816.98	37.97	1816.97	45.21	1816.94
50.5	1816.94	55.61	1816.94	63.46	1816.97	65.9	1816.98	67.79	1817
69.03	1817.06	69.92	1817.08	71.45	1817.02	71.85	1817	72.16	1816.87
74.02	1816	75.11	1815.35	75.66	1815	77.15	1814.06	77.24	1814
78.79	1813.06	78.88	1813	79.19	1812.83	79.32	1812.73	80.56	1812
81.55	1811.81	83.83	1811.69	83.86	1811.68	85.69	1811.64	86.21	1811.61
91.34	1811.39	94.71	1811.31	95.93	1811.22	96.19	1811.23	97.19	1811.3
99.01	1811.39	101.68	1811.34	103.22	1811.33	105.04	1811.2	107.06	1811
109.13	1810.85	110.87	1810.54	112.96	1810.21	114.16	1810	115.06	1809.85
117.71	1809.5	117.98	1809.46	118.7	1809.39	128.89	1809.23	132.17	1809
132.27	1809	132.49	1809	132.6	1809	132.67	1809	132.76	1809
134.23	1808.85	135.66	1808.72	136.44	1808.61	140.03	1808.22	140.55	1808.26
141.49	1808.41	144.49	1809	145.72	1809.3	150.19	1810	150.2	1810
152.03	1810.25	152.25	1810.25	152.46	1810.25	152.78	1810.26	156.12	1810.71
158.48	1810.79	160.09	1810.8	160.22	1810.8	171.56	1810.72	172.06	1810.71
174.87	1814.16	178.7	1814.4	183.06	1814.73	192.15	1815.32	195.83	1815.94
201.42	1816	202.44	1816.04	203.13	1816.06	210.35	1816.31	212.39	1816

212.81	1815.92	213.15	1815.88	213.16	1815.88	213.21	1815.88	213.29	1815.88
218.03	1815.94	218.79	1815.94	220.14	1815.94	220.26	1815.94	220.8	1815.94
221.77	1815.95	223.66	1815.95	223.95	1815.95	225.7	1815.95	228.07	1815.95
228.13	1815.95	232.31	1815.96	233.21	1815.96	235.06	1815.96	236.19	1815.96
242.94	1815.97	243.55	1815.97	245.69	1815.98	254.19	1815.98	266.47	1815.99
269.57	1816	270.34	1816	271.78	1816	271.89	1816	271.96	1816
275.07	1816.35	277.79	1816.69	278.51	1816.76	279.56	1816.83	279.64	1816.84
279.66	1816.84	280.15	1817	280.55	1817.15	283.07	1818	284.48	1818.6
285.48	1819	286.98	1819.6	287.79	1820	287.87	1820.03		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	83.83	.03	279.64	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
83.83	279.64	91.84	87.37	77.44	.1	.3

CROSS SECTION

RIVER: MainChannel
REACH: MainChannel RS: 2304.84

INPUT
Description:
Station Elevation Data num= 96

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1820	2.22	1819.58	5.96	1819	11.98	1818.53	18.65	1818
29.78	1817.6	37.32	1817.2	40.95	1817	41.98	1816.7	44.46	1816
45.48	1815.17	45.7	1815	46.37	1814.47	46.96	1814	47.14	1813.87
48.24	1813	48.76	1812.57	49.46	1812	50.31	1811.32	50.73	1811
51.04	1810.76	51.99	1810	53.13	1809.09	53.24	1809	54.7	1808.83
55.07	1808.79	61.92	1808	70.66	1807.44	77.21	1807	78.51	1806.97
80.43	1806.95	81.79	1806.95	84.16	1806.97	85.83	1806.98	86.78	1806.98
89.03	1807	93.55	1807.03	96.24	1807.02	96.85	1807.02	97.04	1807
101.77	1806.53	102.07	1806.51	105.42	1806.46	110.35	1806.75	111.88	1807
118.78	1807.86	120.53	1808	122.41	1808.1	122.81	1808.11	131.66	1808.49
134.1	1808.53	137.56	1808.62	140.38	1808.62	141.04	1808.59	145.77	1808.73
146.14	1808.72	146.53	1808.72	147.52	1808.69	150.26	1808.7	156	1808.69
158.38	1808.73	161.15	1808.81	162.66	1808.83	163.6	1808.85	168.98	1808.94
169.36	1808.96	169.75	1808.98	169.79	1808.98	170.94	1809	170.95	1809
170.96	1809	173.95	1809.2	174.1	1809.21	174.42	1809.28	179.34	1810.04
182.83	1809.63	185.72	1809.05	186.14	1809	187.21	1808.97	189.85	1808.92
190.56	1808.91	190.78	1808.91	190.95	1808.92	193.24	1809	212.91	1812.07
215.73	1812.13	218.74	1812.37	222.43	1812.83	222.72	1812.87	234.32	1816.62
236.46	1816.55	236.94	1816.55	238.04	1817.31	241.87	1819	242.34	1819.37
243.24	1820								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
       0     .03   55.07     .03  243.24     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
         55.07  243.24             85.72   79.73   75.07              .1        .3

CROSS SECTION


RIVER: MainChannel
REACH: MainChannel        RS: 2225.1

INPUT
Description:
Station Elevation Data    num=       64
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1812.01     .04    1812    1.84 1811.64    4.57    1811     9.1 1810.14
    9.87    1810   10.62 1809.87   15.49    1809   21.29 1808.09   21.89    1808
   22.75  1807.9      23 1807.87    25.1 1807.64   30.53    1807   37.36 1806.19
   39.06    1806    40.5 1805.73   44.65    1805   47.97 1804.92   51.05 1804.87
   52.15 1804.88   54.31 1804.91   55.04 1804.92   57.68 1804.94   58.64 1804.96
   60.47    1805   67.56 1805.43   75.99    1806   78.12 1806.09   78.27 1806.09
   78.44 1806.09   90.23 1806.39   97.73 1806.42  102.08  1806.4   107.8 1806.31
  110.35 1806.31  113.83 1806.27  116.51 1806.28  118.11 1806.27  124.79  1806.3
  128.85 1806.29  135.38 1806.32   138.1 1806.33  143.51 1806.35   146.9 1806.39
  148.73 1806.43  149.66 1806.44  150.14 1806.45  150.66 1806.46  163.09 1806.84
  165.05 1806.91  166.43 1806.96   166.9 1806.97  167.52    1807  169.64 1807.83
  170.19    1808  170.66 1808.17   172.9    1809  174.63  1809.7  175.45    1810
     177 1810.59  178.22    1811  180.82 1811.84  181.55    1812

Manning's n Values        num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03   22.75     .03  166.43     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
         22.75  166.43            150.23  160.16  150.47              .1        .3

CROSS SECTION


RIVER: MainChannel-Junc
REACH: MainChannel-JX     RS: 2064.94

INPUT
Description:
Station Elevation Data    num=       64
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0 1809.99    1.96 1809.63    5.14    1809    9.46 1808.37   12.18    1808
   15.88 1807.42   18.88    1807    25.1 1806.12    25.9    1806    26.2 1805.95
   32.85    1805   33.94 1804.88    34.4 1804.83    37.2 1804.48   40.87    1804
   48.68 1803.25   51.65    1803   68.62 1802.06    69.7    1802   85.68 1801.97
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    93.8 1801.96   94.63 1801.95   94.98 1801.95   95.85 1801.95   108.7 1801.98
  110.23 1801.98  112.81 1801.98   118.4    1802  118.55    1802  118.61    1802
  118.64    1802   118.7    1802  119.05 1802.06  121.04 1802.44  124.05    1803
  124.06    1803  124.39    1803  127.09 1803.03  134.91 1803.11  157.39 1803.69
  160.55 1803.74  173.81 1803.98  175.44 1803.98  175.82 1803.98  175.97 1803.98
  177.34 1803.99   178.4    1804  179.14 1804.03  182.67 1804.29  184.88 1804.45
  189.02 1804.75  189.92 1804.82  192.09    1805   203.2 1805.53  212.86    1806
  214.66 1806.18  223.05    1807  228.03 1808.59  228.52 1808.77  229.32    1809
  231.81 1809.66  232.01 1809.69  232.23 1809.73  233.43    1810

Manning's n Values        num=       3
     Sta    n Val     Sta    n Val     Sta    n Val
       0      .03    34.4      .03  184.88      .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           34.4  184.88           155.05   151.4  154.55              .1       .3

CROSS SECTION


RIVER: MainChannel-Junc
REACH: MainChannel-JX     RS: 1913.54

INPUT
Description:
Station Elevation Data    num=      73
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
       0  1808.99    5.92  1808.47   11.82     1808    15.4   1807.7   23.77     1807
   24.64  1806.89   28.62     1806   28.68  1805.99   32.77     1805   34.59  1804.56
   36.96     1804   38.31  1803.73    41.4     1803   45.66  1802.39   47.67  1802.08
   48.16     1802   51.34  1801.57   56.52     1801    62.5  1800.35   65.65     1800
   77.66  1799.25   80.66  1799.13   84.31     1799   84.47     1799    84.5     1799
   85.67     1799   86.09  1798.99   87.27  1798.99   88.16  1798.99   88.87  1798.99
   94.39  1798.93  101.84  1798.91  103.02   1798.9  105.22  1798.88  114.64  1798.86
  125.47  1798.92  132.26  1798.98  133.81     1799  133.91     1799     136  1799.01
  140.85  1799.12  148.05  1799.26  163.54  1799.63  174.23  1799.85  177.48  1799.89
  177.61  1799.89  178.85     1800  182.93  1800.48  187.58     1801  193.71  1801.88
  194.58     1802  198.66   1802.7  200.15  1802.97  200.31     1803  203.01  1803.55
  204.19  1803.77  205.71     1804  205.85  1804.01  205.95  1804.01  206.26  1804.05
  207.85  1804.23  210.64     1805  212.74  1805.57  214.71     1806  216.54  1806.56
  218.63     1807  221.45   1807.2  224.75  1807.39  232.26     1808  232.74     1808
  253.94  1808.77  256.92  1808.87  260.79     1809

Manning's n Values        num=       3
     Sta    n Val     Sta    n Val     Sta    n Val
       0      .03   47.67      .03  200.15      .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          47.67  200.15           150.29  151.23  152.75              .1       .3
```

CROSS SECTION

RIVER: MainChannel-Junc
REACH: MainChannel-JX RS: 1762.31

INPUT
Description:
Station Elevation Data num= 96

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1805	2.29	1804.36	3.5	1804	5.12	1803.53	6.98	1803
9.37	1802.5	11.84	1802	13.98	1801.57	16.62	1801	19.78	1800.34
21.44	1800	24.71	1799.52	27.93	1799	32.25	1798.67	34	1798.55
42.13	1798	47.91	1797.51	54.48	1797	60.59	1796.4	63.64	1796.13
64.13	1796.09	65.44	1796	65.74	1796	66.64	1795.99	66.73	1795.99
67.51	1795.99	68.05	1795.98	73.55	1795.88	85.49	1795.9	86	1795.9
86.21	1795.9	86.5	1795.89	86.88	1795.88	88.67	1795.87	90.1	1795.81
91.85	1795.78	96.06	1795.59	97.68	1795.53	100.43	1795.41	108.98	1795
110.93	1794.97	111.19	1794.97	111.49	1794.97	115.23	1794.97	120.52	1795
123.9	1795.03	125.97	1795.03	129.03	1795.06	134.1	1795.01	134.86	1795
137.84	1794.79	148.28	1794	148.34	1793.99	148.54	1793.99	148.95	1793.99
149.27	1794	150.41	1794.29	153.25	1795	155.41	1795.23	168.31	1795.78
171.31	1795.94	171.86	1795.96	173.95	1796	177.96	1796.07	181.02	1796.1
189.3	1796.14	189.77	1796.15	194.86	1796.16	195.64	1796.17	196.11	1796.17
197.12	1796.18	197.81	1796.19	198.35	1796.2	198.79	1796.21	201.72	1796.26
206.88	1796.37	212.12	1796.55	223.55	1796.95	224.9	1797	224.94	1797
225.74	1797.08	234.91	1798	239.2	1798.51	243.15	1799	244.3	1799.23
248.49	1800	252.23	1800.59	254.72	1801	256.66	1801.27	261.93	1802
263.41	1802.33	266.72	1803	270.06	1803.81	270.91	1804	271.58	1804.15
274.95	1804.98								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	34	.03	223.55	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
34	223.55	153.08	151.7	150.74	.1	.3

CROSS SECTION

RIVER: MainChannel-Junc
REACH: MainChannel-JX RS: 1610.6

INPUT
Description:
Station Elevation Data num= 54

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1799	4.25	1798.12	4.88	1798	5.97	1797.77	9.84	1797
13.01	1796.32	14.43	1796	16.4	1795.61	19.36	1795	20.09	1794.98

25.05	1794.53	27.72	1794.32	31.07	1794	45.37	1793.04	46.02	1793
46.8	1792.99	50.36	1792.85	53.34	1792.73	58.79	1792.54	62.53	1792.44
65.11	1792.38	66.42	1792.35	71.58	1792.29	72.82	1792.28	84.86	1792.16
90.63	1792.04	91.71	1792.01	93.21	1792	103.92	1791.43	106.49	1791.31
108.14	1791.24	108.96	1791.19	110.85	1791.13	111.41	1791.16	112.34	1791.22
115.89	1792	124.67	1792.33	137.39	1792.78	139.99	1792.86	141.3	1792.88
142.27	1792.9	143.02	1792.91	143.58	1792.92	144.67	1793	148.69	1793.03
154.82	1793.06	156.46	1793.06	160.85	1793.11	174.83	1793.19	188.67	1793.63
194.95	1793.89	197.63	1794	218.32	1798.46	220.34	1799		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	50.36	.03	194.95	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
50.36	194.95	156.27	151.26	159.94	.1	.3

CROSS SECTION

RIVER: MainChannel-Junc
REACH: MainChannel-JX RS: 1459.34

INPUT
Description:
Station Elevation Data num= 94

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1800	3.81	1799.05	4	1799	7.68	1798.19	8.53	1798
11.43	1797.37	13.21	1797	15.51	1796.53	17.99	1796	20.6	1795.44
22.89	1795	24.68	1794.69	27.94	1794	29.01	1793.84	33.65	1793.52
38.6	1793	42.1	1792.71	51.81	1792	54.24	1791.85	55.05	1791.78
57.3	1791.61	62.33	1791.21	65.47	1791	70.88	1790.69	74.54	1790.58
78.12	1790.42	79.48	1790.38	80.7	1790.32	83.1	1790.19	86.21	1790
95.53	1789.62	99.54	1789.55	102.92	1789.53	106.27	1789.41	107.75	1789.37
108.34	1789.36	111.04	1789.28	120.19	1789.25	132.58	1789.02	133.3	1789
133.37	1789	133.39	1789	133.42	1789	133.56	1789	133.63	1789
133.69	1789	147.42	1789.25	156.28	1789.38	157.29	1789.42	158.56	1789.47
164.23	1789.42	164.92	1789.47	165.84	1789.47	167.85	1789.58	176.81	1789.93
177.82	1789.95	178.93	1790	181.27	1790.63	182.77	1791	185.44	1791.72
186.62	1792	187.96	1792.31	188.68	1792.48	190.48	1792.81	191.92	1793
203.44	1793.18	205.38	1793.31	206.87	1793.4	211.86	1793.54	214.01	1793.7
216.32	1793.82	217.64	1793.88	220.32	1794	221.26	1794	222.73	1794
222.76	1794	222.81	1794	223.27	1794.02	225.96	1794.03	230.37	1794.07
233.61	1794.1	234.93	1794	300.03	1794.88	304.98	1794.95	306.86	1794.96
308.8	1794.98	309.9	1795	309.98	1795	310.73	1795	311.04	1795
311.41	1795	311.42	1795	311.63	1795	311.91	1795		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	55.05	.03	187.96	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
55.05	187.96	158.18	150.13	150.13	.1	.3

CROSS SECTION

RIVER: MainChannel-Junc
REACH: MainChannel-JX   RS: 1309.22

INPUT
Description:
Station Elevation Data   num=   107

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1800	1.84	1799.23	2.4	1799	4.68	1798.07	4.83	1798
7.54	1797.04	7.63	1797	15.91	1796.01	15.97	1796	26.68	1795.39
31.72	1795.25	35.58	1795.1	37.84	1795	37.97	1795	39.56	1794.52
41.61	1794	44.13	1793.28	45	1793	45.36	1792.88	47.99	1792
49.39	1791.53	51.07	1791	53.94	1790.37	55.81	1790	65.01	1789.04
65.47	1789	79.48	1788.14	81.16	1788	95.19	1787.09	96.62	1787
99.79	1786.8	111.45	1786	117.7	1785.81	118.93	1785.78	121.13	1785.72
124.94	1785.62	136.25	1785.3	147.29	1785	150.63	1784.98	157.62	1784.83
171.13	1784.6	172.53	1784.59	174.59	1784.57	175.25	1784.55	180.18	1784.47
181.84	1784.46	183.42	1784.45	187.28	1784.48	193.61	1784.52	195.73	1784.57
203.15	1784.67	208.46	1784.82	208.91	1784.83	209.76	1784.84	210.48	1784.85
211.43	1784.85	216.08	1785	219.61	1785.19	224.82	1785.68	226.76	1785.84
228.28	1786	231.5	1786.4	235.42	1787	238.71	1787.89	239.17	1788
239.47	1788.07	242.88	1789	244.92	1789.09	245.63	1789.12	245.65	1789.12
265.74	1790.56	266.35	1790.5	269.69	1790.25	273.17	1790.04	273.68	1790.04
274.07	1790	274.15	1790	282.96	1790.1	283.93	1790.11	285.41	1790.14
286.17	1790.15	293.51	1790.32	295.79	1790.34	298.48	1790.38	304.78	1790.5
310.76	1790.62	319.49	1790.83	325.61	1790.99	326.88	1791	334.85	1791.55
341.24	1792	346.68	1792.87	347.49	1793	348.09	1793.14	351.8	1794
353.98	1794.54	355.94	1795	359.13	1795.77	359.93	1796	360.75	1796.23
363.78	1797	365.09	1797.37	367.35	1798	369.86	1798.73	370.87	1799
372.73	1799.38	376.24	1800						

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	65.47	.03	245.63	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
65.47	245.63	153.67	150.58	155.09	.1	.3

CROSS SECTION

RIVER: MainChannel-Junc
REACH: MainChannel-JX   RS: 1158.64

```
INPUT
Description:
Station Elevation Data    num=      89
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
       0     1794     4.71  1793.07     5.21     1793     6.88  1792.65    10.09     1792
   12.13  1791.54    14.53     1791    15.92  1790.68    19.18     1790    22.16  1789.35
    23.8     1789    27.15  1788.31    28.65     1788    29.97  1787.77     34.3     1787
   39.34  1786.54    46.04     1786    66.09  1785.12    68.75     1785    70.46   1784.9
   80.84  1784.28     85.5     1784    86.27  1783.96   105.84     1783   108.32  1782.89
  108.81  1782.87   118.59  1782.47   129.59  1782.17   130.87  1782.13   132.53  1782.09
  136.25     1782   144.77  1781.88   147.34  1781.84   157.68  1781.69   158.29  1781.68
   167.2  1781.57   173.88  1781.51   175.11   1781.5   176.54  1781.48   180.68  1781.45
  182.13  1781.44   183.54  1781.43   188.06  1781.41   188.67  1781.41   192.77  1781.39
  193.43   1781.4   196.76  1781.41   200.33  1781.43   207.11  1781.51   207.87  1781.51
  209.84  1781.54   212.06  1781.58   224.41  1781.84   226.36  1781.87   226.82  1781.88
  228.03  1781.89   229.01   1781.9   233.44     1782   240.76  1782.57   243.43     1783
   246.5  1783.63   248.32     1784   250.25   1784.3    254.4     1785   256.19  1785.31
  257.06  1785.46   257.59  1785.45   265.46  1785.65   270.44     1786   278.53  1786.31
  286.42  1787.47   294.04     1787    307.7  1787.84    310.6     1788   313.22  1788.31
  314.63  1788.47    316.4  1788.66   317.63  1788.78    319.7     1789   321.85  1789.38
  325.59     1790   328.19   1790.4   331.82     1791   334.55  1791.47   337.45     1792
  340.87  1792.62   342.92     1793   345.36  1793.46   348.22     1794

Manning's n Values        num=       3
     Sta    n Val      Sta    n Val      Sta    n Val
       0      .03    70.46      .03   256.19      .03

Bank Sta: Left    Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
         70.46   256.19            124.4   139.17  157.04             .1       .3

CROSS SECTION


RIVER: MainChannel-Junc
REACH: MainChannel-JX     RS: 1019.47

INPUT
Description:
Station Elevation Data    num=     102
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
       0  1785.01      .06     1785     7.91  1784.74    11.49  1784.64    11.81  1784.64
      19  1784.45       32  1784.11    35.54  1784.01    35.65  1784.01    35.76  1784.01
   36.34  1784.01    37.77  1784.01    39.45  1784.01    47.84     1784    49.54  1783.96
      50  1783.95    61.15  1783.77    69.51  1783.71    72.97  1783.75    75.08   1783.7
   78.93  1783.74    81.28  1783.68    82.91  1783.68    84.32  1783.66    88.02  1783.56
   89.22  1783.53    94.54   1783.2    95.02  1783.18    95.07  1783.18    97.77     1783
   99.95  1782.29   100.77     1782   102.26  1781.47   103.61     1781   105.99  1780.75
     107  1780.66   109.85  1780.37   115.26     1780   122.18  1779.75   123.12   1779.7
  135.46  1779.47   135.52  1779.45   135.61  1778.82   136.26  1774.34   140.02  1774.57
  142.62  1774.77    143.3   1774.8   144.01  1774.81    151.2  1774.76   153.16  1774.75
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155.52	1774.81	156.51	1774.92	156.94	1775	159.64	1775.67	160.69	1776
162.61	1776.67	163.56	1777	164.04	1777.12	164.95	1777.31	166.71	1777.45
167.83	1777.57	169.06	1778.9	169.2	1779	169.44	1779.08	172.47	1780
173.07	1780.28	173.64	1780.51	174.69	1781	176.43	1781.85	176.71	1782
176.79	1782.04	177.78	1782.52	178.78	1783	180.37	1783.5	186.44	1783.82
188	1783.87	190.24	1783.86	193.94	1783.82	222.09	1783.47	229.1	1783.38
232.16	1783.38	232.33	1783.38	235.3	1783.39	235.37	1783.39	239.06	1783.45
240.04	1783.47	255.34	1783.72	262.69	1784	266.78	1784.19	269.34	1784.2
275.72	1784.4	279.64	1784.53	282.21	1784.6	301.96	1784.99	302.41	1784.99
304.6	1784.99	305.89	1784.99	313.96	1784.99	314	1784.99	314.61	1784.99
314.92	1784.98	320.59	1784.87						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	95.07	.03	177.78	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
95.07	177.78	0	0	0	.1	.3

CROSS SECTION

RIVER: WesterlyChannel
REACH: WesterlyChannel RS: 10639.81

INPUT
Description:
Station Elevation Data num= 79

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1838	2.81	1837.81	5.83	1837.6	10.29	1837.3	14.63	1837
18.54	1836.63	24.72	1836	27.92	1835.68	33.01	1835	33.76	1834.9
39.9	1834	40.86	1833.86	46.98	1833	47.52	1832.93	47.95	1832.87
51.19	1832.35	53.97	1832	58.54	1831.39	61.49	1831	62.02	1830.93
62.37	1830.89	66.31	1830.47	71.86	1830	77.85	1829.52	81.04	1829.28
84.6	1829	88.82	1828.68	90.08	1828.55	91.26	1828.39	93.69	1828
94.42	1827.47	95.26	1827	96.45	1826.1	96.69	1826	96.92	1825.87
100.71	1825.79	101.67	1826	102.5	1826.16	103.85	1826.27	104.9	1826.34
108.4	1826.53	114.81	1826.93	115.36	1826.95	115.93	1827	125.5	1827.61
128.54	1828	131.49	1828.64	133.12	1828.91	133.71	1829	138.46	1829.84
139.55	1830	141.22	1830.13	148.2	1830.52	155.22	1831	159.02	1831.09
159.99	1831.11	160.98	1831.15	163.12	1831.24	164.19	1831.29	168.76	1831.43
170.97	1831.48	172.93	1831.59	176.7	1831.67	178.47	1831.8	180.38	1831.9
181.17	1831.93	183.87	1832	188.63	1832.17	190.31	1832.31	194.78	1832.68
201.73	1832.83	202.29	1832.85	203.16	1832.86	206.15	1832.95	206.96	1833
207.85	1833.07	211.64	1833.46	215.01	1833.86	216.07	1834		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	216.07	.03

```
Bank Sta: Left    Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
             0  216.07             52.27   83.61  119.35              .1       .3

CROSS SECTION


RIVER: WesterlyChannel
REACH: WesterlyChannel    RS: 10556.2

INPUT
Description:
Station Elevation Data    num=      51
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    1833    1.87 1832.76    6.62 1832.16    7.78    1832    8.88 1831.86
   15.89    1831   22.63 1830.12   23.65    1830   25.28  1829.7   29.54    1829
   31.55 1828.74   37.56    1828   47.81 1827.17   49.92    1827   51.14  1826.8
   52.67 1826.58   57.16    1826   58.49 1825.77    63.2    1825   65.88  1824.5
    68.3    1824   71.23 1823.47   74.49 1823.42    77.6 1823.45   87.16    1824
   89.77 1824.28   95.06 1824.59   98.26 1824.83  102.34    1825  107.98 1825.25
  109.78 1825.33  121.73 1825.93  122.61 1825.98  122.99    1826  147.25 1826.79
  151.71    1827  154.55 1827.34  160.29    1828  161.08 1828.12  165.55    1829
   169.4 1829.75  170.69    1830  174.76  1830.8   175.8    1831  180.09 1831.93
  180.45    1832   181.1 1832.16  182.11  1832.4     184 1832.84  184.76    1833
  184.77    1833

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03       0     .03  184.77     .03

Bank Sta: Left    Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
             0  184.77             76.46   72.31   78.74              .1       .3

CROSS SECTION


RIVER: WesterlyChannel
REACH: WesterlyChannel    RS: 10483.89

INPUT
Description:
Station Elevation Data    num=      43
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    1828    3.21 1827.36    5.03    1827    5.69  1826.9   10.91    1826
   17.31 1825.16   18.47    1825   18.71 1824.93   22.81    1824   26.82 1823.21
   27.87    1823   29.47  1822.7   33.29    1822    35.9 1821.74   36.19 1821.74
   39.66 1821.42   46.01 1821.38   52.83 1821.45   61.33 1821.52   66.29    1822
   69.82 1822.37   78.73    1823   86.22 1823.42   96.36    1824  100.05 1824.36
  104.08    1825  105.23  1825.2  108.13 1825.75   108.9  1825.9  108.95 1825.92
  109.38    1826  110.05 1826.16  113.83    1827  117.42 1827.83  118.17    1828
  118.64 1828.12  122.21    1829  124.03 1829.48  126.07    1830   127.6 1830.35
```

130.32	1831	132.2	1831.46	134.5	1832

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	134.5	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	134.5	71.53	76.52	86.43	.1	.3

CROSS SECTION

RIVER: WesterlyChannel
REACH: WesterlyChannel RS: 10407.38

INPUT
Description:
Station Elevation Data num= 53

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1827	1.51	1826.44	2.62	1826	3.42	1825.68	4.98	1825
7.54	1824.1	7.77	1824	7.95	1823.93	10.48	1823	11.47	1822.63
13.12	1822	13.74	1821.83	25.37	1821.09	29.32	1821.07	34.3	1821
35.39	1820.9	42.62	1820.33	46.84	1820	56.38	1819.35	60.04	1819.1
61.32	1819	61.34	1819	62.66	1818.83	63.62	1818.7	68.3	1818
69.97	1818	70.86	1818	72.14	1818	73.24	1818.02	76.62	1818.15
93.44	1818.83	98.44	1818.92	99.96	1818.95	101.91	1819	101.92	1819
102.27	1819.1	103.07	1819.31	117.04	1823	122.3	1823.09	122.51	1823.1
125.77	1823.16	132.89	1823.32	137.19	1823.4	142.79	1823.49	159.39	1825.38
163.22	1825.54	178.49	1825.8	180.17	1825.8	181.82	1825.8	181.86	1825.8
190.72	1826	192.75	1826.22	200.08	1827				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.03	0	.03	122.51	.03

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	122.51	67.69	84.87	141.5	.1	.3

CROSS SECTION

RIVER: WesterlyChannel
REACH: WesterlyChannel RS: 10322.51

INPUT
Description:
Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1822	2.14	1821.11	2.37	1821	2.6	1820.88	4.63	1820
6.41	1819.26	6.95	1819	7.41	1818.71	9	1818	18.28	1817.28

```
   20.13    1817   22.37 1816.99   23.06 1816.98   24.12 1816.97   47.98 1816.01
   48.21    1816    53.4 1815.34   55.35    1815      56 1815.03   57.01 1814.84
   58.32 1813.91   60.98 1813.91   61.05    1815   61.12 1815.01   61.17 1815.01
   63.12 1815.09   64.78 1815.16   65.12 1815.18   69.99 1815.51   73.37  1815.8
   77.33 1815.82   77.57 1815.82   78.88 1815.84   79.69 1815.84   83.51 1815.86
   87.11  1815.9   88.24  1815.9   90.78 1815.91   91.06 1815.91   94.98    1816
  132.92    1816  136.56 1816.41  141.57  1816.8  144.12    1817  144.75 1817.12
  149.49    1818  154.07  1818.7  155.72 1818.81  156.17 1818.88  156.38 1818.91
  156.49 1818.92  156.97 1818.93  157.37 1818.93   157.5 1818.92  168.09    1819

Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .03  168.09     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  168.09           109.86  112.88  116.31              .1       .3

CULVERT


RIVER: WesterlyChannel
REACH: WesterlyChannel    RS: 10266.07

INPUT
Description:
Distance from Upstream XS =      30
Deck/Roadway Width        =   41.23
Weir Coefficient          =     2.8
Upstream  Deck/Roadway Coordinates
    num=       7
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  1823.8    1810   17.75    1823    1810   41.05    1822    1810
   63.16    1821    1810      92    1820    1810  129.98    1819    1810
  168.09 1818.25    1810

Upstream Bridge Cross Section Data
Station Elevation Data    num=      55
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    1822    2.14 1821.11    2.37    1821     2.6 1820.88    4.63    1820
    6.41 1819.26    6.95    1819    7.41 1818.71       9    1818   18.28 1817.28
   20.13    1817   22.37 1816.99   23.06 1816.98   24.12 1816.97   47.98 1816.01
   48.21    1816    53.4 1815.34   55.35    1815      56 1815.03   57.01 1814.84
   58.32 1813.91   60.98 1813.91   61.05    1815   61.12 1815.01   61.17 1815.01
   63.12 1815.09   64.78 1815.16   65.12 1815.18   69.99 1815.51   73.37  1815.8
   77.33 1815.82   77.57 1815.82   78.88 1815.84   79.69 1815.84   83.51 1815.86
   87.11  1815.9   88.24  1815.9   90.78 1815.91   91.06 1815.91   94.98    1816
  132.92    1816  136.56 1816.41  141.57  1816.8  144.12    1817  144.75 1817.12
  149.49    1818  154.07  1818.7  155.72 1818.81  156.17 1818.88  156.38 1818.91
  156.49 1818.92  156.97 1818.93  157.37 1818.93   157.5 1818.92  168.09    1819
```

```
Manning's n Values        num=       2
     Sta   n Val     Sta   n Val
       0     .03  168.09     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
             0  168.09             .1       .3

Downstream  Deck/Roadway Coordinates
    num=      8
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  1824.1    1809    3.02    1824    1809   25.08    1823    1809
    48.4    1822    1809   70.51    1821    1809   99.36    1820    1809
  137.35    1819    1809  141.77  1818.8    1809

Downstream Bridge Cross Section Data
Station Elevation Data    num=      52
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    1815     2.1 1814.85    8.45 1814.55   16.52 1814.18   19.56    1814
   22.46 1813.91   24.61 1813.85   30.62 1813.52    35.2 1813.27    38.7  1813.1
    38.9  1813.1   40.19 1813.02   40.36 1813.02   40.62    1813   51.22 1812.53
    56.4 1812.27   57.37 1812.24      58 1812.23   62.72    1812   69.17 1811.74
   72.13 1811.64   73.21 1811.62   74.23 1811.61   74.85 1811.56   75.62  1811.5
   80.52 1811.19   80.92    1811   84.14 1810.31    84.3  1810.3   85.46 1810.45
   86.32 1810.46   90.94 1811.08   91.11    1811    91.9 1811.17   92.04 1811.17
   92.49 1811.18   93.78 1811.29   94.79 1811.35   96.03  1811.4   98.16 1811.46
  105.67 1811.67  107.11 1811.73  109.48 1811.85  112.72    1812   121.8 1812.73
   124.5    1813  134.16 1813.85  135.47    1814  137.86 1814.48  141.23 1814.99
  141.35 1814.99  141.77    1815

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03       0     .03  141.77     .03

Bank Sta: Left   Right    Coeff Contr.   Expan.
             0  141.77             .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular     2.5
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
```

```
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
               4.58   95.79     .013     .013        0                    .5                1
Upstream   Elevation =  1813.46
           Centerline Station =  59.37
Downstream Elevation =  1810.27
           Centerline Station =  84.18

CULVERT OUTPUT  Profile #PF 1  Culv Group:  Culvert #1

  Q Culv Group (cfs)         50.40    Culv Full Len (ft)
  # Barrels                      1    Culv Vel US (ft/s)         10.27
  Q Barrel (cfs)             50.40    Culv Vel DS (ft/s)         15.90
  E.G. US. (ft)            1819.29    Culv Inv El Up (ft)      1813.46
  W.S. US. (ft)            1819.29    Culv Inv El Dn (ft)      1810.27
  E.G. DS (ft)             1811.77    Culv Frctn Ls (ft)          2.74
  W.S. DS (ft)             1811.53    Culv Exit Loss (ft)         3.96
  Delta EG (ft)               7.51    Culv Entr Loss (ft)         0.82
  Delta WS (ft)               7.76    Q Weir (cfs)               36.80
  E.G. IC (ft)             1819.29    Weir Sta Lft (ft)         118.69
  E.G. OC (ft)             1818.41    Weir Sta Rgt (ft)         168.09
  Culvert Control            Inlet    Weir Submerg                0.00
  Culv WS Inlet (ft)       1815.96    Weir Max Depth (ft)         0.75
  Culv WS Outlet (ft)      1811.81    Weir Avg Depth (ft)         0.40
  Culv Nml Depth (ft)         1.50    Weir Flow Area (sq ft)     19.63
  Culv Crt Depth (ft)         2.30    Min El Weir Flow (ft)    1818.81


Warning: The flow through the culvert is supercritical.  However, since there is flow over the road (weir flow), the program
cannot
         determine if the downstream cross section should be subcritical or supercritical.  The program used the downstream
         subcritical answer, even though it may not be valid.
Note:    The flow in the culvert is entirely supercritical.

CULVERT OUTPUT  Profile #PF 2  Culv Group:  Culvert #1

  Q Culv Group (cfs)         46.00    Culv Full Len (ft)
  # Barrels                      1    Culv Vel US (ft/s)          9.37
  Q Barrel (cfs)             46.00    Culv Vel DS (ft/s)         15.35
  E.G. US. (ft)            1818.59    Culv Inv El Up (ft)      1813.46
  W.S. US. (ft)            1818.59    Culv Inv El Dn (ft)      1810.27
  E.G. DS (ft)             1811.77    Culv Frctn Ls (ft)          2.51
  W.S. DS (ft)             1811.53    Culv Exit Loss (ft)         3.62
  Delta EG (ft)               6.81    Culv Entr Loss (ft)         0.68
  Delta WS (ft)               7.06    Q Weir (cfs)
  E.G. IC (ft)             1818.59    Weir Sta Lft (ft)
  E.G. OC (ft)             1817.99    Weir Sta Rgt (ft)
  Culvert Control            Inlet    Weir Submerg
  Culv WS Inlet (ft)       1815.96    Weir Max Depth (ft)
  Culv WS Outlet (ft)      1811.74    Weir Avg Depth (ft)
```

```
  Culv Nml Depth (ft)         1.42    Weir Flow Area (sq ft)
  Culv Crt Depth (ft)         2.24    Min El Weir Flow (ft)    1818.81


Note:    During the supercritical calculations a hydraulic jump occurred at the outlet of (leaving) the culvert.
Warning: During the supercritical analysis, the program could not converge on a supercritical answer in the downstream cross
         section.  The program used the solution with the least error.
Note:    The flow in the culvert is entirely supercritical.

CROSS SECTION


RIVER: WesterlyChannel
REACH: WesterlyChannel    RS: 10209.63

INPUT
Description:
Station Elevation Data    num=      52
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    1815     2.1 1814.85    8.45 1814.55   16.52 1814.18   19.56    1814
   22.46 1813.91   24.61 1813.85   30.62 1813.52    35.2 1813.27    38.7  1813.1
    38.9  1813.1   40.19 1813.02   40.36 1813.02   40.62    1813   51.22 1812.53
    56.4 1812.27   57.37 1812.24      58 1812.23   62.72    1812   69.17 1811.74
   72.13 1811.64   73.21 1811.62   74.23 1811.61   74.85 1811.56   75.62  1811.5
   80.52 1811.19   80.92    1811   84.14 1810.31    84.3  1810.3   85.46 1810.45
   86.32 1810.46   90.94 1811.08   91.11    1811    91.9 1811.17   92.04 1811.17
   92.49 1811.18   93.78 1811.29   94.79 1811.35   96.03  1811.4   98.16 1811.46
  105.67 1811.67  107.11 1811.73  109.48 1811.85  112.72    1812   121.8 1812.73
   124.5    1813  134.16 1813.85  135.47    1814  137.86 1814.48  141.23 1814.99
  141.35 1814.99  141.77    1815

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03       0     .03  141.77     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0  141.77               48   46.64   48.79             .1       .3

CROSS SECTION


RIVER: WesterlyChannel
REACH: WesterlyChannel    RS: 10162.99

INPUT
Description:
Station Elevation Data    num=      59
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    1814    1.26 1813.95    1.39 1813.94    5.22 1813.79    6.57 1813.68
   11.62 1813.22   14.14    1813   14.78 1812.98   19.92 1812.54   21.41 1812.41
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   22.79 1812.29   23.75 1812.22   27.68    1812   28.72 1811.93    29.2 1811.92
   29.51 1811.92   31.94 1811.61   35.11 1811.26   37.22    1811   38.21 1810.81
   44.03    1810   46.65  1809.6   56.14 1809.12   57.22 1809.06    59.4    1809
      60 1808.98   63.21 1808.94   63.67 1808.95    66.6 1808.87   70.38 1808.73
   72.74 1808.71   74.26 1808.59   78.05 1808.28   78.76 1808.24   81.59    1808
   83.29 1807.98   84.28 1807.98   84.54 1807.99   84.71    1808   87.91 1808.55
   90.45    1809   92.51 1809.04    97.4  1809.3  102.52 1809.51  103.37 1809.51
  110.25 1809.84  110.62 1809.86  111.07 1809.88  113.32    1810  122.22 1810.94
  122.44    1811  122.69 1811.07  126.05    1812  129.58 1812.97  129.68    1813
  129.74 1813.02  133.29    1814   135.5  1814.6  136.85 1814.99

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03   21.41     .03  136.85     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         21.41  136.85            44.32    44.1   45.57             .1       .3

CROSS SECTION


RIVER: WesterlyChannel
REACH: WesterlyChannel    RS: 10118.89

INPUT
Description:
Station Elevation Data    num=      45
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    1813    8.57 1812.12    9.12 1812.07    9.42 1812.05    9.59 1812.04
    9.72 1812.03    9.85    1812   10.07 1811.93   10.39 1811.86   12.04 1811.47
   14.08    1811   19.13 1809.25   23.16    1808   43.52 1807.11   43.56  1807.1
   47.04 1807.01   50.39    1807   50.59 1806.99   54.86 1806.86   59.33 1806.86
   64.14 1806.92   64.88 1806.96   65.85 1806.98   65.86 1806.98   71.26 1806.94
   73.86 1806.99   74.25 1806.99   75.17    1807   75.35    1807   78.98 1807.11
   79.51 1807.13    80.3 1807.16   84.68 1807.32   85.11 1807.34   86.45 1807.37
   87.63 1807.42   94.25 1807.49   99.58 1807.65  100.76 1807.68  103.63  1807.8
  105.68 1807.81  106.63 1807.84  109.87 1807.85   111.1 1807.87  117.32    1808

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .03   12.04     .03  117.32     .03

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         12.04  117.32                0       0       0             .1       .3


SUMMARY OF MANNING'S N VALUES

River:MainChannel
```

Reach	River Sta.	n1	n2	n3
MainChannel	2687.17	.03	.03	.03
MainChannel	2604.22	.03	.03	.03
MainChannel	2494.33	.03	.03	.03
MainChannel	2443.27	Culvert		
MainChannel	2392.21	.03	.03	.03
MainChannel	2304.84	.03	.03	.03
MainChannel	2225.1	.03	.03	.03

River:MainChannel-Junc

Reach	River Sta.	n1	n2	n3
MainChannel-JX	2064.94	.03	.03	.03
MainChannel-JX	1913.54	.03	.03	.03
MainChannel-JX	1762.31	.03	.03	.03
MainChannel-JX	1610.6	.03	.03	.03
MainChannel-JX	1459.34	.03	.03	.03
MainChannel-JX	1309.22	.03	.03	.03
MainChannel-JX	1158.64	.03	.03	.03
MainChannel-JX	1019.47	.03	.03	.03

River:WesterlyChannel

Reach	River Sta.	n1	n2	n3
WesterlyChannel	10639.81	.03	.03	.03
WesterlyChannel	10556.2	.03	.03	.03
WesterlyChannel	10483.89	.03	.03	.03
WesterlyChannel	10407.38	.03	.03	.03
WesterlyChannel	10322.51	.03	.03	
WesterlyChannel	10266.07	Culvert		
WesterlyChannel	10209.63	.03	.03	.03
WesterlyChannel	10162.99	.03	.03	.03
WesterlyChannel	10118.89	.03	.03	.03

SUMMARY OF REACH LENGTHS

River: MainChannel

Reach	River Sta.	Left	Channel	Right
MainChannel	2687.17	86.28	82.95	85.76

MainChannel	2604.22	119.35	109.89	103.93
MainChannel	2494.33	101.83	102.12	158.09
MainChannel	2443.27	Culvert		
MainChannel	2392.21	91.84	87.37	77.44
MainChannel	2304.84	85.72	79.73	75.07
MainChannel	2225.1	150.23	160.16	150.47

River: MainChannel-Junc

Reach	River Sta.	Left	Channel	Right
MainChannel-JX	2064.94	155.05	151.4	154.55
MainChannel-JX	1913.54	150.29	151.23	152.75
MainChannel-JX	1762.31	153.08	151.7	150.74
MainChannel-JX	1610.6	156.27	151.26	159.94
MainChannel-JX	1459.34	158.18	150.13	150.13
MainChannel-JX	1309.22	153.67	150.58	155.09
MainChannel-JX	1158.64	124.4	139.17	157.04
MainChannel-JX	1019.47	0	0	0

River: WesterlyChannel

Reach	River Sta.	Left	Channel	Right
WesterlyChannel	10639.81	52.27	83.61	119.35
WesterlyChannel	10556.2	76.46	72.31	78.74
WesterlyChannel	10483.89	71.53	76.52	86.43
WesterlyChannel	10407.38	67.69	84.87	141.5
WesterlyChannel	10322.51	109.86	112.88	116.31
WesterlyChannel	10266.07	Culvert		
WesterlyChannel	10209.63	48	46.64	48.79
WesterlyChannel	10162.99	44.32	44.1	45.57
WesterlyChannel	10118.89	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: MainChannel

Reach	River Sta.	Contr.	Expan.
MainChannel	2687.17	.1	.3
MainChannel	2604.22	.1	.3
MainChannel	2494.33	.1	.3
MainChannel	2443.27	Culvert	
MainChannel	2392.21	.1	.3

MainChannel	2304.84	.1	.3
MainChannel	2225.1	.1	.3

River: MainChannel-Junc

Reach	River Sta.	Contr.	Expan.
MainChannel-JX	2064.94	.1	.3
MainChannel-JX	1913.54	.1	.3
MainChannel-JX	1762.31	.1	.3
MainChannel-JX	1610.6	.1	.3
MainChannel-JX	1459.34	.1	.3
MainChannel-JX	1309.22	.1	.3
MainChannel-JX	1158.64	.1	.3
MainChannel-JX	1019.47	.1	.3

River: WesterlyChannel

Reach	River Sta.	Contr.	Expan.
WesterlyChannel	10639.81	.1	.3
WesterlyChannel	10556.2	.1	.3
WesterlyChannel	10483.89	.1	.3
WesterlyChannel	10407.38	.1	.3
WesterlyChannel	10322.51	.1	.3
WesterlyChannel	10266.07 Culvert		
WesterlyChannel	10209.63	.1	.3
WesterlyChannel	10162.99	.1	.3
WesterlyChannel	10118.89	.1	.3

Profile Output Table - Standard Table 1

River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
MainChannel	MainChannel	2225.1	PF 1	151.60	1804.87	1806.06	1806.07	1806.46	0.014519	5.02	30.20	39.02	1.01
MainChannel	MainChannel	2225.1	PF 2	150.50	1804.87	1806.06	1806.06	1806.45	0.014631	5.03	29.93	38.79	1.01
MainChannel	MainChannel	2304.84	PF 1	151.60	1806.46	1807.42	1807.65	1808.17	0.050387	6.94	21.86	44.27	1.74

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 MainChannel         MainChannel       2304.84       PF 2        150.50     1806.46     1807.42     1807.64     1808.16
0.050325       6.92       21.76       44.22           1.74

 MainChannel         MainChannel       2392.21       PF 1        151.60     1808.22     1809.94     1809.94     1810.37
0.014700       5.24       28.95       35.31           1.02
 MainChannel         MainChannel       2392.21       PF 2        150.50     1808.22     1809.94     1809.94     1810.36
0.014718       5.23       28.80       35.25           1.02

 MainChannel         MainChannel       2443.27                  Culvert

 MainChannel         MainChannel       2494.33       PF 1        151.60     1811.31     1818.57     1813.22     1818.58
0.000016       0.47      351.91      141.51           0.04
 MainChannel         MainChannel       2494.33       PF 2        150.50     1811.31     1818.56     1813.21     1818.56
0.000016       0.47      349.48      140.83           0.04

 MainChannel         MainChannel       2604.22       PF 1        151.60     1814.00     1818.58     1815.64     1818.58
0.000020       0.40      390.81      169.82           0.05
 MainChannel         MainChannel       2604.22       PF 2        151.60     1814.00     1818.56     1815.64     1818.56
0.000021       0.41      387.87      169.54           0.05

 MainChannel         MainChannel       2687.17       PF 1        151.60     1818.00     1818.44     1818.55     1818.85
0.035301       4.66       29.62       72.59           1.37
 MainChannel         MainChannel       2687.17       PF 2        151.60     1818.00     1818.44     1818.55     1818.85
0.035301       4.66       29.62       72.59           1.37

 MainChannel-Junc    MainChannel-JX    1019.47       PF 1        256.50     1774.34     1778.96     1776.34     1779.03
0.000442       2.19      117.25       33.55           0.21
 MainChannel-Junc    MainChannel-JX    1019.47       PF 2        256.50     1774.34     1778.96     1776.34     1779.03
0.000442       2.19      117.25       33.55           0.21

 MainChannel-Junc    MainChannel-JX    1158.64       PF 1        256.50     1781.39     1782.24     1782.24     1782.52
0.016475       4.26       60.17      109.55           1.01
 MainChannel-Junc    MainChannel-JX    1158.64       PF 2        256.50     1781.39     1782.24     1782.24     1782.52
0.016388       4.26       60.27      109.59           1.01

 MainChannel-Junc    MainChannel-JX    1309.22       PF 1        256.50     1784.45     1785.24     1785.44     1785.89
0.044865       6.48       39.60       81.61           1.64
 MainChannel-Junc    MainChannel-JX    1309.22       PF 2        256.50     1784.45     1785.24     1785.44     1785.89
0.044865       6.48       39.60       81.61           1.64
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MainChannel-Junc	MainChannel-JX	1459.34	PF 1	256.50	1789.00	1789.97	1790.02	1790.34	0.020845	4.92	52.11	91.21	1.15
MainChannel-Junc	MainChannel-JX	1459.34	PF 2	256.50	1789.00	1789.97	1790.02	1790.34	0.020845	4.92	52.11	91.21	1.15
MainChannel-Junc	MainChannel-JX	1610.6	PF 1	256.50	1791.13	1792.77	1792.77	1793.11	0.016057	4.69	54.73	84.68	1.03
MainChannel-Junc	MainChannel-JX	1610.6	PF 2	256.50	1791.13	1792.77	1792.77	1793.11	0.016057	4.69	54.73	84.68	1.03
MainChannel-Junc	MainChannel-JX	1762.31	PF 1	256.50	1793.99	1795.55	1795.74	1796.22	0.035607	6.58	38.95	65.68	1.51
MainChannel-Junc	MainChannel-JX	1762.31	PF 2	256.50	1793.99	1795.55	1795.74	1796.22	0.035289	6.56	39.08	65.78	1.50
MainChannel-Junc	MainChannel-JX	1913.54	PF 1	256.50	1798.86	1799.69	1799.72	1800.02	0.018406	4.65	55.12	95.60	1.08
MainChannel-Junc	MainChannel-JX	1913.54	PF 2	256.50	1798.86	1799.69	1799.72	1800.02	0.018560	4.67	54.95	95.49	1.08
MainChannel-Junc	MainChannel-JX	2064.94	PF 1	256.50	1801.95	1802.74	1802.86	1803.27	0.024379	5.86	43.77	66.27	1.27
MainChannel-Junc	MainChannel-JX	2064.94	PF 2	256.50	1801.95	1802.74	1802.86	1803.27	0.024149	5.84	43.91	66.32	1.27
WesterlyChannel	WesterlyChannel	10118.89	PF 1	46.00	1806.86	1807.31	1807.33	1807.49	0.023599	3.39	13.57	45.60	1.10
WesterlyChannel	WesterlyChannel	10118.89	PF 2	46.00	1806.86	1807.31	1807.33	1807.49	0.023656	3.39	13.56	45.59	1.10
WesterlyChannel	WesterlyChannel	10162.99	PF 1	46.00	1807.98	1808.59	1808.96	1809.90	0.134939	9.21	5.00	13.81	2.70
WesterlyChannel	WesterlyChannel	10162.99	PF 2	46.00	1807.98	1808.59	1808.96	1809.87	0.130004	9.08	5.07	13.90	2.65
WesterlyChannel	WesterlyChannel	10209.63	PF 1	46.00	1810.30	1811.53	1811.53	1811.77	0.018379	3.96	11.62	25.46	1.03
WesterlyChannel	WesterlyChannel	10209.63	PF 2	46.00	1810.30	1811.53	1811.53	1811.77	0.018379	3.96	11.62	25.46	1.03
WesterlyChannel	WesterlyChannel	10266.07		Culvert									

WesterlyChannel	WesterlyChannel	10322.51	PF 1	87.20	1813.91	1819.29	1816.03	1819.29	0.000004	0.19	449.51	161.75	0.02
WesterlyChannel	WesterlyChannel	10322.51	PF 2	46.00	1813.91	1818.59	1815.54	1818.59	0.000002	0.13	341.64	145.66	0.02
WesterlyChannel	WesterlyChannel	10407.38	PF 1	87.20	1818.00	1818.79	1819.01	1819.45	0.050543	6.56	13.30	29.35	1.72
WesterlyChannel	WesterlyChannel	10407.38	PF 2	87.20	1818.00	1818.79	1819.01	1819.45	0.050543	6.56	13.30	29.35	1.72
WesterlyChannel	WesterlyChannel	10483.89	PF 1	87.20	1821.38	1822.03	1822.15	1822.48	0.031409	5.40	16.15	33.41	1.37
WesterlyChannel	WesterlyChannel	10483.89	PF 2	87.20	1821.38	1822.03	1822.15	1822.48	0.031409	5.40	16.15	33.41	1.37
WesterlyChannel	WesterlyChannel	10556.2	PF 1	87.20	1823.42	1824.31	1824.51	1824.96	0.035669	6.45	13.52	23.50	1.50
WesterlyChannel	WesterlyChannel	10556.2	PF 2	87.20	1823.42	1824.31	1824.51	1824.96	0.035669	6.45	13.52	23.50	1.50
WesterlyChannel	WesterlyChannel	10639.81	PF 1	87.20	1825.79	1827.06	1827.22	1827.66	0.029222	6.24	13.97	21.63	1.37
WesterlyChannel	WesterlyChannel	10639.81	PF 2	87.20	1825.79	1827.06	1827.22	1827.66	0.029222	6.24	13.97	21.63	1.37

Profile Output Table - Standard Table 2

River	Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
MainChannel	MainChannel	2225.1	PF 1	1806.46	1806.06	0.39	2.33	0.00		151.60		39.02
MainChannel	MainChannel	2225.1	PF 2	1806.45	1806.06	0.39				150.50		38.79
MainChannel	MainChannel	2304.84	PF 1	1808.17	1807.42	0.75	2.17	0.03		151.60		44.27

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  MainChannel        MainChannel       2304.84       PF 2          1808.16     1807.42       0.74          2.17          0.03
         150.50                 44.22


  MainChannel        MainChannel       2392.21       PF 1          1810.37     1809.94       0.43          1.31          0.03
         151.60                 35.31
  MainChannel        MainChannel       2392.21       PF 2          1810.36     1809.94       0.42          1.33          0.03
         150.50                 35.25


  MainChannel        MainChannel       2443.27                     Culvert


  MainChannel        MainChannel       2494.33       PF 1          1818.58     1818.57       0.00
3.20      144.40      4.00      141.51
  MainChannel        MainChannel       2494.33       PF 2          1818.56     1818.56       0.00
3.10      143.52      3.88      140.83


  MainChannel        MainChannel       2604.22       PF 1          1818.58     1818.58       0.00          0.00          0.00
64.28       87.27       0.05      169.82
  MainChannel        MainChannel       2604.22       PF 2          1818.56     1818.56       0.00          0.00          0.00
64.19       87.37       0.04      169.54


  MainChannel        MainChannel       2687.17       PF 1          1818.85     1818.44       0.41
138.09       13.51                  72.59
  MainChannel        MainChannel       2687.17       PF 2          1818.85     1818.44       0.41
138.09       13.51                  72.59


  MainChannel-Junc   MainChannel-JX    1019.47       PF 1          1779.03     1778.96       0.07
         256.50                 33.55
  MainChannel-Junc   MainChannel-JX    1019.47       PF 2          1779.03     1778.96       0.07
         256.50                 33.55


  MainChannel-Junc   MainChannel-JX    1158.64       PF 1          1782.52     1782.24       0.28          0.18          0.06
         256.50                109.55
  MainChannel-Junc   MainChannel-JX    1158.64       PF 2          1782.52     1782.24       0.28
         256.50                109.59


  MainChannel-Junc   MainChannel-JX    1309.22       PF 1          1785.89     1785.24       0.65          4.43          0.03
         256.50                 81.61
  MainChannel-Junc   MainChannel-JX    1309.22       PF 2          1785.89     1785.24       0.65          4.43          0.03
         256.50                 81.61
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MainChannel-Junc 256.50	MainChannel-JX 91.21	1459.34	PF 1	1790.34	1789.97	0.38	2.76	0.00
MainChannel-Junc 256.50	MainChannel-JX 91.21	1459.34	PF 2	1790.34	1789.97	0.38	2.76	0.00
MainChannel-Junc 256.50	MainChannel-JX 84.68	1610.6	PF 1	1793.11	1792.77	0.34		
MainChannel-Junc 256.50	MainChannel-JX 84.68	1610.6	PF 2	1793.11	1792.77	0.34		
MainChannel-Junc 256.50	MainChannel-JX 65.68	1762.31	PF 1	1796.22	1795.55	0.67	3.77	0.03
MainChannel-Junc 256.50	MainChannel-JX 65.78	1762.31	PF 2	1796.22	1795.55	0.67	3.77	0.03
MainChannel-Junc 256.50	MainChannel-JX 95.60	1913.54	PF 1	1800.02	1799.69	0.34	3.19	0.06
MainChannel-Junc 256.50	MainChannel-JX 95.49	1913.54	PF 2	1800.02	1799.69	0.34	3.19	0.06
MainChannel-Junc 256.50	MainChannel-JX 66.27	2064.94	PF 1	1803.27	1802.74	0.53	3.17	0.01
MainChannel-Junc 256.50	MainChannel-JX 66.32	2064.94	PF 2	1803.27	1802.74	0.53	3.17	0.01
WesterlyChannel 46.00	WesterlyChannel 45.60	10118.89	PF 1	1807.49	1807.31	0.18	2.07	0.34
WesterlyChannel 46.00	WesterlyChannel 45.59	10118.89	PF 2	1807.49	1807.31	0.18	2.05	0.33
WesterlyChannel 46.00	WesterlyChannel 13.81	10162.99	PF 1	1809.90	1808.59	1.32	1.76	0.11
WesterlyChannel 46.00	WesterlyChannel 13.90	10162.99	PF 2	1809.87	1808.59	1.28	1.79	0.10
WesterlyChannel 46.00	WesterlyChannel 25.46	10209.63	PF 1	1811.77	1811.53	0.24	0.84	0.01
WesterlyChannel 46.00	WesterlyChannel 25.46	10209.63	PF 2	1811.77	1811.53	0.24	0.84	0.01
WesterlyChannel	WesterlyChannel	10266.07		Culvert				

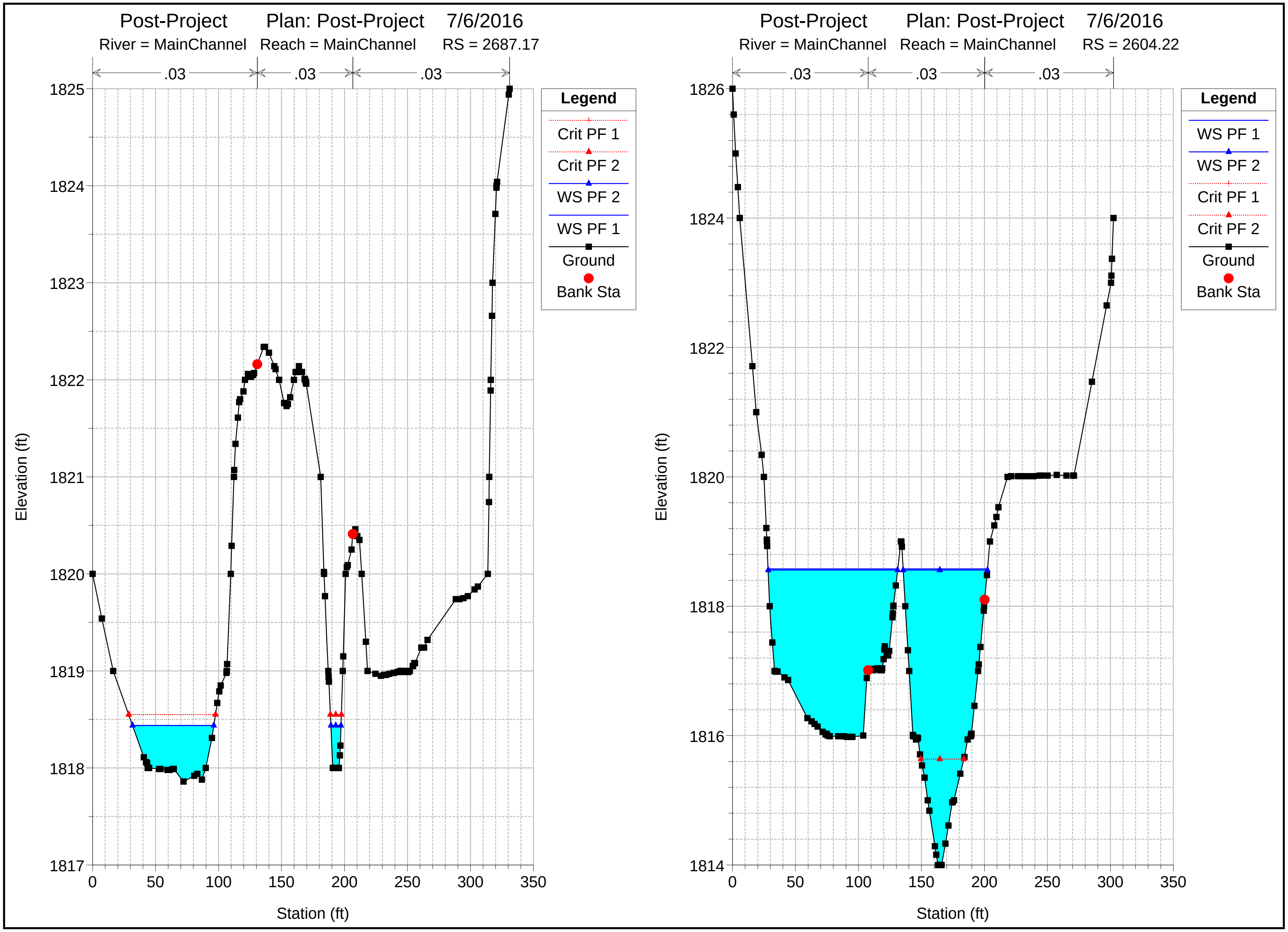
WesterlyChannel	WesterlyChannel	10322.51	PF 1	1819.29	1819.29	0.00			87.20	161.75
WesterlyChannel	WesterlyChannel	10322.51	PF 2	1818.59	1818.59	0.00			46.00	145.66
WesterlyChannel	WesterlyChannel	10407.38	PF 1	1819.45	1818.79	0.67	3.01	0.02	87.20	29.35
WesterlyChannel	WesterlyChannel	10407.38	PF 2	1819.45	1818.79	0.67	3.01	0.02	87.20	29.35
WesterlyChannel	WesterlyChannel	10483.89	PF 1	1822.48	1822.03	0.45	2.42	0.06	87.20	33.41
WesterlyChannel	WesterlyChannel	10483.89	PF 2	1822.48	1822.03	0.45	2.42	0.06	87.20	33.41
WesterlyChannel	WesterlyChannel	10556.2	PF 1	1824.96	1824.31	0.65	2.69	0.00	87.20	23.50
WesterlyChannel	WesterlyChannel	10556.2	PF 2	1824.96	1824.31	0.65	2.69	0.00	87.20	23.50
WesterlyChannel	WesterlyChannel	10639.81	PF 1	1827.66	1827.06	0.61			87.20	21.63
WesterlyChannel	WesterlyChannel	10639.81	PF 2	1827.66	1827.06	0.61			87.20	21.63

HEC-RAS Plan: Post-Project

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
MainChannel	MainChannel	2225.1	PF 1	151.60	1804.87	1806.06	1806.07	1806.46	0.014519	5.02	30.20	39.02	1.01
MainChannel	MainChannel	2225.1	PF 2	150.50	1804.87	1806.06	1806.06	1806.45	0.014631	5.03	29.93	38.79	1.01
MainChannel	MainChannel	2304.84	PF 1	151.60	1806.46	1807.42	1807.65	1808.17	0.050387	6.94	21.86	44.27	1.74
MainChannel	MainChannel	2304.84	PF 2	150.50	1806.46	1807.42	1807.64	1808.16	0.050325	6.92	21.76	44.22	1.74
MainChannel	MainChannel	2392.21	PF 1	151.60	1808.22	1809.94	1809.94	1810.37	0.014700	5.24	28.95	35.31	1.02
MainChannel	MainChannel	2392.21	PF 2	150.50	1808.22	1809.94	1809.94	1810.36	0.014718	5.23	28.80	35.25	1.02
MainChannel	MainChannel	2443.27		Culvert									
MainChannel	MainChannel	2494.33	PF 1	151.60	1811.31	1818.57	1813.22	1818.58	0.000016	0.47	351.91	141.51	0.04
MainChannel	MainChannel	2494.33	PF 2	150.50	1811.31	1818.56	1813.21	1818.56	0.000016	0.47	349.48	140.83	0.04
MainChannel	MainChannel	2604.22	PF 1	151.60	1814.00	1818.58	1815.64	1818.58	0.000020	0.40	390.81	169.82	0.05
MainChannel	MainChannel	2604.22	PF 2	151.60	1814.00	1818.56	1815.64	1818.56	0.000021	0.41	387.87	169.54	0.05
MainChannel	MainChannel	2687.17	PF 1	151.60	1818.00	1818.44	1818.55	1818.85	0.035301	4.66	29.62	72.59	1.37
MainChannel	MainChannel	2687.17	PF 2	151.60	1818.00	1818.44	1818.55	1818.85	0.035301	4.66	29.62	72.59	1.37
MainChannel-Junc	MainChannel-JX	1019.47	PF 1	256.50	1774.34	1778.96	1776.34	1779.03	0.000442	2.19	117.25	33.55	0.21
MainChannel-Junc	MainChannel-JX	1019.47	PF 2	256.50	1774.34	1778.96	1776.34	1779.03	0.000442	2.19	117.25	33.55	0.21
MainChannel-Junc	MainChannel-JX	1158.64	PF 1	256.50	1781.39	1782.24	1782.24	1782.52	0.016475	4.26	60.17	109.55	1.01
MainChannel-Junc	MainChannel-JX	1158.64	PF 2	256.50	1781.39	1782.24	1782.24	1782.52	0.016388	4.26	60.27	109.59	1.01
MainChannel-Junc	MainChannel-JX	1309.22	PF 1	256.50	1784.45	1785.24	1785.44	1785.89	0.044865	6.48	39.60	81.61	1.64
MainChannel-Junc	MainChannel-JX	1309.22	PF 2	256.50	1784.45	1785.24	1785.44	1785.89	0.044865	6.48	39.60	81.61	1.64
MainChannel-Junc	MainChannel-JX	1459.34	PF 1	256.50	1789.00	1789.97	1790.02	1790.34	0.020845	4.92	52.11	91.21	1.15
MainChannel-Junc	MainChannel-JX	1459.34	PF 2	256.50	1789.00	1789.97	1790.02	1790.34	0.020845	4.92	52.11	91.21	1.15
MainChannel-Junc	MainChannel-JX	1610.6	PF 1	256.50	1791.13	1792.77	1792.77	1793.11	0.016057	4.69	54.73	84.68	1.03
MainChannel-Junc	MainChannel-JX	1610.6	PF 2	256.50	1791.13	1792.77	1792.77	1793.11	0.016057	4.69	54.73	84.68	1.03
MainChannel-Junc	MainChannel-JX	1762.31	PF 1	256.50	1793.99	1795.55	1795.74	1796.22	0.035607	6.58	38.95	65.68	1.51
MainChannel-Junc	MainChannel-JX	1762.31	PF 2	256.50	1793.99	1795.55	1795.74	1796.22	0.035289	6.56	39.08	65.78	1.50
MainChannel-Junc	MainChannel-JX	1913.54	PF 1	256.50	1798.86	1799.69	1799.72	1800.02	0.018406	4.65	55.12	95.60	1.08
MainChannel-Junc	MainChannel-JX	1913.54	PF 2	256.50	1798.86	1799.69	1799.72	1800.02	0.018560	4.67	54.95	95.49	1.08
MainChannel-Junc	MainChannel-JX	2064.94	PF 1	256.50	1801.95	1802.74	1802.86	1803.27	0.024379	5.86	43.77	66.27	1.27
MainChannel-Junc	MainChannel-JX	2064.94	PF 2	256.50	1801.95	1802.74	1802.86	1803.27	0.024149	5.84	43.91	66.32	1.27
WesterlyChannel	WesterlyChannel	10118.89	PF 1	46.00	1806.86	1807.31	1807.33	1807.49	0.023599	3.39	13.57	45.60	1.10

HEC-RAS Plan: Post-Project (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
WesterlyChannel	WesterlyChannel	10118.89	PF 2	46.00	1806.86	1807.31	1807.33	1807.49	0.023656	3.39	13.56	45.59	1.10
WesterlyChannel	WesterlyChannel	10162.99	PF 1	46.00	1807.98	1808.59	1808.96	1809.90	0.134939	9.21	5.00	13.81	2.70
WesterlyChannel	WesterlyChannel	10162.99	PF 2	46.00	1807.98	1808.59	1808.96	1809.87	0.130004	9.08	5.07	13.90	2.65
WesterlyChannel	WesterlyChannel	10209.63	PF 1	46.00	1810.30	1811.53	1811.53	1811.77	0.018379	3.96	11.62	25.46	1.03
WesterlyChannel	WesterlyChannel	10209.63	PF 2	46.00	1810.30	1811.53	1811.53	1811.77	0.018379	3.96	11.62	25.46	1.03
WesterlyChannel	WesterlyChannel	10266.07		Culvert									
WesterlyChannel	WesterlyChannel	10322.51	PF 1	87.20	1813.91	1819.29	1816.03	1819.29	0.000004	0.19	449.51	161.75	0.02
WesterlyChannel	WesterlyChannel	10322.51	PF 2	46.00	1813.91	1818.59	1815.54	1818.59	0.000002	0.13	341.64	145.66	0.02
WesterlyChannel	WesterlyChannel	10407.38	PF 1	87.20	1818.00	1818.79	1819.01	1819.45	0.050543	6.56	13.30	29.35	1.72
WesterlyChannel	WesterlyChannel	10407.38	PF 2	87.20	1818.00	1818.79	1819.01	1819.45	0.050543	6.56	13.30	29.35	1.72
WesterlyChannel	WesterlyChannel	10483.89	PF 1	87.20	1821.38	1822.03	1822.15	1822.48	0.031409	5.40	16.15	33.41	1.37
WesterlyChannel	WesterlyChannel	10483.89	PF 2	87.20	1821.38	1822.03	1822.15	1822.48	0.031409	5.40	16.15	33.41	1.37
WesterlyChannel	WesterlyChannel	10556.2	PF 1	87.20	1823.42	1824.31	1824.51	1824.96	0.035669	6.45	13.52	23.50	1.50
WesterlyChannel	WesterlyChannel	10556.2	PF 2	87.20	1823.42	1824.31	1824.51	1824.96	0.035669	6.45	13.52	23.50	1.50
WesterlyChannel	WesterlyChannel	10639.81	PF 1	87.20	1825.79	1827.06	1827.22	1827.66	0.029222	6.24	13.97	21.63	1.37
WesterlyChannel	WesterlyChannel	10639.81	PF 2	87.20	1825.79	1827.06	1827.22	1827.66	0.029222	6.24	13.97	21.63	1.37


Post-Project Plan: Post-Project 7/6/2016
River = MainChannel Reach = MainChannel RS = 2687.17
.03 .03 .03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Post-Project Plan: Post-Project 7/6/2016
River = MainChannel Reach = MainChannel RS = 2604.22
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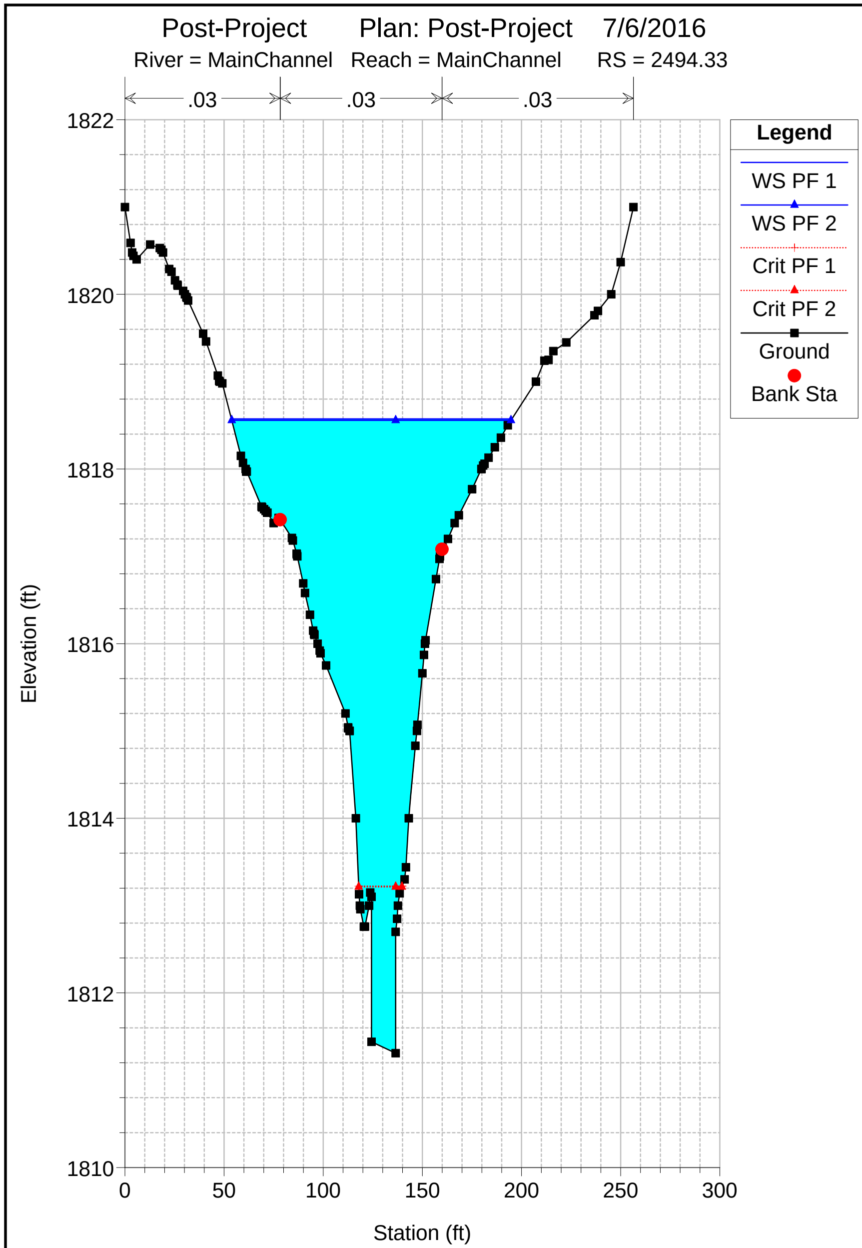
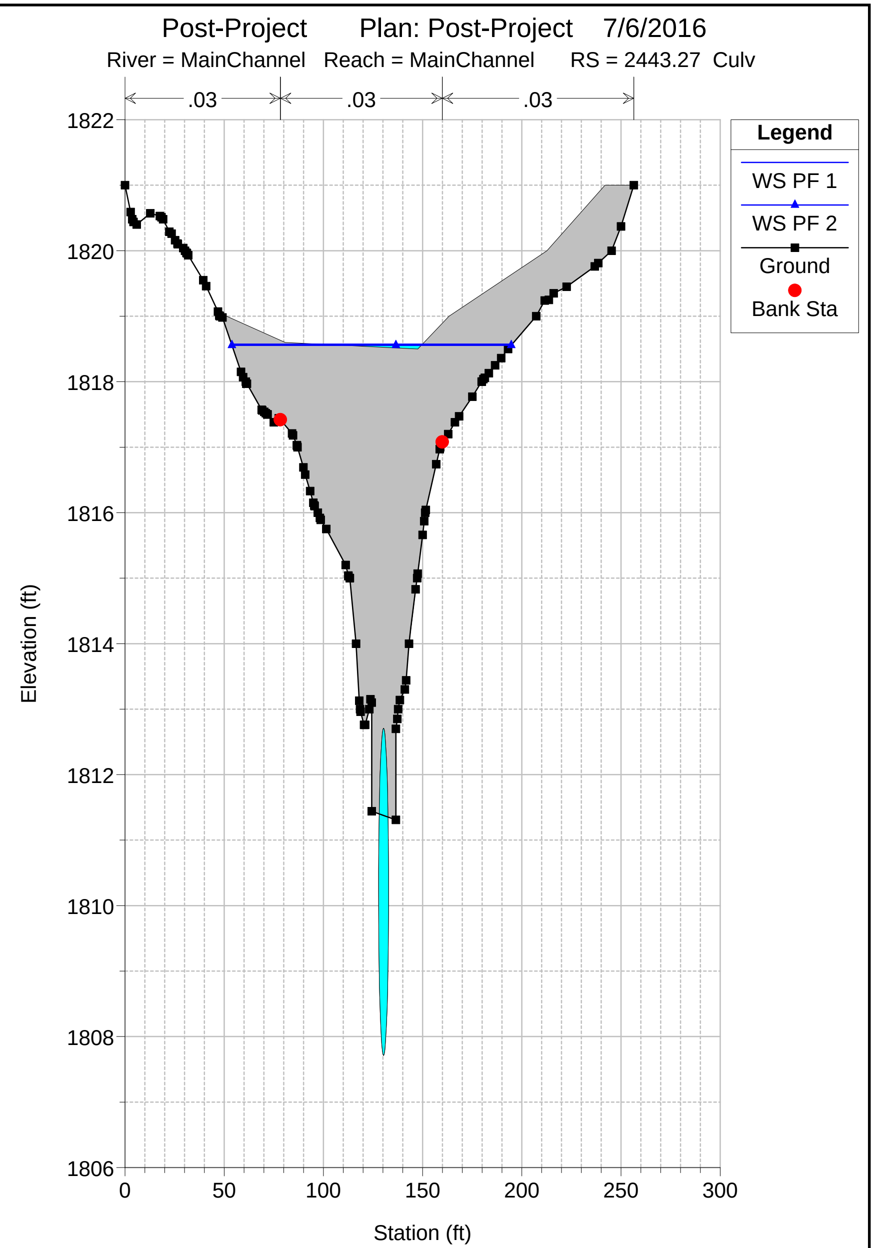
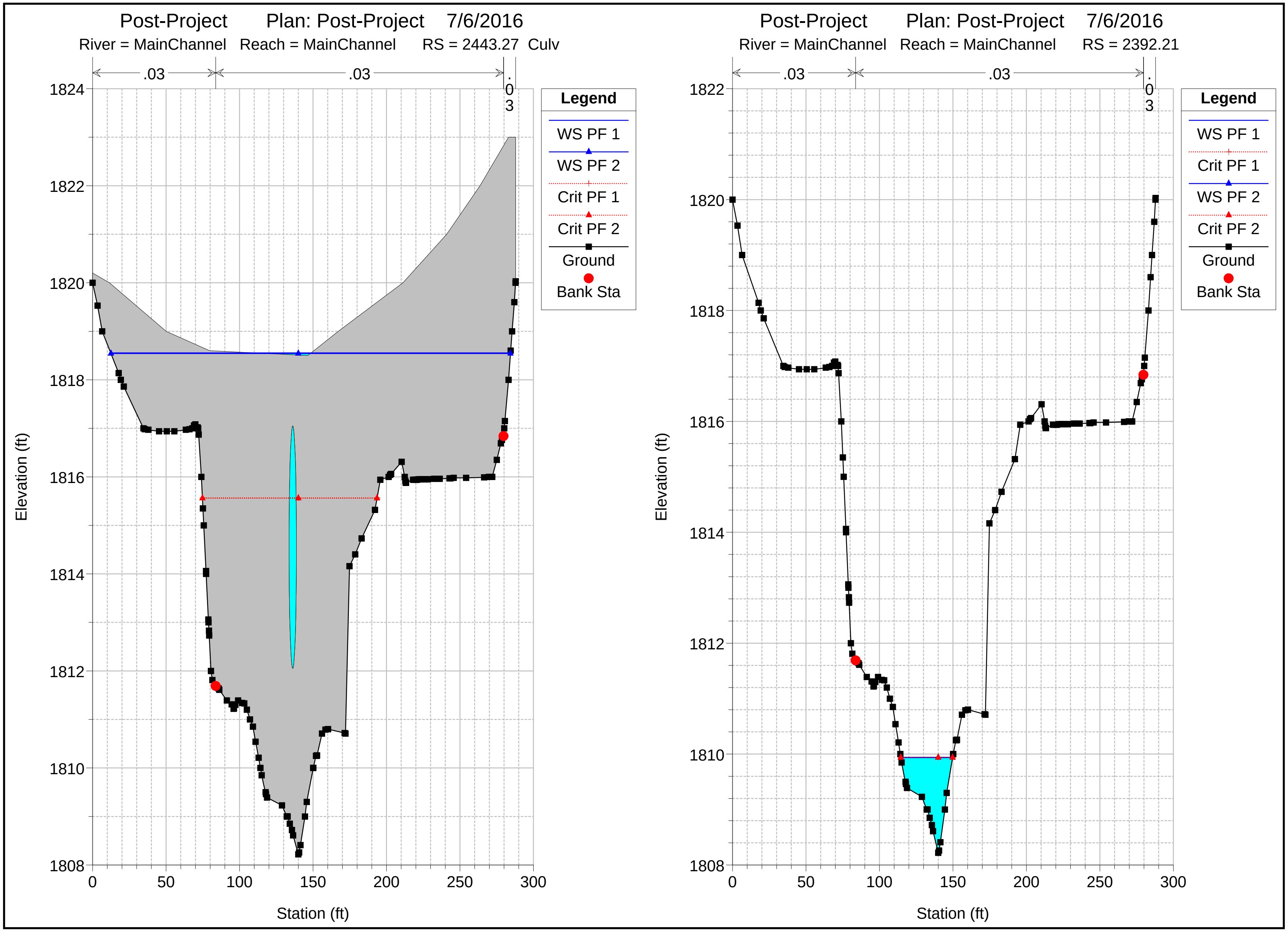
Legend
WS PF 1
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

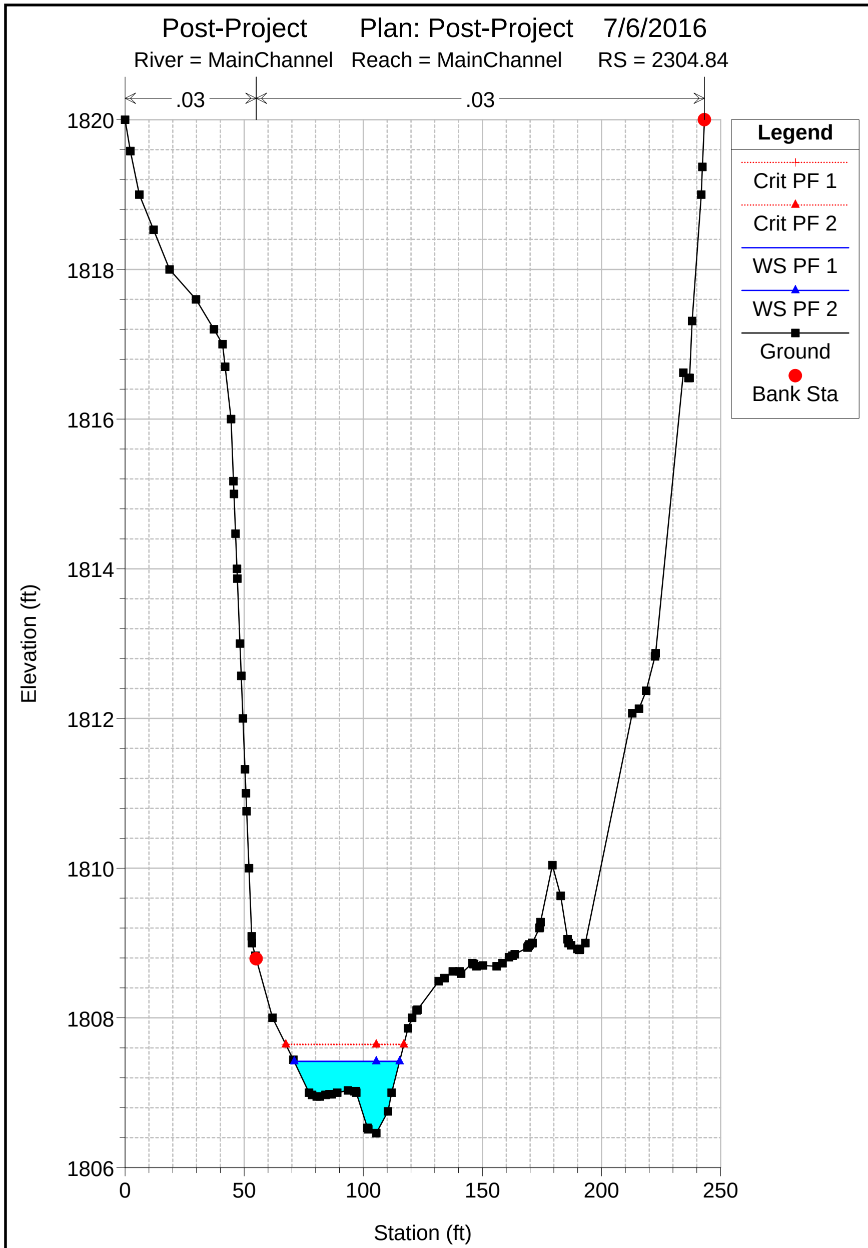


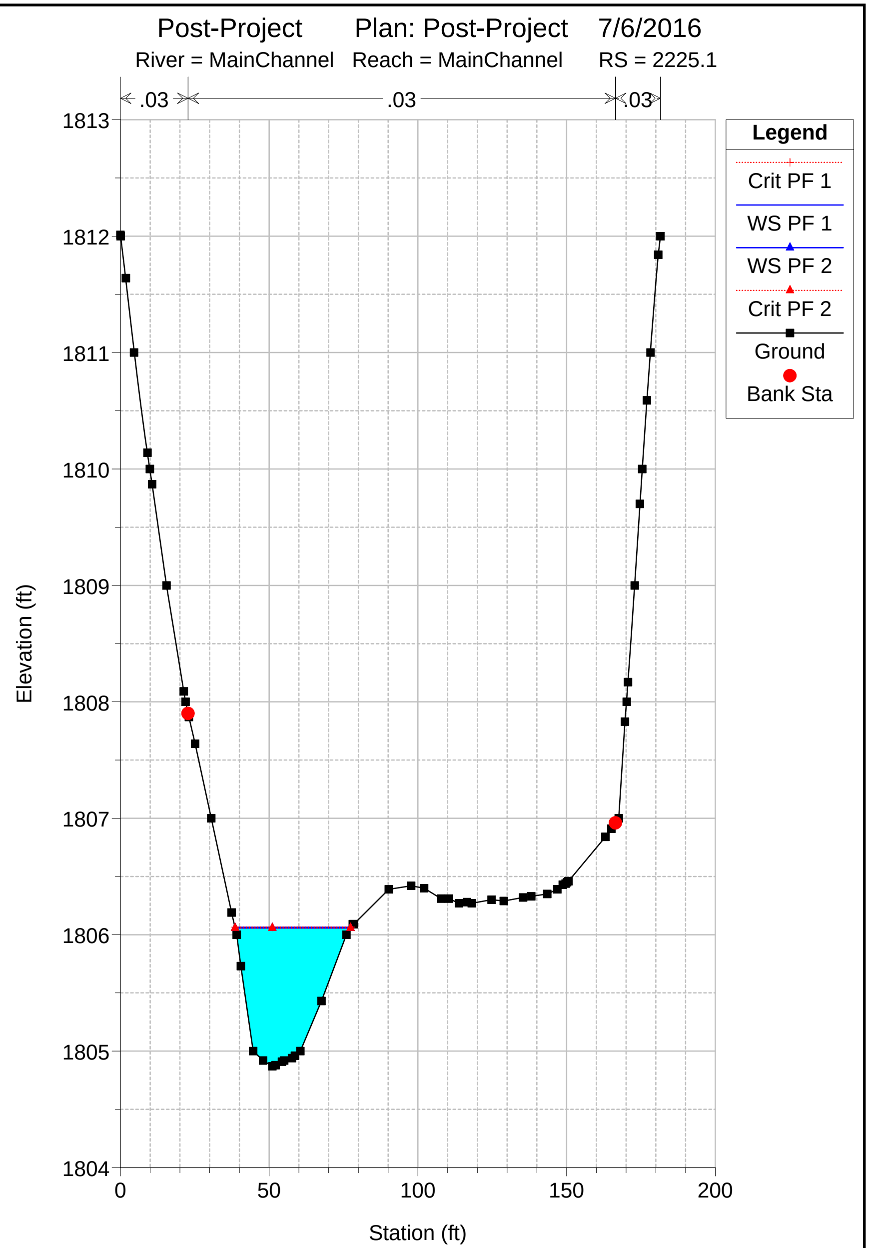
Post-Project Plan: Post-Project 7/6/2016
River = MainChannel Reach = MainChannel RS = 2494.33
.03
.03
.03
Legend
WS PF 1
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
1810
1812
1814
1816
1818
1820
1822
Station (ft)
0
50
100
150
200
250
300



Post-Project Plan: Post-Project 7/6/2016
River = MainChannel Reach = MainChannel RS = 2443.27 Culv
.03
.03
.03
Legend
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
1806
1808
1810
1812
1814
1816
1818
1820
1822
Station (ft)
0
50
100
150
200
250
300


Post-Project Plan: Post-Project 7/6/2016
River = MainChannel Reach = MainChannel RS = 2443.27 Culv
.03
.03
.03
Legend
WS PF 1
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
Post-Project Plan: Post-Project 7/6/2016
River = MainChannel Reach = MainChannel RS = 2392.21
.03
.03
.03
Legend
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)





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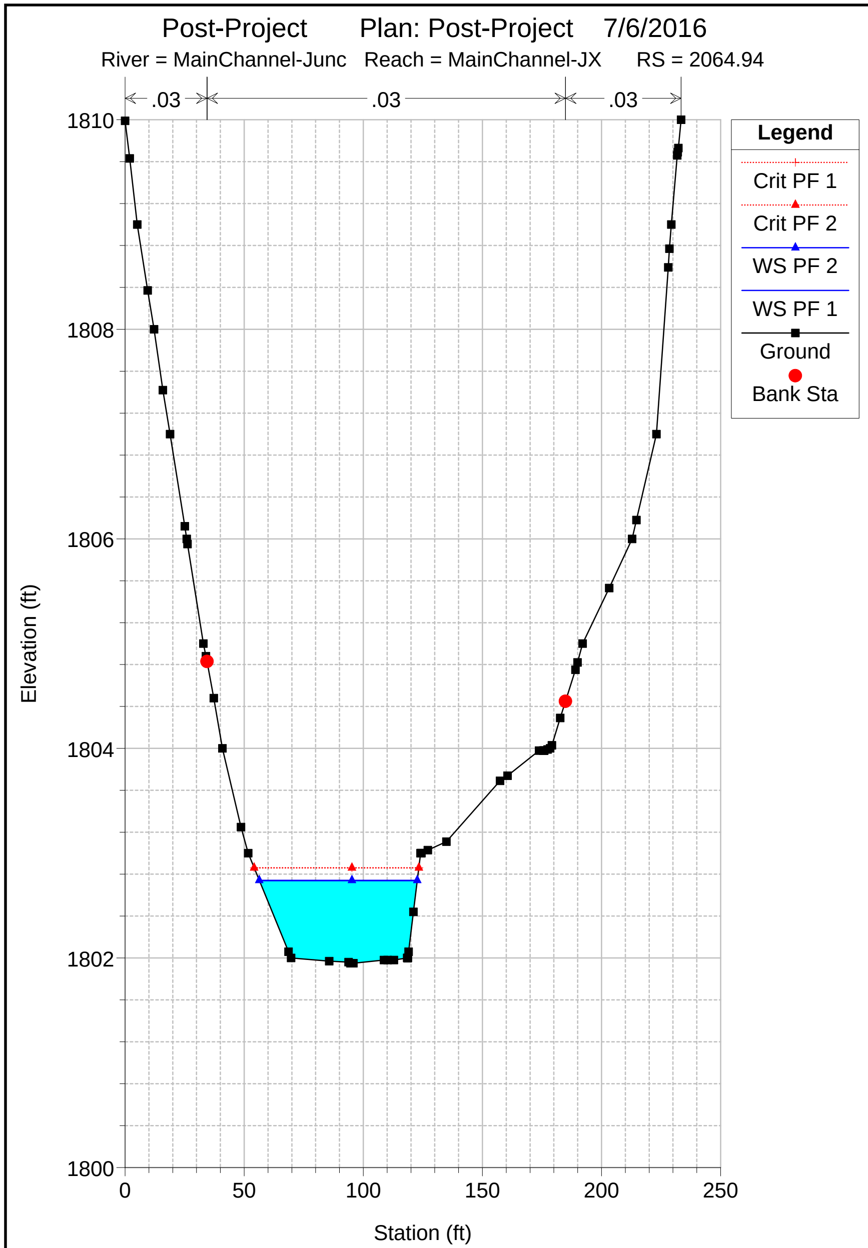
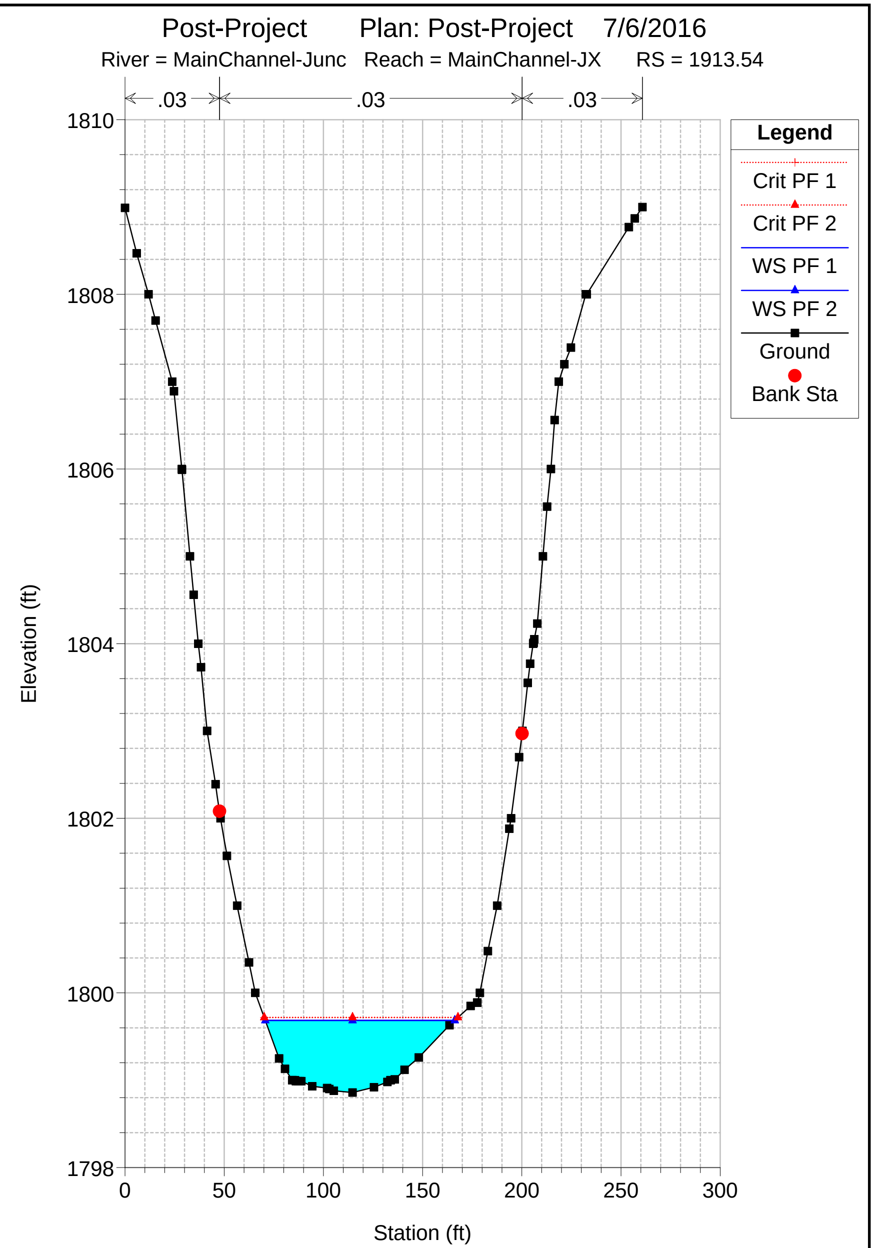
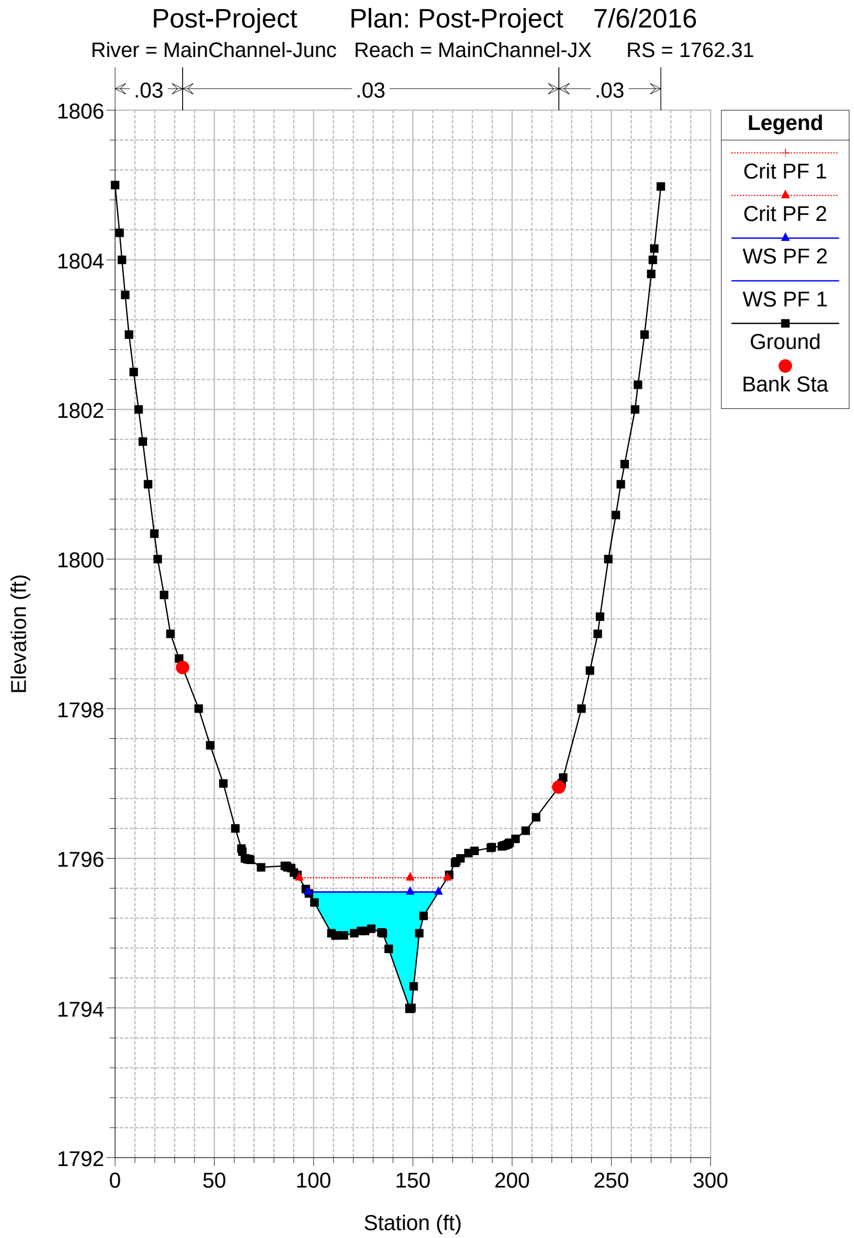
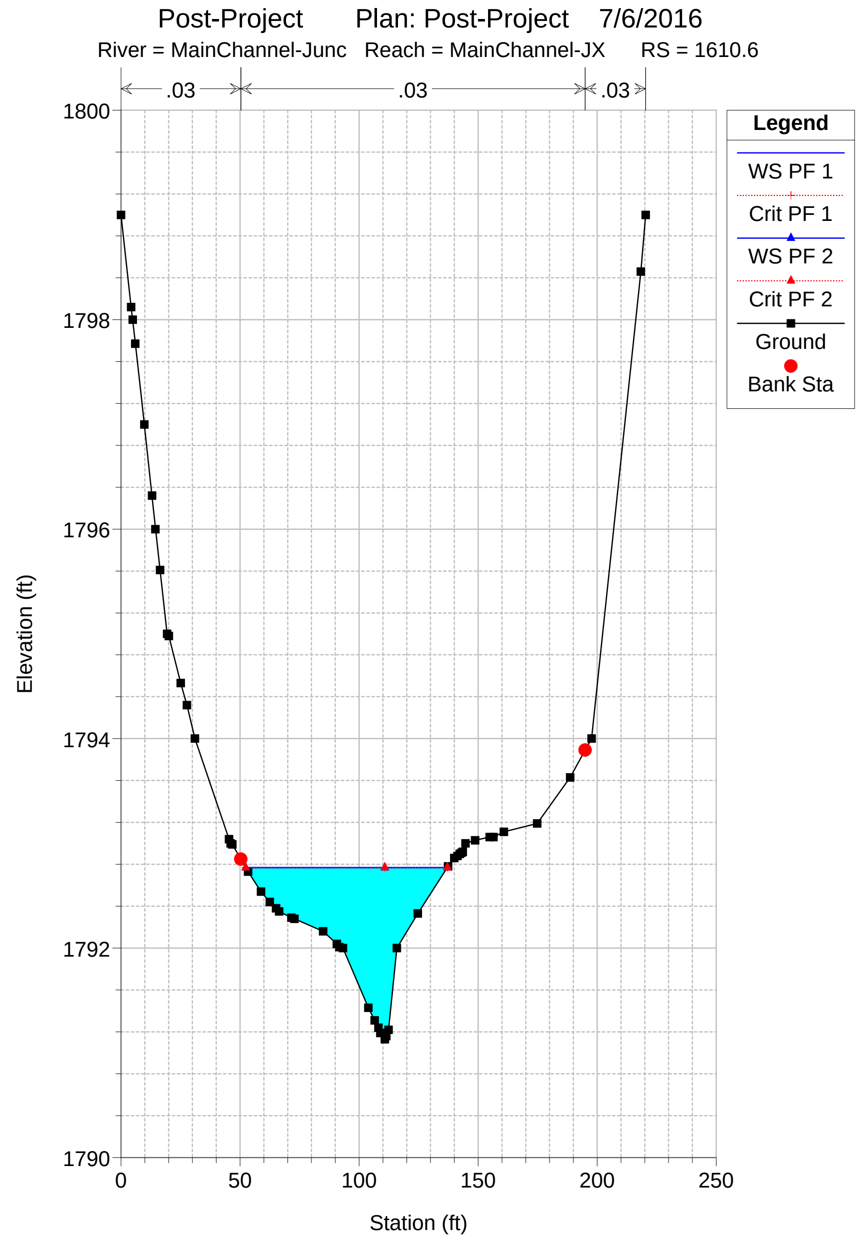
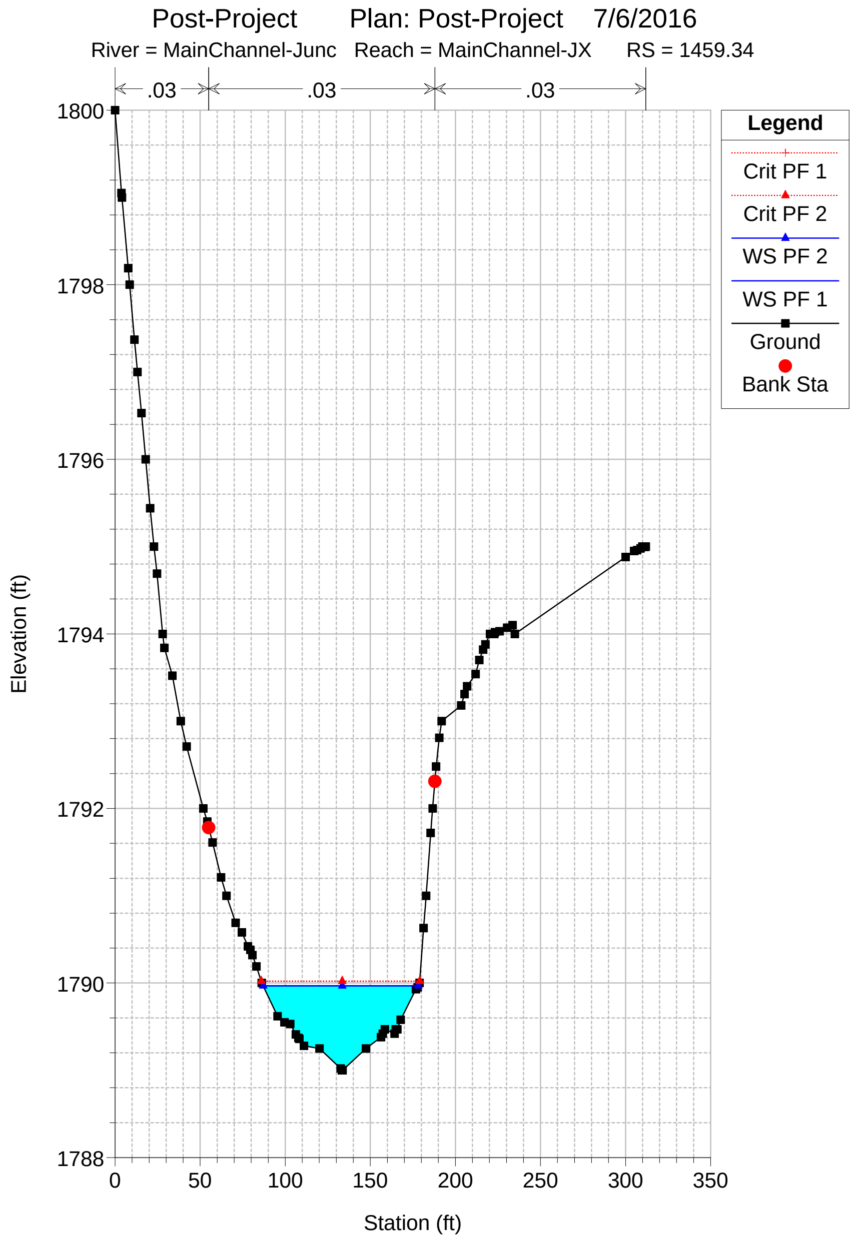
4.ae

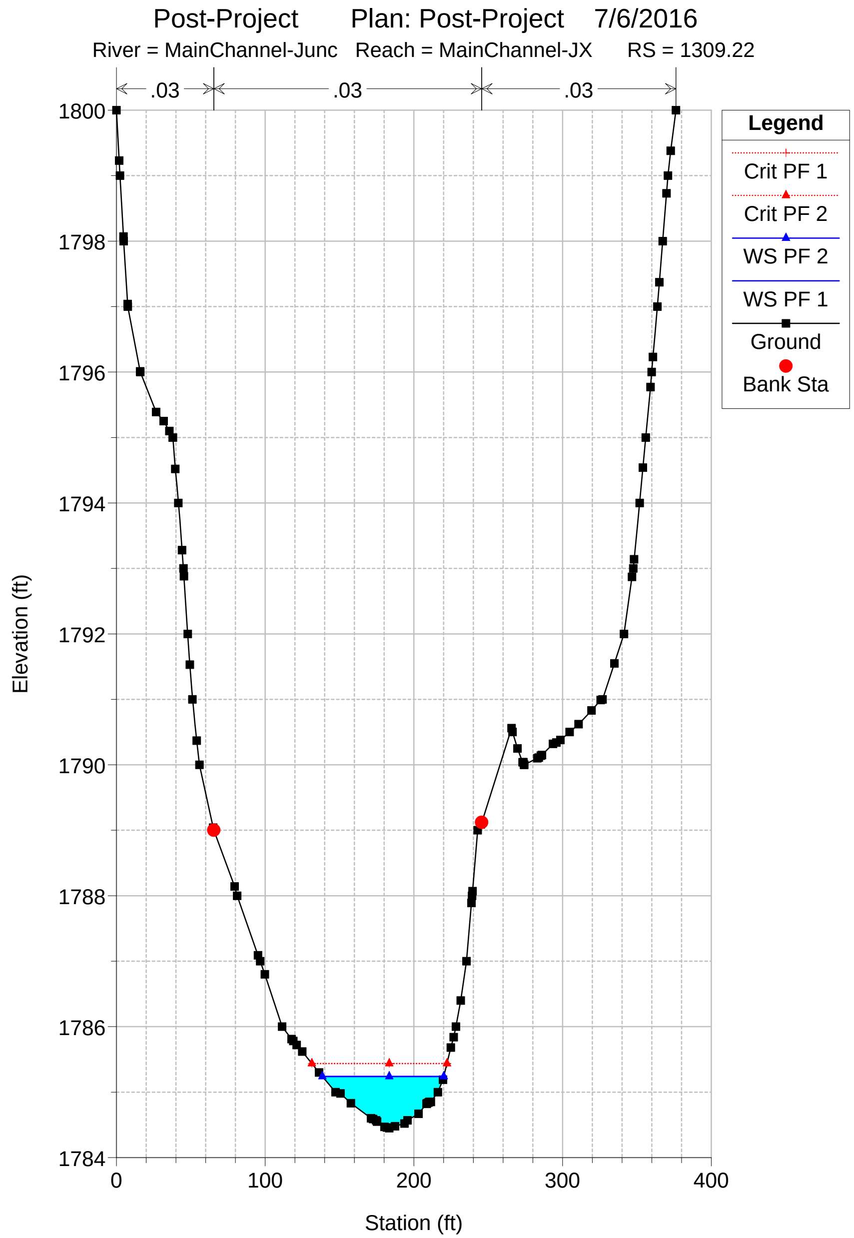

Post-Project Plan: Post-Project 7/6/2016
River = MainChannel-Junc Reach = MainChannel-JX RS = 2064.94
.03
.03
.03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

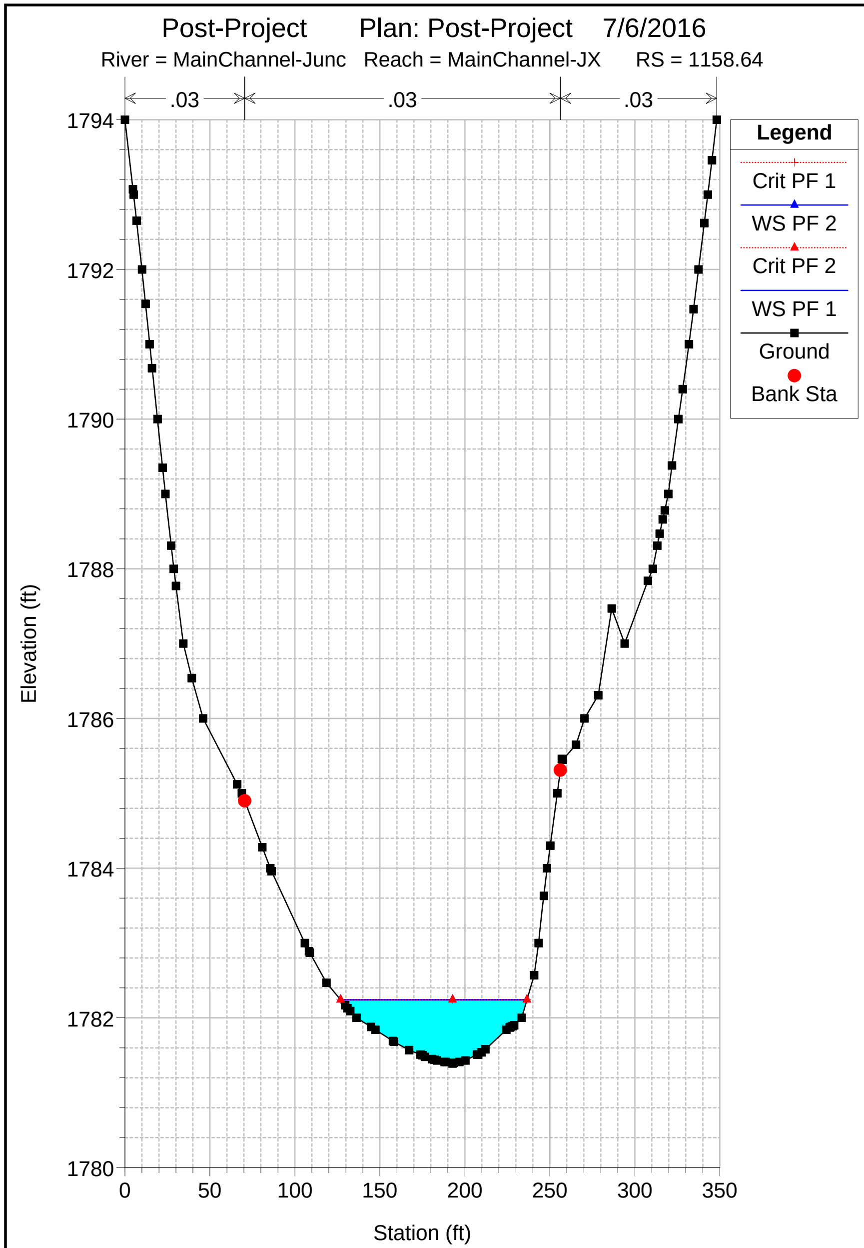

Post-Project Plan: Post-Project 7/6/2016
River = MainChannel-Junc Reach = MainChannel-JX RS = 1913.54
.03
.03
.03
Legend
Crit PF 1
Crit PF 2
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

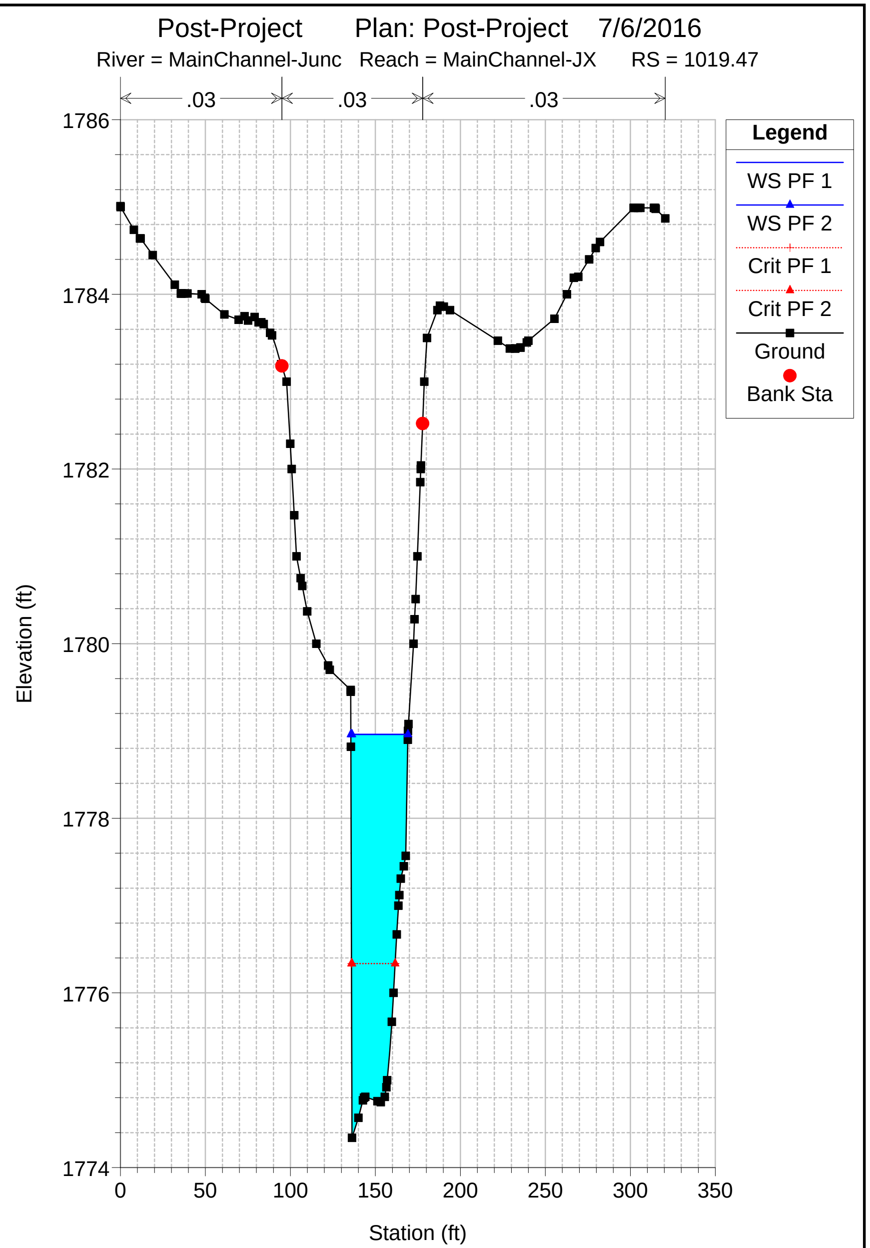

Post-Project Plan: Post-Project 7/6/2016
River = MainChannel-Junc Reach = MainChannel-JX RS = 1762.31
.03
.03
.03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1806
1804
1802
1800
1798
1796
1794
1792
0
50
100
150
200
250
300

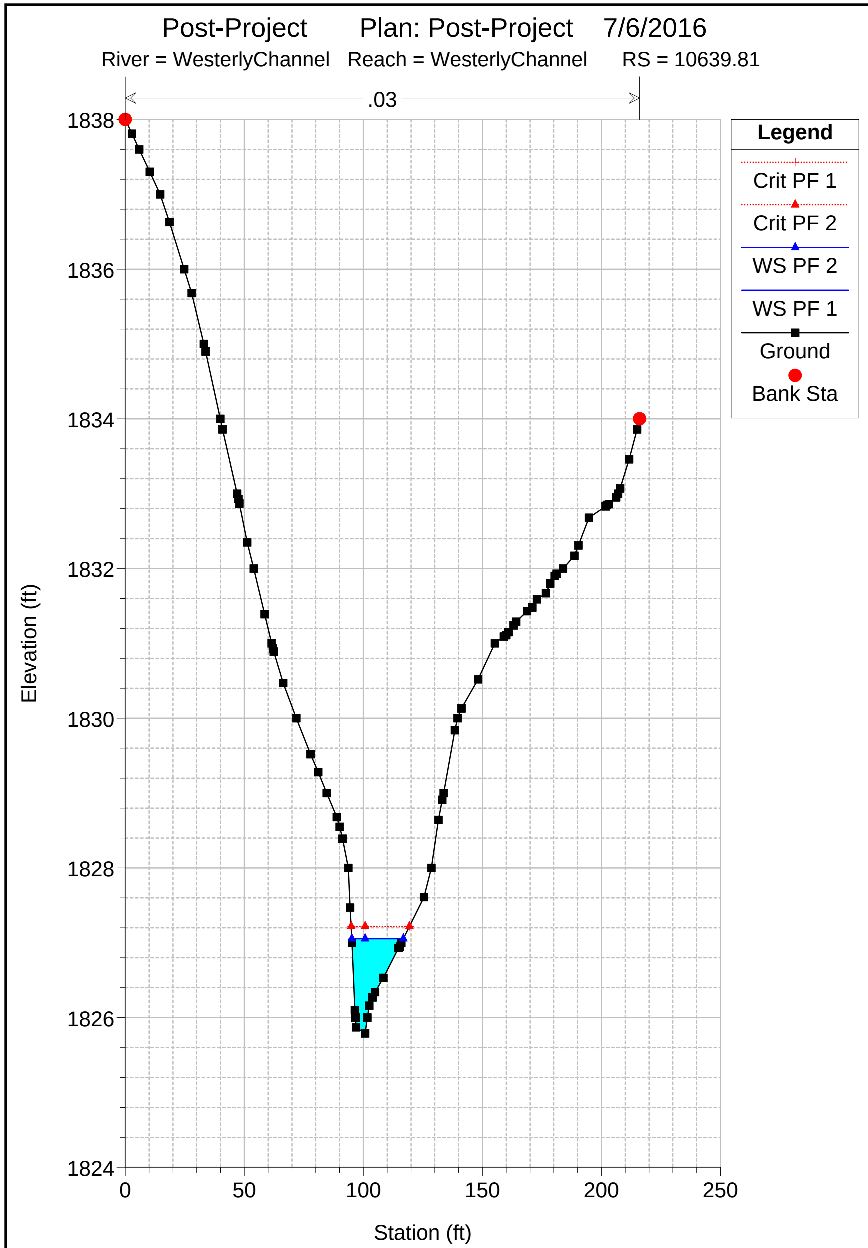

Post-Project Plan: Post-Project 7/6/2016
River = MainChannel-Junc Reach = MainChannel-JX RS = 1610.6
.03
.03
.03
Legend
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
1800
1798
1796
1794
1792
1790
0
50
100
150
200
250

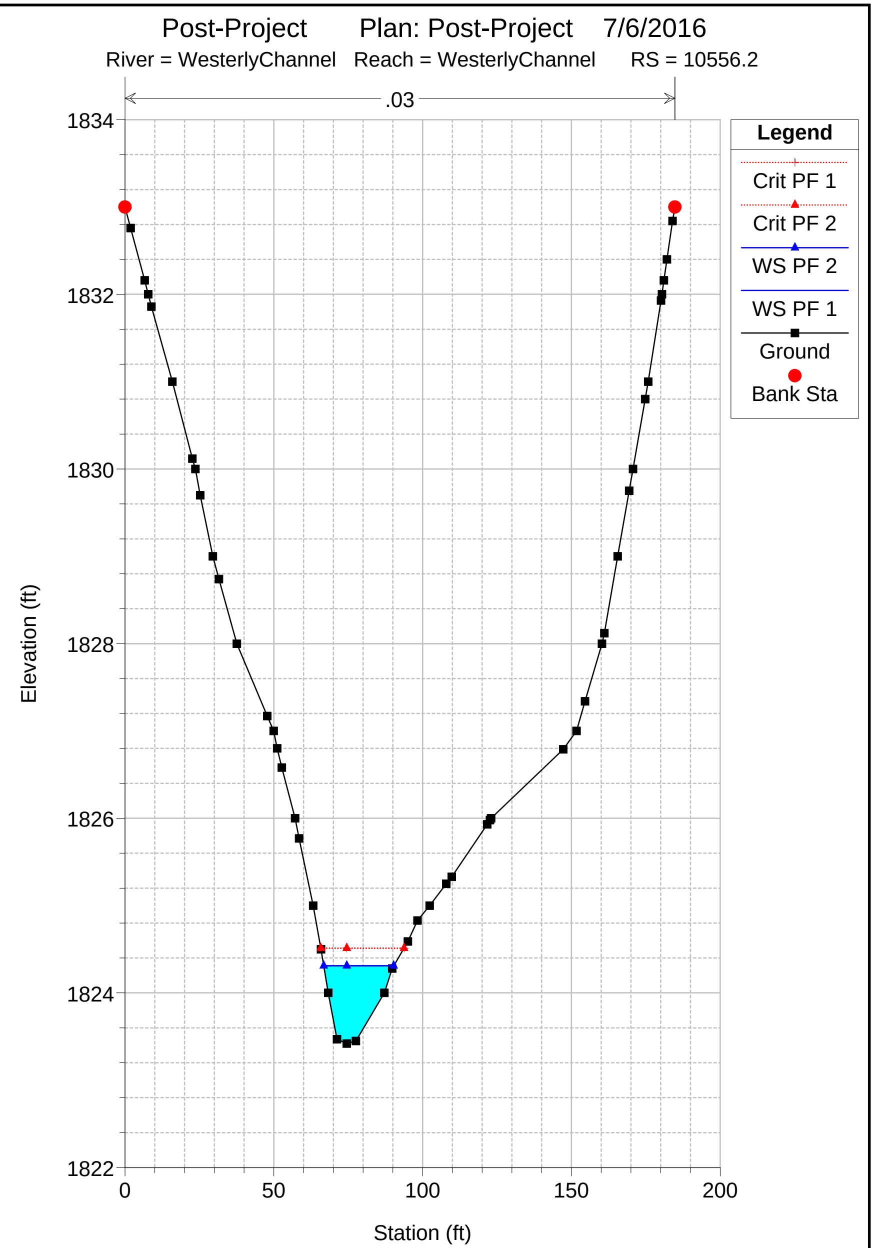

Post-Project Plan: Post-Project 7/6/2016
River = MainChannel-Junc Reach = MainChannel-JX RS = 1459.34
.03
.03
.03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1800
1798
1796
1794
1792
1790
1788
0
50
100
150
200
250
300
350

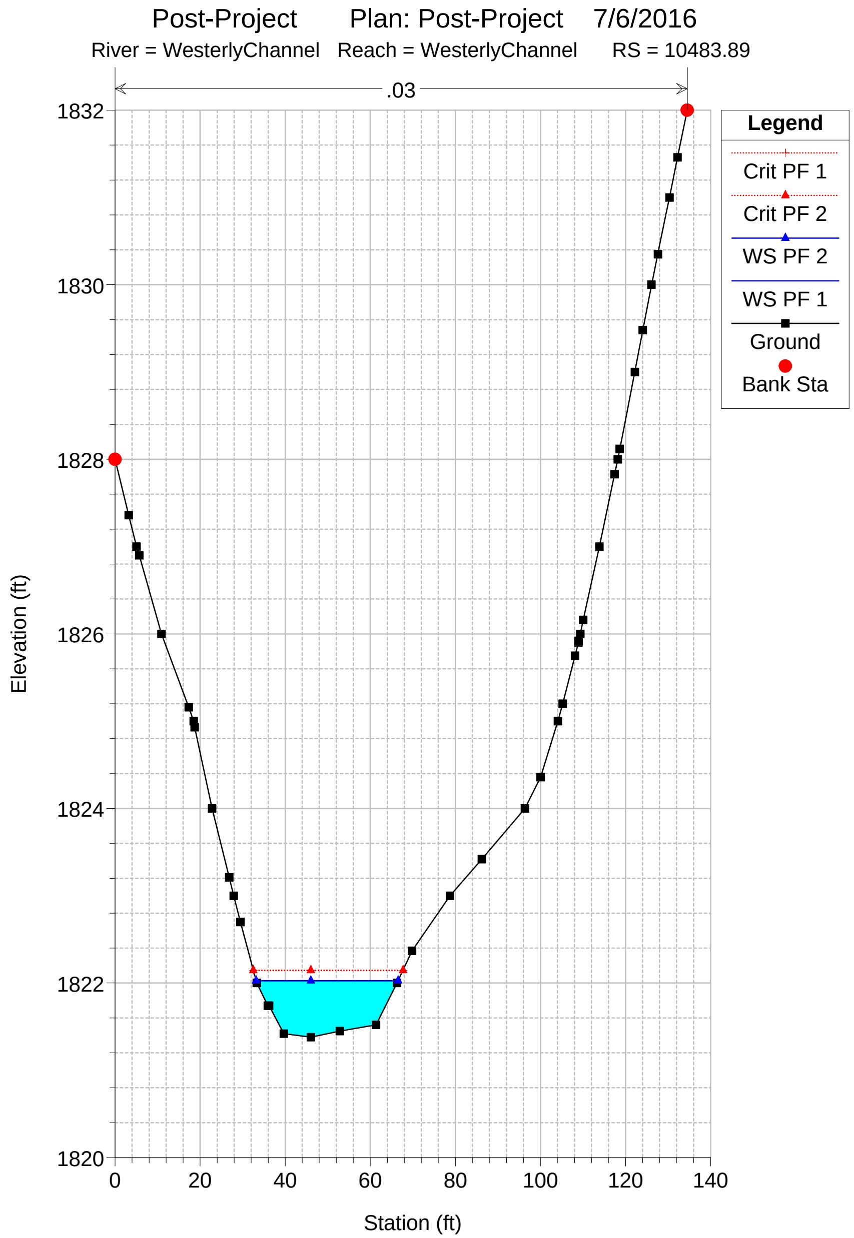

Post-Project Plan: Post-Project 7/6/2016
River = MainChannel-Junc Reach = MainChannel-JX RS = 1309.22
.03
.03
.03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1800
1798
1796
1794
1792
1790
1788
1786
1784
0
100
200
300
400


Post-Project Plan: Post-Project 7/6/2016
River = MainChannel-Junc Reach = MainChannel-JX RS = 1158.64
.03
.03
.03
Legend
Crit PF 1
WS PF 2
Crit PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1794
1792
1790
1788
1786
1784
1782
1780
0
50
100
150
200
250
300
350

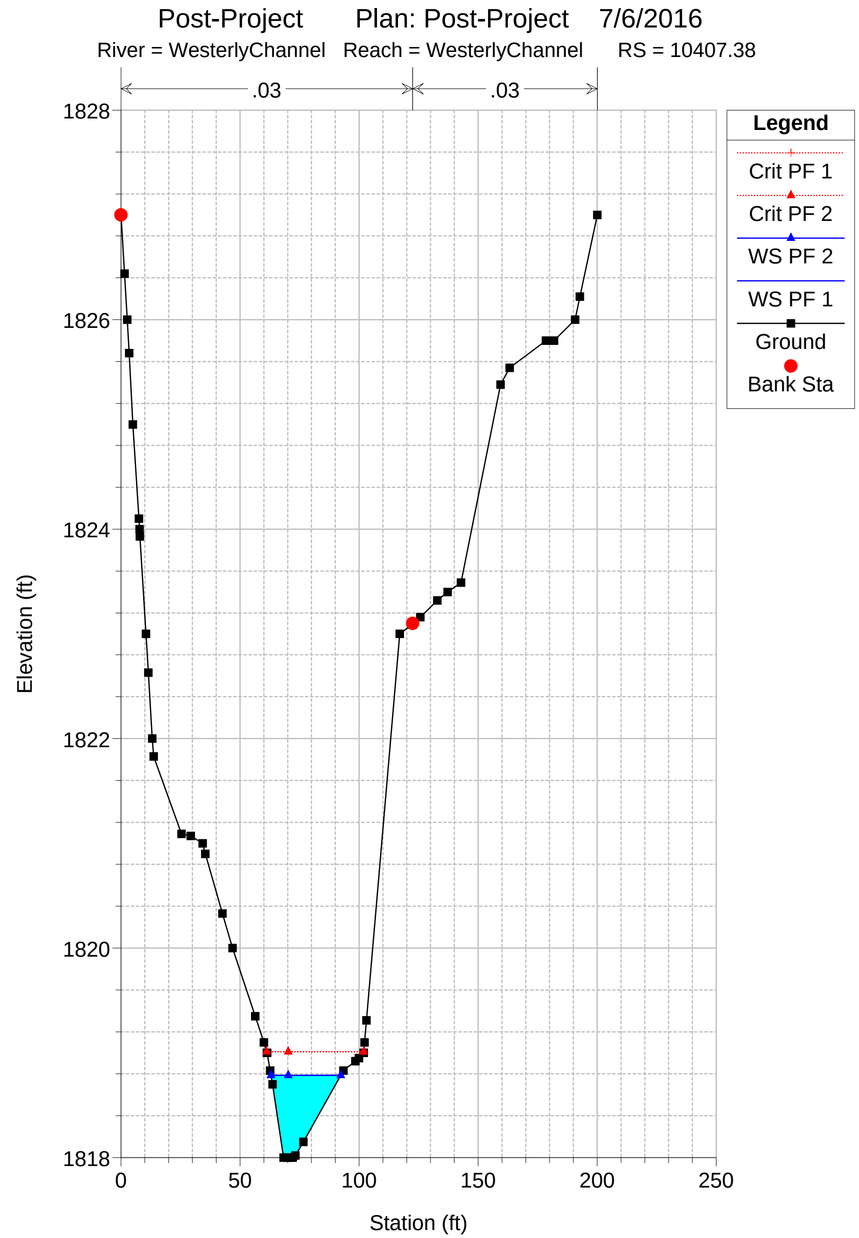

Post-Project Plan: Post-Project 7/6/2016
River = MainChannel-Junc Reach = MainChannel-JX RS = 1019.47
.03
.03
.03
Legend
WS PF 1
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
1786
1784
1782
1780
1778
1776
1774
0
50
100
150
200
250
300
350


Post-Project Plan: Post-Project 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10639.81
.03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1838
1836
1834
1832
1830
1828
1826
1824
0
50
100
150
200
250

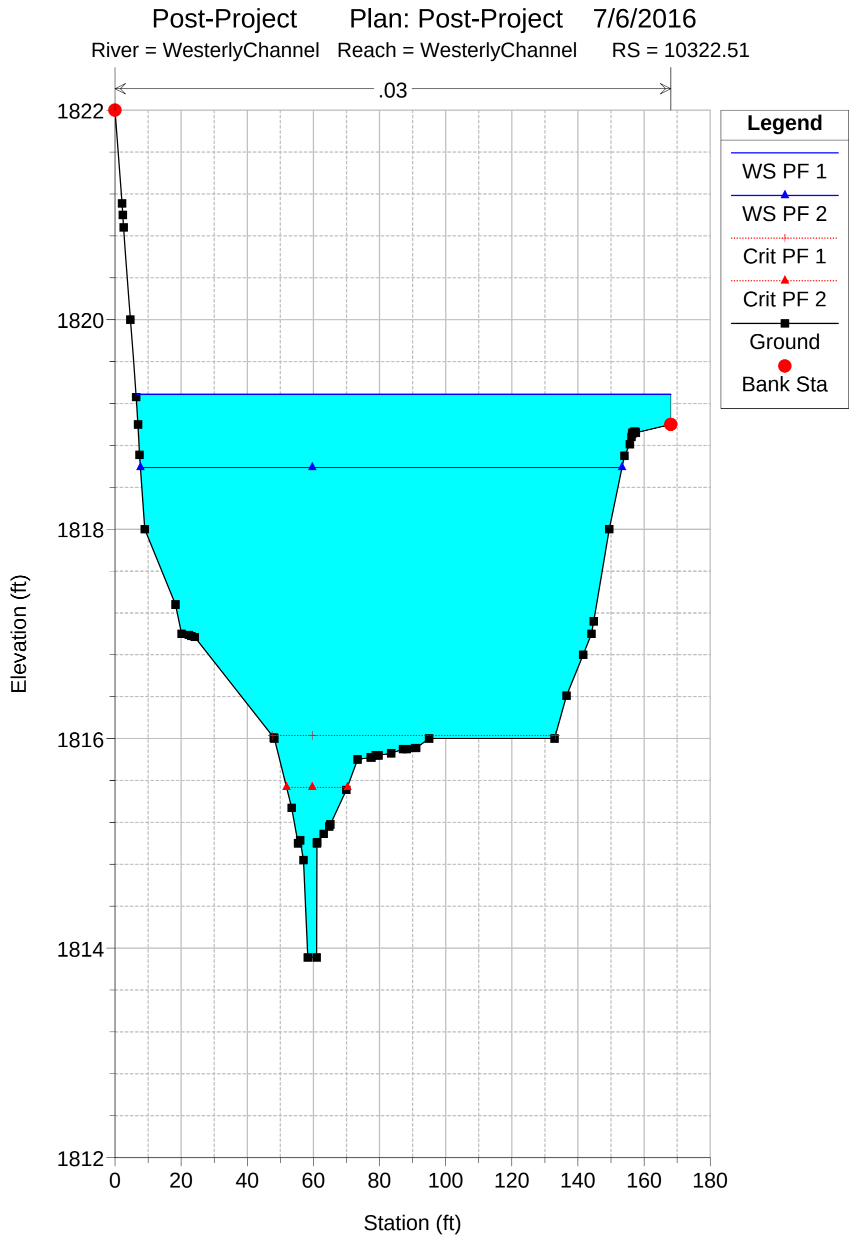

Post-Project Plan: Post-Project 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10556.2
.03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1834
1832
1830
1828
1826
1824
1822
0
50
100
150
200

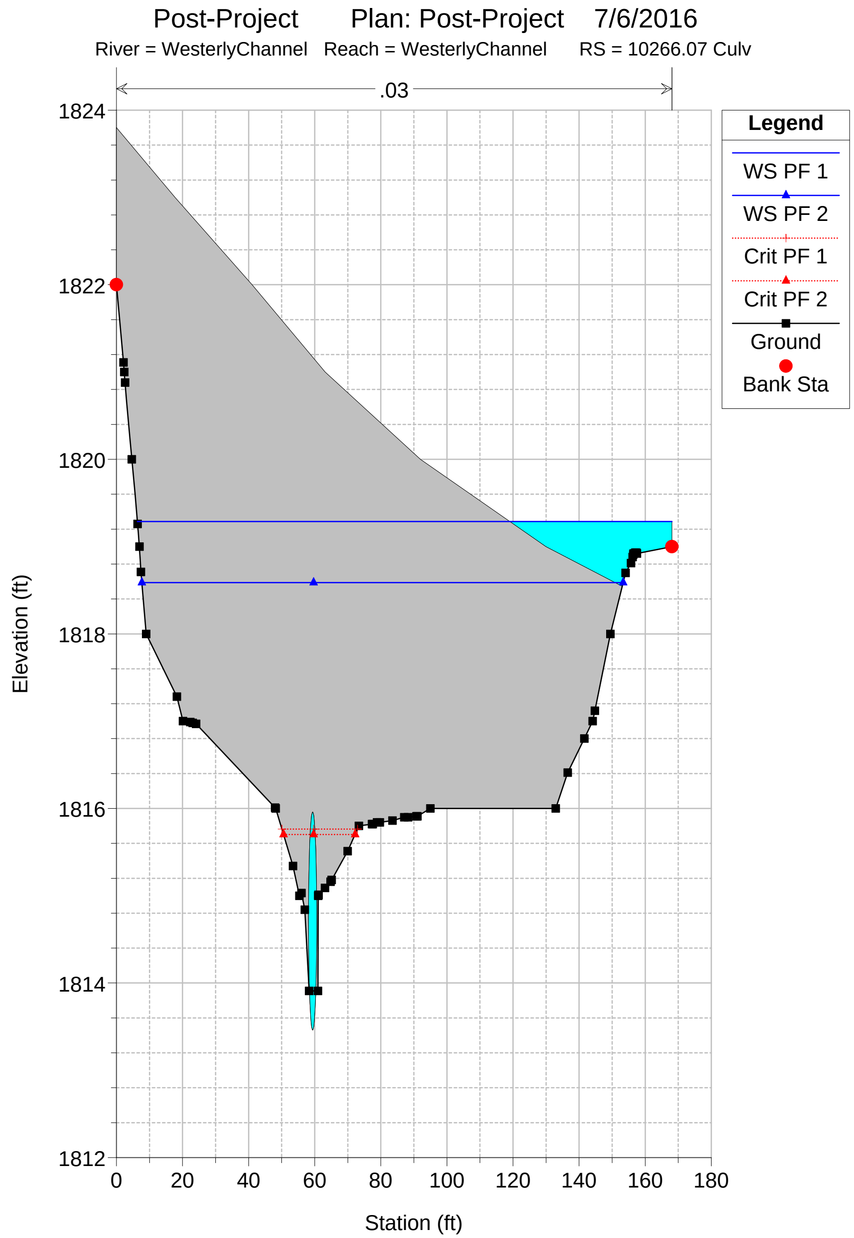


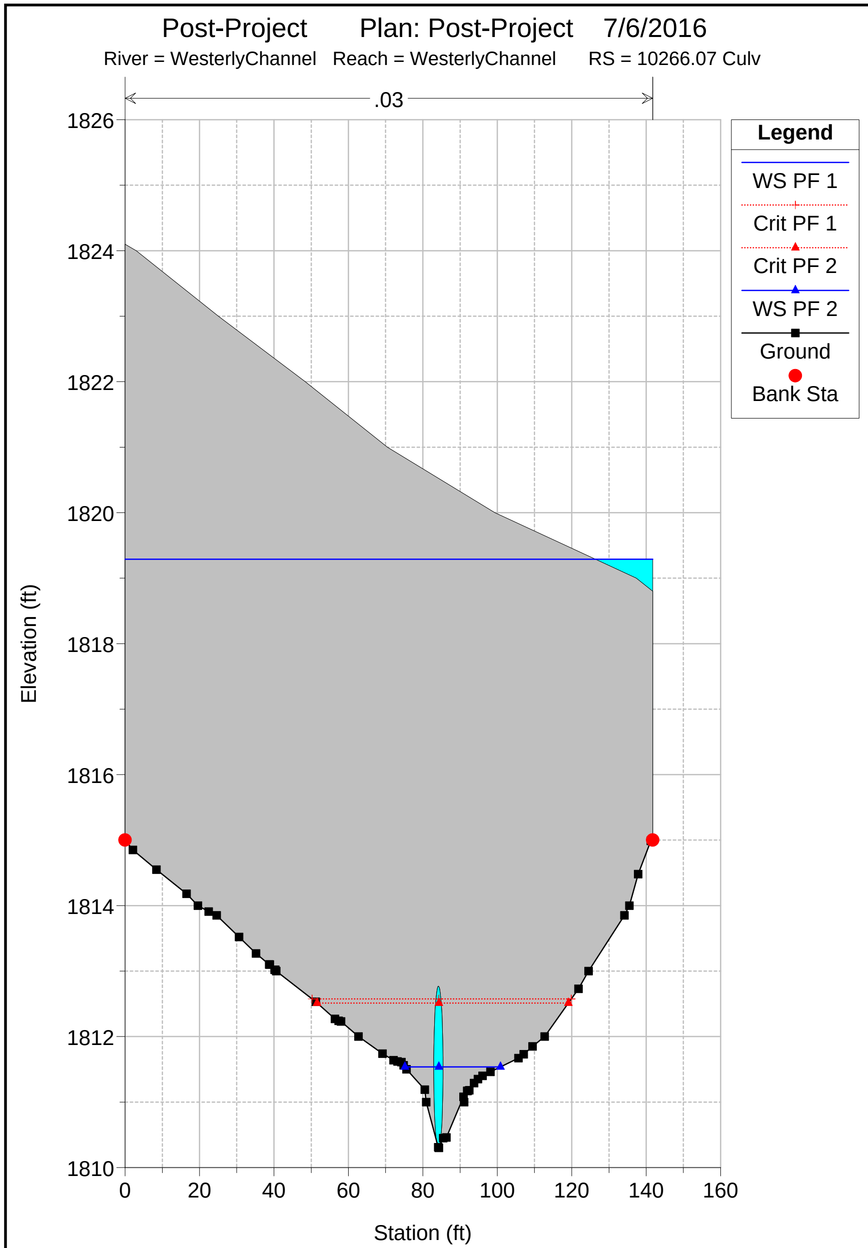
Post-Project Plan: Post-Project 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10483.89
.03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
1832
1830
1828
1826
1824
1822
1820
0
20
40
60
80
100
120
140
Station (ft)

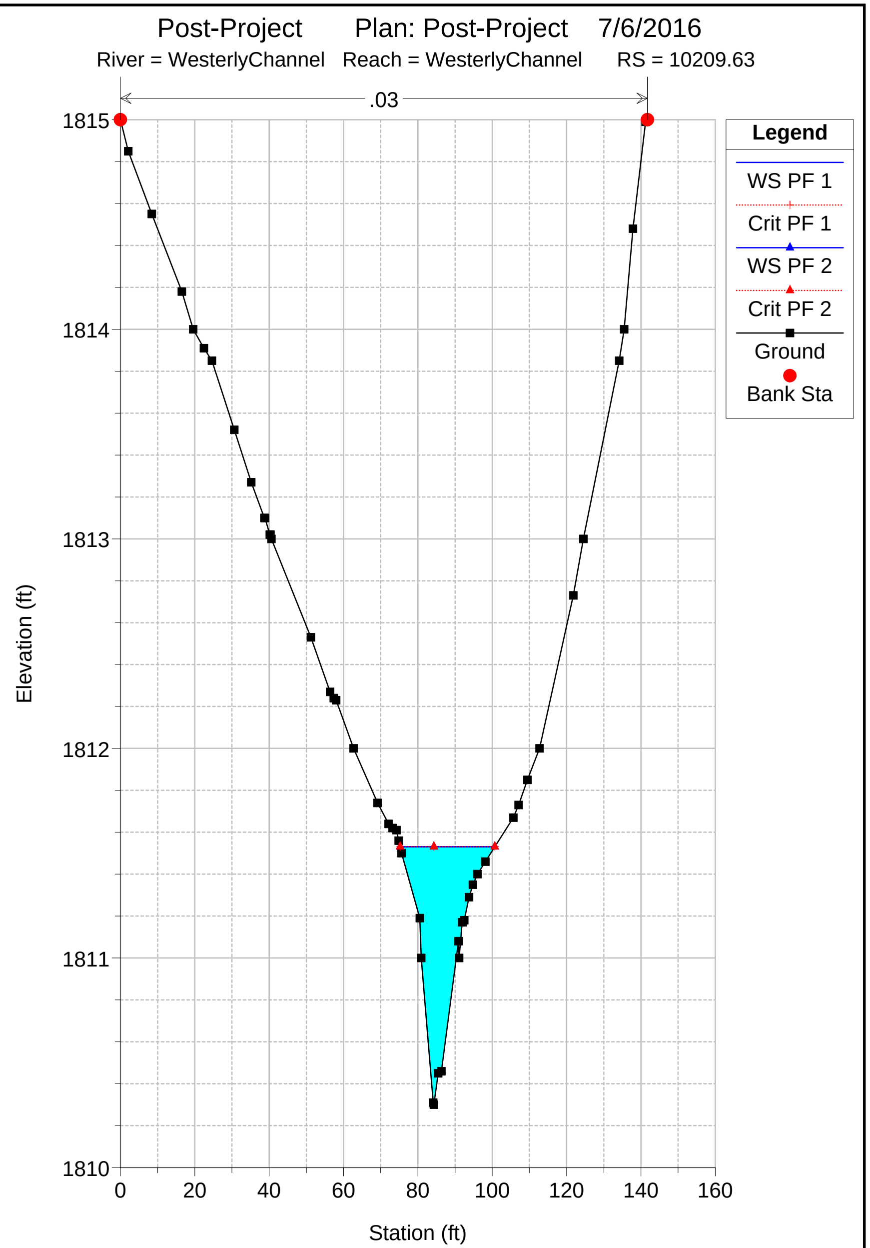


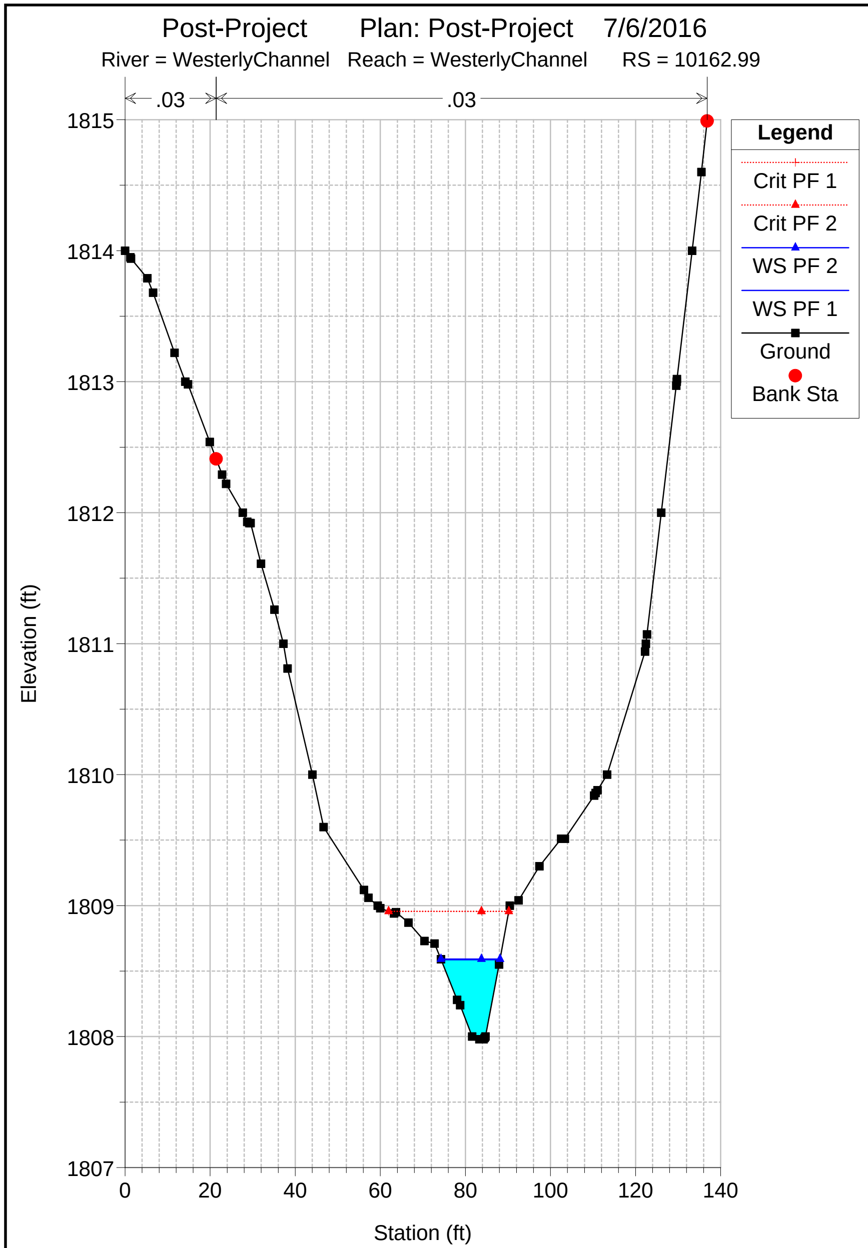
Post-Project Plan: Post-Project 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10407.38
.03
.03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
1828
1826
1824
1822
1820
1818
0
50
100
150
200
250
Station (ft)

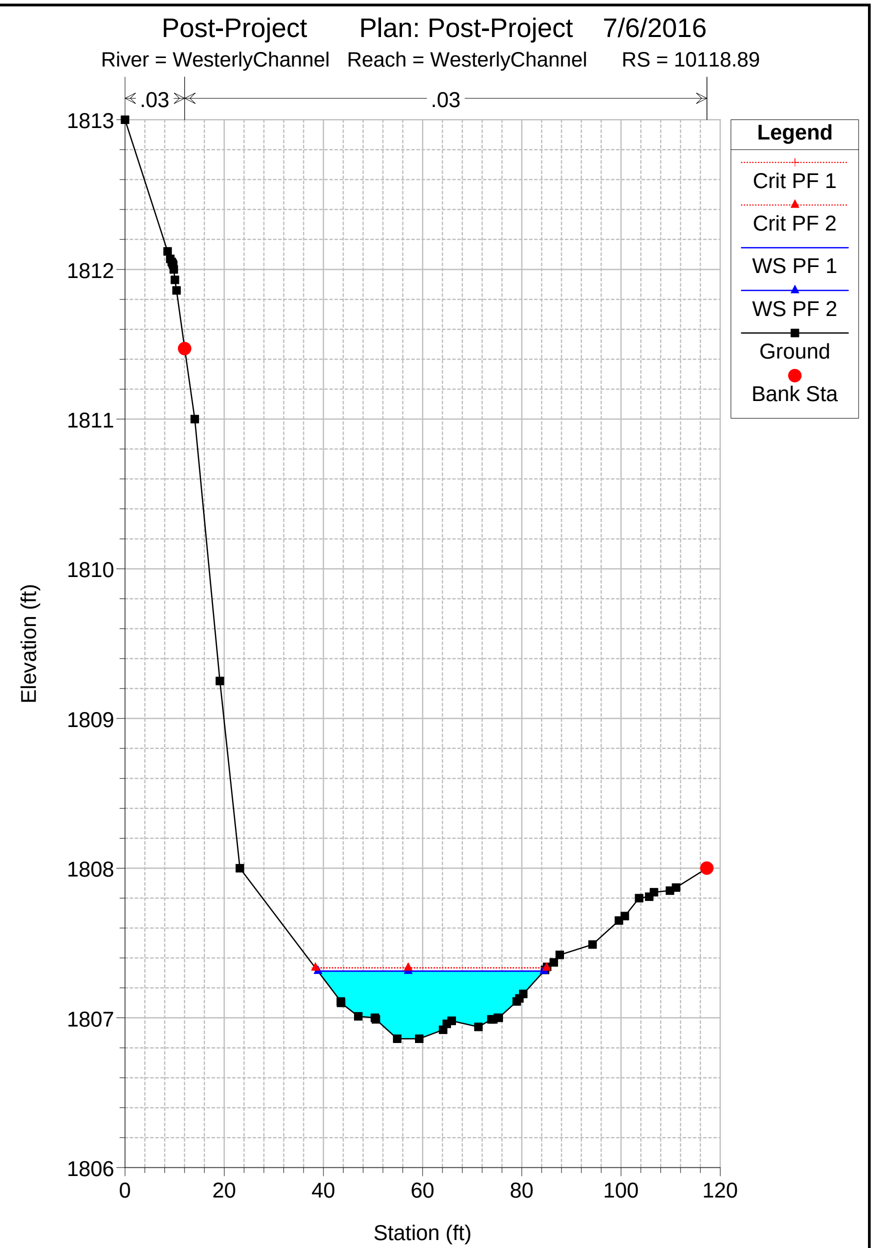

Post-Project Plan: Post-Project 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10322.51
.03
Legend
WS PF 1
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
1822
1820
1818
1816
1814
1812
0
20
40
60
80
100
120
140
160
180


Post-Project Plan: Post-Project 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10266.07 Culv
.03
Legend
WS PF 1
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
1824
1822
1820
1818
1816
1814
1812
0
20
40
60
80
100
120
140
160
180


Post-Project Plan: Post-Project 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10266.07 Culv
.03
Legend
WS PF 1
Crit PF 1
Crit PF 2
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)


Post-Project Plan: Post-Project 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10209.63
.03
Legend
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)


Post-Project Plan: Post-Project 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10162.99
.03
.03
Legend
Crit PF 1
Crit PF 2
WS PF 2
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1815
1814
1813
1812
1811
1810
1809
1808
1807
0
20
40
60
80
100
120
140


Post-Project Plan: Post-Project 7/6/2016
River = WesterlyChannel Reach = WesterlyChannel RS = 10118.89
.03
.03
Legend
Crit PF 1
Crit PF 2
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
1813
1812
1811
1810
1809
1808
1807
1806
0
20
40
60
80
100
120

APPENDIX I: IRONWOOD AVENUE NORMAL DEPTH CAPACITIES

APPENDIX I1: IRONWOOD AVENUE – NORTH SIDE

Worksheet for Ironwood Street Capacity-North

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.01690	ft/ft
Normal Depth	0.53	ft
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	1860.00
0+00.11	1859.90
0+01.25	1859.00
0+01.92	1858.34
0+02.26	1858.00
0+02.65	1857.64
0+03.29	1857.00
0+04.19	1856.10
0+04.30	1856.00
0+04.47	1855.84
0+05.39	1855.00
0+08.87	1854.47
0+11.71	1854.53
0+33.30	1855.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1860.00)	(0+08.87, 1854.47)	0.030
(0+08.87, 1854.47)	(0+33.30, 1855.00)	0.015

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Worksheet for Ironwood Street Capacity-North

Results

Discharge		33.59	ft³/s
Elevation Range	1854.47 to 1860.00 ft		
Flow Area		7.42	ft²
Wetted Perimeter		27.96	ft
Hydraulic Radius		0.27	ft
Top Width		27.91	ft
Normal Depth		0.53	ft
Critical Depth		0.62	ft
Critical Slope		0.00643	ft/ft
Velocity		4.53	ft/s
Velocity Head		0.32	ft
Specific Energy		0.85	ft
Froude Number		1.55	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.53	ft
Critical Depth	0.62	ft
Channel Slope	0.01690	ft/ft
Critical Slope	0.00643	ft/ft

APPENDIX I2: IRONWOOD AVENUE – SOUTH SIDE

Worksheet for Ironwood Street Capacity-South

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.01690	ft/ft
Normal Depth	0.59	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1855.00
0+00.99	1854.99
0+01.65	1854.97
0+02.33	1854.95
0+07.64	1854.78
0+15.01	1854.47
0+21.95	1854.18
0+25.47	1854.04
0+26.18	1854.00
0+26.18	1854.50
0+38.37	1854.59

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1855.00)	(0+38.37, 1854.59)	0.013

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	21.56	ft^3/s
Elevation Range	1854.00 to 1855.00 ft	

Worksheet for Ironwood Street Capacity-South

Results

Flow Area		4.65	ft^2
Wetted Perimeter		26.73	ft
Hydraulic Radius		0.17	ft
Top Width		26.21	ft
Normal Depth		0.59	ft
Critical Depth		0.69	ft
Critical Slope		0.00397	ft/ft
Velocity		4.63	ft/s
Velocity Head		0.33	ft
Specific Energy		0.92	ft
Froude Number		1.94	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.59	ft
Critical Depth	0.69	ft
Channel Slope	0.01690	ft/ft
Critical Slope	0.00397	ft/ft

APPENDIX J: ONSITE TRIBUTARY AREA YIELD CALCULATIONS

APPENDIX J1: YIELD CALCULATION SUMMARY TABLES

ORIGINAL AREA NAME	ACRES	100 YR CFS	YIELD	NEW AREA NAMES	ACRES	FLOW RATE PER YIELD
A8	5.32	10.91	2.05	A8-1	3.31	6.79
				A8-2	2.01	4.12
				TOTAL AREA	**5.32**	

ORIGINAL AREA NAME	ACRES	100 YR CFS	YIELD	NEW AREA NAMES	ACRES	FLOW RATE PER YIELD
A10	2.75	6.15	2.24	A10-1	2.7	6.04
				TOTAL AREA	**2.7**	

ORIGINAL AREA NAME	ACRES	100 YR CFS	YIELD	NEW AREA NAMES	ACRES	FLOW RATE PER YIELD
A11	4.57	10.20	2.23	A11-1	2.48	5.53
				A11-2	2.14	4.78
				TOTAL AREA	**4.62**	

ORIGINAL AREA NAME	ACRES	100 YR CFS	YIELD	NEW AREA NAMES	ACRES	FLOW RATE PER YIELD
A12	1.67	3.57	2.14	A12-1	3.11	6.64
A13	1.44	3.07	2.13			
TOTAL	**3.11**	**6.64**	**2.13**	**TOTAL AREA**	**3.11**	

ORIGINAL AREA NAME	ACRES	100 YR CFS	YIELD	NEW AREA NAMES	ACRES	FLOW RATE PER YIELD
A15	0.48	1.81	3.78	A15-1	2.37	4.75
A16	1.89	3.57	1.89			
TOTAL	**2.37**	**4.75**	**2.00**	**TOTAL AREA**	**2.37**	

ORIGINAL AREA NAME	ACRES	100 YR CFS	YIELD	NEW AREA NAMES	ACRES	FLOW RATE PER YIELD
A26	4.73	9.58	2.02	A26-1	2.16	4.37
				A26-2	1.76	3.56
				A26-3	0.81	1.64
				TOTAL AREA	**4.73**	

ORIGINAL AREA NAME	ACRES	100 YR CFS	YIELD	NEW AREA NAMES	ACRES	FLOW RATE PER YIELD
A28	3.62	6.97	1.93	A28-1	2.75	5.29
				A28-2	0.87	1.68
				TOTAL AREA	**3.62**	

ORIGINAL AREA NAME	ACRES	100 YR CFS	YIELD	NEW AREA NAMES	ACRES	FLOW RATE PER YIELD
A29	5.22	11.18	2.14	A29-1	0.99	2.12
				A29-2	0.82	1.76
				A29-3	1.9	4.07
				A29-4	1.51	3.23
				TOTAL AREA	**5.22**	

ORIGINAL AREA NAME	ACRES	100 YR CFS	YIELD	NEW AREA NAMES	ACRES	FLOW RATE PER YIELD
A30	1.15	2.65	2.31	A30-1	2	3.98
A31	3.01	5.62	1.87	A31-1	0.65	1.29
TOTAL	**4.16**	**8.27**	**1.99**	A31-2	1.51	3.00
				TOTAL AREA	**4.16**	

ORIGINAL AREA NAME	ACRES	100 YR CFS	YIELD	NEW AREA NAMES	ACRES	FLOW RATE PER YIELD
A32	1.16	3.10	2.67	A32-1	2.83	6.68
A33	1.67	3.58	2.14			
TOTAL	**2.83**	**6.68**	**2.36**	**TOTAL AREA**	**2.83**	

ORIGINAL AREA NAME	ACRES	100 YR CFS	YIELD	NEW AREA NAMES	ACRES	FLOW RATE PER YIELD
B1	2.24	6.90	3.08	B1-1	1.34	4.13
				B1-2	0.9	2.77
				TOTAL AREA	**2.24**	

ORIGINAL AREA NAME	ACRES	100 YR CFS	YIELD	NEW AREA NAMES	ACRES	FLOW RATE PER YIELD
B2	1.96	5.81	2.96	B2-1	1.12	3.32
				B2-2	0.84	2.49
				TOTAL AREA	**1.96**	

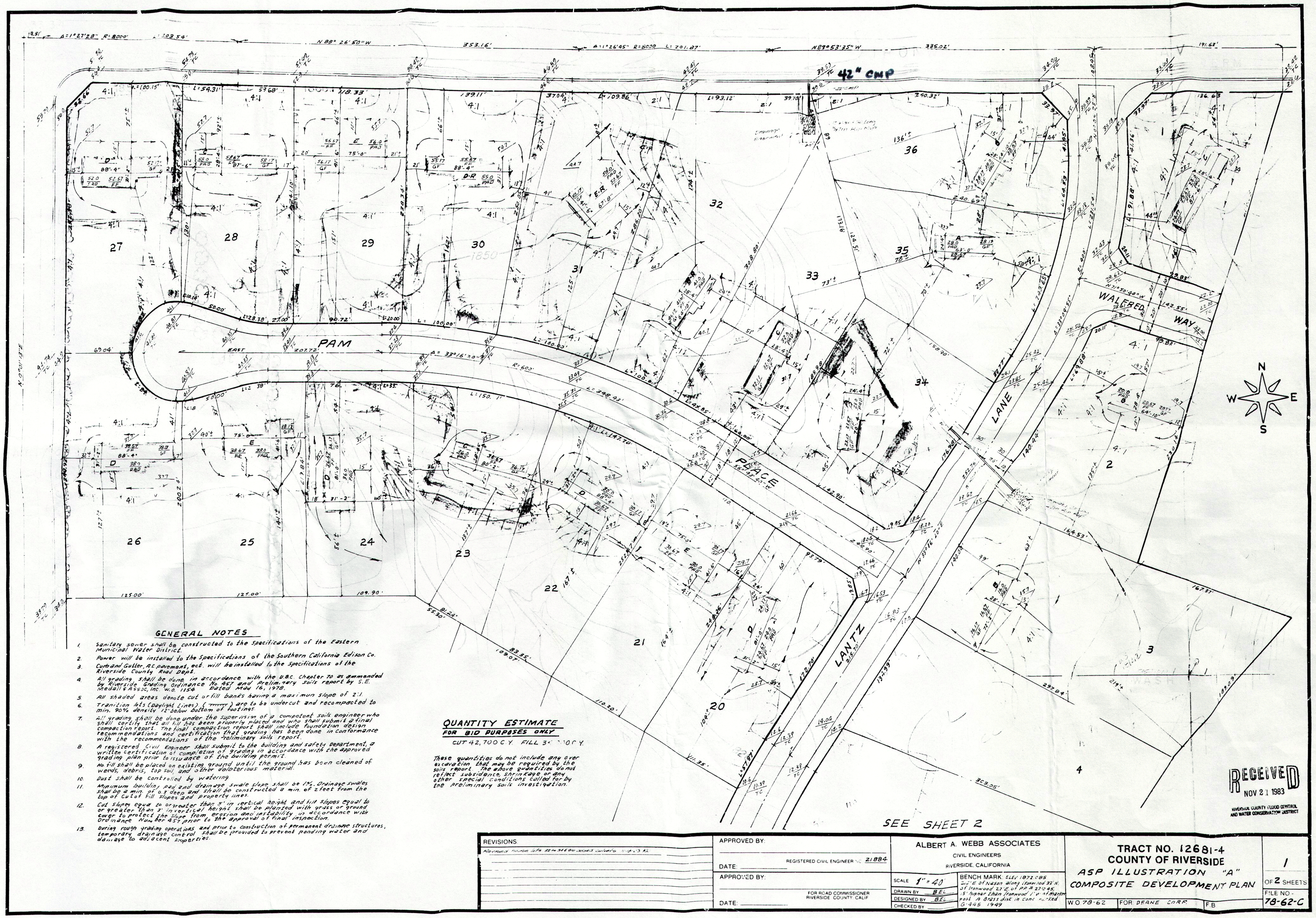
ORIGINAL AREA NAME	ACRES	100 YR CFS	YIELD	NEW AREA NAMES	ACRES	FLOW RATE PER YIELD
B3	2.22	8.00	3.60	B3-1	3.86	12.57
B4	2.97	8.91	3.00	B4-1	1.33	4.33
TOTAL	**5.19**	**16.91**	**3.26**	**TOTAL AREA**	**1.33**	

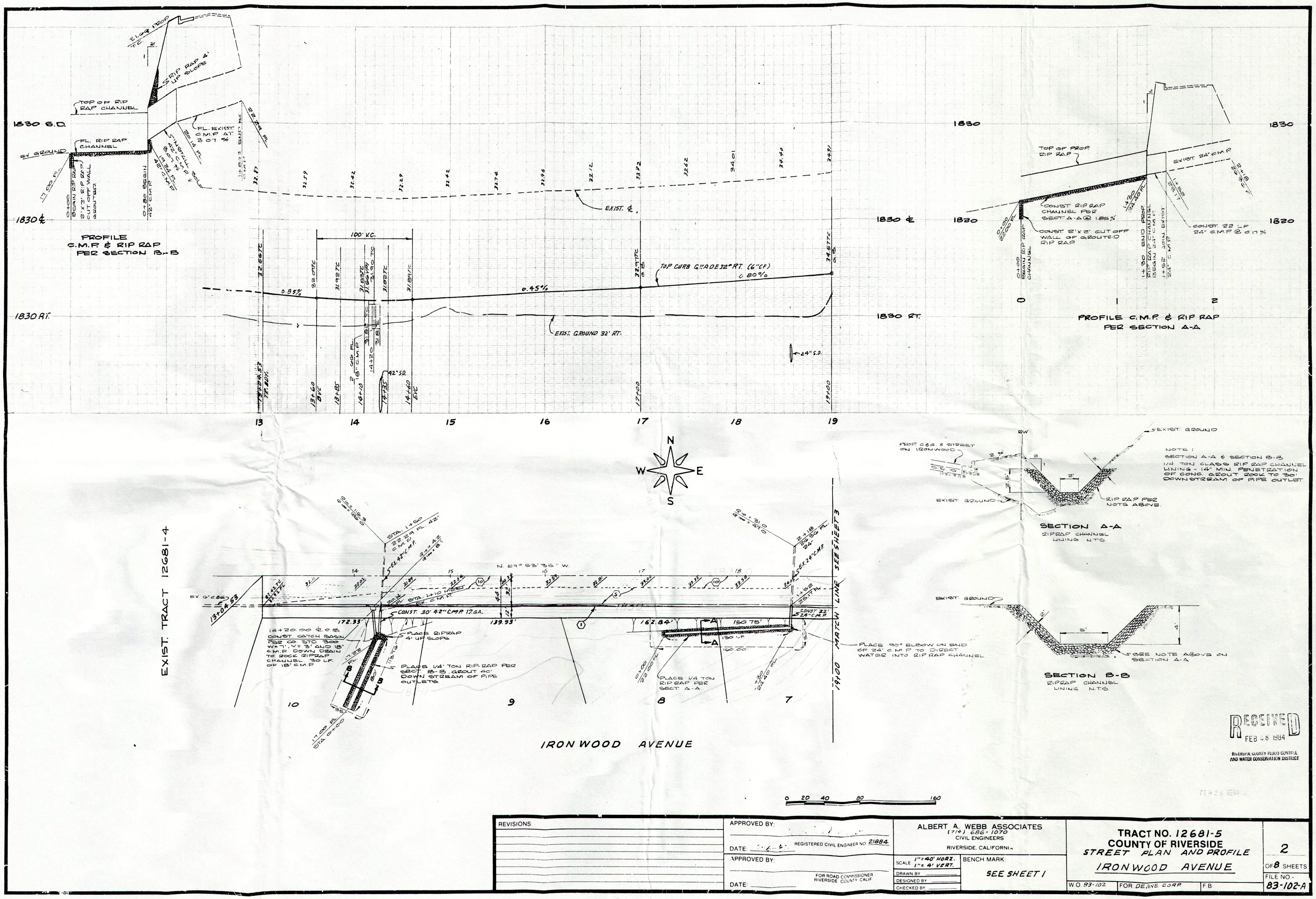
ORIGINAL AREA NAME	ACRES	100 YR CFS	YIELD	NEW AREA NAMES	ACRES	FLOW RATE PER YIELD
B5	2.33	6.11	2.62	B5-1	1.91	5.01
				B5-2	0.42	1.10
				TOTAL AREA	**2.33**	

ORIGINAL AREA NAME	ACRES	100 YR CFS	YIELD	NEW AREA NAMES	ACRES	FLOW RATE PER YIELD
B7	1.06	2.99	2.82	B7-1	1.65	3.68
B8	0.59	1.61	2.73			
TOTAL	**1.65**	**16.91**	**10.25**	**TOTAL AREA**	**1.65**	

EXCERPTS

EXCERPT A: **PAGES FROM TRACT NO. 12681-4 ASP ILLUSTRATION "A" COMPOSITE DEVELOPMENT PLAN (EXISTING CULVERT PLANS)**

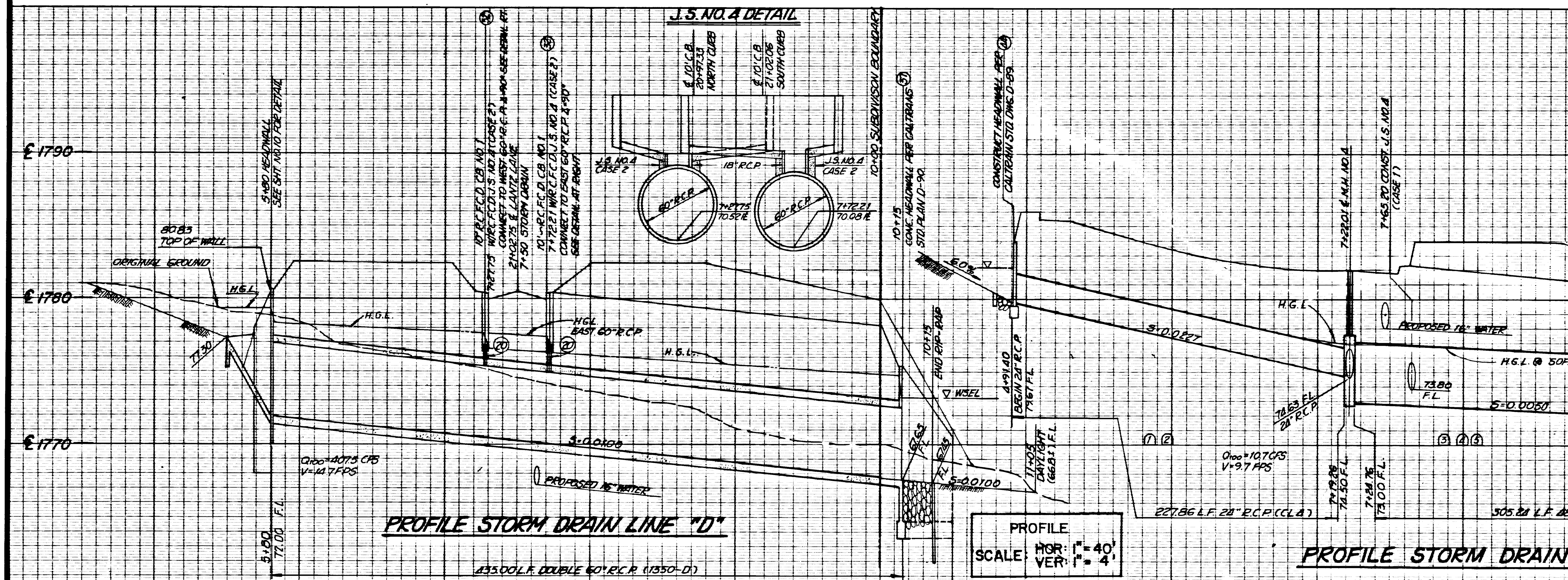

42" CMP
PAM
EAST
PLACE
LANTZ
LANE
WALEFSED WAY
N
W
E
S
GENERAL NOTES
1. Sanitary sewer shall be constructed to the Specifications of the Eastern Municipal Water District.
2. Power will be installed to the Specifications of the Southern California Edison Co.
3. Curb and Gutter, A.C. pavement, ect. will be installed to the Specifications of the Riverside County Road Dept.
4. All grading shall be done in accordance with the U.B.C. Chapter 70 as ammended by Riverside Grading Ordinance No. 457 and Preliminary soils report by S.E. Medall & Assoc, Inc. W.O. 1154 Dated May 16, 1978.
5. All shaded areas denote cut or fill banks having a maximun slope of 2:1.
6. Tranition lots (Daylight Lines). ( ) are to be undercut and recompacted to min. 90% density 12" below bottom of footings.
7. All grading shall be done under the supervision of a competent soils engineer who shall certify that all fill has been properly placed and who shall submit a final compaction report. The final compaction report shall include foundation design recommendations and certification that grading has been done in conformance with the recommendations of the Preliminary soils report.
8. A registered Civil Engineer shall submit to the building and safety Department, a written certification of completion of grading in accordance with the approved grading plan prior to issuance of the building permit.
9. No fill shall be placed on existing ground until the ground has been cleaned of weeds, debris, top soil, and other deleterious material.
10. Dust shall be controlled by watering.
11. Minimum building pad and drainage swale slope shall be 1%. Drainage swales shall be a min. of 0.3' deep and shall be constructed a min. of 2 feet from the top of Cut of fill slopes and property lines.
12. Cut slopes equal to or greater than 5' in vertical height and fill slopes equal to or greater than 3' in vertical height shall be planted with grass or ground cover to protect the slope from erosion and instability in accordance with Ordinance Number 457 prior to the approval of final inspection.
13. During rough grading operations and prior to construction of permanent drainage structures, temporary drainage control shall be provided to prevent ponding water and damage to adjacent properties.
QUANTITY ESTIMATE
FOR BID PURPOSES ONLY
CUT 42,700 C.Y.
These quantities do not include any over excavation that may be required by the soils report. The above quantities do not reflect subsidence, shrinkage or any other special conditions called for by the preliminary soils investigation.
RECEIVED
NOV 21 1983
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
SEE SHEET 2
REVISIONS:
APPROVED BY:
REGISTERED CIVIL ENGINEER NO. 21884
DATE:
APPROVED BY:
FOR ROAD COMMISSIONER RIVERSIDE COUNTY, CALIF
DATE:
ALBERT A. WEBB ASSOCIATES
CIVIL ENGINEERS
RIVERSIDE, CALIFORNIA
SCALE 1" = 40'
DRAWN BY BEL
DESIGNED BY BEL
CHECKED BY
BENCH MARK: ELEV 1872.085
G-445 1949
TRACT NO. 12681-4
COUNTY OF RIVERSIDE
ASP ILLUSTRATION "A"
COMPOSITE DEVELOPMENT PLAN
1
OF 2 SHEETS
FILE NO. -
78-62-C
W.O. 78-62
FOR DEANE CORP.
F.B.



Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

EXCERPT B: EXISTING LINE "D" STORM DRAIN IMPROVEMENT PLANS

J.N.10399



CONSTRUCTION NOTES

(32) CONST. J.S. NO. 4 PER R.C.F.C.W.C.D. STD. DWG. NO. J.S. 229.

(33) CONST. M.H. NO. 4 PER R.C.F.C.W.C.D. STD. DWG. NO. M.H. 254.

(35) CONST. LOCAL DEPRESSION PER R.C.F.C.W.C.D. STD. DWG. NO. LD201

(37) CONST. HEADWALL PER CALTRANS STD. NO. D-90 (MODIFIED AS NOTED)

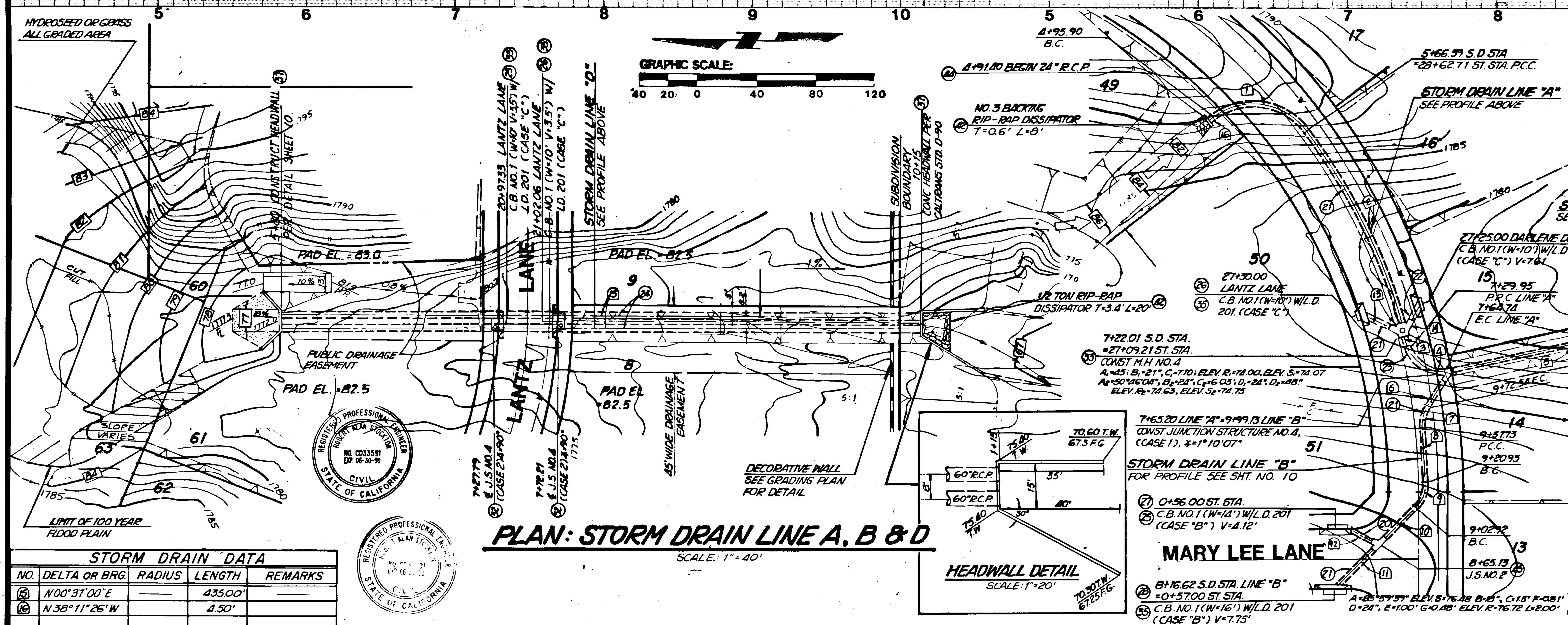
(38) CONST. WINGWALL PER CALTRANS STD. NO. D-86-B..................

(39) CONST. FLARED END SECTION PER CAL TRANS STD. NO. D-94.........

(42) PLACE RIP RAP ENERGY DISSIPATOR AS PER DETAIL ON SHEET 3......

(44) THE CONSTSRUCTION OF HEADWALL PER CALTRANS STANDARD NO. D-89..

(45) THE CONSTRUCTION OF J.S. NO. 2 PER R.C.F.C.W.C.D. STD. DWG. NO. J.S. 227..............................



STORM DRAIN DATA				
NO.	DELTA OR BRG.	RADIUS	LENGTH	TANGENT
1	Δ=90°00'00"	45.00'	70.69'	45.00'
2	Δ=21°35'54"	405.00'	152.67'	77.25'
3	Δ= 0°44'03"	405.00'	5.19'	2.60'
4	Δ= 88°35'34"	22.50'	34.79'	21.95'
5	N: 11°40'19"W	——	265.26'	——
6	N=56°40'19"W	——	23.76'	——
7	Δ= 38°43'36"	22.50	15.21'	7.91
8	Δ: 05°09'00"	405.00	36.40'	18.21'
9	Δ=45°51'55"	22.50'	18.01'	9.52'
10	N=44°23'00"W	——	37.78'	——
11	N=44°23'00"W	——	40.51'	——
12	N=41°36'39"E	——	27.88'	——
13	N=22°46'03"E	——	29.94'	——
14	N=61°27'53"W	——	19.77'	——

STORM DRAIN DATA				
NO.	DELTA OR BRG.	RADIUS	LENGTH	REMARKS
15	N00°37'00"E	——	435.00'	——
16	N38°11'26"W		4.50'	

CONSTRUCTION NOTES

(20) THE INSTALLATION OF 18" R.C.P. (CL. IV)......................

(21) THE INSTALLATION OF 24" R.C.P. (CL. IV)......................

(22) THE INSTALLATION OF 21" R.C.P. (1350-D)......................

(23) THE INSTALLATION OF 48" R.C.P. (1350-D)......................

(24) THE INSTALLATION OF 60" R.C.P. (1350-D)......................

(26) CONST. C.B. NO. 1 PER R.C.F.C.W.C.D. STD. DWG. NO. CB100 (W=10')

(27) CONST. C.B. NO. 1 PER R.C.F.C.W.C.D. STD. DWG. NO. CB100 (W=14')

(28) CONST. C.B. NO. 1 PER R.C.F.C.W.C.D. STD. DWG. NO. CB100 (W=16')

(30) CONST. C.B. NO. 1 PER R.C.F.C.W.C.D. STD. DWG. NO. CB100 (W=20')

BENCH MARK

LOCATION: 215' E. OF MASON ALONG IRONWOOD 33' N. OF IRONWOOD 27' E. OF PP 271045 15' HIGHER THAN IRONWOOD 1' W. OF MARKER POST. A BRASS IN CONC. MARKED G-445, 1949

ELEVATION: 1672.960

REFERENCE BLOCK:

DESIGNED BY

DRAWN BY:

CHECKED BY

REVISIONS				
MARK	DATE	INITIAL	DESCRIPTION	APP'VD

APPROVED BY: ROBERT STOCKTON R.C.E. 33591

DATE: 3-18-88

APPROVED BY: TIM D. SERLET R.C.E. 28738 EXP. 9/30/90 CITY ENGINEER, CITY OF MORENO VALLEY

DATE: 3/31/87

RICK ENGINEERING COMPANY
CIVIL ENGINEERS : PLANNING CONSULTANTS : SURVEYORS
3120 CHICAGO AVE SUITE 100 RIVERSIDE, CA 92507 (714) 782-0707

SCALE: HOR: 1" 40' VERT: 1" 4'

DATE: 3-21-88

CITY OF MORENO VALLEY

STORM DRAIN PLAN PROFILE FOR TRACT NO. 21958 PACIFIC RANCH II

SHEET: 9 OF 11 SHTS.

FILE NO.

J.N.10399

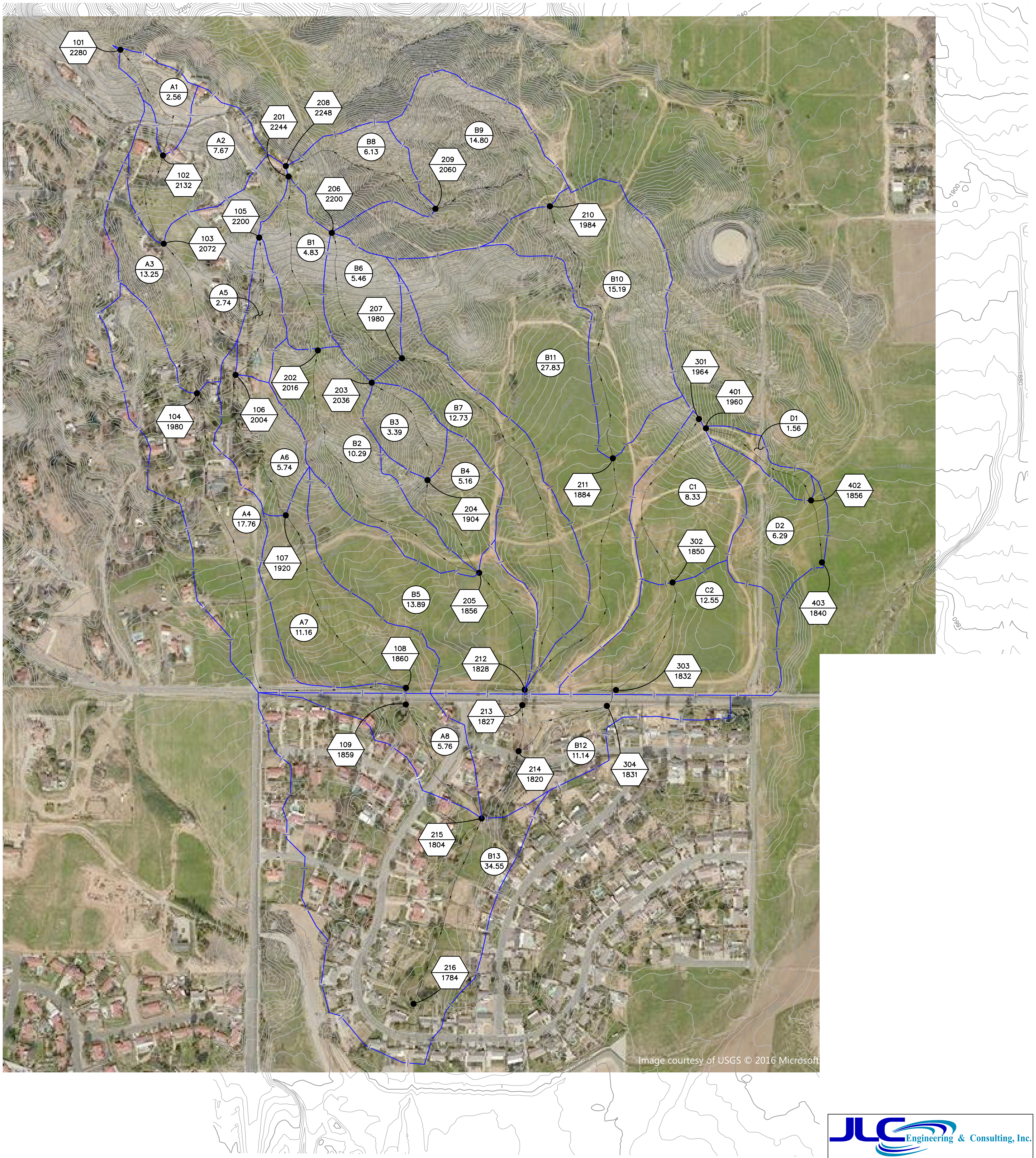
EXHIBITS

EXHIBIT A: **PRE-PROJECT CONDITION OFFSITE AND ONSITE RATIONAL METHOD HYDROLOGY MAP**

TENTATIVE TRACT MAP NO. 37001

IN THE CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

EXISTING CONDITION HYDROLOGY MAP



LEGEND:

Symbol	Description
X.X / X.X	NODE/CONCENTRATION POINT, FLOWLINE ELEVATION
XXXX.X	APPROXIMATE INVERT ELEVATION
XXX / X.X	SUB AREA, ACRES
L=XXX'	FLOW DISTANCE
	FLOW PATH
	WATERSHED BOUNDARY

N

GRAPHIC SCALE

200' 0 100' 200' 400'

1" = 200'

EXHIBIT "A"

TTM 37001

EXISTING CONDITION HYDROLOGY MAP

JLC Engineering & Consulting, Inc.

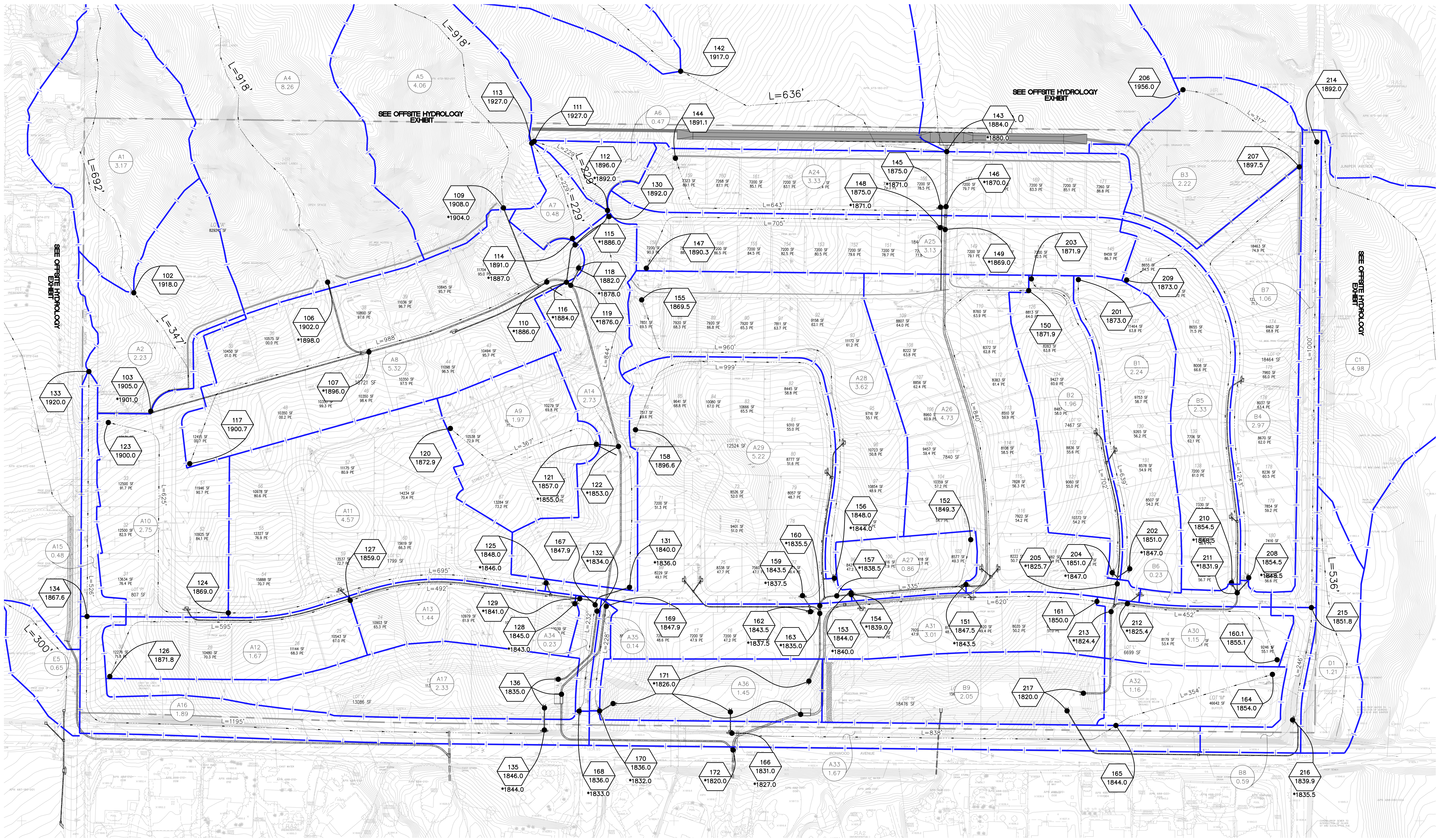
36263 CALLE DE LOBO
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

EXHIBIT B: POST-PROJECT CONDITION ONSITE AND OFFSITE RATIONAL METHOD HYDROLOGY MAP

TENTATIVE TRACT MAP NO. 37001

CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

ONSITE RATIONAL METHOD HYDROLOGY MAP



LEGEND:

- XXX / XXXX — NODE/CONCENTRATION POINT / FLOWLINE ELEVATION
- *XXXX.X — PIPEFLOW ELEVATION
- XX / XX.XX — SUB AREA / ACRES
- L=XXX' — FLOW DISTANCE
- FLOW PATH
- WATERSHED BOUNDARY

JLC Engineering & Consulting, Inc.
36263 CALLE DE LOBO
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

EXHIBIT "B-1"

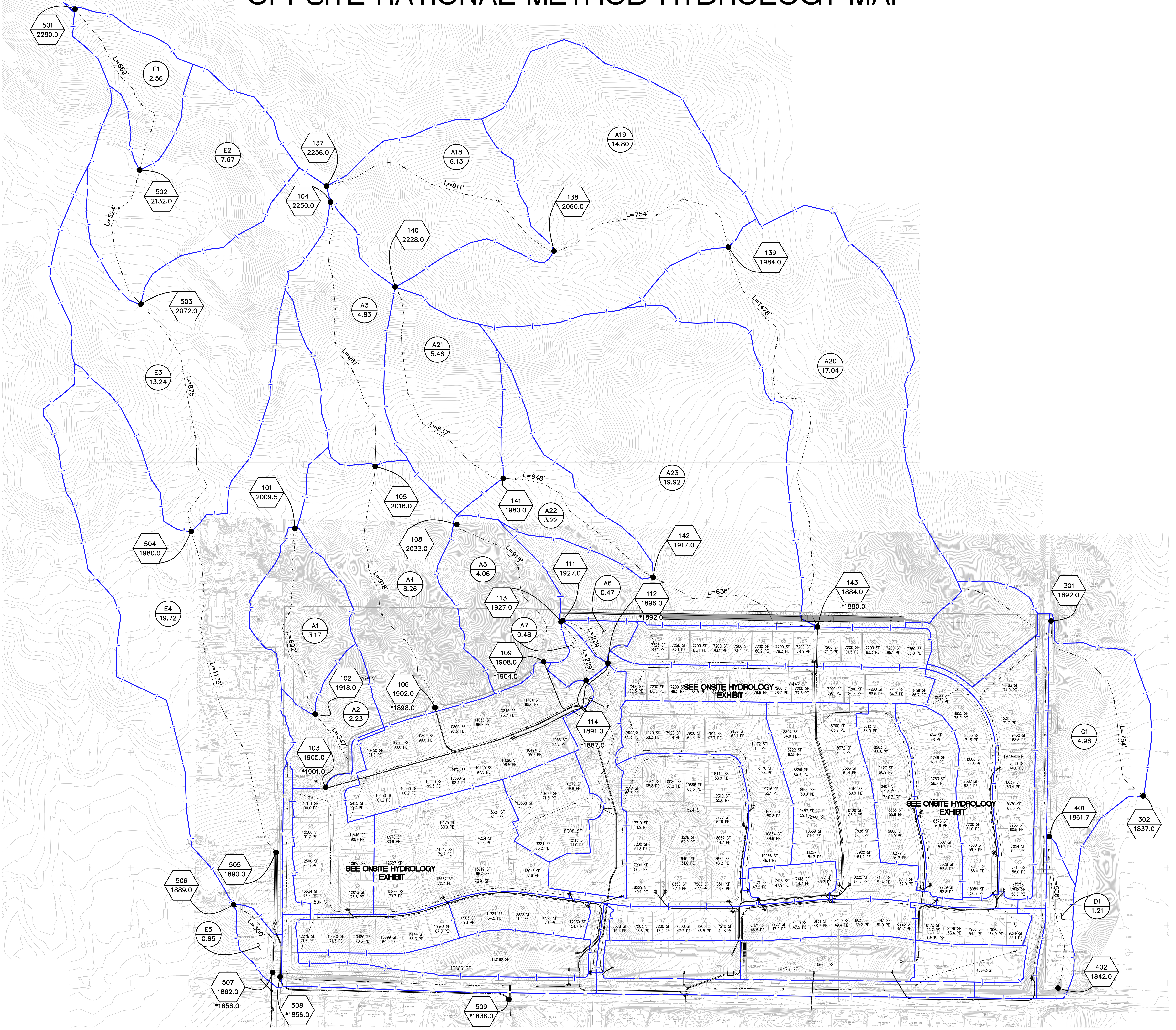
TTM 37001

ONSITE RATIONAL METHOD HYDROLOGY MAP

TENTATIVE TRACT MAP NO. 37001

CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

OFFSITE RATIONAL METHOD HYDROLOGY MAP



LEGEND:

XXX / XXXX	NODE/CONCENTRATION POINT / FLOWLINE ELEVATION
*XXXX.X	PIPEFLOW ELEVATION
XX / XX.XX	SUB AREA / ACRES
L=XXX'	FLOW DISTANCE

FLOW PATH
WATERSHED SUB-BOUNDARY
WATERSHED BOUNDARY

GRAPHIC SCALE
120' 0 60' 120' 240'
1" = 120'

JLC Engineering & Consulting, Inc.
36263 CALLE DE LOBO
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

EXHIBIT "B-2"

TTM 37001

OFFSITE RATIONAL METHOD HYDROLOGY MAP

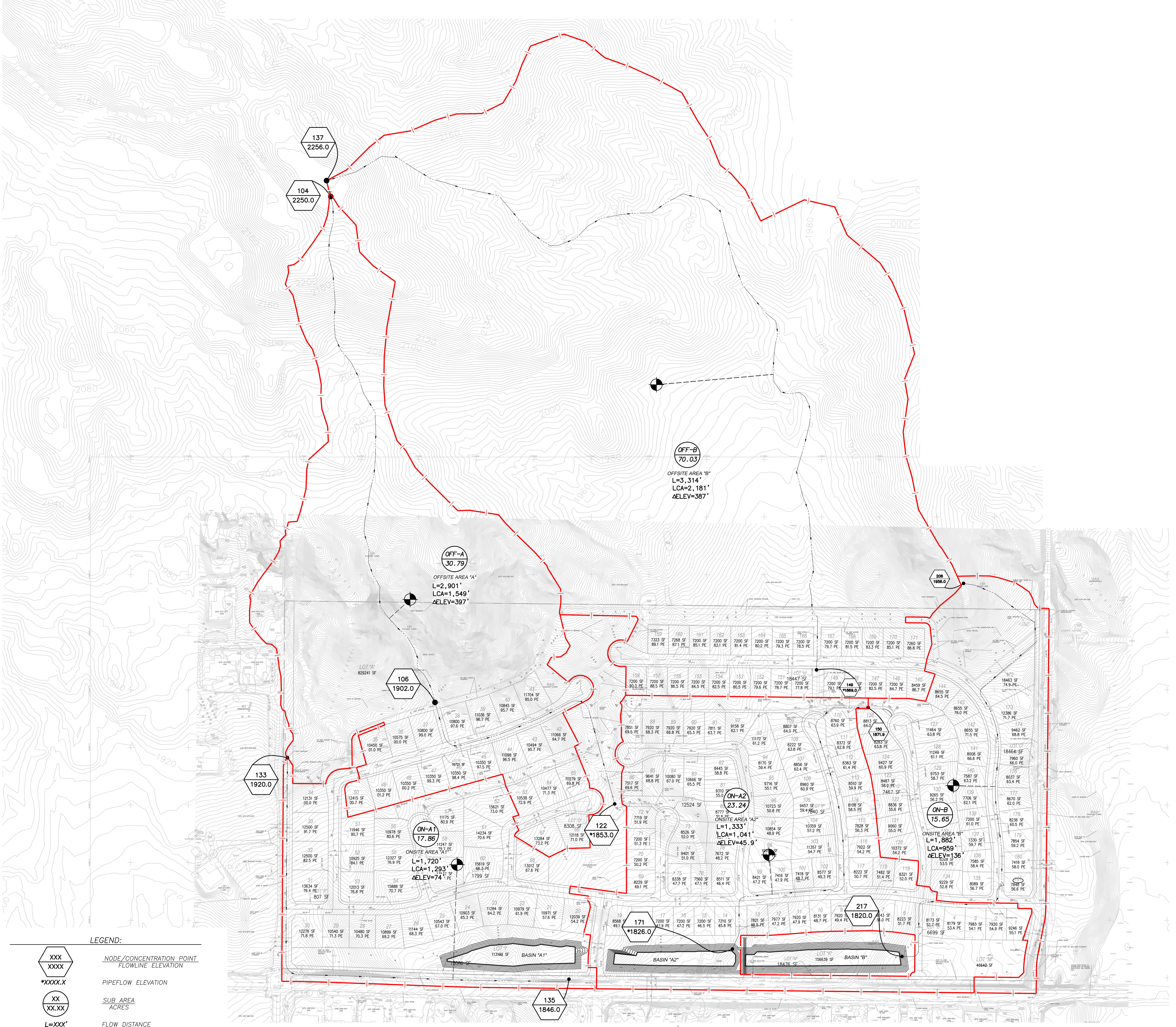
EXHIBIT C: UNIT HYDROGRAPH METHOD HYDROLOGY MAP – 100-YEAR WATERSHED

SHEET 1 OF 1

TENTATIVE TRACT MAP NO. 37001

CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

UNIT HYDROGRAPH HYDROLOGY MAP - 100 YEAR



LEGEND:

XXX / XXXX	NODE/CONCENTRATION POINT FLOWLINE ELEVATION
*XXXX.X	PIPEFLOW ELEVATION
XX / XX.XX	SUB AREA ACRES
L=XXX'	FLOW DISTANCE
	FLOW PATH
	WATERSHED BOUNDARY
	PERPENDICULAR LOCATION FROM FLOW LINE TO CENTROID
	CENTROID
L=#####'	TOTAL FLOW LENGTH
LCA=###'	CENTROID LENGTH
ΔELEV=##'	DIFFERENCE IN ELEVATION

GRAPHIC SCALE
120' 0 60' 120' 240'
1" = 120'

JLC Engineering & Consulting, Inc.
36263 CALLE DE LOBO
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

EXHIBIT "C"

TTM 37001

UNIT HYDROGRAPH HYDROLOGY MAP - 100 YEAR

Drawing Name: O:\150.06.14\Engineering\Hydrology_Plan\Exhibits\Exhibit C - Unit Hydrograph Map-1.dwg
Last Opened: Jun 15, 2016 - 3:51pm by bwiltzen

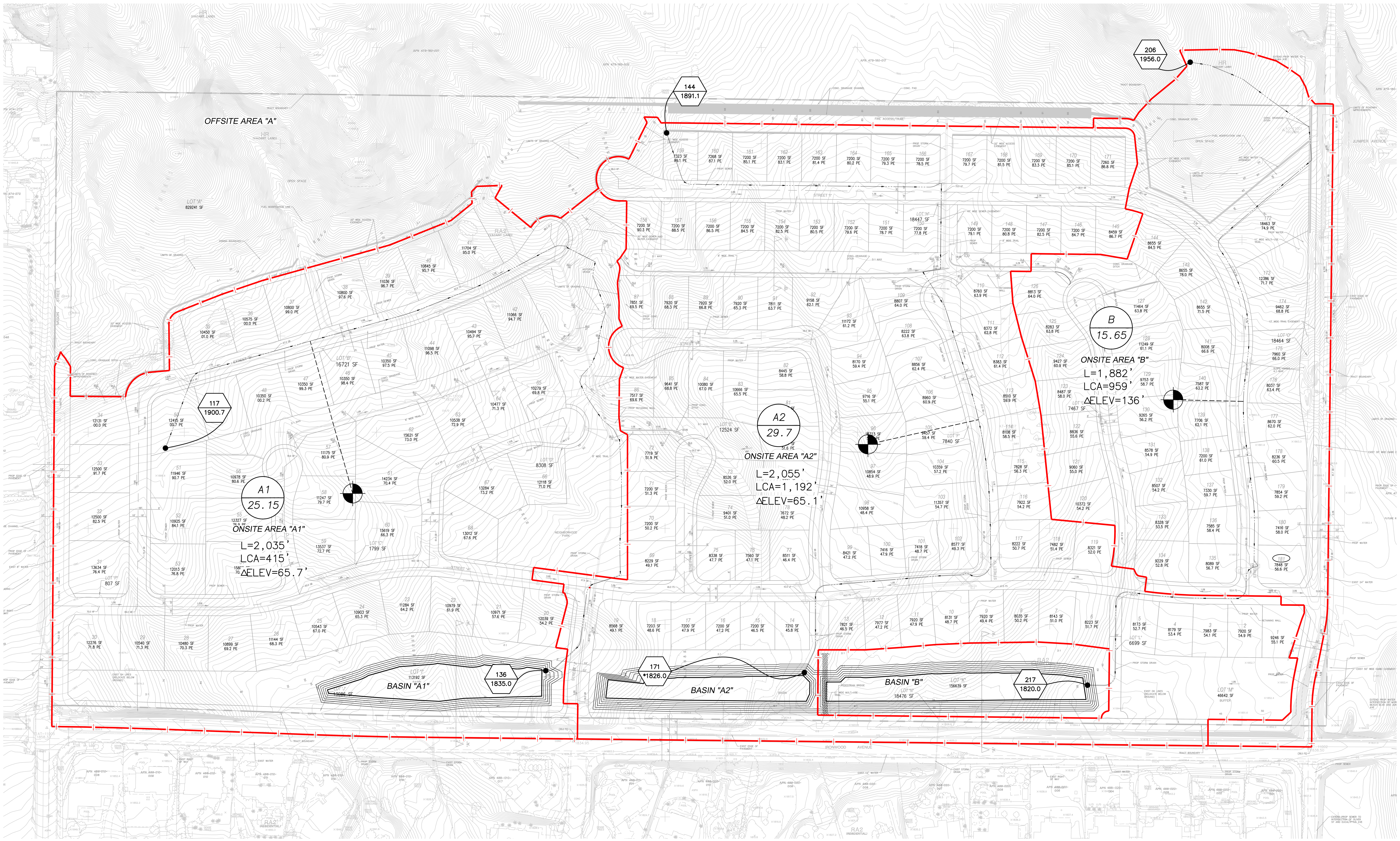
Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0083))

EXHIBIT D: **UNIT HYDROGRAPH METHOD HYDROLOGY MAP – 2-YEAR, 24-HOUR ONSITE WATERSHED**

TENTATIVE TRACT MAP NO. 37001

CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

ONSITE UNIT HYDROGRAPH HYDROLOGY MAP - 2 YEAR - 24HR



LEGEND:

XXX / XXXX	NODE/CONCENTRATION POINT / FLOWLINE ELEVATION
*XXXX.X	PIPEFLOW ELEVATION
XX / XX.XX	SUB AREA / ACRES
L=XXX'	FLOW DISTANCE
	FLOW PATH
	WATERSHED BOUNDARY
	PERPENDICULAR LOCATION FROM FLOW LINE TO CENTROID
	CENTROID
L=#####'	TOTAL FLOW LENGTH
LCA=###'	CENTROID LENGTH
ΔELEV=##'	DIFFERENCE IN ELEVATION

GRAPHIC SCALE

1" = 70'

JLC Engineering & Consulting, Inc.
36263 CALLE DE LOBO
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

EXHIBIT "D"

TTM 37001

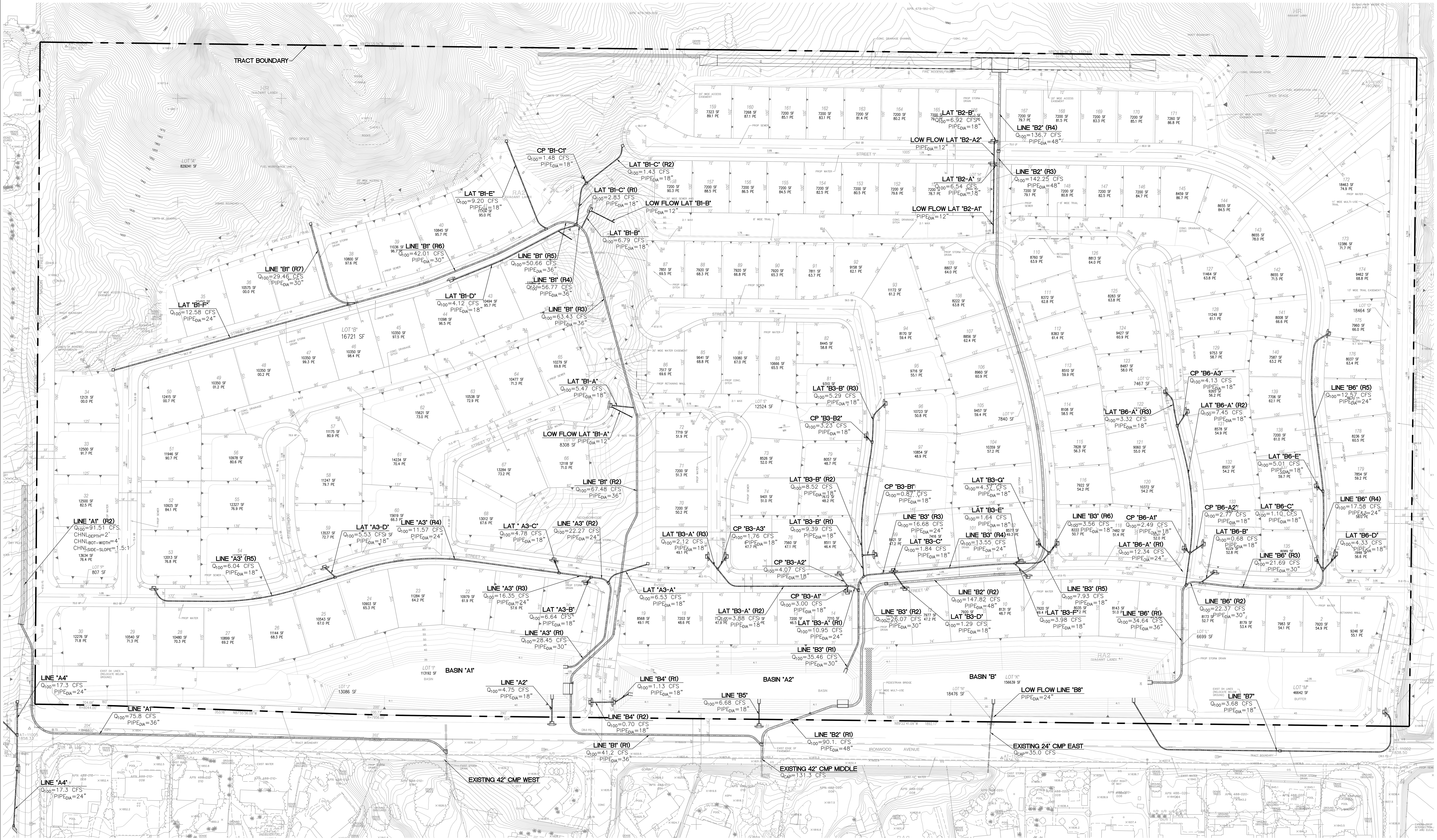
ONSITE UNIT HYDROGRAPH HYDROLOGY MAP - 2YR - 24HR

EXHIBIT E: DRAINAGE FACILITIES MAP

TENTATIVE TRACT MAP NO. 37001

CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

DRAINAGE FACILITIES MAP



Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

LEGEND:

———	TRACT BOUNDARY
Q_{100} =	FLOW RATE FROM HYDROLOGY STUDY 100-YEAR STORM EVENT
PIPE$_{DIA}$ =	PIPE DIAMETER
Q_{CAP} =	PIPE FLOW RATE CAPACITY
CHNL$_{DEPTH}$ =	TRAPEZOIDAL CHANNEL DEPTH
CHNL$_{BOT-WIDTH}$ =	TRAPEZOIDAL CHANNEL BOTTOM WIDTH
CHNL$_{SIDE-SLOPE}$ =	TRAPEZOIDAL CHANNEL SIDE SLOPES

N

GRAPHIC SCALE
60' 0 30' 60' 120'
1" = 60'

JLC Engineering & Consulting, Inc.
36263 CALLE DE LOBO
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

EXHIBIT "E"

TTM 37001

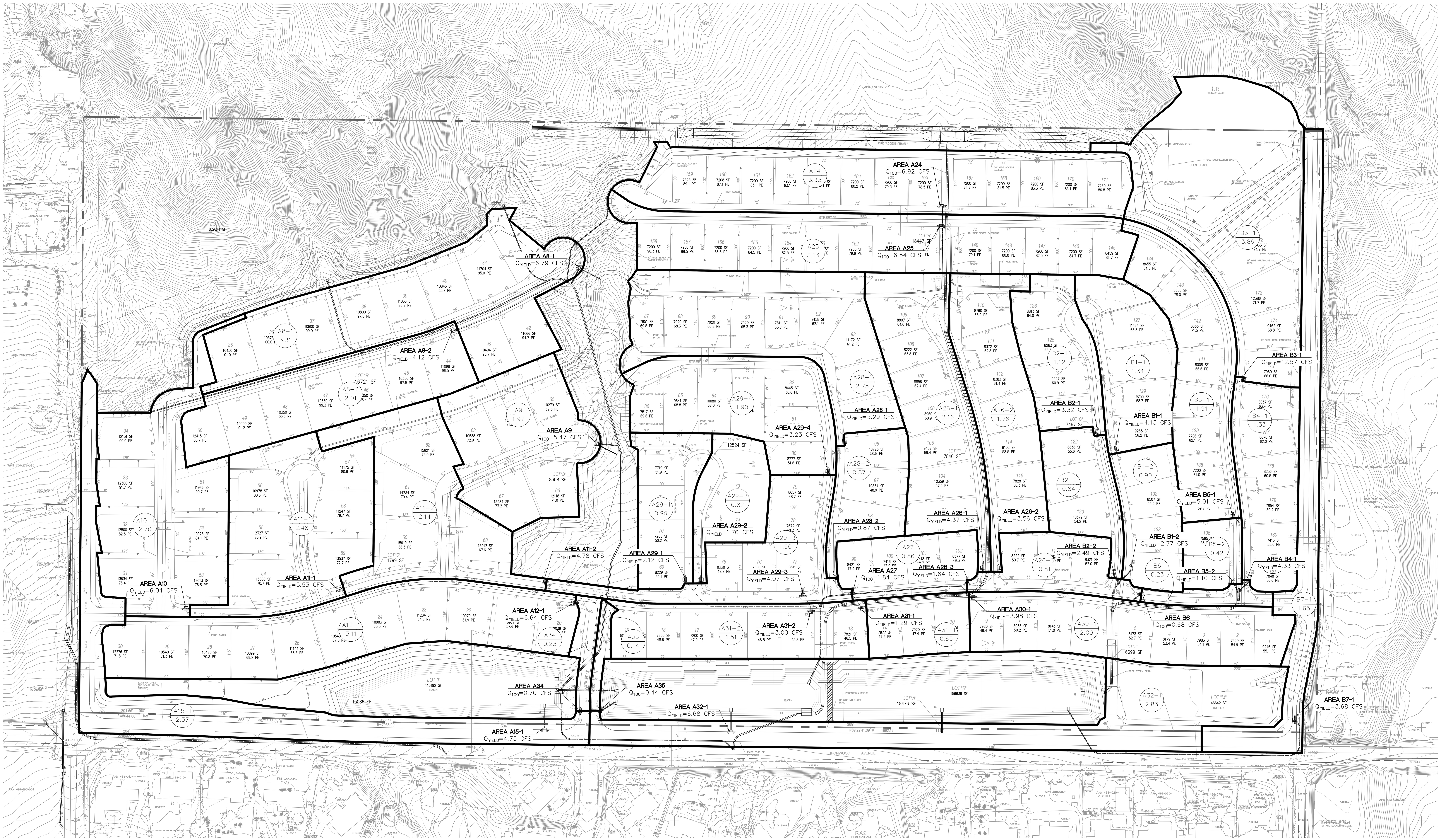
DRAINAGE FACILITIES MAP

EXHIBIT F: ONSITE TRIBUTARY AREA YIELD MAP

TENTATIVE TRACT MAP NO. 37001

CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

ONSITE TRIBUTARY AREA YIELD MAP



NOTE 1: THE FLOW RATE YIELD WAS DETERMINED BY DIVIDING THE FLOW RATE OF ANY GIVEN AREA BY THE AREA THAT PRODUCED THE SPECIFIED FLOW RATE. THIS YIELD VALUE WAS THEN MULTIPLIED BY THE AREA TRIBUTARY TO THE SPECIFIED CATCH BASIN. THE VALUES WERE OBTAINED FROM THE 100 YEAR RATIONAL METHOD HYDROLOGY CALCULATIONS. SEE APPENDIX B FOR HYDROLOGY CALCULATIONS AND APPENDIX J FOR AREA BREAKDOWN AND YIELD CALCULATIONS.

LEGEND:

Symbol	Description
XXX / X.X (circle)	SUB AREA ACRES
(heavy line)	WATERSHED BOUNDARY
AREA XXX Q_{YIELD}=XXXX CFS	SUB AREA DESIGNATION FLOW RATE YIELD PER AREA (SEE NOTE 1)
AREA XXX Q_{100}=XXXX CFS	SUB AREA DESIGNATION FLOW RATE PER RATIONAL METHOD–100 YEAR STORM EVENT

N

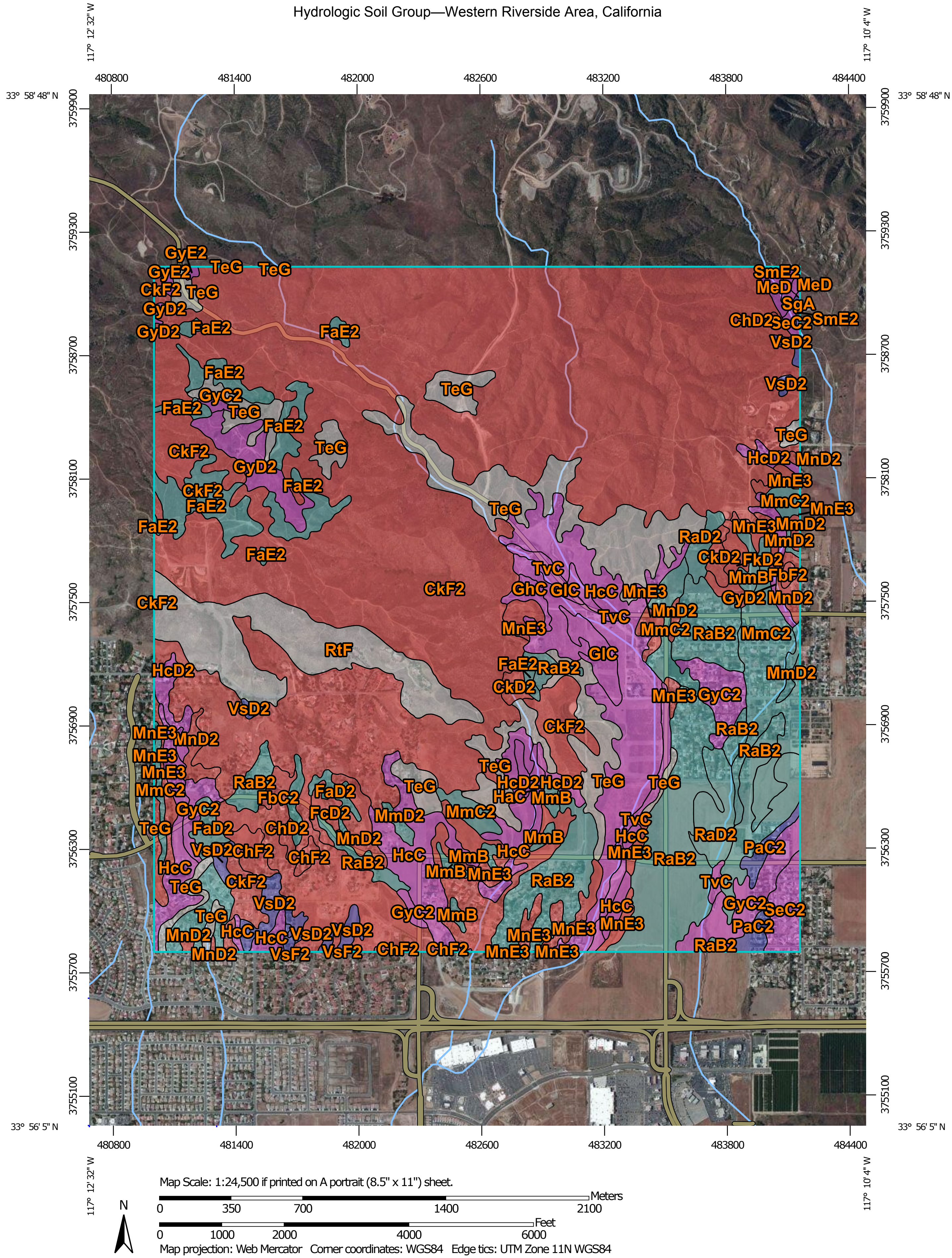
GRAPHIC SCALE
70' 0 35' 70' 140'
1" = 70'

JLC Engineering & Consulting, Inc.
36263 CALLE DE LOBO
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

EXHIBIT "F"
TTM 37001
ONSITE TRIBUTARY AREA YIELD MAP

EXHIBIT G: HYDROLOGIC SOILS MAP

Hydrologic Soil Group—Western Riverside Area, California



Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 7, Sep 17, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 3, 2010—Jul 3, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Western Riverside Area, California (CA679)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
ChD2	Cieneba sandy loam, 8 to 15 percent slopes, eroded	D	3.3	0.1%
ChF2	Cieneba sandy loam, 15 to 50 percent slopes, eroded	D	11.3	0.4%
CkD2	Cieneba rocky sandy loam, 8 to 15 percent slopes, eroded	D	9.4	0.4%
CkF2	Cieneba rocky sandy loam, 15 to 50 percent slopes, erod ed	D	1,263.9	48.5%
FaD2	Fallbrook sandy loam, 8 to 15 percent slopes, eroded	C	17.2	0.7%
FaE2	Fallbrook sandy loam, 15 to 25 percent slopes, eroded	C	68.6	2.6%
FbC2	Fallbrook sandy loam, shallow, 5 to 8 percent slopes, e roded	D	4.9	0.2%
FbF2	Fallbrook sandy loam, shallow, 15 to 35 percent slopes, eroded	D	3.6	0.1%
FcD2	Fallbrook rocky sandy loam, shallow, 8 to 15 percent sl opes, eroded	D	6.2	0.2%
FkD2	Fallbrook fine sandy loam, shallow, 8 to 15 percent slo pes, eroded	D	9.4	0.4%
GhC	Gorgonio loamy sand, 0 to 8 percent slopes	A	5.5	0.2%
GlC	Gorgonio loamy sand, deep, 2 to 8 percent slopes	A	15.8	0.6%
GyC2	Greenfield sandy loam, 2 to 8 percent slopes, eroded	A	56.3	2.2%
GyD2	Greenfield sandy loam, 8 to 15 percent slopes, eroded	A	31.4	1.2%
GyE2	Greenfield sandy loam, 15 to 25 percent slopes, eroded	A	2.6	0.1%

Hydrologic Soil Group— Summary by Map Unit — Western Riverside Area, California (CA679)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
HaC	Hanford loamy fine sand, 0 to 8 percent slopes	A	5.3	0.2%
HcC	Hanford coarse sandy loam, 2 to 8 percent slopes	A	208.4	8.0%
HcD2	Hanford coarse sandy loam, 8 to 15 percent slopes, erod ed	A	24.0	0.9%
MeD	Metz loamy sand, channeled, 0 to 15 percent slopes	A	5.4	0.2%
MmB	Monserate sandy loam, 0 to 5 percent slopes	C	15.0	0.6%
MmC2	Monserate sandy loam, 5 to 8 percent slopes, eroded	C	103.8	4.0%
MmD2	Monserate sandy loam, 8 to 15 percent slopes, eroded	C	7.4	0.3%
MnD2	Monserate sandy loam, shallow, 5 to 15 percent slopes, eroded	D	29.2	1.1%
MnE3	Monserate sandy loam, shallow, 15 to 25 percent slopes, severely eroded	D	95.8	3.7%
PaC2	Pachappa fine sandy loam, 2 to 8 percent slopes, eroded	B	11.5	0.4%
RaB2	Ramona sandy loam, 2 to 5 percent slopes, eroded	C	207.6	8.0%
RaD2	Ramona sandy loam, 8 to 15 percent slopes, eroded	C	28.2	1.1%
RtF	Rockland		101.5	3.9%
SeC2	San Emigdio fine sandy loam, 2 to 8 percent slopes, ero ded	A	19.8	0.8%
SgA	San Emigdio loam, 0 to 2 percent slopes	A	0.1	0.0%
SmE2	San Timoteo loam, 8 to 25 percent slopes, eroded	B	1.6	0.1%
TeG	Terrace escarpments		185.1	7.1%
TvC	Tujunga loamy sand, channeled, 0 to 8 percent slopes	A	22.2	0.9%

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Hydrologic Soil Group— Summary by Map Unit — Western Riverside Area, California (CA679)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
VsD2	Vista coarse sandy loam, 8 to 15 percent slopes, eroded	B	24.9	1.0%
VsF2	Vista coarse sandy loam, 15 to 35 percent slopes, erode d	B	1.4	0.1%
Totals for Area of Interest			**2,607.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

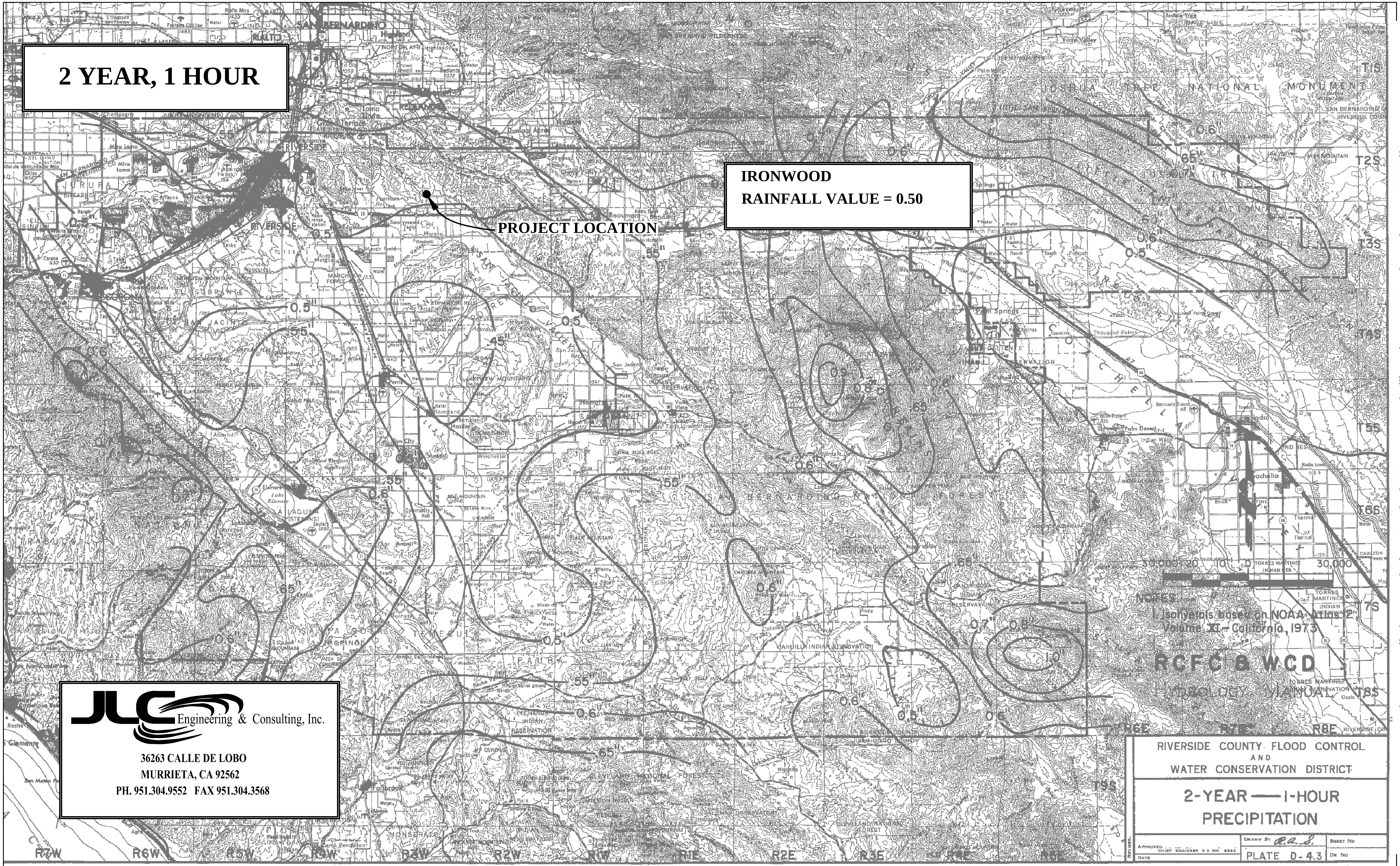
Rating Options

Aggregation Method: Dominant Condition

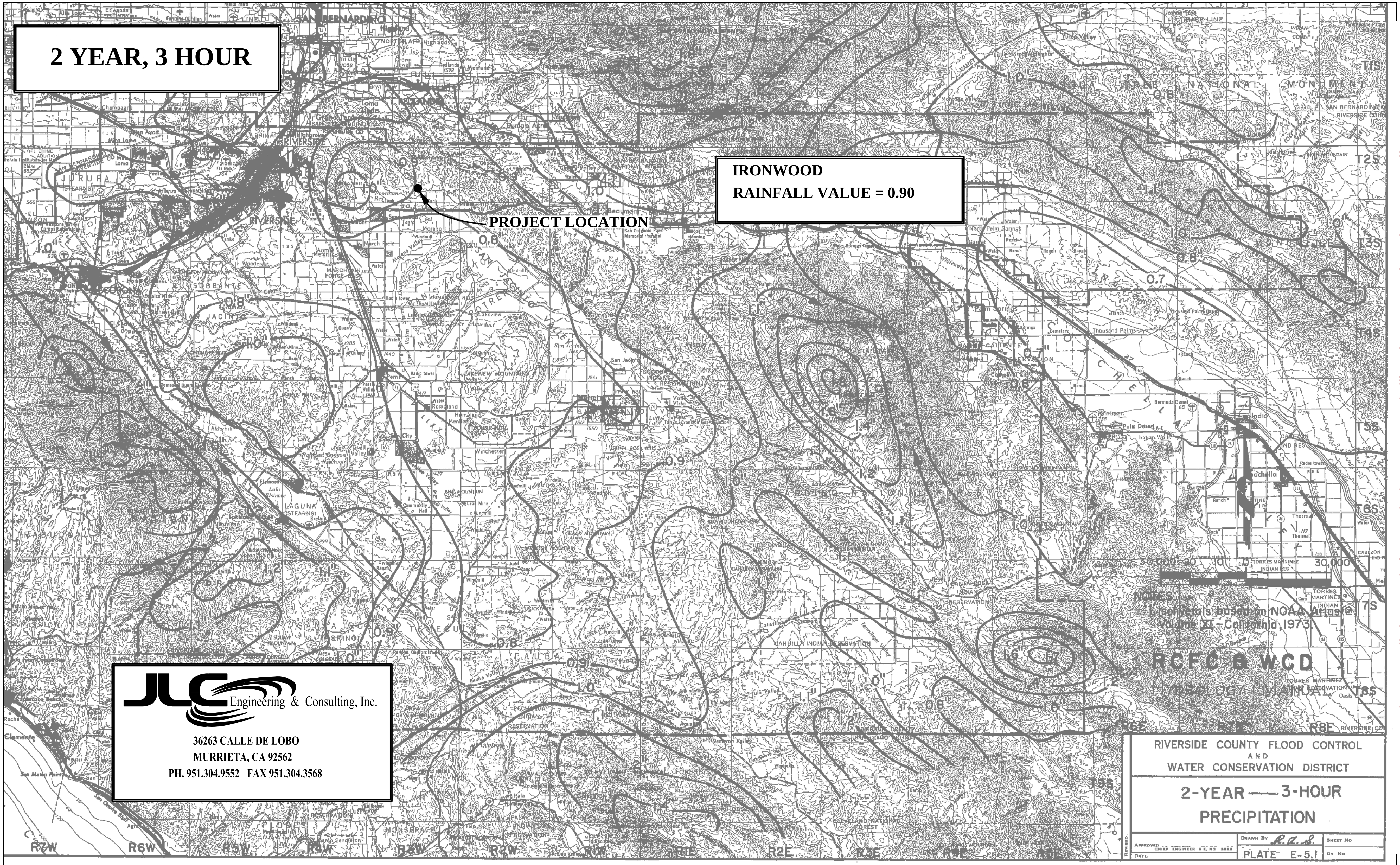
Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

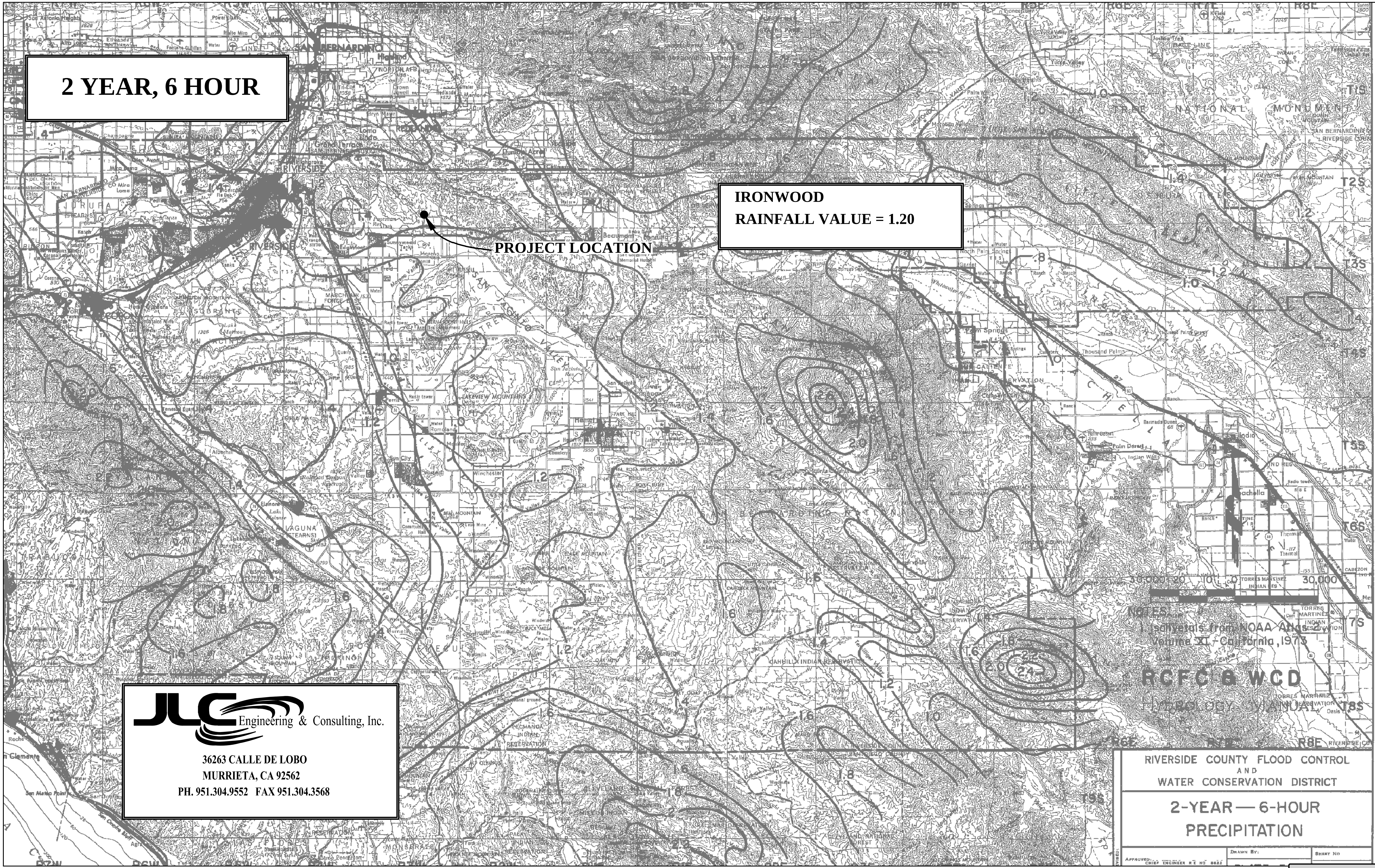
EXHIBIT H: RAINFALL MAPS



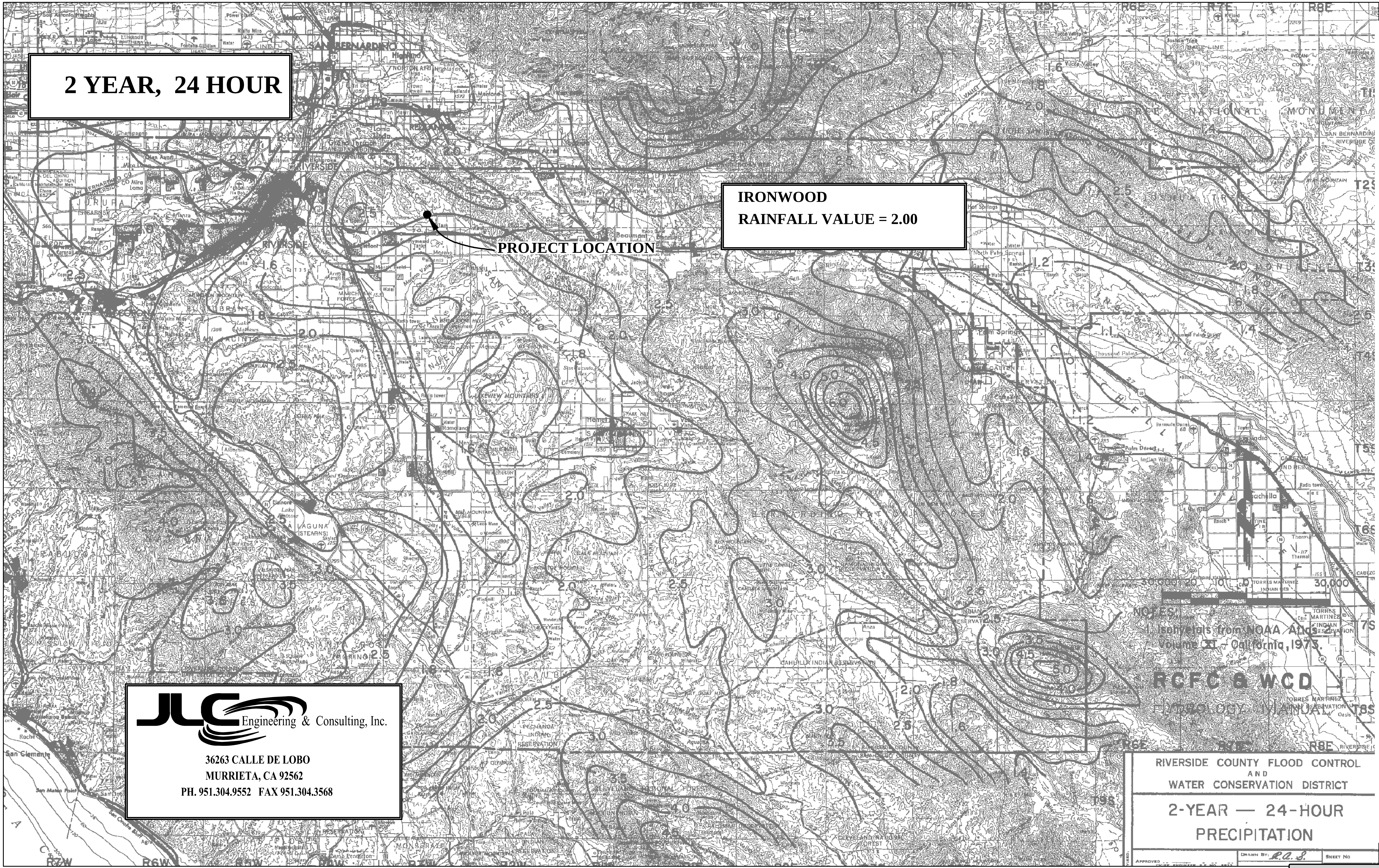
Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))



Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

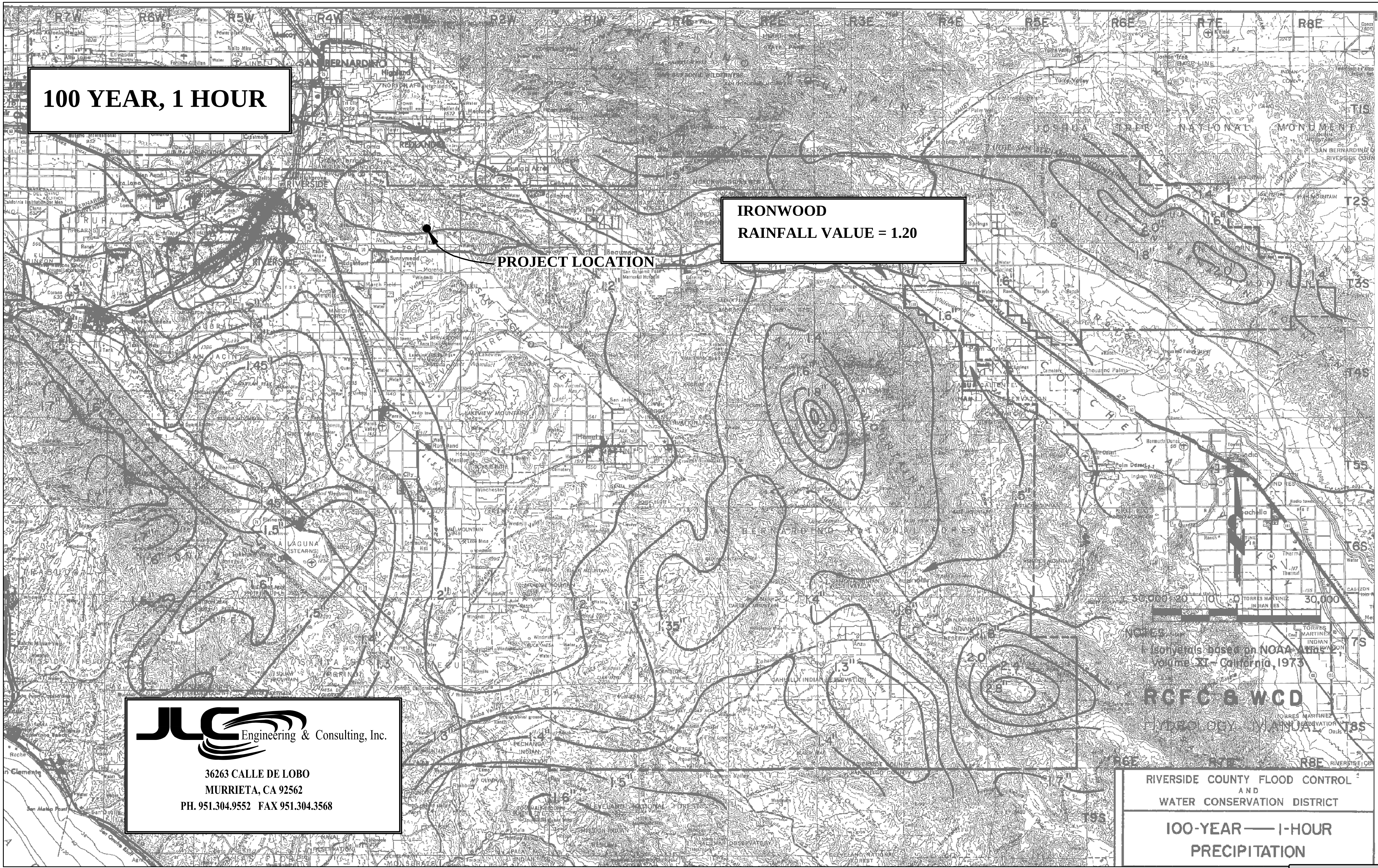


Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))



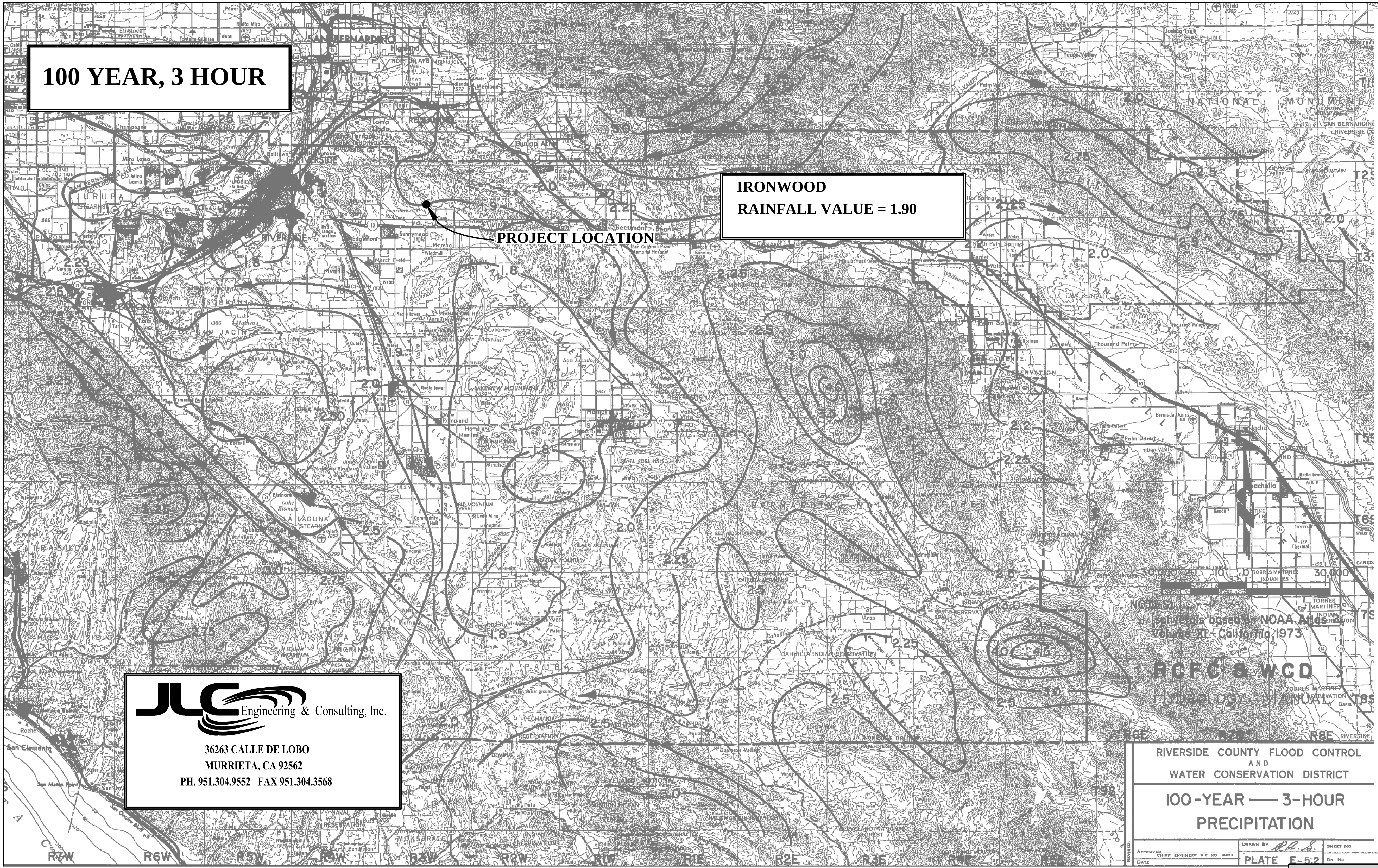
Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

100 YEAR, 1 HOUR



JLC Engineering & Consulting, Inc.
36263 CALLE DE LOBO
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))



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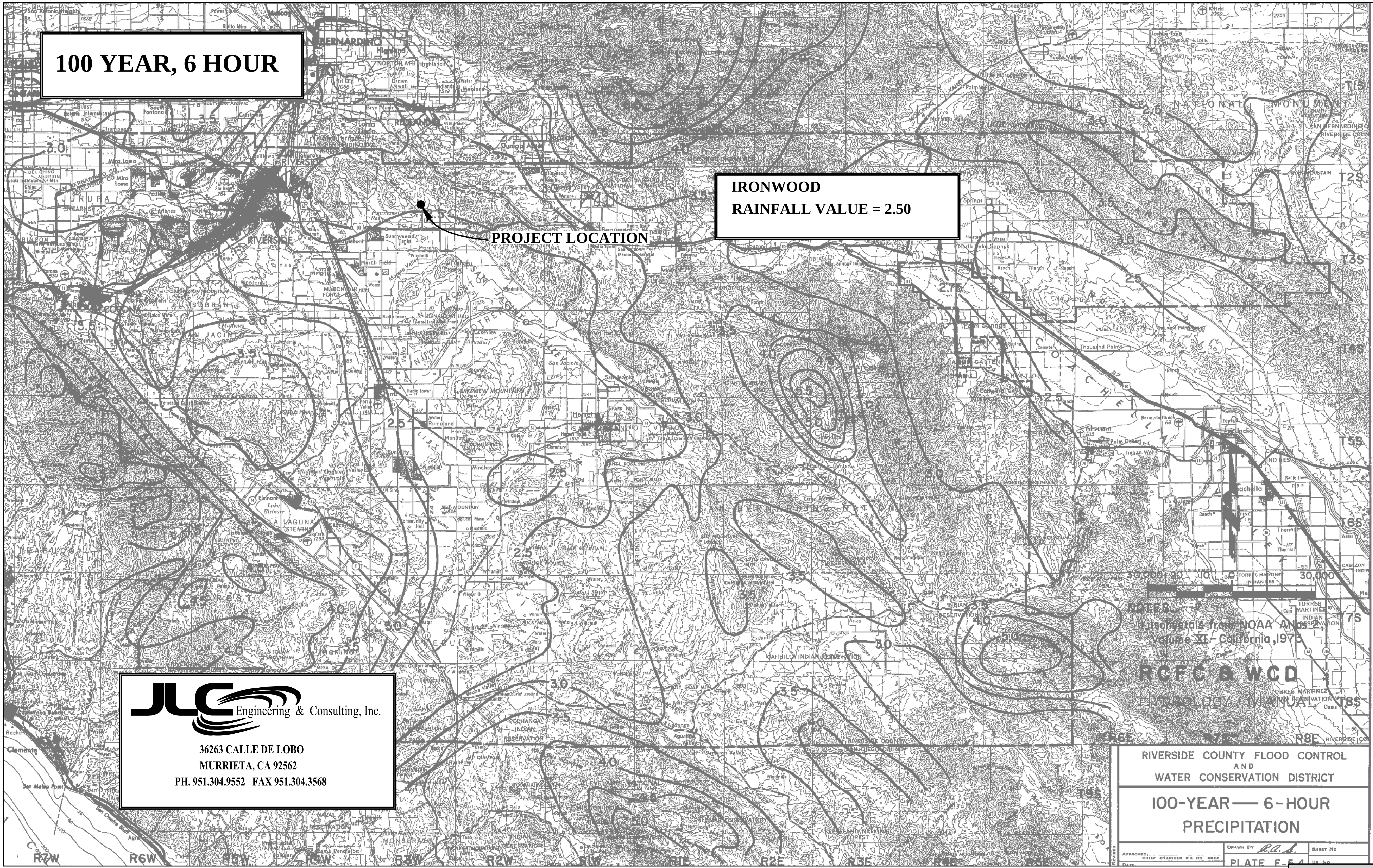

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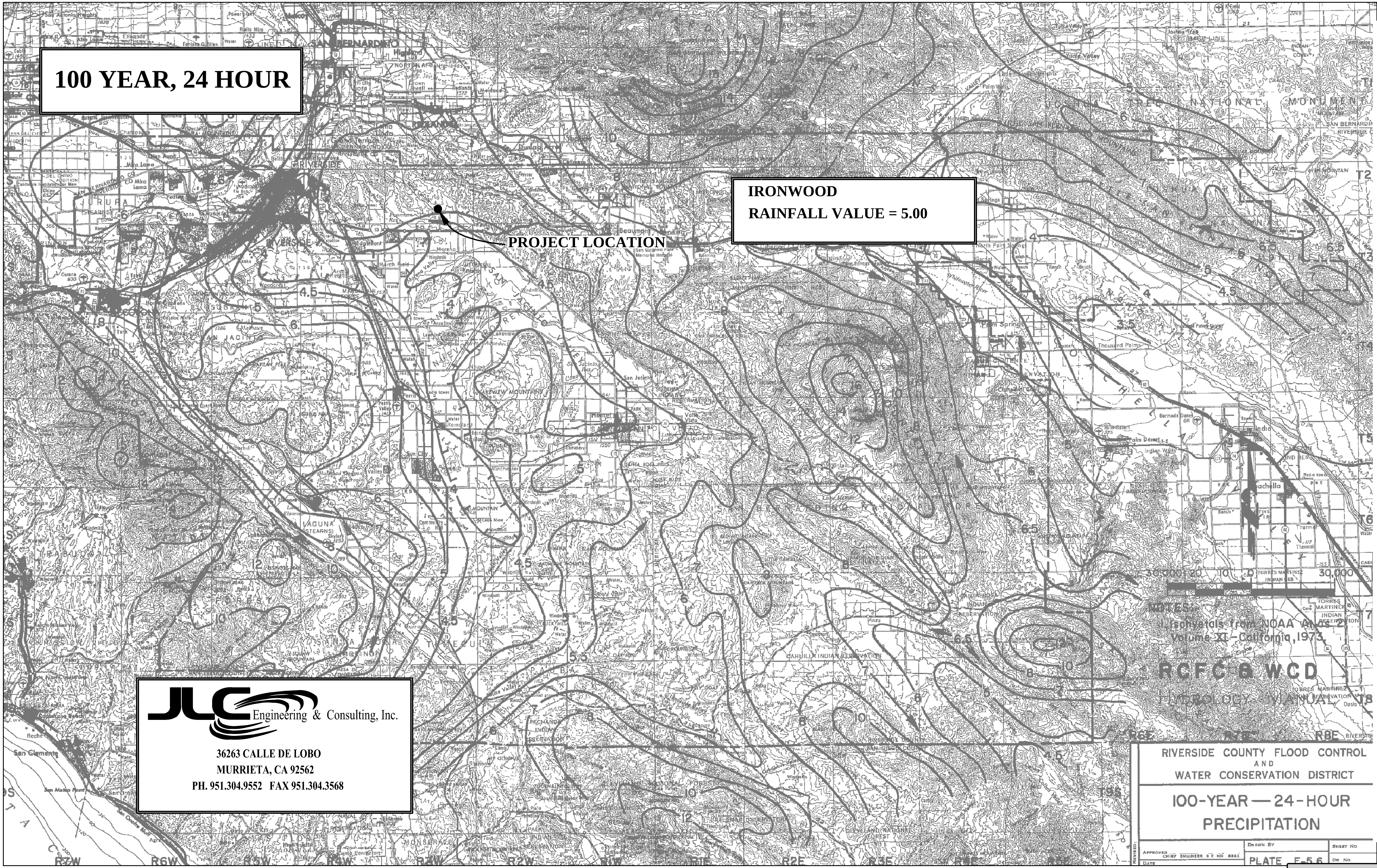
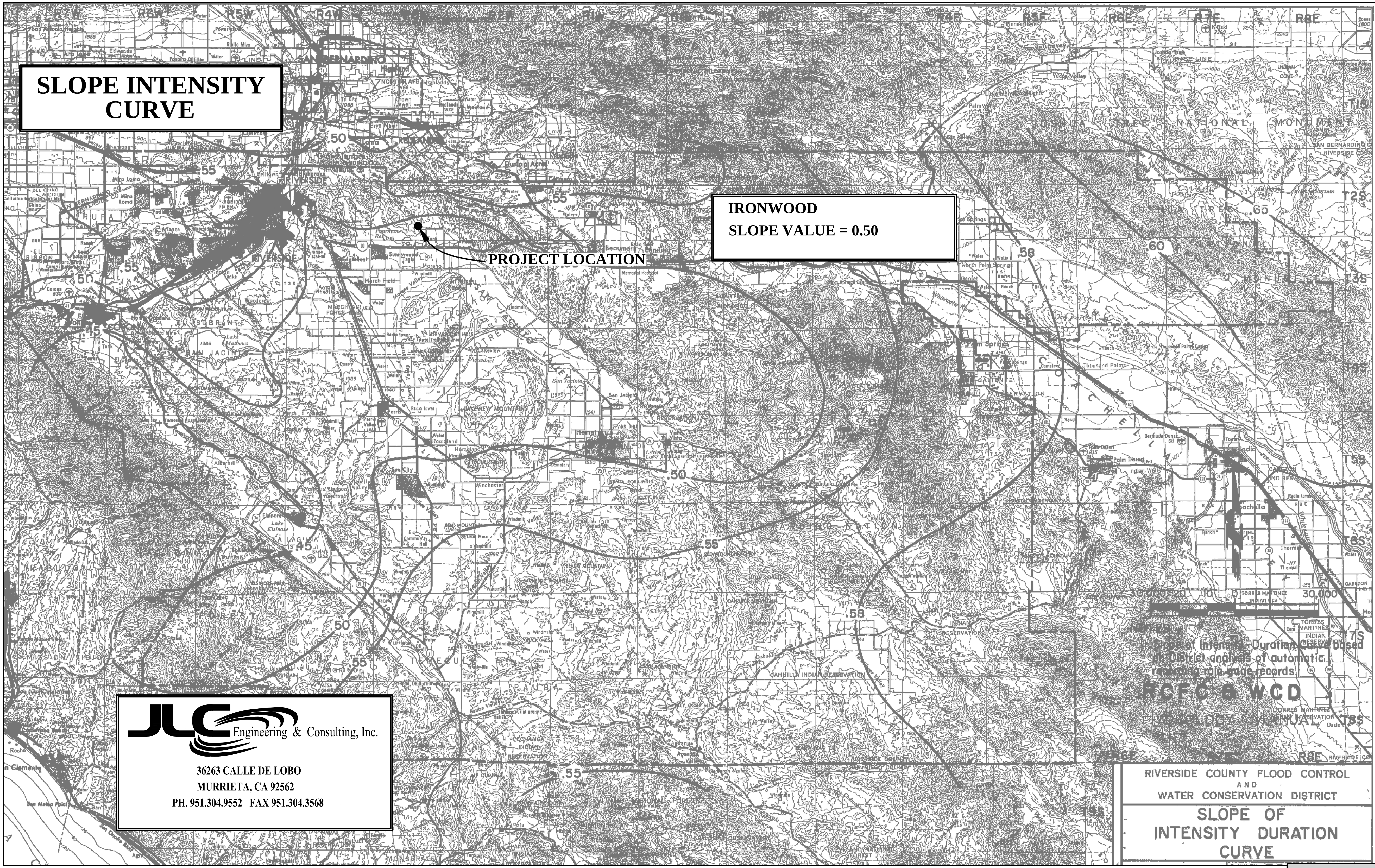

100 YEAR, 24 HOUR
IRONWOOD
RAINFALL VALUE = 5.00
PROJECT LOCATION
JLC Engineering & Consulting, Inc.
36263 CALLE DE LOBO
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568
NOTES:
1. Isohyetals from NOAA Atlas 2
Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR
PRECIPITATION
PLATE E-5.6

EXHIBIT I: SLOPE OF INTENSITY DURATION CURVE



Attachment: Preliminary Hydrology Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

EXHIBIT J: FLOW RATE ANALYSIS

IRONWOOD

IN THE CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

FLOW RATE ANALYSES

N

GRAPHIC SCALE
60' 0 30' 60' 120'
1" = 60'

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EXHIBIT J

IRONWOOD

FLOW RATE ANALYSES

EXHIBIT K: EXISTING CONDITION HEC-RAS FLOOD PLAIN MAP

TENTATIVE TRACT MAP NO. 37001
CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
EXISTING CONDITION HEC-RAS FLOOD PLAIN MAP

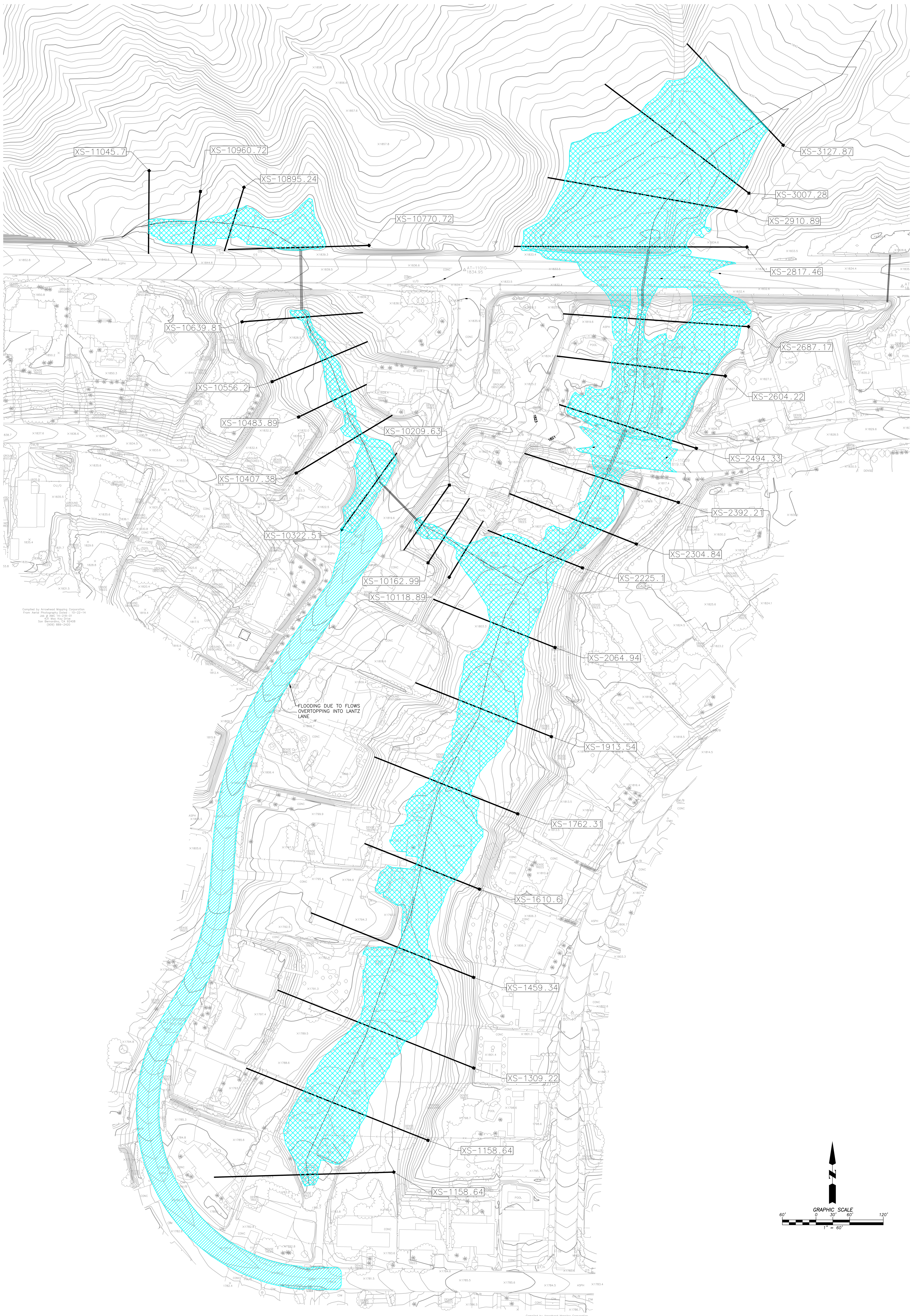

EXHIBIT K

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TTM 37001

EXISTING CONDITION
HEC-RAS FLOOD PLAIN

EXHIBIT L: POST-PROJECT CONDITION FLOOD PLAIN MAP

TENTATIVE TRACT MAP NO. 37001

CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

POST-PROJECT CONDITION HEC-RAS FLOOD PLAIN MAP

EXHIBIT L

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TTM 37001

POST-PROJECT HEC-RAS FLOOD PLAIN

Geotechnical & Environmental Solutions

DUE DILIGENCE LEVEL PRELIMINARY GEOTECHNICAL EVALUATION

Proposed Residential Development
NWC Ironwood Avenue and Oliver Street,
Moreno Valley, Riverside County, California

EEI Project No.: GLO-71982.4

November 25, 2014

Corporate Office: 2195 Faraday Avenue • Suite K • Carlsbad, California 92008-7207 • Ph: 760-431-3747
Fax: 760-431-3748 • www.eeitiger.com

DUE DILIGENCE LEVEL PRELIMINARY GEOTECHNICAL EVALUATION

Prepared for:

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Bellacap, LLC
3470 Wilshire Boulevard
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c/o

Mr. Jeff Anderson
President
Anderson Consulting Engineers, Inc.
12526 High Bluff Drive, Suite 300
San Diego, California 92130

Project Site Location:

NWC Ironwood Avenue and Oliver Street,
Moreno Valley, Riverside County, California

Prepared by:

Jerry L Michal
GE 2515 (exp. 3/31/16)
Senior Geotechnical Engineer

Craig C. Chase
CEG 2225 (exp. 6/30/15)
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Carlsbad, California 92008-7207

EEI Project No.: GLO-71982.4

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

Distribution: (3) Addressee one via electronic copy

1.0 INTRODUCTION

1.1 Purpose

The purpose of this evaluation was to provide due diligence level preliminary geotechnical information to Anderson Consulting Engineers, Inc. ("Client"), regarding the subject property in the City of Moreno Valley, Riverside County, California. The information developed in this evaluation is intended to provide the Client with an understanding of the physical conditions of site-specific subsurface soils, groundwater, and the regional geologic setting which could affect the cost or design of the proposed development at the subject property (Site Vicinity Map-**Figure 1**, Aerial Site Map-**Figure 2**).

This Due Diligence Preliminary Geotechnical Evaluation has been conducted in general accordance with the accepted geotechnical engineering principles and in general conformance with the approved revised proposal and cost estimate for the project by EEI, dated September 23, 2014.

EEI conducted an onsite field exploration on October 16 and 17, 2014 that included excavation and sampling of four (4) exploratory backhoe trenches and drilling and sampling of four (4) hollow stem auger geotechnical borings for the proposed development at the subject property. Also, three (3) additional shallow borings were drilled to depths of 3 feet or less below the existing ground surface in the areas of proposed detention basins in order to perform field percolation testing. Three (3) additional hollow stem auger geotechnical borings were drilled and sampled for the proposed offsite sewer alignment located approximately ¼ mile south of the main subject property. This Due Diligence Preliminary Geotechnical Evaluation has been prepared for the sole use of Anderson Consulting Engineers, Inc. Other parties, without the express written consent of EEI and the Client should not rely upon this due diligence level preliminary geotechnical evaluation.

1.2 Project Description

We understand that the Client is considering purchasing the subject property for a residential project. Based on a Project Exhibit provided to EEI by Anderson Consulting Engineers, Inc., it appears that the subject property will be developed into approximately 146 residential building pads and associated streets and other improvements. A future offsite sewer extension is proposed for the right-of-way near the southern terminus of Oliver Street approximately ¼ mile south of the subject property. The approximate depth of the proposed sewer is about 25 feet below the existing ground surface within the Eastern Municipal Water District (EMWD) water main right-of-way. No further information is known at this time.

1.3 Scope of Services

The scope of our services included:

- A review of readily available data pertinent to the subject property, including published and unpublished geologic reports/maps, aerial photographs, local groundwater information, and soils data for the area (**References**).
- Conduct a geotechnical reconnaissance of the subject property and nearby vicinity.
- Coordinate with Underground Service Alert to identify the presence of underground utilities for clearance of proposed boring and test pit locations.

- The drilling and logging of four (4) hollow stem auger (HSA) borings (B-1 through B-4) throughout the subject property, ranging from 16 to 50.5 feet below existing grade elevations (bgs). One of the HSA exploratory borings was extended to 50.5 feet bgs for preliminary evaluation of settlement.

- The drilling and logging of three (3) additional hollow stem (HSA) auger borings (B-5 through B-7) in readily accessible areas along the proposed offsite sewer extension near the southern terminus of Oliver Street. The three (3) borings were extended to depths of approximately 26.5 feet below the existing ground surface along the approximate proposed sewer alignment

- Perform field percolation testing at three (3) locations (P-1 through P-3) at depths of approximately 3 feet below the existing ground surface at the locations of proposed detention basins as shown on the Project Exhibit. Testing was performed in general accordance with the County of Riverside guidelines for percolation test methods for preliminary percolation/infiltration information. Percolation testing results are presented in **Table 4**.

- Excavate four (4) exploratory trenches (T-1 through T-4) utilizing a backhoe in readily accessible but widely separated areas of the subject property at depths from approximately 6.5 to 9 feet below the existing ground surface.

- The locations of each of the offsite exploratory borings (for the proposed offsite sewer) are presented on **Figure 2** (Aerial Site Map/Offsite Boring Location Plan). The locations of the exploratory borings, exploratory trenches and percolation test pits on the subject property are presented on **Figure 3** (Field Exploration Plan).

- An evaluation of seismicity and geologic hazards to include an evaluation of faulting.

- Completion of laboratory testing of representative earth materials encountered onsite to ascertain their pertinent soils engineering properties, including corrosion potential (**Appendix B**).

- The preparation of this report which presents our preliminary findings, conclusions, and recommendations.

2.0 BACKGROUND

2.1 Subject Property Description

Based on the information provided by Anderson Consulting Engineers, Inc. ("Client"), and a review of the Google Earth© online database, the subject property consists of approximately 80-acres of undeveloped vacant land located at the northwest corner of the intersection of Oliver Street and Ironwood Avenue, in the City of Moreno Valley, Riverside County, California. Nason Street forms the majority of the western boundary; Ironwood borders the south; and Oliver Street forms the eastern boundary. Vacant land is present to the north. In general, the area is characterized by rural residential and vacant land. Proposed development is for multi or single-family residential.

We understand that an offsite sewer alignment is proposed which is located approximately ¼ miles south of the main subject property area. The sewer alignment is proposed to be extended approximately 900 feet to the south from the existing terminus on Oliver Street near the intersection with Carol Place.

The subject property is approximately situated at 33.9448° north latitude and 117.1871° west longitude (GoogleEarth®, 2013).

2.2 Site Topography

A review of the Sunnymead, California 7.5-minute topographic quadrangle (USGS, 2012) and Project Exhibit/topographic map prepared by Anderson Consulting Engineers, Inc. indicates that the subject property elevation varies from approximately 1,840 to 1,980 feet above mean sea level (amsl). From east-west across the property is a series of north-south oriented ridges and alternating drainage gullies in the lower, southern portion of the property. The intervening ridges are generally about 5 to 10 feet higher in elevation than the adjacent drainage gullies. Rounded granitic outcrops are exposed in the northwestern and northeastern sections of the subject property. The site topography can be generally described as a relatively well-dissected alluvial fan descending from the eroded hills to the north. The overall surface gradient across the property is gently to moderately south or south-southeast.

2.3 Geologic Setting

The subject property and vicinity lies within the Peninsular Ranges Geomorphic Province of California (CGS, 2002). The Peninsular Ranges Geomorphic Province extends from the Transverse Ranges Geomorphic Province and the Los Angeles Basin, south to Baja California. This province varies in width from about 30- to 100-miles. It is bounded on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province. The Transverse Ranges Geomorphic Province bounds the Peninsular Ranges on the north. The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks. Major fault zones and subordinate fault zones found in the Peninsular Ranges Province typically trend in a northwest-southeast direction.

Regional geologic maps of the subject property vicinity (Morton et al., 2004) indicate the property is underlain by Cretaceous-age plutonic rocks composed of tonalite and Holocene age Younger Alluvial Fan deposits. Outcroppings of the weathered tonalite bedrock are exposed in the northwestern and northeastern portions of the property. Over the remainder of the property, the tonalite bedrock was found to be weathering into a soil with a "decomposed granite" or "dg" texture at depth in the exploratory borings and trenches and in general is covered with several feet of alluvial and colluvial (younger alluvial fan) soils also derived from the weathered tonalite. The alluvial and colluvial soils are generally comprised of relatively loose to dense silty sand. The property is relatively undeveloped and artificial fill was not encountered during our field exploration at the property.

Due to the proximity of the subject property area to several nearby active faults, strong ground shaking could occur at the property as a result of an earthquake on any one of the faults. Our review indicates that there are no known active faults crossing the property and the property is not within a State of California Earthquake Fault Zone (Jennings, 1994; Hart and Bryant, 1997, CDMG, 1974; 1998). Due to the presence of shallow bedrock and the lack of shallow groundwater at the property, the property is considered as having a low susceptibility to liquefaction.

2.4 Regional Groundwater

A seismic hazard zone map and report have not been completed for the Sunnymead Quadrangle, therefore, the depth to the historic high groundwater at the subject property is not known. Due to the presence of relatively shallow granitic bedrock at the property, static groundwater is not expected and groundwater was not encountered in any of the exploratory borings or trenches excavated at the property to a maximum explored depth of 50.5 feet below the existing ground surface. Within the lower drainage gullies, up to 30 feet in thickness of silty sand alluvium was encountered. Although not encountered within the alluvium during our field excavation, during times of heavy precipitation or runoff, a localized perched groundwater condition could exist. A review of topographic maps of the general vicinity of the subject property indicates regional topographic relief slopes gently towards the south or south-southeast.

This information suggests that regional groundwater in the property vicinity could be inferred to flow in the same general topographic direction.

3.0 FAULTING AND SEISMICITY

The portion of Southern California that includes the subject property is considered to be seismically active. Due to the proximity of the property area to several nearby active faults, strong ground shaking could occur at the property as a result of an earthquake on any one of the faults. Our review indicates that there are no known active faults crossing the property (Blake, 2000) and the property is not within an Earthquake Fault Zone (Hart and Bryant, 1997). It is our opinion, therefore, that the likelihood of surface fault rupture at the property is low. **Table 1** lists the major active faults within 25 miles that are likely to affect the property.

TABLE 1
Summary of Major Active Faults

	Fault Name	Approximate Distance From Site miles (kilometers)	Maximum Moment Magnitude
1	San Jacinto-San Jacinto Valley	1.5 (2.4)	6.9
2	San Jacinto-San Bernardino	5.8 (9.3)	6.7
3	San Andreas – San Bernardino M-1	12.1 (19.5)	7.5
4	San Andreas – SB-Coach. M-2b	12.1 (19.5)	7.7
5	San Andreas – SB-Coach. M-1b-2	12.1 (19.5)	7.7
6	San Andreas – Whole M-1a	12.1 (19.5)	8.0
7	North Frontal Fault Zone (West)	19.4 (31.2)	7.2
8	San Jacinto – Anza	21.0 (33.8)	7.2
9	Elsinore (Glen Ivy)	21.7 (35.0)	6.8
10	Cucamonga	21.9 (35.2)	6.9
11	Elsinore (Temecula)	22.8 (36.7)	6.8
12	Cleghorn	23.1 (37.2)	6.5
13	Chino-Central Ave. (Elsinore)	23.3 (37.5)	6.7

3.1 Seismic Parameters and Peak Ground Acceleration

Maximum considered ground motion maps provided in the California Building Code (CBC, 2013) were utilized with coordinates of 33.9448° north latitude and 117.1871° west longitude, to determine the subject property seismic parameters. EEI utilized seismic design criteria provided in the CBC (2013).

In accordance with the guidelines of the CBC (2013), the spectral parameters for the subject property (based on a Site Class B soil) are estimated to be S_s = 2.166g and S_1 = 0.982g. Review of the geotechnical data obtained during our subsurface exploration, however, indicates that the property should be classified as Class D per the CBC (Table 1613.5.2). Consequently, Site Coefficients F_a= 1.000 and F_v = 1.500 appear to be appropriate for the property. Based on this information, the adjusted maximum considered earthquake spectral response parameters S_{MS} = 2.166g and S_{M1} = 1.472g are recommended for seismic design of the project. Assuming an occupancy category of II (Table 1604A.5), an S_{DS} value of 1.444g and an S_{D1} value of 0.982g, the proposed building at the property can be assigned a seismic design category of D [Table 1613.5.6 (1) and (2)]. Final selection of the appropriate seismic design coefficients should be made by the structural consultant based on the local laws and ordinances, expected building response, and desired level of conservatism.

Seismic Hazard Response Parameters are listed in **Table 2**.

TABLE 2
Seismic Hazard Response Parameters and Design Parameters CBC (2013)

Latitude: 33.9448° - Longitude: -117.1871° Seismic Parameter	Period (Sec)		Value
Mapped Spectral Acceleration Value, Soil Class B	0.2	S_s	2.166g
Mapped Spectral Acceleration Value, Soil Class B	1.0	S_1	0.982g
Site Coefficient, Subject Site Soil Classification D per 2013 CBC Table 1613.5.2	--	F_a	1.000
Site Coefficient, Subject Site Soil Classification D per 2013 CBC Table 1613.5.2	--	F_v	1.500
Adjusted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Site Class D	0.2	S_{MS}	2.166g
Adjusted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Site Class D	1.0	S_{M1}	1.472g
Design Spectral Response Acceleration Occupancy Category II per 2013 CBC Table1604.5	0.2	S_{DS}	1.444g
Design Spectral Response Acceleration Occupancy Category II per 2013 CBC Table1604.5	1.0	S_{D1}	0.982g
Peak Ground Acceleration Adjusted For Site Class Effects.		PGA_M	0.837g
Building Assigned Seismic Design Category per Table 1613.5.6 (1) and (2)	--	--	D

3.2 Ground Lurching or Shallow Ground Rupture

Based on the geography, topography and site-specific geotechnical conditions encountered during our preliminary geotechnical evaluation at the subject property, we consider the potential for ground lurching or shallow ground rupture at the property to be low; however, due to the active seismicity of California, this possibility cannot be completely ruled out. In light of this, the unlikely hazard of lurching or ground-rupture should not preclude consideration of "flexible" design for onsite utility lines and connections.

3.3 Liquefaction

Liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading. Liquefaction and related phenomena have been responsible for substantial structural damage in historical earthquakes, and are a design concern under certain conditions. Liquefaction occurs in saturated soils that are soils in which the space between individual particles is completely filled with water. This pore water exerts a pressure on the soil particles that influences how tightly the particles themselves are pressed together.

Prior to an earthquake, pore water pressure is typically low; however, earthquake motion can cause the pore water pressure to increase to the point where the soil particles can readily move with respect to each other. When liquefaction occurs; the strength of the soil decreases and the ability of a soil deposit to support structural loads are reduced.

A seismic hazard zone map and report for the Sunnymead Quadrangle has not been issued by the California Geological Survey (CGS) so the subject property is, therefore, not situated within a mapped Liquefaction Zone. The majority of the property is underlain by generally loose to medium dense alluvial and colluvial deposits that overlie relatively shallow granitic bedrock. The alluvial and colluvial soils are subject to removal and recompaction during site grading for the proposed residential development. It appears that liquefaction is not a significant geotechnical concern at the property.

Cyclic mobility is a liquefaction phenomenon, triggered by cyclic loading, occurring in soil deposits with static shear stresses lower than the soil strength. Deformations due to cyclic mobility develop incrementally because of static and dynamic stresses that exist during an earthquake. Lateral spreading, a common result of cyclic mobility, can occur on gently sloping and on flat ground close to rivers and lakes. These conditions do exist within the subject property, however, based on the conceptual site plan, the property should be relatively level following rough grading with a lack of free channel faces and cyclic mobility should not be an issue post-grading.

3.4 Seismic Induced Settlement

Seismically induced settlement can occur due to reorientation of soil particles during strong shaking of unsaturated sands, as well as in response to liquefaction of saturated loose granular soils.

Based on our evaluation and the geotechnical data obtained from our exploratory borings and trenches, we estimate the total seismic-induced settlement to be less than 1-inch. Differential earthquake induced settlements are estimated to be less than 0.5-inches over a 50-foot span.

4.0 FIELD EXPLORATION AND LABORATORY TESTING

4.1 Field Exploration

Field work for our geotechnical evaluation was conducted on October 16 and 17, 2014. A total of four (4) hollow stem auger borings were drilled on the subject property. Boring depths ranged from 11 feet to 50.5 feet below the existing ground surface. Three (3) additional hollow stem auger borings were drilled offsite in the area of the proposed sewer line extension. All three borings were drilled to an approximate depth of 26.5 feet below existing grade. In addition to the hollow stem auger borings, four (4) exploratory backhoe trenches were excavated on the subject property to depths ranging from 6.5 to 9 feet below existing grade. All exploratory borings and trenches were logged under the supervision of a Registered Professional Engineer and/or Certified Engineering Geologist at EEI. Boring and trench locations were adjusted as necessary due to existing utilities and improvements.

Blow count (N) values were determined utilizing a 140 pound automatic hammer, falling 30-inches onto a Standard Penetration Test (SPT) split-spoon sampler and a Modified California split-tube sampler. A truck mounted hollow-stem auger (HSA) drill rig and rubber-tired backhoe were used during field work. The blows per foot (N value) required to advance the 18-inch long SPT and 12-inch long Modified California split-tube samplers was measured at various initial depths followed by 5-foot intervals, recorded on the boring logs. The boring logs and trench logs for the field exploration are presented in **Appendix A**-Soil Classification Chart and Boring & Trench Logs. Relatively "undisturbed" samples were collected in a 2.42-inch (inside diameter) California Modified split-tube sampler for visual examination and laboratory testing in the exploratory borings. The soils were classified in accordance with the Unified Soil Classification System (ASTM, 2008). Representative bulk samples were also collected from both the exploratory borings and trenches for appropriate laboratory testing.

4.2 Subsurface Conditions

The results of our geotechnical exploration indicate that the proposed residential development is underlain by weathered Cretaceous-age plutonic rocks composed of tonalite. This material was observed to extend beyond the maximum depth of our exploratory borings and test pits (approximately 50.5 feet below existing grades). Alluvial soils up to 30 feet thick were observed to mantle the weathered tonalite bedrock within the lower lying channel/drainage areas.

On the higher, elevated ridge areas on the subject property, colluvial soils were observed to mantle the weathered tonalite bedrock with a thickness varying between 3 and 14 feet. The weathered tonalite bedrock can generally be described as gray, white or black speckled or orange to dark grayish-orange (depending on degree of weathering) with a "granitic" or phaneritic texture and was generally unweathered to highly weathered. Outcroppings of the weathered tonalite bedrock are exposed in the northwestern and northeastern portions of the site. Over the remainder of the property, the tonalite bedrock was found to be weathering into a medium dense to very dense silty sand soil with a "decomposed granite" or "dg" texture at depth in the exploratory borings and test pits. The alluvial and colluvial (younger alluvial fan) soils are also derived from the weathered tonalite. The alluvial and colluvial soils are generally comprised of orange-brown or red-brown, medium brown or light gray brown, fine to coarse, damp to moist, loose to dense silty sand. The property is relatively undeveloped and artificial fill was not encountered during our field exploration at the property.

Our exploratory excavations were performed utilizing light-duty equipment which can provide general excavation characteristics of the onsite materials. Large granitic (tonalite) bedrock outcrops are present on the northeast and northwest portions of the property, along with some isolated rock outcrops within the areas of the proposed development area and generally on the higher elevations of the property. Boulders were present at the surface in these areas, some localized "core rock or floaters" should be anticipated at variable depths in these areas. Based on observed subsurface conditions in the exploratory trench excavations and borings, the "decomposed granite" or "dg" is moderately to highly weathered and/or fractured and was relatively easy to excavate to the depths indicated with a light-duty backhoe and a drill rig equipped with flight auger equipment. No refusal was encountered in any of the exploratory excavations during our field exploration.

In general, the ease of rock excavation or rippability depends on various factors such as rock type, rock hardness and density, the amount of weathering, and the existence and characteristics of discontinuities such as joint spacing, foliation, or fractures.

Due to the relatively dense character of the granitic bedrock encountered onsite, it is likely that oversized rock materials will be created during grading operations. Native earth materials appear to be suitable for use as structural fill provided they are moisture conditioned (as needed), meet EEI's recommendations for size (Section 4.2.2 Fills), and are properly compacted. Dependent upon the grading plan, some of the oversized materials may be re-used in landscape areas.

For the proposed offsite sewer line location, weathered tonalite overlain by 15 feet of alluvial soils was encountered in boring B-5. In boring B-6, colluvial soils at depth were mantled by approximately 10 feet of artificial fill. For boring B-7, colluvial soils were encountered from the surface to the total explored depth. All three offsite borings were advanced to a total depth of 26.5 feet below the existing ground surface. The weathered tonalite bedrock and alluvial soils are generally unchanged from the materials encountered on the subject property. The offsite colluvial soils can generally be described as orange brown to brown, fine to coarse, moist, medium dense to dense silty sand and sandy silt. The artificial fill soils encountered can be described as light brown, fine to coarse, and damp, medium dense silty sand. Refusal was not encountered within any of our exploratory borings or test pits. Detailed descriptions of the encountered soils are provided on the boring logs and test pit logs included as **Appendix A**.

Due to the presence of relatively shallow granitic bedrock at subject property, static groundwater is not expected and groundwater was not encountered in any of the exploratory borings or trenches excavated at the property to a maximum explored depth of 50.5 feet below the existing ground surface. Our review of ground water monitoring data from nearby wells suggests that the groundwater level may fluctuate seasonally and yearly.

It should be noted that fluctuations in the ground water level could also occur due to variations in ground surface topography, subsurface stratifications, precipitation, irrigation, and other factors which may not have been evident at the time of our exploration.

4.3 Laboratory Testing and Classification

Representative samples were selected for laboratory testing to confirm their field classification(s). Field descriptions and classifications were visually classified according to the American Society for Testing and Materials (ASTM) D2488 which classifies soils under the Unified Soil Classification System (USCS). Representative soil samples were tested in the lab for grain size distribution, liquid limits, and plastic limits to determine actual classifications by ASTM D2487-Standard Practice for Classification of Soils for Engineering Purposes in accordance to the USCS. Final classifications of soils can be found on the boring logs in **Appendix A** and the laboratory test data in **Appendix B**.

4.3.1 Moisture Content and Dry Density

The in-situ moisture content and dry density of soils were determined for soil samples obtained from the borings. Moisture contents and dry densities of soils help to determine engineering design parameters for foundations, retaining walls, and other engineered structures. Moisture content on soil samples was conducted in general accordance with ASTM D2216, and was recorded as a percentage. In-situ moisture content and dry density information for soil samples retrieved from the field can be found on the boring logs located in **Appendix A**.

4.3.2 Grain Size Distribution

To help check field classifications of soils, the grain size distribution of representative soil samples was determined. In order to find the percentages of different sized particles in a particular soil stratum, soils were tested in general accordance with ASTM D422-Standard Test Method for Particle-Size Analysis of Soils. Grain size distribution curves and gradation results are presented in **Appendix B.**

4.3.3 Maximum Dry Density and Optimum Moisture Content

The maximum dry density and optimum moisture content were determined from a bulk sample obtained from boring B-1 at depths between 0 and 5 feet below existing grade. Our testing was performed in general accordance with ASTM D1557, Method A. Results of our testing are presented in **Appendix B.**

4.3.4 Direct Shear

Direct shear testing was conducted on three representative samples of the upper soils. One sample was remolded to 90 percent of their maximum dry density (based on ASTM D1557), and the other two samples in its natural state, to measure its shear strength characteristics for engineering purposes. The samples were inundated for at least 18 hours. The samples were placed in a shear box and a normal load was applied (10, 20, and 40 kilogram weights were used). The samples were then sheared at a controlled strain rate in a direct shear apparatus that measures horizontal displacement and shear resistance. Shear testing was run in general accordance with ASTM D3080. The results of our testing are presented in **Appendix B.**

4.3.5 Expansion Index

A soil sample from boring B-1 within the upper 5 feet of existing grade was tested for its expansion potential. Our expansion index testing was conducted in general accordance with ASTM D4829. The results of our expansion index testing are presented in **Appendix B.**

4.3.6 Sulfate/Corrosion

One representative sample of onsite earth material was collected for analysis at Clarkson Laboratory and Supply, Inc. located in Chula Vista, California for corrosion/soluble sulfate potential. This corrosion testing included soil minimum resistivity and pH by California Test 643, sulfate by California Test 417, and chloride by California Test 422. Results of these tests are presented in **Appendix B**.

It should be understood that the results provided in **Appendix B** are based upon pre-development conditions. Verification testing is recommended at the conclusion of grading on samples collected at or near finish grade.

5.0 CONCLUSIONS

Based on our field exploration, laboratory testing and engineering and geologic analysis, it is our opinion that the subject property is suitable for the proposed new development and associated improvements from a geotechnical engineering and geologic viewpoint; however, there are existing geotechnical conditions associated with the property that will warrant mitigation and/or consideration during planning stages. If site plans and/or the location of the proposed residential buildings or proposed offsite sewer line are revised, additional field studies may be warranted to address proposed site-specific conditions. As a result, EEI is providing the following conclusions:

- A total of four (4) hollow stem auger borings were drilled on the subject property. Boring depths ranged from 11 feet to 50.5 feet below the existing ground surface. Three (3) additional hollow stem auger borings were drilled offsite in the area of the proposed sewer line extension. All three borings were drilled to an approximate depth of 26.5 feet below existing grade. In addition to the hollow stem auger borings, four (4) exploratory backhoe trenches were excavated on the subject property to depths ranging from 6.5 to 9 feet below existing grade. The subject property is underlain by weathered Cretaceous-age plutonic rocks composed of tonalite. This material was observed to extend beyond the maximum depth of our exploratory borings and test pits (approximately 50.5 feet below existing grades). Alluvial soils up to 30 feet thick were observed to mantle the weathered tonalite bedrock within the lower lying channel/drainage areas. On the higher, elevated ridge areas on the subject property, colluvial soils were observed to mantle the weathered tonalite bedrock with a thickness varying between 3 and 14 feet. The weathered tonalite bedrock was can generally be described as gray, white or black speckled or orange to dark grayish-orange (depending on degree of weathering) with a "granitic" or phaneritic texture and was generally unweathered to highly weathered and very soft to moderately hard. The alluvial and colluvial (younger alluvial fan) soils are also derived from the weathered tonalite. The alluvial and colluvial soils are generally comprised of orange-brown or red-brown, medium brown or light gray brown, fine to coarse, damp to moist loose to dense silty sand.

- On the subject property, the weathered tonalite bedrock was observed to be mantled by up to approximately a 30-foot thick layer of alluvium in the lower drainage/wash areas while a relatively thin layer of colluvial soils, also mainly silty sand was observed in the exploratory borings and test pits on the higher "ridges".

- For the proposed offsite sewer line location, weathered tonalite overlain by 15 feet of alluvial soils was encountered in boring B-5. In boring B-6, colluvial soils at depth were mantled by approximately 10 feet of artificial fill. For boring B-7, colluvial soils were encountered from the surface to the total explored depth. All three offsite borings were advanced to a total depth of 26.5 feet below the existing ground surface. The weathered tonalite bedrock and alluvial soils are generally unchanged from the materials encountered on the subject property. The offsite colluvial soils can generally be described as orange brown to brown, fine to coarse, moist, loose to medium dense silty sand and sandy silt. The artificial fill soils encountered can be described as light brown, fine to coarse, and damp, loose to medium dense silty sand. No refusal was encountered in any of the onsite or offsite exploratory boring or test pit locations.

- We understand that the Client is considering purchasing the subject property for a residential project. Based on a Project Exhibit provided to EEI by Anderson Consulting Engineers, Inc., it appears that the subject property will be developed into approximately 146 residential building pads and associated streets and other improvements. A future offsite sewer extension is proposed for the right-of-way near the southern terminus of Oliver Street approximately ¼ south of the subject property. The approximate depth of the proposed sewer is about 25 feet below the existing ground surface within the Eastern Municipal Water District (EMWD) water main right-of-way. No further information is known at this time.

- Groundwater was not encountered in any of our onsite or offsite exploratory borings or exploratory test pits to the depths explored (approximately 50.5 feet below existing grades). It should be noted that variations in groundwater may result from fluctuations in the ground surface topography, subsurface stratification, precipitation, irrigation and other factors that may not have been evident at the time of our subsurface exploration.

- Laboratory test results indicate that the near surface materials are near neutral (pH = 7.1) and are moderately corrosive to ferrous metals with a minimum resistivity value of 5,200 ohm-cm. Laboratory testing of the upper soils yielded a soluble sulfate concentration of 0.005 percent and a chloride concentration of 0.007 percent, indicating a negligible corrosion potential to reinforced concrete.

- The results of our laboratory Expansion Index (EI) testing indicate an expansion index of 0, for the tested soils which represents a very low expansion potential.

- The subject property is located within an area of Southern California recognized as having a number of active and potentially-active faults. Our review indicates that there are no known active faults crossing the property and the property is not located within an Earthquake Fault Zone. The nearest active faults that could affect the property are the San Jacinto Valley segment of the San Jacinto Fault Zone, located approximately 1.5 miles from the property, the San Bernardino segment of the San Jacinto Fault Zone, located approximately 5.8 miles from the area of study, the San Bernardino M-1 segment of the San Andreas Fault Zone, the San Bernardino-Coachella Valley M-2b segment of the San Andreas Fault Zone, the San Bernardino-Coachella Valley M-1b-2 segment of the San Andreas Fault Zone and the San Bernardino-Coachella Valley M-1a segment of the San Andreas Fault Zone, all located approximately 12.1 miles from the area of study. Each of these active faults is capable of generating severe ground shaking at the property. A list of active faults within an approximate 25 mile radius is presented in **Table 1**.

- Based on EEI's evaluation, earth materials underlying the subject property are not considered susceptible to liquefaction or significant amounts of seismic settlement. Based on EEI's evaluation, the earth materials underlying the subject property of the proposed development appear to be susceptible to some seismically induced settlement on the order of less than one-inch with differential settlements of less than 0.5-inches over a 50-foot span. Liquefaction-induced lateral spreading does not appear to be a concern at the subject property due to the lack of shallow groundwater, the lack of nearby open face channels and the relatively shallow depth to bedrock.

- At this time and for the purposes of this Due Diligence Level Preliminary Evaluation, we cannot present specific footing recommendations that can be incorporated in the structural design, given that we do not have a scope of the proposed project, no grading or foundation plans were available at the time and no information was provided to us other than the Client is considering purchasing the property for future development.

6.0 RECOMMENDATIONS

The recommendations presented herein should be considered as preliminary for the purpose of characterizing the geotechnical and geologic conditions at the subject property prior to purchasing the property, and for preliminary information to aid the initial planning and design phases of development. Guidelines for site preparation, earthwork, and onsite improvements are provided in the following sections based on a limited number of widely spaced exploratory borings and test pits, and the assumption that the planned onsite development will consist of single-family, wood-frame, slab-on-grade 1- to 2-story residential structures and the planned offsite construction for the proposed sewer line. For more detailed and specific recommendations for the design and planning of the proposed structures at the property, we recommend to supplement this Due Diligence Level Preliminary Geotechnical Evaluation with an additional Geotechnical Evaluation. This additional Geotechnical Evaluation would include a supplementary subsurface evaluation, incorporating additional hollow stem auger borings (HSA), to identify more specifically and in areas not covered by this Due Diligence Level Preliminary Geotechnical Evaluation, the subject property's subsurface conditions and other zones potentially susceptible to seismically induced settlement to the depths explored.

6.1 General

Grading should conform to the guidelines presented in the 2013 California Building Code (CBC, 2013), as well as the requirements of the City of Moreno Valley and the County of Riverside. Additionally, general Earthwork and Grading Guidelines are provided herein as **Appendix C**.

During earthwork construction, removals and reprocessing of fill materials, as well as general grading procedures of the contractor should be observed and the fill placed selectively tested by representatives of the geotechnical engineer, EEI. If any unusual or unexpected conditions are exposed in the field, they should be reviewed by the Geotechnical Engineer and if warranted, modified and/or additional remedial recommendations will be offered. Specific guidelines and comments pertinent to the planned development are provided herein.

The recommendations presented herein have been completed using the preliminary information provided to us regarding site development. If information concerning the proposed development is revised, or any changes in the design and location of the proposed property improvements are made, the preliminary conclusions and recommendations contained in this report should not be considered applicable unless the changes are reviewed and conclusions of this report modified or approved in writing by this office.

6.2 Site Preparation and Grading

Debris and other deleterious material, such as organic soils and/or environmentally impacted earth materials should be removed from the subject property prior to the start of grading. Areas to receive fill should be properly benched in accordance with current industry standards of practice and guidelines specified in the CBC and the requirements of the local jurisdiction.

Existing utilities should be removed within the proposed building envelope. Abandoned trenches should be properly backfilled and tested. If unanticipated subsurface improvements (utility lines, septic systems, wells, utilities, etc.) are encountered during earthwork construction, the geotechnical engineer should be informed and appropriate remedial recommendations would then be provided.

6.3 Remedial Earthwork

The encountered portions of the existing surficial soils including the upper portions of the alluvial and colluvial soils were observed to be somewhat loose and variable in moisture content and relative density. As such, they are considered potentially compressible and unsuitable for the support of settlement-sensitive structures or engineered fill in their current condition. Therefore, where not already removed by the proposed site grading, the existing materials should be completely removed and recompacted in the areas to receive the proposed building improvement and other settlement-sensitive improvements. Based on the results of our subsurface exploration, we recommend that these removals extend to approximate depths on the order of a minimum of 4 feet to a maximum of 30 feet below the existing ground surface, or 24-inches below the bottoms of the proposed foundations. At the approximate location of boring B-1, 30 feet of relatively loose to medium dense silty sand alluvium was encountered above the tonalite bedrock and should be removed to a depth of 30 feet. A similar situation likely exists in other, lower elevation portions of the site within the drainage channels.

Following removal of the upper soils, the bottom of the resulting excavation(s) should be observed by a representative of EEI to check that unsuitable materials have been sufficiently removed. It should be understood that based on the observations of our field representative, localized deeper removals may be recommended. The base of the removal area should be level to avoid differential fill thicknesses under proposed improvements. This remedial earthwork should extend at least 5 feet outside the proposed building limits and/or 5 feet beyond the area to receive fill. Note that vertical sides exceeding 5 feet in depth may be prone to sloughing and may require laying back to an inclination of 1:1 (horizontal to vertical).

After removal of the upper soils and observation of the excavation bottoms, the over-excavated areas should be scarified to a minimum depth of 6-inches, moisture conditioned as needed to achieve at least optimum moisture content and re-compacted to at least 90 percent of the maximum dry density (based on ASTM D1557). The over-excavated areas should then be backfilled with onsite and/or imported soils that are placed and compacted as recommended herein until design finish grades are reached.

6.4 Yielding Subgrade Conditions

The soils encountered at the subject property can often exhibit "pumping" or yielding once they become saturated. This can often occur in response to periods of significant precipitation, such as during the winter rainy season, or if the bottom of an excavation is situated relatively close to the groundwater level. In order to help stabilize the yielding subgrade soils within the bottom of the removal areas, the contractor can consider the placement of uniform sized, ¾- to 2-inch crushed rock within areas exhibiting the "pumping" conditions. The crushed rock should be properly tracked into the underlying soils such that it is adequately intruded into and interlocks with the soils. We expect that a 6- to 12-inch thick section of the crushed rock will be required.

Following the placement and tracking of the gravel layer into the underlying "pumping" soils, it is recommended that Mirafi 600X stabilization fabric (or approved equivalent) then be placed upon the gravel layer. Fill soils, which should be placed and compacted in accordance with the recommendations presented herein, should then be placed upon the fabric until design finish grades are reached. The gravel and stabilization fabric should extend at least 5 feet laterally beyond the limits of the "pumping" areas. These operations should be performed under the observation and testing of a representative of EEI in order to evaluate the effectiveness of these measures and to provide additional recommendations for mitigative measures, as warranted.

6.5 Fill Placement

The soils encountered at the subject property can often exhibit "pumping" or yielding once they become saturated. This can often occur in response to periods of significant precipitation, such as during the winter rainy season, or if the bottom of an excavation is situated relatively close to the groundwater level. In order to help stabilize the yielding subgrade soils within the bottom of the removal areas, the contractor can consider the placement of uniform sized, ¾- to 2-inch crushed rock within areas exhibiting the "pumping" conditions. The crushed rock should be properly tracked into the underlying soils such that it is adequately intruded into and interlocks with the soils. We expect that a 6- to 12-inch thick section of the crushed rock will be required. Following the placement and tracking of the gravel layer into the underlying "pumping" soils, it is recommended that Mirafi 600X stabilization fabric (or approved equivalent) then be placed upon the gravel layer. Fill soils, which should be placed and compacted in accordance with the recommendations presented herein, should then be placed upon the fabric until design finish grades are reached. The gravel and stabilization fabric should extend at least 5 feet laterally beyond the limits of the "pumping" areas. These operations should be performed under the observation and testing of a representative of EEI in order to evaluate the effectiveness of these measures and to provide additional recommendations for mitigative measures, as warranted.

If import soils are needed, the earthwork contractor should ensure that all proposed fill materials are approved by the Geotechnical Engineer prior to use. Representative soil samples should be made available for testing at least ten working days prior to hauling to the subject property to allow for laboratory tests.

Fill materials should be placed in 6- to 8-inch loose lifts, moisture conditioned as necessary to at least optimum moisture and compacted to a minimum of 90 percent maximum density according to ASTM D1557. The upper 12-inches of pavement subgrade should be moisture conditioned to at least optimum moisture and compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557. Suitable heavy grading equipment should be utilized to properly mix, spread, moisture condition or dry, and compact each fill lift.

Those areas to receive fill (including over-excavated areas) or surface improvements should be scarified at least 6-inches, moisture conditioned to at least one percent over optimum moisture content and recompacted to at least 90 percent of the maximum dry density (based on ASTM D1557).

6.6 Shrinkage and Bulking

Several factors will impact earthwork balancing on the subject property, including shrinkage, bulking, subsidence, trench spoils from utilities and footing excavations, and final pavement section thickness as well as the accuracy of topography.

Shrinkage, bulking and subsidence are primarily dependent upon the degree of compactive effort achieved during construction. For planning purposes, the shrinkage factor is estimated to be on the order of 10 to 15 percent for the onsite natural soils to be utilized as fill. This shrinkage factor may vary with methods employed by the contractor. Subsidence is estimated to be on the order of 0.1 feet. For preliminary planning purposes, bulking of the granitic bedrock derived materials is estimated to be 0 to 10 percent. Losses from site clearing and removal of existing site improvements as well as generation of oversize material may affect earthwork quantity calculation and should be considered.

The previous estimates are intended as an aid for the project engineers in estimating earthwork quantities. It is recommended that the site development be planned to include an area that could be raised or lowered to accommodate final site balancing.

7.0 PRELIMNARY FOUNDATION RECOMMENDATIONS

7.1 General

The conclusions and recommendations presented herein, are based on the assumption that the planned development will consist of two- to four-story wood frame residential structures with slab-on-grade. It is our understanding that these conceptual plans are also part of the due diligence phase of the project and may or may not be the final design. As such, the conclusions and recommendations contained in this Due Diligence Preliminary Geotechnical Evaluation report should be considered preliminary, and should be reviewed, revised and/or approved in writing by EEI at the time the project design is finalized.

Be advised that as part of the foundation design election process, there is always a cost/benefit evaluation. Although we are providing alternatives for foundation design we have not accomplished the cost/benefit evaluation.

7.2 Preliminary Foundation Design

Lightly loaded wood-frame, two- to four-story residential buildings with a slab-on-grade, can be supported on conventional continuous or isolated spread footings bearing upon at least 24-inches of properly compacted fill materials. In preparation for foundation construction, the earthwork contractor should ensure that the site has been prepared as recommended, and that field density tests have been performed to adequately document the relative compaction of the structural fill.

Conventional foundations can be designed to impose dead plus long term live load bearing pressures of 2,000 pounds per square foot (psf). The allowable foundation bearing pressure is for footings having a minimum width of 15-inches and a minimum depth of 18-inches embedment below the lowest adjacent finish grade for one or two story buildings and 18-inches wide and a minimum 24-inches embedment below lowest adjacent finish grade for three or four-story buildings. The allowable soil bearing pressure can be increased by one-third when considering transient loads of short duration, such as wind or earthquake loads. Based on the prevailing geotechnical conditions encountered during our subsurface exploration, we recommend that foundations be reinforced with at least two No. 4 bars placed at the top of the footing and two placed at the bottom.

Horizontal loads acting on foundations and stem walls cast in open excavations against undisturbed native soil or against properly placed and compacted fill will be resisted by friction acting along the base of the footing and by passive earth pressures against the side of the footing and stem wall. The frictional resistance acting along the base of footings founded on suitable foundation soils may be computed using a coefficient of friction equal to 0.30 with the normal dead load.

Passive earth pressures acting against the side of footings and stem walls may be assumed to be equivalent to a fluid weighing 250 pounds per cubic foot. Passive pressure in the upper 1.0-foot should be neglected unless confined by concrete slabs-on-grade or asphalt concrete pavement. The values given above may be increased by one-third for transient wind or seismic loads.

7.3 Footing Setbacks

All footings should maintain a minimum 7-foot horizontal setback from the base of the footing to any descending slope (if existing onsite). This distance is measured from the outside footing face at the bearing elevation. Footings should maintain a minimum horizontal setback of H/3 (H=slope height) from the base of the footing to the descending slope face and no less than seven feet, or greater than 40 feet.

Footings adjacent to unlined drainage swales or underground utilities (if any) should be deepened to a minimum of 6-inches below the invert of the adjacent unlined swale or utilities. This distance is measured from the footing face at the bearing elevation. Footings for structures adjacent to retaining walls should be deepened so as to extend below a 1:1 projection from the heel of the wall. Alternatively, walls may be designed to accommodate structural loads from buildings or appurtenances.

7.4 Construction

The foundation construction considerations contained herein are presented as minimum preliminary recommendations from a soils engineering standpoint. Laboratory test results indicate the onsite soils' swell (expansion) potential is very low. During grading of the site, we recommend that no soil possessing an Expansion Index of more than 20 be placed within 18-inches of finish grade, if possible. As such, design parameters provided herein assume that finish grade soil materials will have a low expansion potential.

Recommendations by the project's design-structural engineer or architect, which may exceed the soils engineer's recommendations, should take precedence over the following minimum preliminary considerations. Final foundation design should be provided based on the expansion potential of the near surface soils encountered during grading.

7.5 Concrete Slab-on-Grade

Interior slabs can be grade supported by structural fill whose placement/compaction is documented by the project soils engineer/engineer geologist as recommended herein. The thickness of the slab should be in accordance with the structural engineer's design. However, based on geotechnical considerations, we recommend that concrete slabs be a minimum of 4-inches in thickness. Concrete slabs should be underlain by at least 2-inches of clean sand with a Sand Equivalent (SE) of at least 30. Where moisture condensation is undesirable, concrete slabs should be underlain with a moisture/vapor retarder consisting of a minimum 10-mil, visqueen membrane, with all laps sealed. The membrane should be underlain by a 2-inch layer of clean sand with the aforementioned sand layer placed over the visqueen to aid concrete curing. To reduce the potential for buildup of hydrostatic pressures, the free draining material under the slabs should have positive drainage with no low lying areas (i.e., depressions) created.

Floor slabs should be suitably reinforced and jointed (in accordance with Structural Engineer's recommendations) so that a small amount of independent movement can occur without causing damage. Based on the encountered geotechnical conditions, we recommend that floor slabs be reinforced with No. 4 bars spaced on 18-inch centers (each way)

The contractor should take the appropriate precautions to make sure that the reinforcement is placed and maintained within the middle one-third of the slab. Exterior slabs, such as walkways and driveways, can be adequately supported on documented structural fill that is at minimum 12-inches in thickness, and placed and compacted in accordance with the recommendations contained herein.

In preparation for slab or flatwork construction, the earthwork contractor should ensure that the onsite soils have been prepared as recommended and that field density tests have been performed to adequately document the relative compaction of the structural fill. Preparation of the native soils should be documented prior to placement of aggregate, structural components and/or fill.

Some minor cracking of slabs can be expected due to shrinkage. The potential for this slab cracking can be reduced by careful control of water/cement ratios in the concrete. The contractor should take appropriate curing precautions during the pouring of concrete in hot or windy weather to reduce the potential for cracking of slabs. We recommend that a slipsheet (or equivalent) be utilized if grouted fill, tile, or other crack-sensitive floor covering is planned directly on concrete slabs. All slabs should be designed in accordance with structural considerations.

All dedicated exterior flatwork should conform to standards provided by the governing agency including section composition, supporting material thickness and any requirements for reinforcing steel. Concrete mix proportions and construction techniques, including the addition of water and improper curing, can adversely affect the finished quality of the concrete and result in cracking and spalling of the slab. We recommend that all placement and curing be performed in accordance with procedures outlined by the American Concrete Institute and/or Portland Cement Association. Special consideration should be given to concrete placed and cured during hot or cold weather conditions. Proper control joints should be provided to reduce the potential for damage resulting from shrinkage.

Laboratory test results indicate that the upper soils contain soluble sulfate concentrations of 0.005 percent and chloride concentrations of 0.007 percent. The results of these analyses indicate a negligible corrosion potential to concrete. As such, Type II cement can be used in concrete elements that will be in contact with the upper soils.

8.0 PAVEMENT DESIGN RECOMMENDATIONS

Deleterious material, excessively wet or dry pockets, concentrated zones of oversized rock fragments, and any other unsuitable yielding materials encountered during grading should be removed. Once compacted fill and/or native soils are brought to the proposed pavement subgrade elevations, the subgrade should be proof-rolled in order to check for a uniform firm and unyielding surface. Representatives of the project geotechnical engineer should observe all grading and fill placement.

The upper 12-inches of pavement subgrade soils should be scarified; moisture conditioned to at least optimum moisture content and compacted to at least 95 percent of the laboratory standard (ASTM D1557). If loose or yielding materials are encountered during subgrade preparation, evaluation should be performed by EEI. Aggregate base materials should be properly prepared (i.e., processed and moisture conditioned) and compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557. Aggregate base materials should conform to Caltrans specifications for Class 2 aggregate base.

All pavement section changes should be properly transitioned. Although not anticipated, if adverse conditions are encountered during the preparation of subgrade materials, special construction methods may need to be employed. A representative of the project geotechnical engineer should be present for the preparation of subgrade and aggregate base.

For design purposes we have assumed a Traffic Index (TI) of 4.5 for the proposed parking areas and 6.0 for drive areas at the subject property. These assumed TI's should be verified as necessary by the Civil Engineer or Traffic Engineer. For preliminary design purposes, we have conservatively assumed a preliminary R-Value of 20 for the materials likely to be exposed at subgrade. The modulus of subgrade reaction (K-Value) was estimated at 70 pounds per square inch per inch (psi/in) for an R-Value of 20 (Caltrans, 1974).

TABLE 3
Preliminary Pavement Design Recommendations

Traffic Index (TI)	Pavement Surface	Aggregate Base Material (1)
4.5 – Parking Stalls	3.0-inches Asphalt Concrete	6.0-inches
6.0 – Main Drive Areas	4.0-inches Asphalt Concrete	8.0-inches
Trash Area and Concrete Pavement	5.5-inches Portland Cement Concrete (2)	Optional

(1) R-Value of 78 for Caltrans Class 2 aggregate base
(2) Reinforcement and control joints placed in accordance with the structural engineer's requirements

The recommended pavement sections provided above are intended as a preliminary minimum guideline. If thinner or highly variable pavement sections are constructed, increased maintenance and repair could be expected. If the ADT (average daily traffic) or ADTT (average daily truck traffic) increases beyond that intended, as reflected by the assumed traffic index used for design, increased maintenance and repair could be required for the pavement section. Final pavement design should be verified by testing of soils exposed at subgrade after grading has been completed. Thicker pavement sections could result if R-Value testing indicates lower values.

9.0 DEVELOPMENT RECOMMENDATIONS

9.1 Landscape Maintenance and Planting

Water is known to decrease the physical strength of earth materials, significantly reducing stability by high moisture conditions. Surface drainage away from foundations and graded slopes should be maintained. Only the volume and frequency of irrigation necessary to sustain plant life should be applied.

Consideration should be given to selecting lightweight, deep rooted types of landscape vegetation which require low irrigation that are capable of surviving the local climate. From a soils engineering viewpoint, "leaching" of the onsite soils is not recommended for establishing landscaping. If landscape soils are processed for the addition of amendments, the processed soils should be re-compacted to at least 90 percent relative compaction (based on ASTM D1557).

9.2 Site Drainage

Positive site drainage should be maintained at all times. Drainage should not flow uncontrolled over slopes or the subject parcel. Runoff should be channeled away from slopes and structures and not allowed to pond and/or seep uncontrolled into the ground. Pad drainage should be directed toward an acceptable outlet. Although not required, roof gutters and down spouts may be considered to control roof drainage, discharging a minimum of 10 feet from the proposed structures, or into a subsurface drainage system. Consideration should be given to eliminating open bottom planters directly adjacent to proposed structures for a minimum distance of ten feet. As an alternative, closed-bottom type planters could be utilized, with a properly designed drain outlet placed in the bottom of the planter.

9.3 Stormwater Disposal Systems

EEI understands that current plans call for runoff generated from the facility to be disposed of in engineered subsurface features onsite.

9.3.1 Percolation Testing

During our subsurface exploration at the subject property, EEI conducted percolation testing in three widely separated locations (P1, P2 and P3) near the southern property boundary at the locations for proposed detention basins as shown on the conceptual site plan. Our testing was performed at an approximate depth of approximately 3 feet below the existing ground surface. A minimum 2-inch layer of ½-inch diameter crushed gravel was placed at the bottom of the excavation prior to testing. The approximate locations of our percolation test borings are provided on **Figure 3**.

Percolation testing was conducted by one of EEI's field geologists under the guidance of a Registered Engineering Geologist and Registered Civil Engineer with EEI. In general accordance with the County of Riverside guidelines for percolation testing, the percolation test locations were pre-soaked by pouring at least 5 gallons of water into the excavation. Testing was started after the hole was allowed to pre-soak for at least one hour. During testing, a minimum of 12-inches of water was placed in the excavation and the rate of the water drop was recorded at approximately 10 minute intervals. This procedure was repeated for the test hole until rates varied generally less than 10 percent for the test hole. We note that a soil profile's percolation rate is not the same as its infiltration rate. Therefore, the measured/calculated field percolation rate was converted to an estimated infiltration rate utilizing a reduction factor known as the Porchet method (Ritzema, 1974). Upon conclusion of testing, the perforated pipe was removed and the test excavation was backfilled. Results of percolation testing are presented in the following table, **Table 4**.

TABLE 4
Percolation Test Results

Test		Depth of Test (feet below existing grade)	Stabilized Percolation Rate (in/hr)	Infiltration Rate (in/hr)
P1		3	3.84	0.82
P2		3	3.60	0.50
P3		3	3.60	0.45

9.3.2 Summary of Findings

Based on the results of our percolation testing, it appears that a preliminary tested infiltration rate of 0.45-inches per hour can be used in preliminary design of subsurface stormwater retention/disposal devices at the property.

9.3.3 Structural Setback from Retention Devices

It is recommended that retention/disposal devices be situated at least three times their depth, or a minimum of 15 feet (whichever is greater), from the outside bottom edge of structural foundations. Structural foundations include (but are not limited to) buildings, loading docks, retaining walls, and screen walls.

9.4 Additional Site Improvements

Recommendations for additional grading, exterior concrete flatwork design and construction can be provided upon request. If in the future, additional property improvements are planned for the subject property, recommendations concerning the design and construction of improvements would be provided upon request.

9.5 Trenching

All temporary excavations for grading purposes and installation of underground utilities should be constructed in accordance with OSHA guidelines and local safety codes. Temporary excavations over 5 feet in height should be evaluated by the project engineer, and could require shoring, sloping, or a combination thereof. Temporary excavations within the onsite materials should be stable at 1:1 inclinations for cuts less than 10 feet in height.

Footing trench excavations for structures and walls should be observed and approved by a representative of the project soils engineer prior to placing reinforcement. Footing trench spoil and excess soils generated from utility trench excavations should be compacted to a minimum relative compaction of 90 percent (based on ASTM D1557) if not removed from the subject property. All excavations should conform to OSHA and local safety codes.

9.6 Utility Backfill

Fill around the pipe should be placed in accordance with details shown on the drawings, and should be placed in layers not to exceed 8-inches loose (unless otherwise approved by the geotechnical engineer) and compacted to at least 90 percent of the maximum dry density as determined in accordance with ASTM D1557 (Modified Proctor). The geotechnical engineer should approve all backfill material. Select material should be used when called for on the drawings, or when recommended by the geotechnical engineer. Care should be taken during backfill and compaction operations to maintain alignment and prevent damage to the joints. The backfill should be kept free from oversized material, chunks of highly plastic clay, or other objectionable material. Backfill soils should be non-expansive, non-corrosive, and compatible with native earth materials. Backfill materials and testing should be in accordance with the CBC (2013), and the requirements of the local governing jurisdiction.

Pipe backfill areas should be graded and maintained in such a condition that erosion or saturation will not damage the pipe bed or backfill. Flooding trench backfill is not recommended. Heavy equipment should not be operated over any pipe until it has been properly backfilled with a minimum of 2 to 3 feet of cover. The utility trench should be systematically backfilled to allow maximum time for natural settlement. Backfill should not occur over porous, wet, or spongy subgrade surfaces. Should these conditions exist, the areas should be removed, replaced and recompacted.

10.0 PLAN REVIEW

Once detailed site and grading plans are available, they should be submitted to this office for review and comment, to reduce the potential for discrepancies between plans and the preliminary recommendations presented herein. If conditions are found to differ substantially from those stated, appropriate recommendations would be provided. Additional field studies may be warranted.

11.0 LIMITATIONS

This Due Diligence Level Preliminary Geotechnical Evaluation has been conducted in accordance with generally accepted geotechnical engineering principles and practices. Findings provided herein have been derived in accordance with current standards of practice, and no warranty is expressed or implied. Standards of practice are subject to change with time. This Preliminary Evaluation report has been prepared for the sole use of Anderson Consulting Engineers, Inc. (Client), within a reasonable time from its authorization. Site conditions, land use (both onsite and offsite), or other factors may change as a result of man-made influences, and additional work may be required with the passage of time.

This Due Diligence Level Preliminary Geotechnical Evaluation should not be relied upon by other parties without the express written consent of EEI and the Client; therefore, any use or reliance upon this geotechnical evaluation by a party other than the Client should be solely at the risk of such third party and without legal recourse against EEI, its employees, officers, or directors, regardless of whether the action in which recovery of damages is brought or based upon contract, tort, statue, or otherwise. The Client has the responsibility to see that all parties to the project, including the designer, contractor, subcontractor, and building official, etc. are aware of this report in its complete form. This report contains information that may be used in the preparation of contract specifications; however, the report is not designed as a specification document, and may not contain sufficient information for use without additional assessment. EEI assumes no responsibility or liability for work or testing performed by others. In addition, this report may be subject to review by the controlling authorities.

12.0 REFERENCES

American Society of Civil Engineers (ASCE), 2005, Minimum Design Loads for Buildings and Other Structures, ASCE Document ASCE/SEI 7-05.

American Society for Testing and Materials (ASTM), 2008, Annual Book of ASTM Standards, Volume 04.08, Construction: Soil and Rock (I), Standards D 420 - D 5876.

Anderson Consulting Engineers, Inc., 2014, Ironwood – Project Exhibit, scale: 1"=100', dated September 16, 2014.

Blake, T., 2000, "EQFAULT, version 3.0", a Computer Program for Probabilistic Estimation of Peak Acceleration from 3-D Fault Sources," Thomas F. Blake Computer Services and Software, Newbury Park, California.

California Building Code (CBC), 2013, California Code of Regulations, Title 24, Part 2, Volume 2 of 2, California Building Standards Commission, Based on 2012 International Building Code; 2013 California Historical Building Code, Title 24, Part 8; effective January 1, 2014.

California Department of Transportation (Caltrans), 1974, Highway Design Manual, dated October 1.

California Division of Mines and Geology (CDMG), 1974, State of California Special Studies Zones, Sunnymead Quadrangle. Official Map, Effective July 1, 1974, scale 1:24,000.

California Geological Survey (CGS), 2002, California Geomorphic Provinces Note 36, Electronic Copy, Revised December 2002.

California Geological Survey (CGS), 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117, revised and re-adopted September 11, 2008.

Coduto, D. P., 2001, Foundation Design Principles and Practices, Second Edition.

DeLORME, 1999, 3-D TopoQuads, California South, Region 7.

Google Earth®, 2014, Version 6.0.

Hart, E.W., and Bryant, W.A. (Hart and Bryant), 1997, Fault-Rupture Hazard Zones in California: California Department of Conservation, Division of Mines and Geology, Special Publication 42.

Jennings, C.W., 1994, Fault Activity Map of California and Adjacent Areas: California Division of Mines and Geology (CDMG), Map Sheet No. 6, scale 1:750,000.

Mayers & Associates Civil Engineering, Inc., 2008, City of Moreno Valley, Tract No. 31556, Off-Site Sewer, Plan and Profile, Oliver Street 21+00.00 to 32+00.00, scale: 1"=40', Sheet 4 of 8, Plot Date February 21, 2008.

Morton, D.M., 2004, Preliminary Digital Geologic Map of the Santa Ana 30' x 60' Quadrangle, Southern California, Version 2.0: U.S. Geological Survey Open-File Report 99-0172.

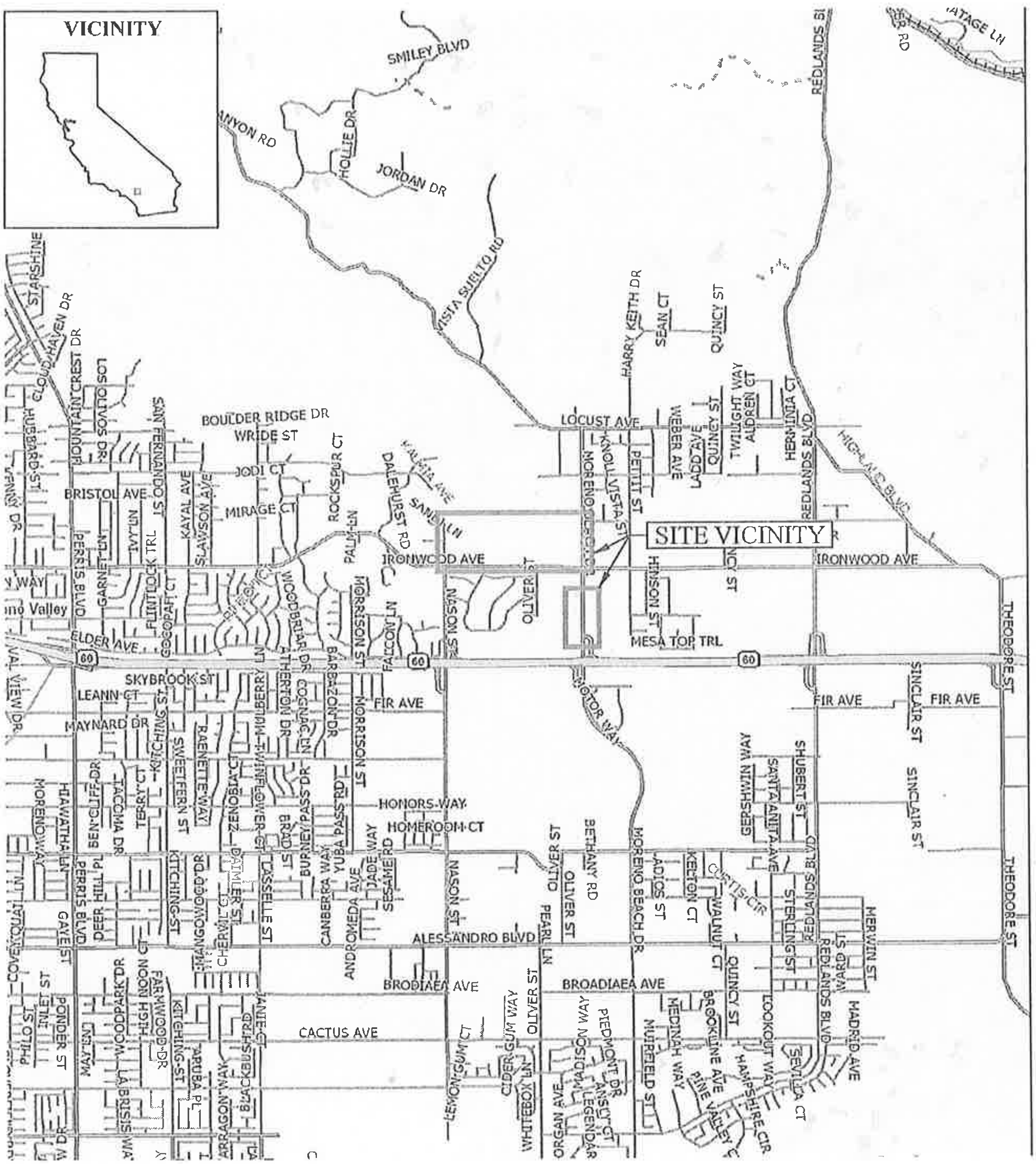
Sowers and Sowers, 1970, Unified Soil Classification System (After U. S. Waterways Experiment Station and ASTM 02487-667) in Introductory Soil Mechanics, New York.

Tokimatsu, K. and Seed, H.B., 1987, "Evaluation of Settlements in Sands Due to Earthquake Shaking," American Society of Civil Engineers Journal of Geotechnical Engineering, Vol. 113, No. 8, pp. 861-878.

United States Geological Survey (USGS), 2002, Earthquake Hazards Program, Interpolated Probalistic Ground Motion for the Conterminous 48 States, http://earthquake.usgs.gov/research/hazmaps/design/.

United States Geological Survey (USGS), 2012, 7.5 Minute Topographic Map, Sunnymead Quadrangle, California, Scale 1:24,000.

FIGURES



Map Source: © 2007 DeLorme. Topo USA ® 7.0 West Region

Scale: 1" = 4000'

0 FT 2400 FT 4000 FT 8000 FT

Note: All locations are approximate

N

SITE VICINITY MAP

BELLACAP, LLC
North of Ironwood Avenue Between Oliver Street & Nason Street
Moreno Valley, California 92555
EEI Project No. GLO-71982.4
Created October 2014

EEI Geotechnical & Environmental Solutions

CREATED BY: JAB
REVISION DATE: -
REVISION NO.: -

FIGURE 1

Map Source: © Google Earth 2014, Imagery Date 11/06/2012

Sewerline Boring Locations
B7

Scale: 1" = 600'

0 FT 360 FT 600 FT 1200 FT

Note: All locations are approximate

N

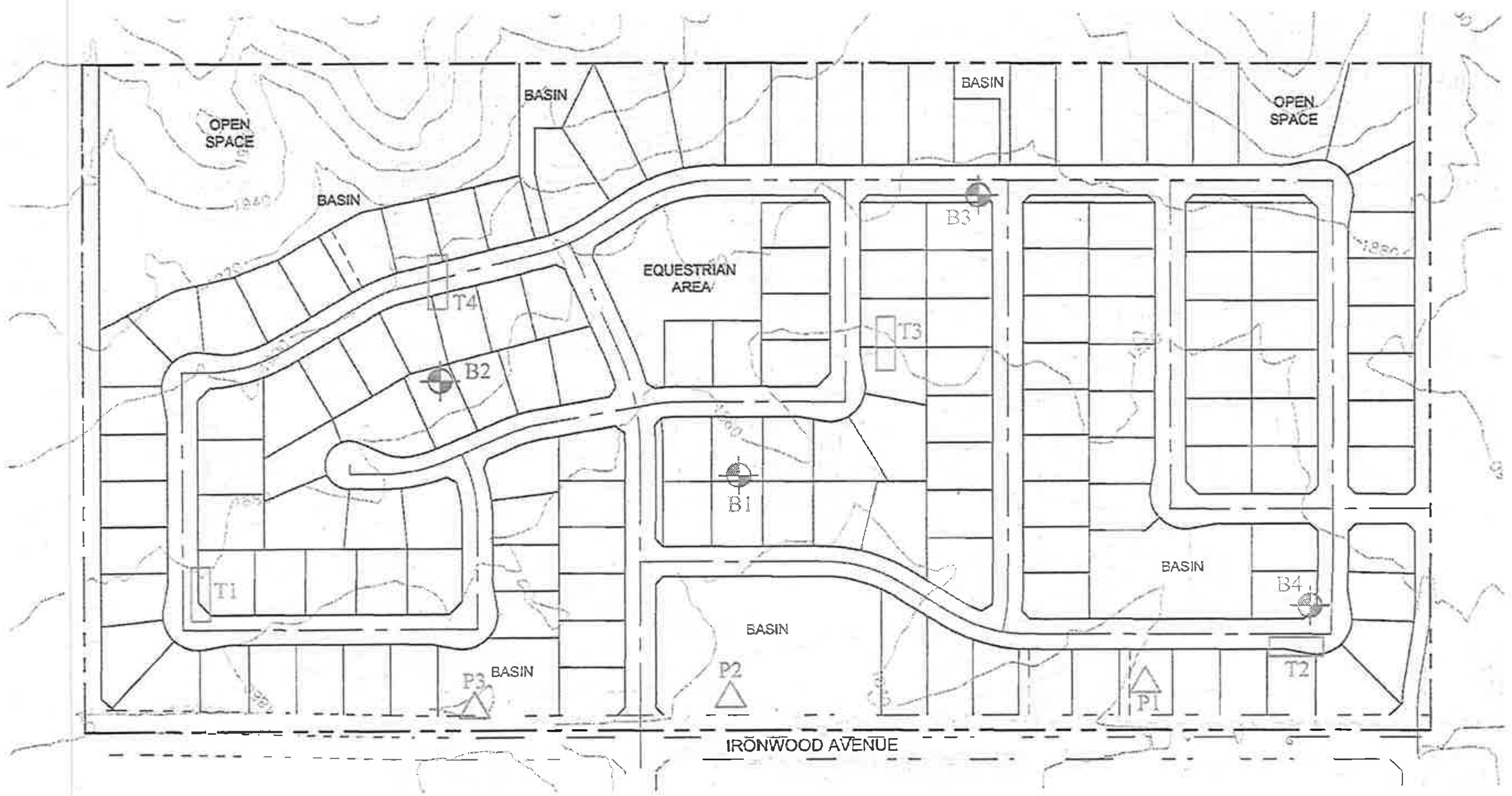
AERIAL SITE MAP & OFFSITE BORING LOCATION

BELLACAP, LLC
North of Ironwood Avenue Between Oliver Street & Nason Street
Moreno Valley, California 92555
EEI Project No. GLO-71982.4
Created October 2014

EEI Geotechnical & Environmental Solutions

CREATED BY: JAB
REVISION DATE: -
REVISION NO.: -

FIGURE 2



Map Source: Anderson Consulting Engineers, Inc., Ironwood, Project Exhibit, dated Sept. 16, 2014

LEGEND

T4 Test Pit

P3 Percolation Test

B4 Boring

NOTE: All Locations are Approximate

Scale: 1" = 300'

0 FT 180 FT 300 FT 600 FT

Note: All locations are approximate

N

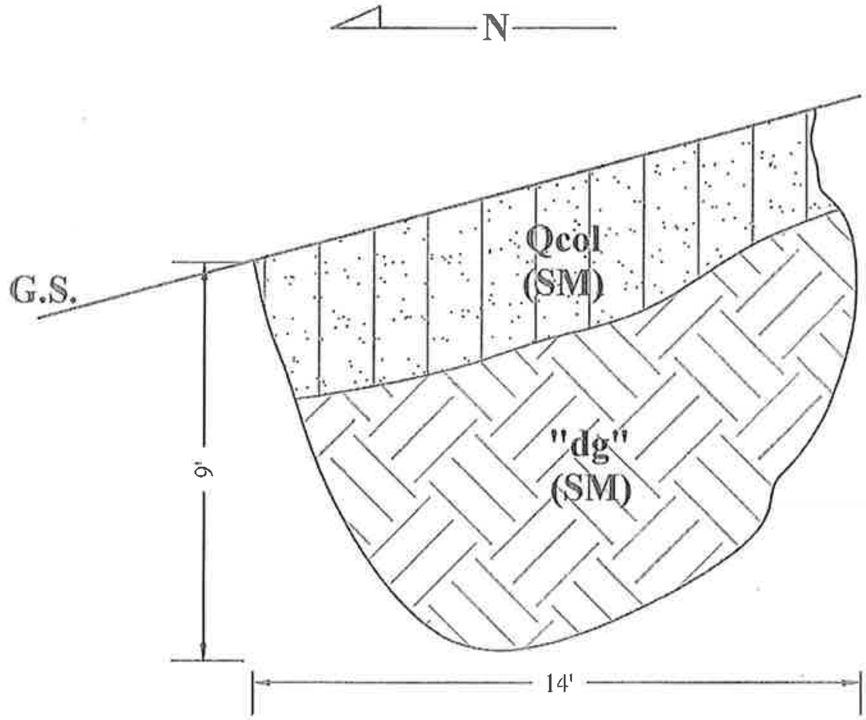
FIELD EXPLORATION PLAN

BELLACAP, LLC
North of Ironwood Avenue Between Oliver Street & Nason Street
Moreno Valley, California 92555
EEI Project No. GLO-71982.4
Created October 2014

EEI

CREATED BY: JAB
REVISION DATE: -
REVISION NO.: -

FIGURE 3



@ 0-3' COLLUVIUM (Qcol)
Silty-Sand (SM) - red-orange, medium to coarse, slightly moist, medium dense to dense, trace clay, weathered "dg" texture, oxidized.

@ 3'-9' WEATHERED BEDROCK: Tonalite (Kt)
Decomposed Granitics ("dg") - yellow-brown to gray-brown mottled/speckled, medium to coarse, slightly moist to moist, very soft to moderately hard, moderately to heavily weathered, minor clay, "dg" texture, less weathered with depth, weathers to silty sand (SM).

Total Depth = 9'
Bulk Sample @ 0-9'

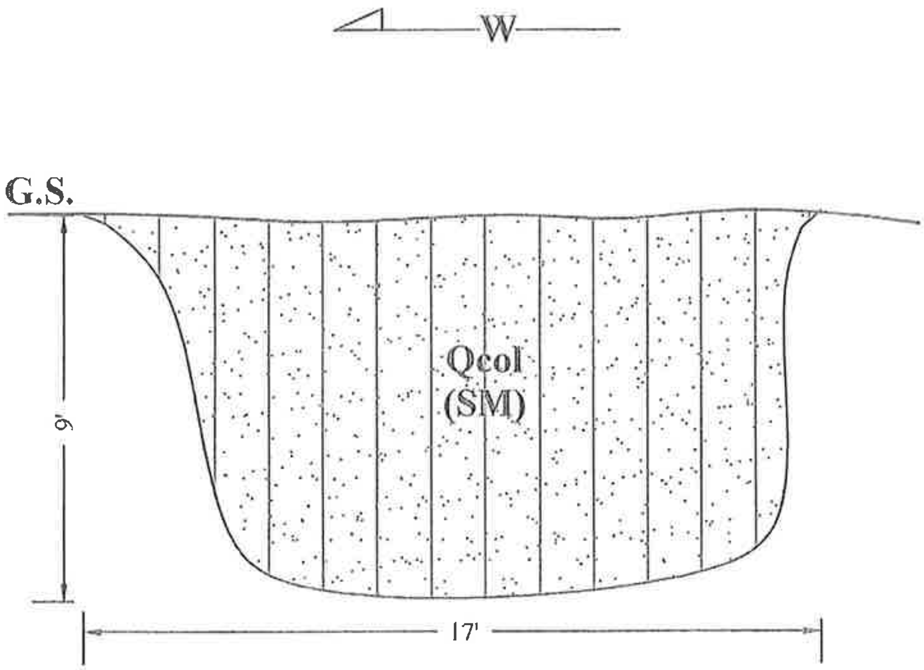
Scale: 1" = 4'

0 FT 2.4 FT 4 FT 8 FT

Note: All locations are approximate

TRENCH LOG
ANDERSON CONSULTING ENGINEERS
Preliminary Geotechnical Evaluation
Ironwood
Moreno Valley, California
EEI Project No. GLO-71982.4
Created November 2014

CREATED BY: JAB	FIGURE T1
REVISION DATE: -	
REVISION NO.: -	



@ 0-9' COLLUVIUM (Qcol)
Silty-Sand (SM) - red-brown, medium to coarse, slightly moist to moist, medium dense to dense, trace clay, weathered "dg" texture, oxidized.

Total Depth = 9'
Bulk Sample @ 0-6'

Scale: 1" = 4'

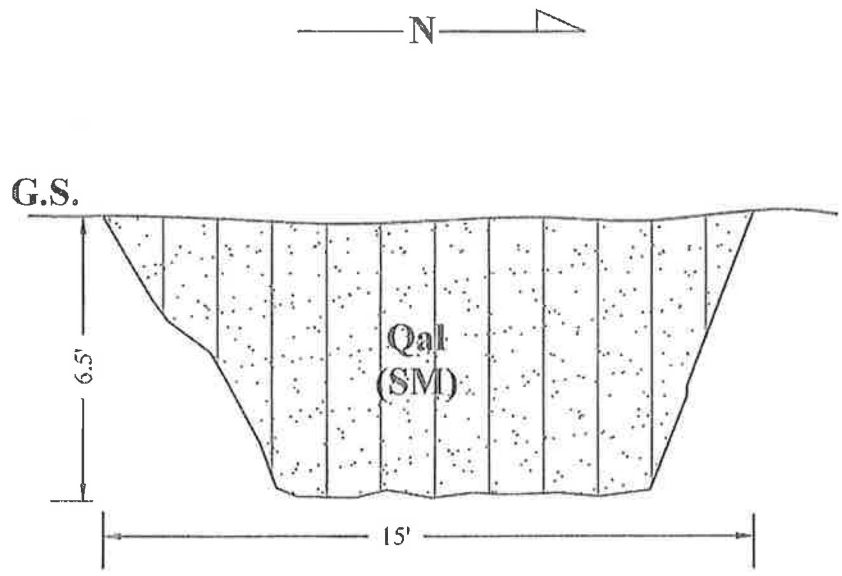
0 FT 2.4 FT 4 FT 8 FT

Note: All locations are approximate

TRENCH LOG
ANDERSON CONSULTING ENGINEERS
Preliminary Geotechnical Evaluation
Ironwood
Moreno Valley, California
EEI Project No. GLO-71982.4
Created November 2014

EEI Geotechnical & Environmental Solutions

CREATED BY: JAB	FIGURE T2
REVISION DATE: -	
REVISION NO.: -	



@ 0-6.5' ALLUVIUM (Qal)
Silty-Sand (SM) - medium-brown, fine to coarse, slightly moist, medium dense, trace clay, minor pinhole root porosity, trace gravel.

Total Depth = 6.5'
No Sampling

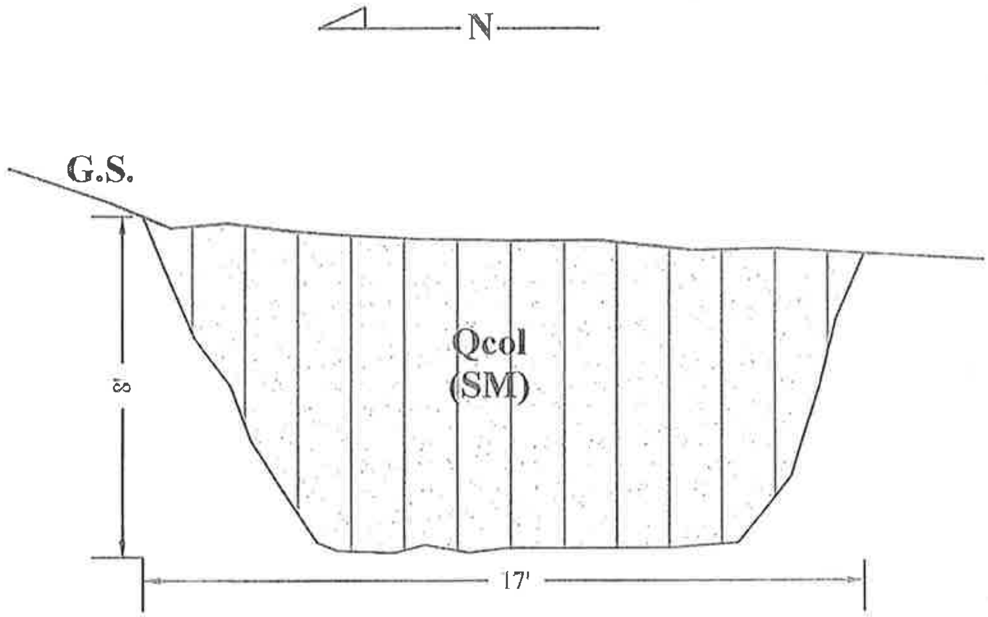
Scale: 1" = 4'

Note: All locations are approximate

TRENCH LOG
ANDERSON CONSULTING ENGINEERS
Preliminary Geotechnical Evaluation
Ironwood
Moreno Valley, California
EEI Project No. GLO-71982.4
Created November 2014

EEI Geotechnical & Environmental Solutions

CREATED BY:	
JAB	**FIGURE T3**
REVISION DATE:	
REVISION NO.:	



@ 0-8' COLLUVIUM (Qcol)
Silty-Sand (SM) - light gray-brown mottled, fine to medium, trace coarse, slightly moist to moist, medium dense to dense, trace clay, weathered "dg" texture.

Total Depth = 8'
No Sampling

Scale: 1" = 4'

0 FT 2.4 FT 4 FT 8 FT

Note: All locations are approximate

TRENCH LOG
ANDERSON CONSULTING ENGINEERS
Preliminary Geotechnical Evaluation
Ironwood
Moreno Valley, California
EEI Project No. GLO-71982.4
Created November 2014

CREATED BY: JAB	**FIGURE T4**
REVISION DATE: -	
REVISION NO.: -	

APPENDIX A
SOIL CLASSIFICATION CHART, BORING LOGS AND TEST PIT LOGS

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
CLAYSTONE				CL	CLAYSTONE, Piocene Fernando Formation/late Miocene Puente Formation

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

BOREHOLE LOG

EEI Geotechnical & Environmental Solutions	**BOREHOLE LOG**	**Number:** B-1
	Client: Global - Anderson Consulting Engineers	**Sheet:** 1 of 2
Date Started: 10/17/2014 · **Date Finished:** 10/17/2014	**Location:** Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca	
EEI Rep: BM · **Project No.:** GLO-71982.4	**Drill Rig/Sampling Method:** Truck Mounted CME-75 / 140 lb Auto Hammer	**Borehole Diameter:** 6-inch

SAMPLE LOG					BOREHOLE LOG			
Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Graphic Log	Geologic Description (SoilType, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					0–1			ALLUVIUM SILTY-SAND, orange-brown mottled, fine to coarse grained, damp, loose
X	MC	3 4 5	105	3	3			
	MC	4 6 8	108	3	6			
	MC	3 3 4	138	3	8			
	MC	4 5 6	104	7	10			@ 10' Becomes fine to medium grained, moist, loose; micaceous
	SPT	3 3 3		9	15	SM		
	MC	6 11 16	122	8	20			@ 20' becomes medium dense
	SPT	6 8 8		7	25			
	MC	8 10 11	124	7	30–31	SM		WEATHERED BEDROCK: TONALITE (Kt) DECOMPOSED GRANITICS ("DG"), gray-white to black speckled, damp, dense; weathered, friable, phaneritic texture, moderate to heavily weathered

BOREHOLE LOG VES-71982.4.GPJ EEI.GDT 11/25/14

Attachment: Preliminary Geotechnical Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

BOREHOLE LOG

Number: B-1	Sheet: 2 of 2	Client: Global - Anderson Consulting Engineers	Location: Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca
Date Started: 10/17/2014	Date Finished: 10/17/2014		
EEI Rep: BM	Project No.: GLO-71982.4	Drill Rig/Sampling Method: Truck Mounted CME-75 / 140 lb Auto Hammer	Borehole Diameter: 6-inch

SAMPLE LOG								BOREHOLE LOG
Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Graphic Log	Geologic Description (SoilType, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					33			
					34			
	SPT	50-4"		4	35			@ 35' Becomes very dense
					36			
					37			
					38			
					39			
	MC	50-3"	103	7	40			
					41	SM		
					42			
					43			
					44			
	SPT	50-5"		7	45			@ 45' DECOMPOSED GRANITICS ("DG"), dark gray, orange and white speckled, damp, medium dense to dense; moderately weathered
					46			
					47			
					48			
					49			
	NR	50-3"			50			@ 50' No sample recovery
					51			
					52			Total depth: 50.5-feet No groundwater encountered Hole backfilled on 10/17/2014 with drilled cuttings
					53			
					54			
					55			
					56			
					57			
					58			
					59			
					60			
					61			
					62			
					63			

BOREHOLE LOG VES-71982.4.GPJ EEI.GDT 11/25/14

BOREHOLE LOG

EEI Geotechnical & Environmental Solutions	**BOREHOLE LOG**	Number: B-2
	Client: Global - Anderson Consulting Engineers	Sheet: 1 of 1
Date Started: 10/17/2014 / Date Finished: 10/17/2014	Location: Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca	
EEI Rep: BM / Project No.: GLO-71982.4	Drill Rig/Sampling Method: Truck Mounted CME-75 / 140 lb Auto Hammer	Borehole Diameter: 6-inch

SAMPLE LOG / BOREHOLE LOG

Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Geologic Description (SoilType, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					0–11	SM	**COLLUVIUM** SILTY-SAND, orange-brown mottled, fine to coarse grained, damp, loose
	MC	4 6 8	111	2	3		
	MC	7 8 10	137	3	5.5		
	MC	5 6 9	115	4	8		
	MC	5 31 50-3"	126	3	10.5		
					11–15.75	SM	**WEATHERED BEDROCK: TONALITE (Kt)** DECOMPOSED GRANITICS ("DG"), white, orange and black speckled, damp, dense to very dense; unweathered to moderately weathered
	SPT	23 50-3"		4	15		

Total depth: 15.75-feet
No groundwater encountered

Hole backfilled on 10/17/2014 with drilled cuttings

BOREHOLE LOG VES-71982.4.GPJ EEI.GDT 11/25/14

EEI Geotechnical & Environmental Solutions	BOREHOLE LOG	Number: B-3
	Client: Global - Anderson Consulting Engineers	Sheet: 1 of 1
Date Started: 10/17/2014 / Date Finished: 10/17/2014	Location: Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca	
EEI Rep: BM / Project No.: GLO-71982.4	Drill Rig/Sampling Method: Truck Mounted CME-75 / 140 lb Auto Hammer	Borehole Diameter: 6-inch

SAMPLE LOG						BOREHOLE LOG		
Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Graphic Log	Geologic Description (SoilType, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					0–1	SM		COLLUVIUM SILTY-SAND, red-brown, fine to coarse grained with occasional gravels, dry to damp, dense
	MC	50-3"	85	5	3			
	MC	20 22 26	119	3	5	SM		@ 5' Becomes medium dense
	MC	23 31 34	123	4	8			@ 8' Becomes dense
					10			WEATHERED BEDROCK: TONALITE (Kt) DECOMPOSED GRANITICS ("DG"), orange, brown and black speckled, damp, medium dense to dense; occasional unweathered to moderately weathered
	MC	9 13 18	113	2	11			
	SPT	8 9 10		4	16	SM		
					19			@ 19' Becomes very dense
	MC	23 44 50-5"	128	9	21			
					22–31			Total depth: 21.5-feet No groundwater encountered Hole backfilled on 10/17/2014 with drilled cuttings

BOREHOLE LOG VES-71982.4.GPJ EEI.GDT 11/25/14

Attachment: Preliminary Geotechnical Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

BOREHOLE LOG

Number:	B-4
Client:	Global - Anderson Consulting Engineers
Sheet:	1 of 1
Location:	Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca
Date Started:	10/17/2014
Date Finished:	10/17/2014
EEI Rep:	BM
Project No.:	GLO-71982.4
Drill Rig/Sampling Method:	Truck Mounted CME-75 / 140 lb Auto Hammer
Borehole Diameter:	6-inch

EEI Geotechnical & Environmental Solutions

Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Geologic Description (SoilType, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					0–14	SM	COLLUVIUM SILTY-SAND, red-brown, fine to coarse grained with occasional gravels, moist, medium dense
	MC	13 / 13 / 19	111	4	3		
	MC	6 / 7 / 7	111	3	6		@ 5' Becomes loose
	MC	7 / 21 / 50-5"	115	5	8		@ 8' Becomes dense to very dense
	MC	39 / 50-4"	116	8	11		
					14–16.5	SM	WEATHERED BEDROCK; TONALITE (Kt) DECOMPOSED GRANITICS ("DG"), orange, brown and black speckled, moist, medium dense; weathered
	SPT	6 / 9 / 9		4	15–16		

Total depth: 16.5-feet
No groundwater encountered

Hole backfilled on 10/17/2014 with drilled cuttings

BOREHOLE LOG VES-71982.4.GPJ EEI.GDT 11/25/14

EEI Geotechnical & Environmental Solutions		**BOREHOLE LOG**	**Number:** B-5
		Client: Global - Anderson Consulting Engineers	**Sheet:** 1 of 1
Date Started: 10/17/2014	**Date Finished:** 10/17/2014	**Location:** Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca	
EEI Rep: BM	**Project No.:** GLO-71982.4	**Drill Rig/Sampling Method:** Truck Mounted CME-75 / 140 lb Auto Hammer	**Borehole Diameter:** 6-inch

SAMPLE LOG								BOREHOLE LOG
Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Graphic Log	Geologic Description (SoilType, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
Bulk (1–5 ft)					0–15	SM		ALLUVIUM SILTY-SAND, Orange-brown mottled, fine to coarse grained, poorly sorted, damp, loose to medium dense
	MC	3 5 6	106	3	5–6			
	MC	5 9 15	123	5	10–11			
	SPT	10 10 15		6	15–16	SM		WEATHERED BEDROCK: TONALITE (Kt) DEOMPOSED GRANITICS ("DG"), orange, brown and black speckled, moist, medium dense; weathered
	MC	10 20 25	124	12	20–21			
	SPT	10 12 18		11	25–26.5			
					26.5			Total depth: 26.5-feet No groundwater encountered Hole backfilled on 10/17/2014 with drilled cuttings

BOREHOLE LOG VES-71982.4.GPJ EEI.GDT 11/25/14

BOREHOLE LOG

EEI Geotechnical & Environmental Solutions		**BOREHOLE LOG**	**Number:** B-6
		Client: Global - Anderson Consulting Engineers	**Sheet:** 1 of 1
Date Started: 10/17/2014	**Date Finished:** 10/17/2014	**Location:** Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca	
EEI Rep: BM	**Project No.:** GLO-71982.4	**Drill Rig/Sampling Method:** Truck Mounted CME-75 / 140 lb Auto Hammer	**Borehole Diameter:** 6-inch

SAMPLE LOG								BOREHOLE LOG
Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Graphic Log	Geologic Description (SoilType, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					0–10	SM		FILL SILTY-SAND, light brown, fine to coarse grained, damp, loose
	MC	5 7 8	116	2	5			
					10–26.5	ML		COLLUVIUM SANDY-SILT, orange-brown, fine to medium grained, moderately sorted, moist, medium dense
	MC	8 11 13	111	7	10			
	SPT	5 6 6		5	15			
	MC	8 13 16	118	3	20			
	SPT	8 10 12		6	25			
					26.5			Total depth: 26.5-feet No groundwater encountered Hole backfilled on 10/17/2014 with drilled cuttings

BOREHOLE LOG VES-71982.4.GPJ EEI.GDT 11/25/14

BOREHOLE LOG

EEI Geotechnical & Environmental Solutions

Number:	B-7
Client:	Global - Anderson Consulting Engineers
Sheet:	1 of 1
Location:	Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca
Date Started:	10/17/2014
Date Finished:	10/17/2014
EEI Rep:	BM
Project No.:	GLO-71982.4
Drill Rig/Sampling Method:	Truck Mounted CME-75 / 140 lb Auto Hammer
Borehole Diameter:	6-inch

SAMPLE LOG / BOREHOLE LOG

Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Geologic Description (Soil Type, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					0–15	SM	COLLUVIUM SILTY-SAND, brown to orange-brown, fine to coarse grained, moist, medium dense
	MC	41 / 24 / 26	115	3	5		
	MC	8 / 14 / 21	112	3	10		
	SPT	6 / 10 / 10		8	15	ML	@ 15' SANDY-SILT, brown, fine to coarse, moist, medium dense, micaceous
	MC	8 / 13 / 19	122	7	20		
	SPT	8 / 10 / 12		5	25		

Total depth: 26.5-feet
No groundwater encountered

Hole backfilled on 10/17/2014 with drilled cuttings

BOREHOLE LOG VES-71982.4.GPJ EEI.GDT 11/25/14

Attachment: Preliminary Geotechnical Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

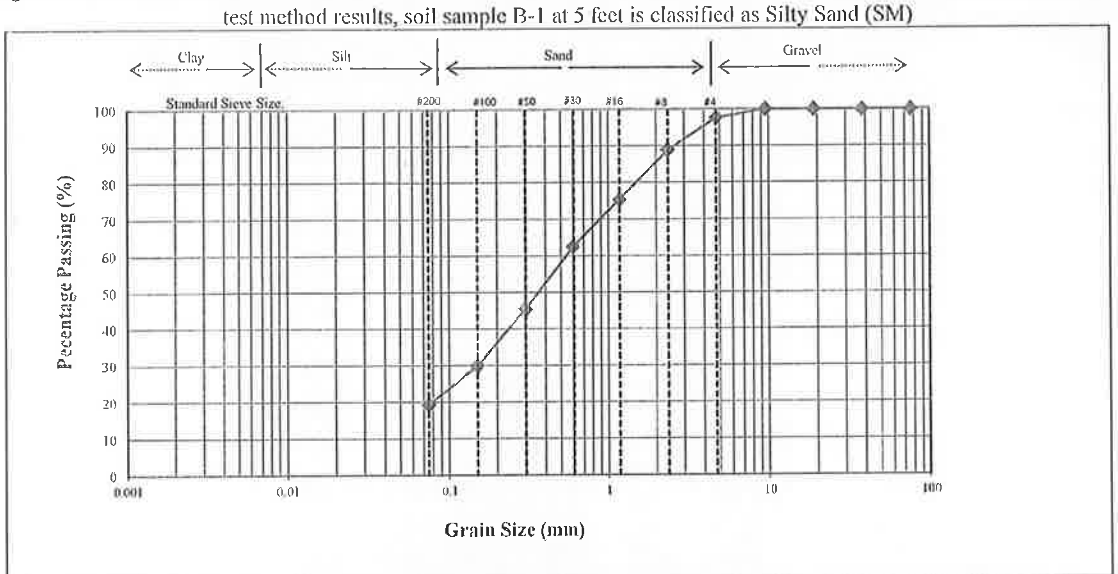
APPENDIX B
LABORATORY TEST DATA

PARTICLE-SIZE ANALYSIS OF SOILS
ASTM METHOD D 422 (SIEVE ANALYSIS)

Sample :	B-1 @ 5 ft.
Total Weight (g)	129.2
Dry Weight (g)	125.8
Wet Sieve Weight (g)	101.5
Initial Moisture (%)	2.7

D10 (mm)	N/A
D30 (mm)	0.15
D60 (mm)	0.53
Cu	N/A
Cc	N/A

According to ASTM D 2487 Unified Soil Classification System (USCS) and ASTM D 422 (Standard Test Method for Particle-Size Analysis) test method results, soil sample B-1 at 5 feet is classified as Silty Sand (SM)



Sieve Size (in)	Sieve Size (mm)	Cumulative Weight of dry soil (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	3.0	2.4	97.6
#8	2.36	14.0	11.1	88.9
#16	1.18	31.0	24.6	75.4
#30	0.6	47.2	37.5	62.5
#50	0.3	68.7	54.6	45.4
#100	0.15	88.2	70.1	29.9
#200	0.075	101.5	80.7	19.3

Client: Anderson Consulting Engineers

Project Name: Ironwood

Job Number: GLO-71982.4

Date: 10/24/14

Boring Number: B-1

Depth: 5 ft.

Soil Description: Brown Mottled Silty Sand SM

Tested by: B D

EEI Geotechnical & Environmental Solutions

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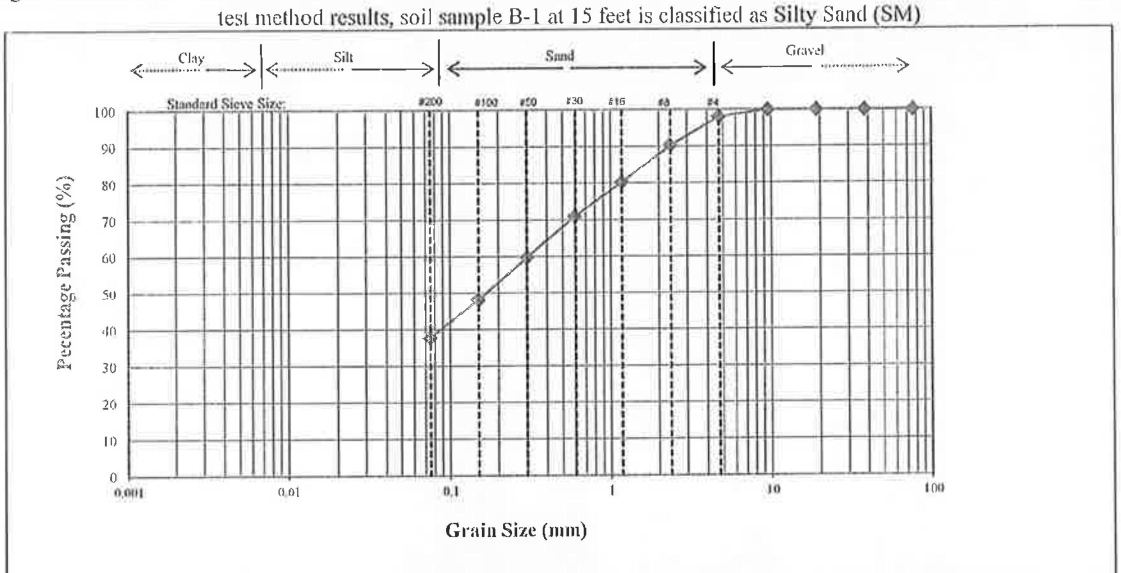
PARTICLE-SIZE ANALYSIS OF SOILS
ASTM METHOD D 422 (SIEVE ANALYSIS)

Sample :	B-1 @15 ft.
Total Weight (g)	117.5
Dry Weight (g)	108.1
Wet Sieve Weight (g)	67.3
Initial Moisture (%)	8.7

D10 (mm)	N/A
D30 (mm)	N/A
D60 (mm)	0.30
Cu	N/A
Cc	N/A

According to ASTM D 2487 Unified Soil Classification System (USCS) and ASTM D 422 (Standard Test Method for Particle-Size Analysis) test method results, soil sample B-1 at 15 feet is classified as Silty Sand (SM)



Sieve Size (in)	Sieve Size (mm)	Cumulative Weight of dry soil (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	2.1	1.9	98.1
#8	2.36	10.6	9.8	90.2
#16	1.18	21.4	19.8	80.2
#30	0.6	31.4	29.0	71.0
#50	0.3	43.6	40.3	59.7
#100	0.15	56.1	51.9	48.1
#200	0.075	67.3	62.3	37.7

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2195 Faraday Avenue, Suite K, Carlsbad CA 92008

Client: Anderson Consulting Engineers

Project Name: Ironwood

Job Number: GLO-71982.4

Date: 10/24/14

Boring Number: B-1

Depth: 15 ft.

Soil Description: Brown Mottled Silty Sand SM

Tested by: B D

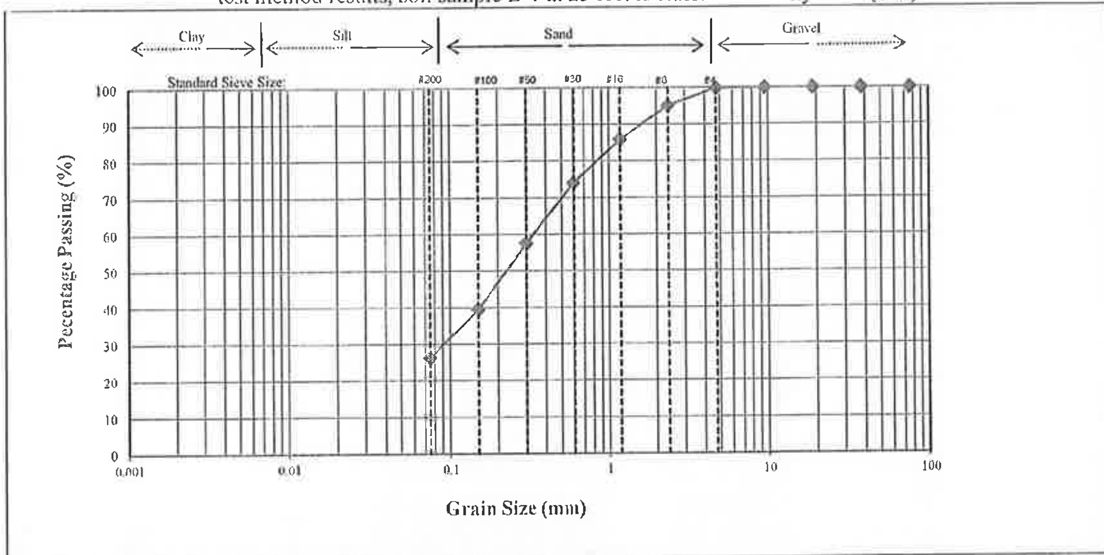
Attachment: Preliminary Geotechnical Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

PARTICLE-SIZE ANALYSIS OF SOILS
ASTM METHOD D 422 (SIEVE ANALYSIS)

Sample :	B-1 @ 25 ft.
Total Weight (g)	123.6
Dry Weight (g)	115.8
Wet Sieve Weight (g)	85.3
Initial Moisture (%)	6.7

D10 (mm)	N/A
D30 (mm)	0.08
D60 (mm)	0.33
Cu	N/A
Cc	N/A

According to ASTM D 2487 Unified Soil Classification System (USCS) and ASTM D 422 (Standard Test Method for Particle-Size Analysis) test method results, soil sample B-1 at 25 feet is classified as Silty Sand (SM)



Sieve Size (in)	Sieve Size (mm)	Cumulative Weight of dry soil (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	0.2	0.2	99.8
#8	2.36	5.7	4.9	95.1
#16	1.18	16.4	14.2	85.8
#30	0.6	30.1	26.0	74.0
#50	0.3	49.2	42.5	57.5
#100	0.15	70.1	60.5	39.5
#200	0.075	85.3	73.7	26.3

EEI Geotechnical & Environmental Solutions

2195 Faraday Avenue, Suite K, Carlsbad CA 92008

Client: Anderson Consulting Engineers

Project Name: Ironwood

Job Number: GLO-71982.4

Date: 10/24/14

Boring Number: B-1

Depth: 25 ft.

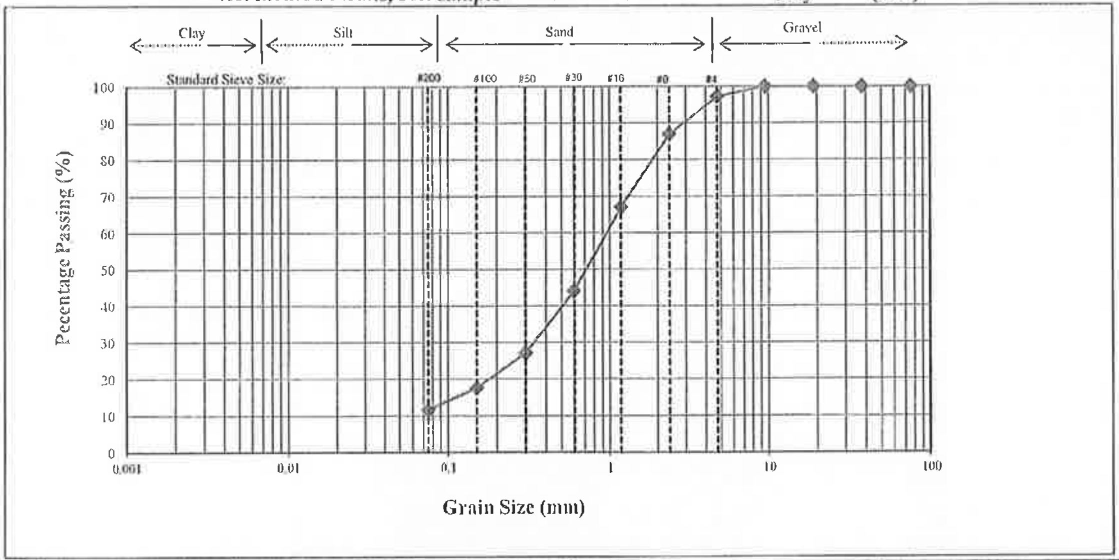
Soil Description: Brown Mottled Silty Sand SM

Tested by: B D

PARTICLE-SIZE ANALYSIS OF SOILS
ASTM METHOD D 422 (SIEVE ANALYSIS)

Sample :	B-1 @ 35 ft.	D10 (mm)	N/A
Total Weight (g)	126.5	D30 (mm)	0.30
Dry Weight (g)	122.1	D60 (mm)	0.90
Wet Sieve Weight (g)	108.0	Cu	N/A
Initial Moisture (%)	3.6	Cc	N/A

According to ASTM D 2487 Unified Soil Classification System (USCS) and ASTM D 422 (Standard Test Method for Particle-Size Analysis) test method results, soil sample B-1 at 45 feet is classified as Silty Sand (SM)



Sieve Size (in)	Sieve Size (mm)	Cumulative Weight of dry soil (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	3.3	2.7	97.3
#8	2.36	15.9	13.0	87.0
#16	1.18	40.3	33.0	67.0
#30	0.6	68.2	55.9	44.1
#50	0.3	89.0	72.9	27.1
#100	0.15	100.5	82.3	17.7
#200	0.075	108.0	88.5	11.5

Client: Anderson Consulting Engineers

Project Name: Ironwood

Job Number: GLO-71982.4

Date: 10/24/14

Boring Number: B-1

Depth: 35 ft.

Soil Description: Gray-Green Mottled Silty Sand SM

Tested by: B D

EEI Geotechnical & Environmental Solutions

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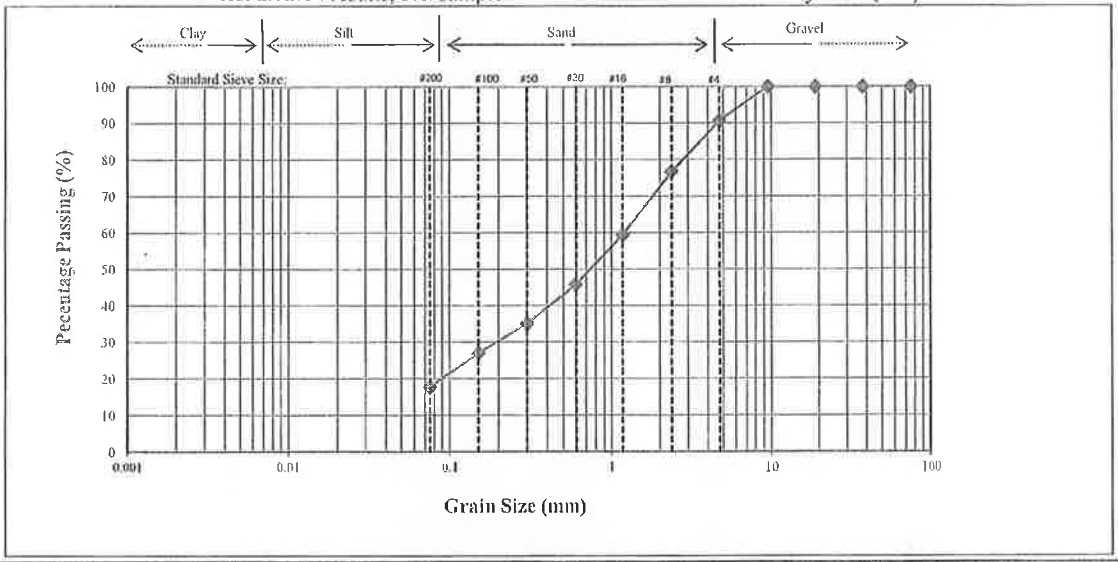
Attachment: Preliminary Geotechnical Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

PARTICLE-SIZE ANALYSIS OF SOILS
ASTM METHOD D 422 (SIEVE ANALYSIS)

Sample :	B-1 @ 45 ft.	D10 (mm)	N/A
Total Weight (g)	120.2	D30 (mm)	0.20
Dry Weight (g)	112.2	D60 (mm)	1.18
Wet Sieve Weight (g)	92.3	Cu	N/A
Initial Moisture (%)	7.1	Cc	N/A

According to ASTM D 2487 Unified Soil Classification System (USCS) and ASTM D 422 (Standard Test Method for Particle-Size Analysis) test method results, soil sample B-1 at 45 feet is classified as Silty Sand (SM)



Sieve Size (in)	Sieve Size (mm)	Cumulative Weight of dry soil (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	10.4	9.3	90.7
#8	2.36	26.1	23.3	76.7
#16	1.18	45.6	40.6	59.4
#30	0.6	60.9	54.3	45.7
#50	0.3	72.8	64.9	35.1
#100	0.15	81.9	73.0	27.0
#200	0.075	92.3	82.3	17.7

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Client: Anderson Consulting Engineers

Project Name: Ironwood

Job Number: GLO-71982.4

Date: 10/24/14

Boring Number: B-1

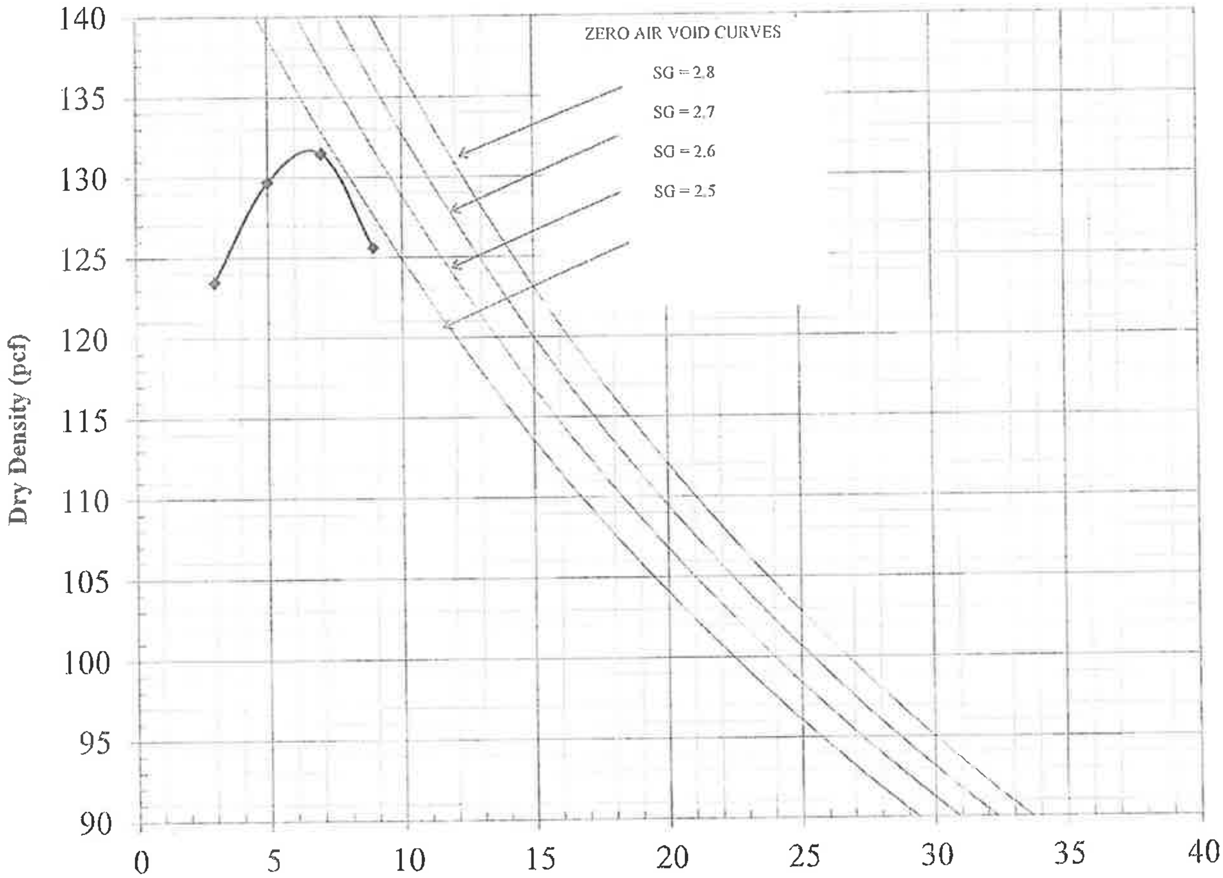
Depth: 45 ft.

Soil Description: Orange-Gray Mottled Silty Sand (SM)

Tested by: B D

LABORATORY COMPACTION ASTM D 1557

Sample	1	2	3	4
Mold and wet soil (lbs.)	8.550	8.850	9.000	8.870
Mold (lbs.)	4.310	4.310	4.310	4.310
Wet Soil (lbs.)	4.240	4.540	4.690	4.560
Wet Density (pcf)	127.20	136.20	140.70	136.80
Moisture (%)	3.0	5.0	7.0	8.9
Dry Density (pcf)	123.5	129.7	131.5	125.6



Maximum density 132.0 pcf @ 6.5% moisture

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Client: Anderson Consulting Engineers	
Project Name: Ironwood	
Procedure: Method A	
Job Number: GLO-71982.4	
Date: 10/21/14	
Boring Number: B-1	
Location: 0-5 ft.	
Soil Description: Brown Mottled Silty Sand SM	
Tested by: B D	

Attachment: Preliminary Geotechnical Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

EXPANSION INDEX TEST
ASTM METHOD D 4829

B-1 @ 1-5 ft.

Moisture Content of Initial Sample		% Saturation of Re-molded Sample		Moisture Content of Final Sample	
Tare No. -	S6	Wt. of Soil and Ring (g) -	615.2	Wt. of Soil and Ring (g) -	641.3
Wet Weight and Tare (g) -	134.0	Ring Weight (g) -	199.0	Ring Weight (g) -	199.0
Dry Weight and Tare (g) -	128.8	Wet Weight of Soil (g) -	416.2	Wet Weight of Soil (g) -	442.3
Tare Weight (g) -	51.2	Dry Weight of Soil (g) -	390.1	Dry Weight of Soil (g) -	390.1
Water Loss (g) -	5.2	Volume of Ring (ft^3) -	0.0073	Weight of Water (g) -	52.2
Dry Weight (g) -	77.6	Dry Density (pcf) -	117.8	*Final Moisture (%)*	*13.4*
Initial Moisture (%) -	*6.7*	*Initital Saturation (%) -*	*42.1*	*Final Saturation (%) -*	*84.0*

Expansion Test - UBC (144 PSF)				
	Date	Time	Reading	
Add Weight	10/21/2014	10:20	0.000	
10 Minutes		10:30	0.000	Initial Reading
Add Water		11:30	0.002	
		3:00	0.002	
	10/22/2014	6:17	0.002	Final Reading

EImeasured	=	2
EI_{50}	=	**0**

Expansion Index, EI_{50}	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
>130	Very High

EEI Geotechnical & Environmental Solutions

2195 Faraday Avenue, Suite K, Carlsbad, CA 92008

Client: Anderson Consulting Engineers

Job Name; Ironwood

Job Number: GLO-71982.4

Date: 10/21/14

Boring Number: B-1

Depth: 0-5 ft.

Soil Description: Brown Mottled Silty Sand SM

Tested by: BD

Attachment: Preliminary Geotechnical Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

DIRECT SHEAR TEST ASTM D 3080

Job Data	
Job No.:	GLO-71982.4
Client:	Anderson Consulting Engineers
Date:	10/22/14
Sample Data	
Sample:	B-1 @ 0 - 5 ft.
Remolded:	90 % Relative Compaction
Remarks:	Soaked Before Placing in Shear Box
Soil Description:	Brown Silty Sand (SM)

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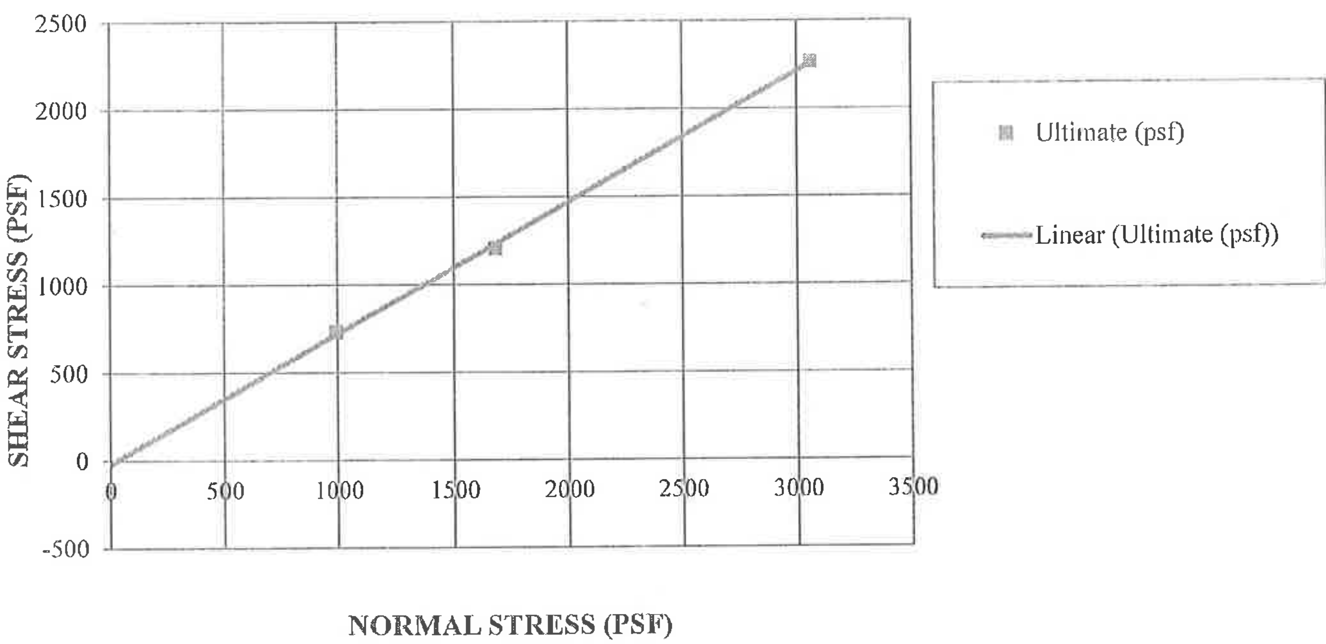
SHEAR TEST DIAGRAM



Test Results

	Phi		Cohesion	
Ultimate (psf)	37	degrees	-20	psf

Average Initial Moisture	6.5%
Average Dry Density	118.7 pcf
Average Final Moisture	12.9%

DIRECT SHEAR TEST ASTM D 3080

Job Data	
Job No.:	GLO-71982.4
Client:	Anderson Consulting Engineers
Date:	10/24/14
Sample Data	
Sample:	B-1 @ 5 ft.
Remolded:	90 % Relative Compaction
Remarks:	Soaked Before Placing in Shear Box
Soil Description:	Brown Silty Sand (SM)

Geotechnical & Environmental Solutions

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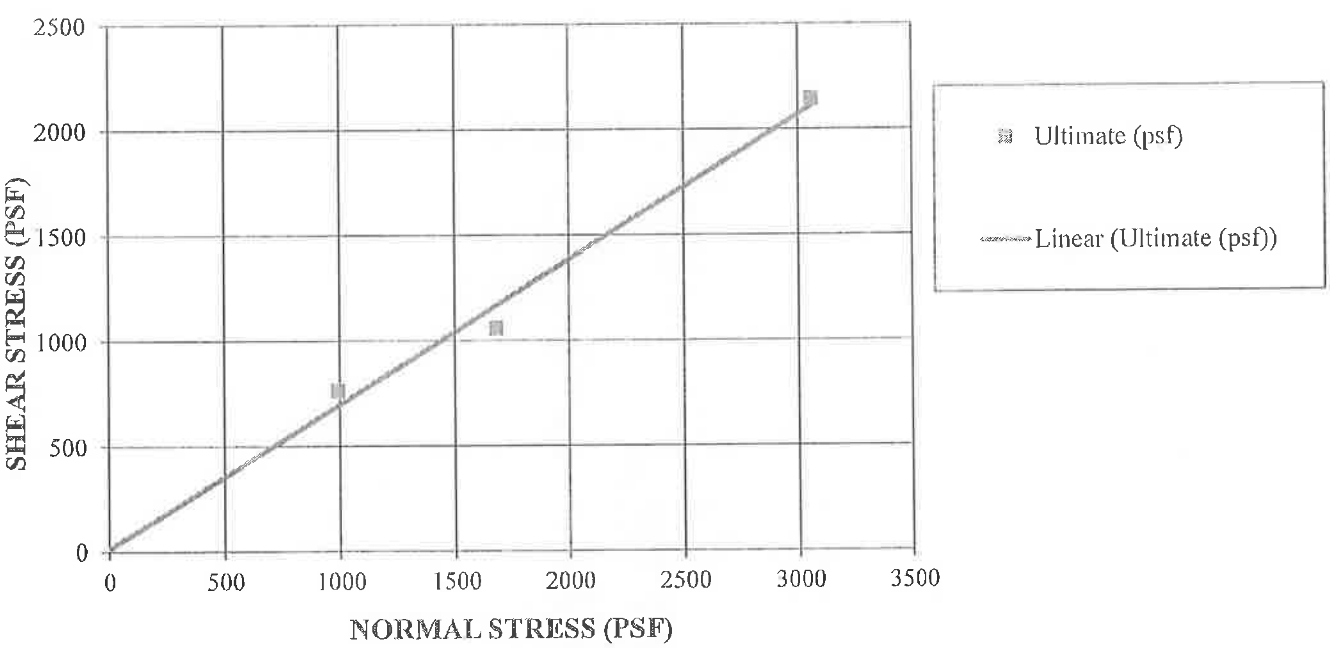
SHEAR TEST DIAGRAM



Test Results

	Phi		Cohesion	
Ultimate (psf)	34	degrees	12	psf

Average Initial Moisture	2.7%
Average Dry Density	109.7 pcf
Average Final Moisture	15.4%

DIRECT SHEAR TEST ASTM D 3080

Job Data	
Job No.:	GLO-71982.4
Client:	Anderson Consulting Engineers
Date:	10/24/14
Sample Data	
Sample:	B-2 @ 5 ft.
Remolded:	90 % Relative Compaction
Remarks:	Soaked Before Placing in Shear Box
Soil Description:	Orange-Brown Silty Sand (SM)

EEI Geotechnical & Environmental Solutions

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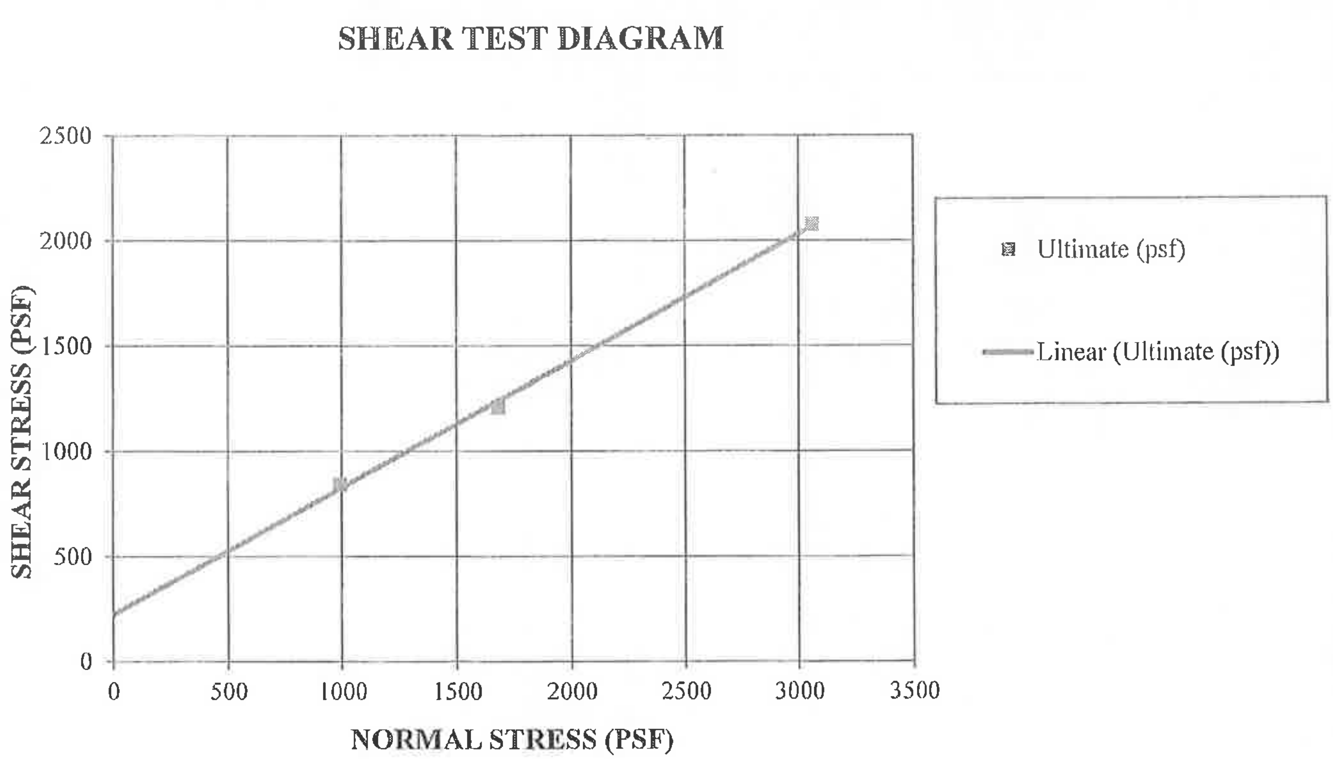

Test Results

	Phi		Cohesion	
Ultimate (psf)	31	degrees	225	psf

Average Initial Moisture	3.0%
Average Dry Density	112.9 pcf
Average Final Moisture	15.7%

L A B O R A T O R Y R E P O R T

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350 Trousdale Dr. Chula Vista, Ca. 91910 www.clarksonlab.com
A N A L Y T I C A L A N D C O N S U L T I N G C H E M I S T S

Date: October 29, 2014
Purchase Order Number: GLO-71982-4
Sales Order Number: 24454
Account Number: EEI
To:

EEI Environmental Equalizers Inc
2195 Faraday Avenue Suite K
Carlsbad, CA 92008
Attention: Hector Estrella/Jeff Blake

Laboratory Number: SO5463 Customers Phone: 760-431-3747

Sample Designation:

One soil sample received on 10/23/14 at 3:00pm, from Global - Ironwood Project# GLO-70982-4, marked as B-1 @ 0'-5' SM.

Analysis By California Test 643, 1999, Department of Transportation Division of Construction, Method for Estimating the Service Life of Steel Culverts.

pH 7.1

Water Added (ml)	Resistivity (ohm-cm)
10	13000
5	9500
5	7800
5	7300
5	6400
5	5800
5	5200
5	5500
5	5800

35 years to perforation for a 16 gauge metal culvert.
46 years to perforation for a 14 gauge metal culvert.
63 years to perforation for a 12 gauge metal culvert.
81 years to perforation for a 10 gauge metal culvert.
98 years to perforation for a 8 gauge metal culvert.

Water Soluble Sulfate	Calif. Test 417	0.005%
Water Soluble Chloride	Calif. Test 422	0.007%

Laura Torres

Laura Torres
LT/dbb

APPENDIX C
EARTHWORK AND GRADING GUIDELINES

Geotechnical & Environmental Solutions

EARTHWORK AND GRADING GUIDELINES

GENERAL

These guidelines present general procedures and recommendations for earthwork and grading as required on the approved grading plans, including preparation of areas to be filled, placement of fill and installation of subdrains and excavations. The recommendations contained in the geotechnical report are applicable to each specific project, are part of the earthwork and grading guidelines and would supersede the provisions contained hereafter in the case of conflict. Observations and/or testing performed by the consultant during the course of grading may result in revised recommendations which could supersede these guidelines or the recommendations contained in the geotechnical report. Figures A through O are provided at the back of this appendix, exhibiting generalized cross sections relating to these guidelines.

The contractor is responsible for the satisfactory completion of all earthworks in accordance with provisions of the project plans and specifications. The project soil engineer and engineering geologist (geotechnical consultant) or their representatives should provide observation and testing services, and geotechnical consultation throughout the duration of the project.

EARTHWORK OBSERVATIONS AND TESTING

Geotechnical Consultant

Prior to the commencement of grading, a qualified geotechnical consultant (a soil engineer and engineering geologist) should be employed for the purpose of observing earthwork procedures and testing the fills for conformance with the recommendations of the geotechnical report, the approved grading plans, and applicable grading codes and ordinances.

The geotechnical consultant should provide testing and observation so that determination may be made that the work is being completed as specified. It is the responsibility of the contractor to assist the consultant and keep them aware of work schedules and predicted changes, so that the consultant may schedule their personnel accordingly.

All removals, prepared ground to receive fill, key excavations, and subdrains should be observed and documented by the project engineering geologist and/or soil engineer prior to placing any fill. It is the contractor's responsibility to notify the engineering geologist and soil engineer when such areas are ready for observation.

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Laboratory and Field Tests

Maximum dry density tests to determine the degree of compaction should be performed in accordance with American Standard Testing Materials test method ASTM designation D-1557-78. Random field compaction tests should be performed in accordance with test method ASTM designations D-1556-82, D-2937 or D-2922 & D-3017, at intervals of approximately two (2) feet of fill height per 10,000 sq. ft. or every one thousand cubic yards of fill placed. These criteria would vary depending on the soil conditions and the size of the project. The location and frequency of testing would be at the discretion of the geotechnical consultant

Contractor's Responsibility

All clearing, site preparation, and earthwork performed on the project should be conducted by the contractor, with observation by geotechnical consultants and staged approval by the appropriate governing agencies. It is the contractor's responsibility to prepare the ground surface to receive the fill to the satisfaction of the soil engineer, and to place, spread, moisture condition, mix and compact the fill in accordance with the recommendations of the soil engineer. The contractor should also remove all major deleterious material considered unsatisfactory by the soil engineer.

It is the sole responsibility of the contractor to provide adequate equipment and methods to accomplish the earthwork in accordance with applicable grading guidelines, codes or agency ordinances, and approved grading plans. Sufficient watering apparatus and compaction equipment should be provided by the contractor with due consideration for the fill material, rate of placement, and climatic conditions. If, in the opinion of the geotechnical consultant, unsatisfactory conditions such as questionable weather, excessive oversized rock, deleterious material or insufficient support equipment are resulting in a quality of work that is not acceptable, the consultant will inform the contractor, and the contractor is expected to rectify the conditions, and if necessary, stop work until conditions are satisfactory.

The contractor will properly grade all surfaces to maintain good drainage and prevent ponding of water. The contractor will take action to control surface water and to prevent erosion control measures that have been installed.

SITE PREPARATION

All vegetation including brush, trees, thick grasses, organic debris, and other deleterious material should be removed and disposed of offsite, and must be concluded prior to placing fill. Existing fill, soil, alluvium, colluvium, or rock materials determined by the soil engineer or engineering geologist as unsuitable for structural in-place support should be removed prior to fill placement. Depending upon the soil conditions, these materials may be reused as compacted fills. Any materials incorporated as part of the compacted fills should be approved by the soil engineer.

Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, or other structures not located prior to grading are to be removed or treated in a manner recommended by the soil engineer. Soft, dry, spongy, highly fractured, or otherwise unsuitable ground extending to such a depth that surface processing cannot adequately improve the condition should be over excavated down to firm ground and approved by the soil engineer before compaction and filling operations continue. Over excavated and processed soils which have been properly mixed and moisture-conditioned should be recompacted to the minimum relative compaction as specified in these guidelines.

Existing ground which is determined to be satisfactory for support of the fills should be scarified to a minimum depth of six (6) inches, or as directed by the soil engineer. After the scarified ground is brought to optimum moisture (or greater) and mixed, the materials should be compacted as specified herein. If the scarified zone is greater than 6 inches in depth, it may be necessary to remove the excess and place the material in lifts restricted to six (6) inches in compacted thickness.

Existing grind which is not satisfactory to support compacted fill should be over excavated as required in the geotechnical report or by the onsite soils engineer and/or engineering geologists. Scarification, discing, or other acceptable form of mixing should continue until the soils are broken down and free of large fragments or clods, until the working surface is reasonably uniform and free from ruts, hollows, hummocks, or other uneven features which would inhibit compaction as described above.

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical) gradient, the ground should be benched. The lowest bench, which will act as a key, should be a minimum of 12 feet wide and should be at least two (2) feet deep into competent material, approved by the soil engineer and/or engineering geologist. In fill over cut slope conditions, the recommended minimum width of the lowest bench or key is at least 15 feet with the key excavated on competent material, as designated by the Geotechnical Consultant. As a general rule, unless superseded by the Soil Engineer, the minimum width of fill keys should be approximately equal to one-half (½) the height of the slope.

Standard benching is typically four feet (minimum) vertically, exposing competent material. Benching may be used to remove unsuitable materials, although it is understood that the vertical height of the bench may exceed four feet. Pre stripping may be considered for removal of unsuitable materials in excess of four feet in thickness.

All areas to receive fill, including processed areas, removal areas, and toe of fill benches should be observed and approved by the soil engineer and/or engineering geologist prior to placement of fill. Fills may then be properly placed and compacted until design grades are attained.

COMPACTED FILLS

Earth materials imported or excavated on the property may be utilized as fill provided that each soil type has been accepted by the soil engineer. These materials should be free of roots, tree branches, other organic matter or other deleterious materials. All unsuitable materials should be removed from the fill as directed by the soil engineer. Soils of poor gradation, undesirable expansion potential, or substandard strength characteristics may be designated unsuitable by the consultant and may require mixing with other earth materials to serve as a satisfactory fill material.

Fill materials generated from benching operations should be dispersed throughout the fill area. Benching operations should not result in the benched material being placed only within a single equipment width away from the fill/bedrock contact.

Oversized materials, defined as rock or other irreducible materials with a maximum size exceeding 12 inches in one dimension, should not be buried or placed in fills unless the location of materials and disposal methods are specifically approved by the soil engineer. Oversized material should be taken offsite or placed in accordance with recommendations of the soil engineer in areas designated as suitable for rock disposal. Oversized material should not be placed vertically within 10 feet of finish grade or horizontally within 20 feet of slope faces.

To facilitate trenching, rock should not be placed within the range of foundation excavations or future utilities unless specifically approved by the soil engineer and/or the representative developers.

If import fill material is required for grading, representative samples of the material should be analyzed in the laboratory by the soil engineer to determine its physical properties. If any material other than that previously analyzed is imported to the fill or encountered during grading, analysis of this material should be conducted by the soil engineer as soon as practical.

Fill material should be placed in areas prepared to receive fill in near-horizontal layers that should not exceed six (6) inches compacted in thickness. The soil engineer may approve thicker lifts if testing indicates the grading procedures are such that adequate compaction is being achieved. Each layer should be spread evenly and mixed to attain uniformity of material and moisture suitable for compaction.

Fill materials at moisture content less than optimum should be watered and mixed, and "wet" fill materials should be aerated by scarification, or should be mixed with drier material. Moisture conditioning and mixing of fill materials should continue until the fill materials have uniform moisture content at or above optimum moisture.

After each layer has been evenly spread, moisture-conditioned and mixed, it should be uniformly compacted to a minimum of 90 percent of maximum density as determined by ASTM test designation, D 1557-78, or as otherwise recommended by the soil engineer. Compaction equipment should be adequately sized and should be reliable to efficiently achieve the required degree of compaction.

Where tests indicate that the density of any layer of fill, or portion thereof, is below the required relative compaction or improper moisture content, the particular layer or portion will be reworked until the required density and/or moisture content has been attained. No additional fill will be placed in an area until the last placed lift of fill has been tested and found to meet the density and moisture requirements, and is approved by the soil engineer.

Compaction of slopes should be accomplished by over-building the outside edge a minimum of three (3) feet horizontally, and subsequently trimming back to the finish design slope configuration. Testing will be performed as the fill is horizontally placed to evaluate compaction as the fill core is being developed. Special efforts may be necessary to attain the specified compaction in the fill slope zone. Final slope shaping should be performed by trimming and removing loose materials with appropriate equipment. A final determination of fill slope compaction should be based on observation and/or testing of the finished slope face.

If an alternative to over-building and cutting back the compacted fill slope is selected, then additional efforts should be made to achieve the required compaction in the outer 10 feet of each lift of fill by undertaking the following:

- Equipment consisting of a heavy short-shanked sheepsfoot should be used to roll (horizontal) parallel to the slopes continuously as fill is placed. The sheepsfoot roller should also be used to roll perpendicular to the slopes, and extend out over the slope to provide adequate compaction to the face slope.

- Loose fill should not be spilled out over the face of the slope as each lift is compacted. Any loose fill spilled over a previously completed slope face should be trimmed off or be subject to re-rolling.

- Field compaction tests will be made in the outer two (2) to five (5) feet of the slope at two (2) to three (3) foot vertical intervals, subsequent to compaction operations.

- After completion of the slope, the slope face should be shaped with a small dozer and then re-rolled with a sheepsfoot to achieve compaction to near the slope face. Subsequent to testing to verify compaction, the slopes should be grid-rolled to achieve adequate compaction to the slope face. Final testing should be used to confirm compaction after grid rolling.

- Where testing indicates less than adequate compaction, the contractor will be responsible to process, moisture condition, mix and recompact the slope materials as necessary to achieve compaction. Additional testing should be performed to verify compaction.

- Erosion control and drainage devices should be designed by the project civil engineer in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the soil engineer or engineering geologist.

EXCAVATIONS

Excavations and cut slopes should be observed and mapped during grading by the engineering geologist. If directed by the engineering geologist, further excavations or over-excavation and refilling of cut areas should be performed. When fills over cut slopes are to be graded, the cut portion of the slope should be observed by the engineering geologist prior to placement of the overlying fill portion of the slope. The engineering geologist should observe all cut slopes and should be notified by the contractor when cut slopes are started.

If, during the course of grading, unanticipated adverse or potentially adverse geologic conditions are encountered, the engineering geologist and soil engineer should investigate, evaluate and make recommendations to mitigate (or limit) these conditions. The need for cut slope buttressing or stabilizing should be based on as-grading evaluations by the engineering geologist, whether anticipated previously or not.

Unless otherwise specified in soil and geological reports, no cut slopes should be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies. Additionally, short-term stability of temporary cut slopes is the contractor's responsibility.

Erosion control and drainage devices should be designed by the project civil engineer and should be constructed in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the soil engineer or engineering geologist.

SUBDRAIN INSTALLATION

Subdrains should be installed in accordance with the approved embedment material, alignment and details indicated by the geotechnical consultant. Subdrain locations or construction materials should not be changed or modified without approval of the geotechnical consultant. The soil engineer and/or engineering geologist may recommend and direct changes in subdrain line, grade and drain material in the field, pending exposed conditions. The location of constructed subdrains should be recorded by the project civil engineer.

COMPLETION

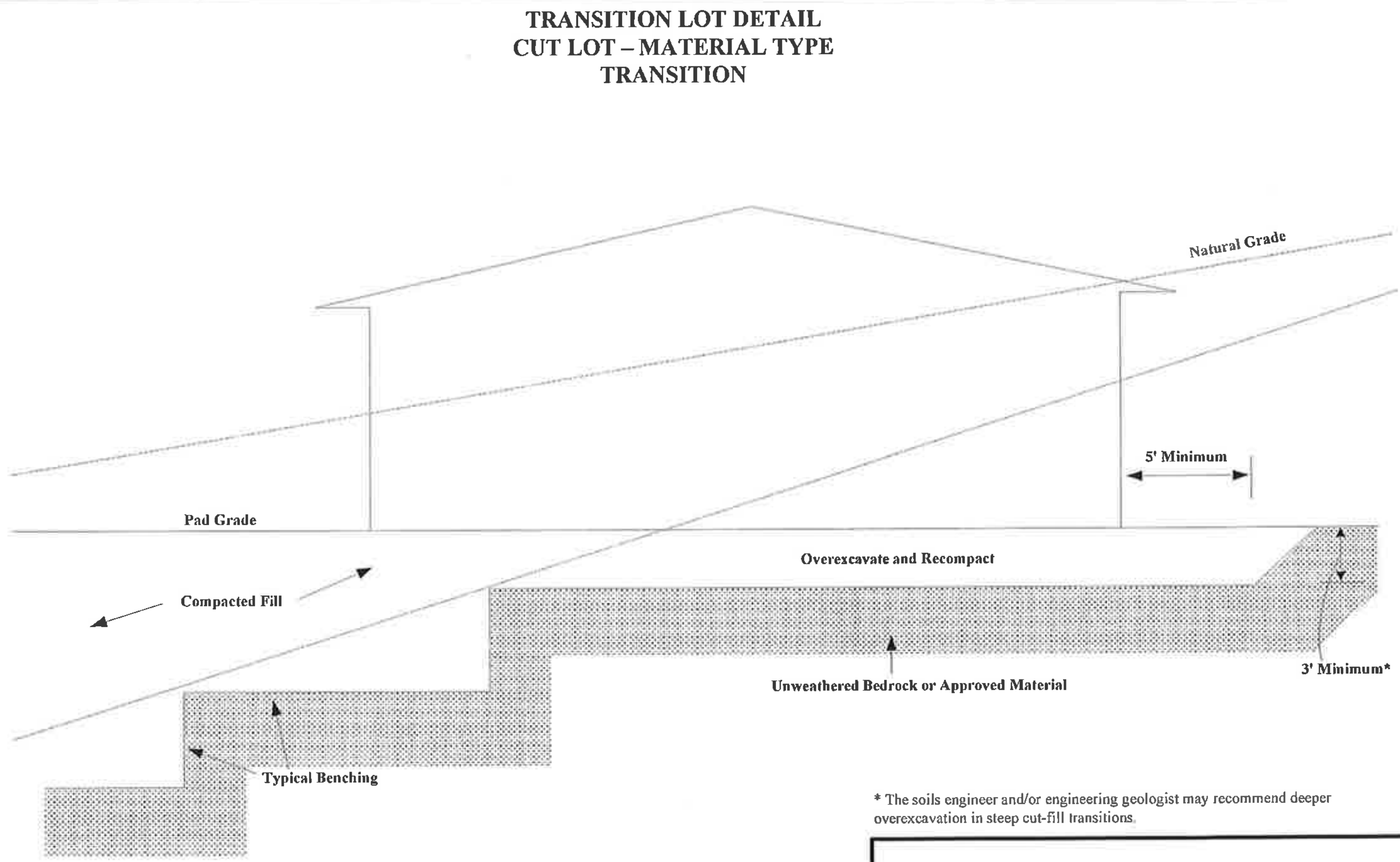
Consultation, observation and testing by the geotechnical consultant should be completed during grading operations in order to state an opinion that all cut and filled areas are graded in accordance with the approved project specifications.

After completion of grading and after the soil engineer and engineering geologist have finished their observations, final reports should be submitted subject to review by the controlling governmental agencies. No additional grading should be undertaken without prior notification of the soil engineer and/or engineering geologist.

All finished cut and fill slopes should be protected from erosion, including but not limited to planting in accordance with the plan design specifications and/or as recommended by a landscape architect. Such protection and/or planning should be undertaken as soon as possible after completion of grading.

ATTACHMENTS

Figure A – Transition Lot Detail Cut Lot
Figure B – Transition Lot Detail Cut - Fill
Figure C – Rock Disposal Pits
Figure D – Detail for Fill Slope Toeing out on a Flat Alluviated Canyon
Figure E – Removal Adjacent to Existing Fill
Figure F – Daylight Cut Lot Detail
Figure G – Skin Fill of Natural Ground
Figure H – Typical Stabilization Buttress Fill Design
Figure I – Stabilization Fill for Unstable Material Exposed in Portion of Cut Slope
Figure J – Fill Over Cut Detail
Figure K – Fill Over Natural Detail
Figure L – Oversize Rock Disposal
Figure M – Canyon Subdrain Detail
Figure N – Canyon Subdrain Alternate Details
Figure O – Typical Stabilization Buttress Subdrain Detail
Figure P – Retaining Wall Backfill



* The soils engineer and/or engineering geologist may recommend deeper overexcavation in steep cut-fill transitions.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
TRANSITION LOT DETAIL
CUT LOT – MATERIAL TYPE TRANSITION

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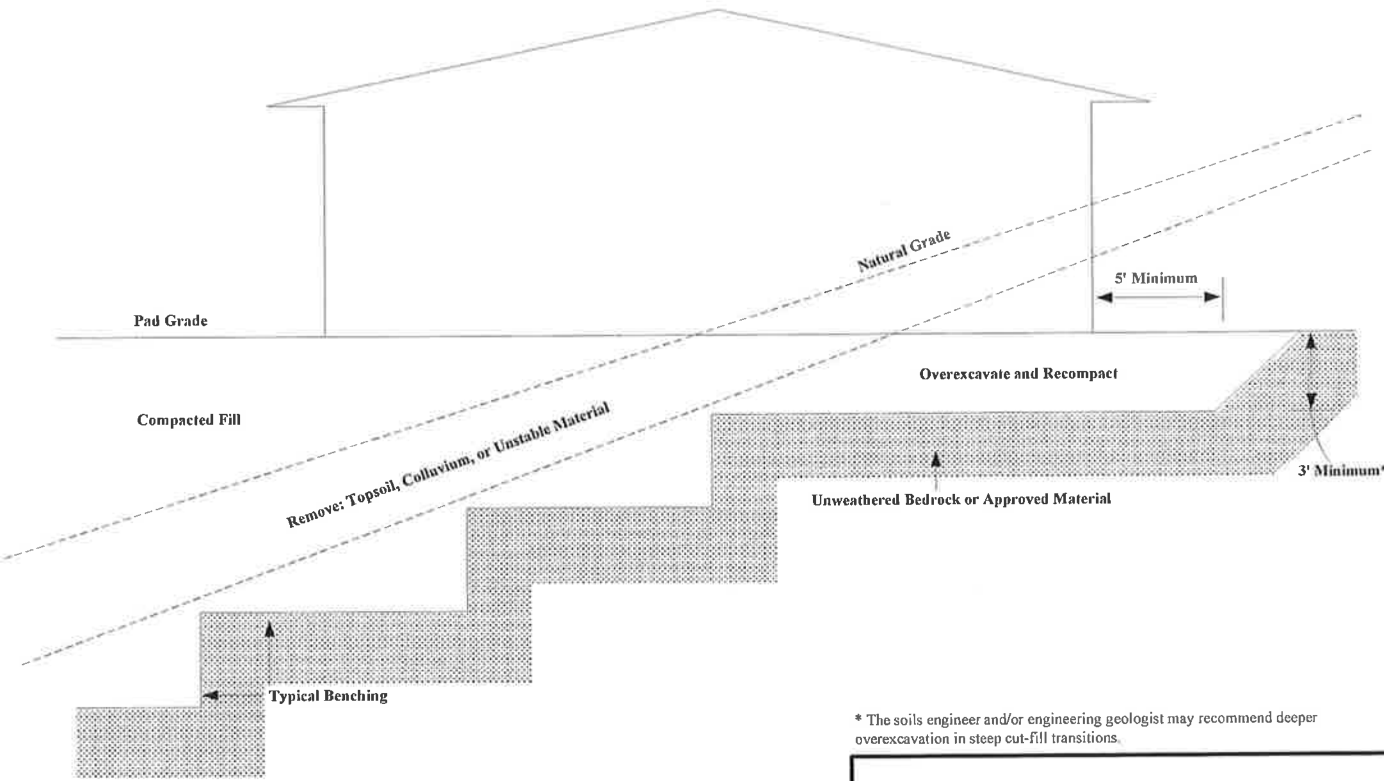
FIGURE A



* The soils engineer and/or engineering geologist may recommend deeper overexcavation in steep cut-fill transitions.

EARTHWORK AND GRADING GUIDELINES
TRANSITION LOT DETAIL
CUT – FILL – DAYLIGHT TRANSITION

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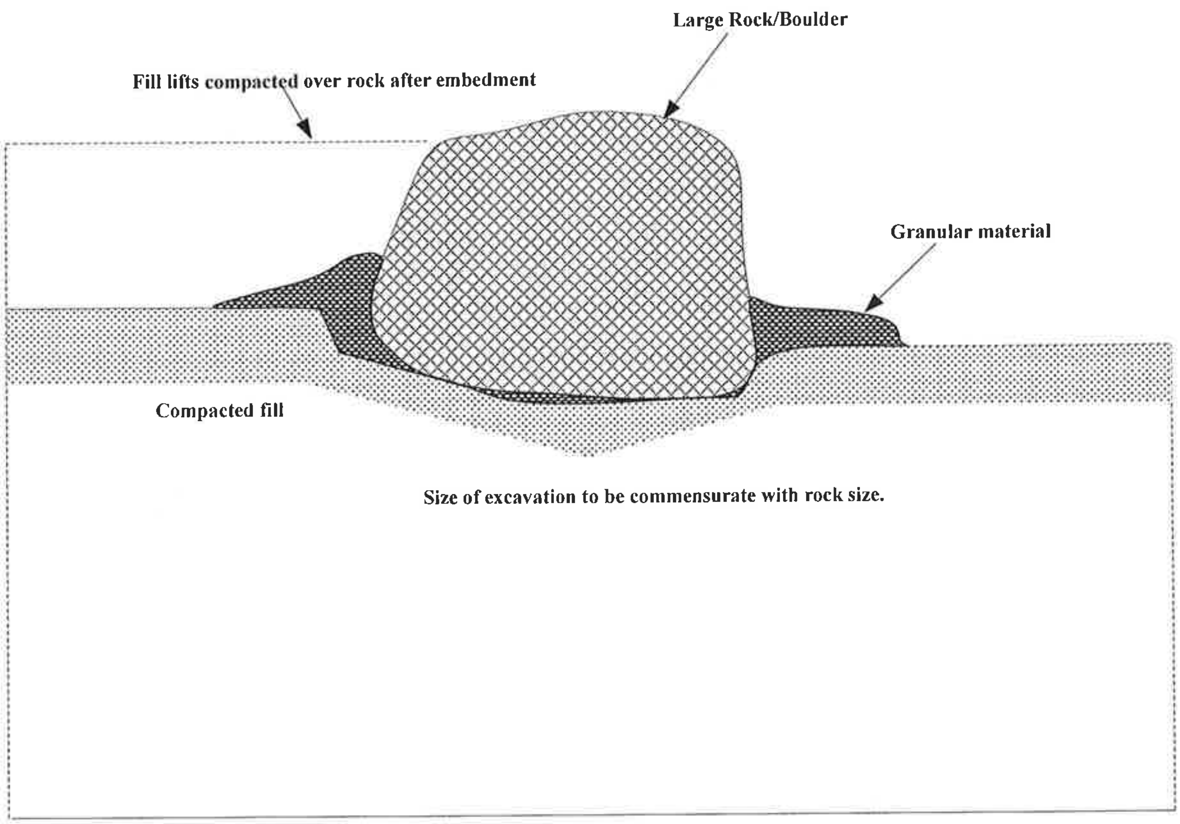
FIGURE B

Note: Figure not to scale

ROCK DISPOSAL PITS



Note:
(1) Large rock is defined as having a diameter larger than 3 feet in maximum size.
(2) Pit shall be excavated into compacted fill to a depth equal to half of the rock size.
(3) Granular soil shall be pushed into the pit and then flooded around the rock using a sheepsfoot to help with compaction.
(4) A minimum of 3 feet of compacted fill should be laid over each pit.
(5) Pits shall have at least 15 feet of separation between one another, horizontally.
(6) Pits shall be placed at least 20 feet from any fill slope.
(7) Pits shall be used only in deep fill areas.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
ROCK DISPOSAL PITS

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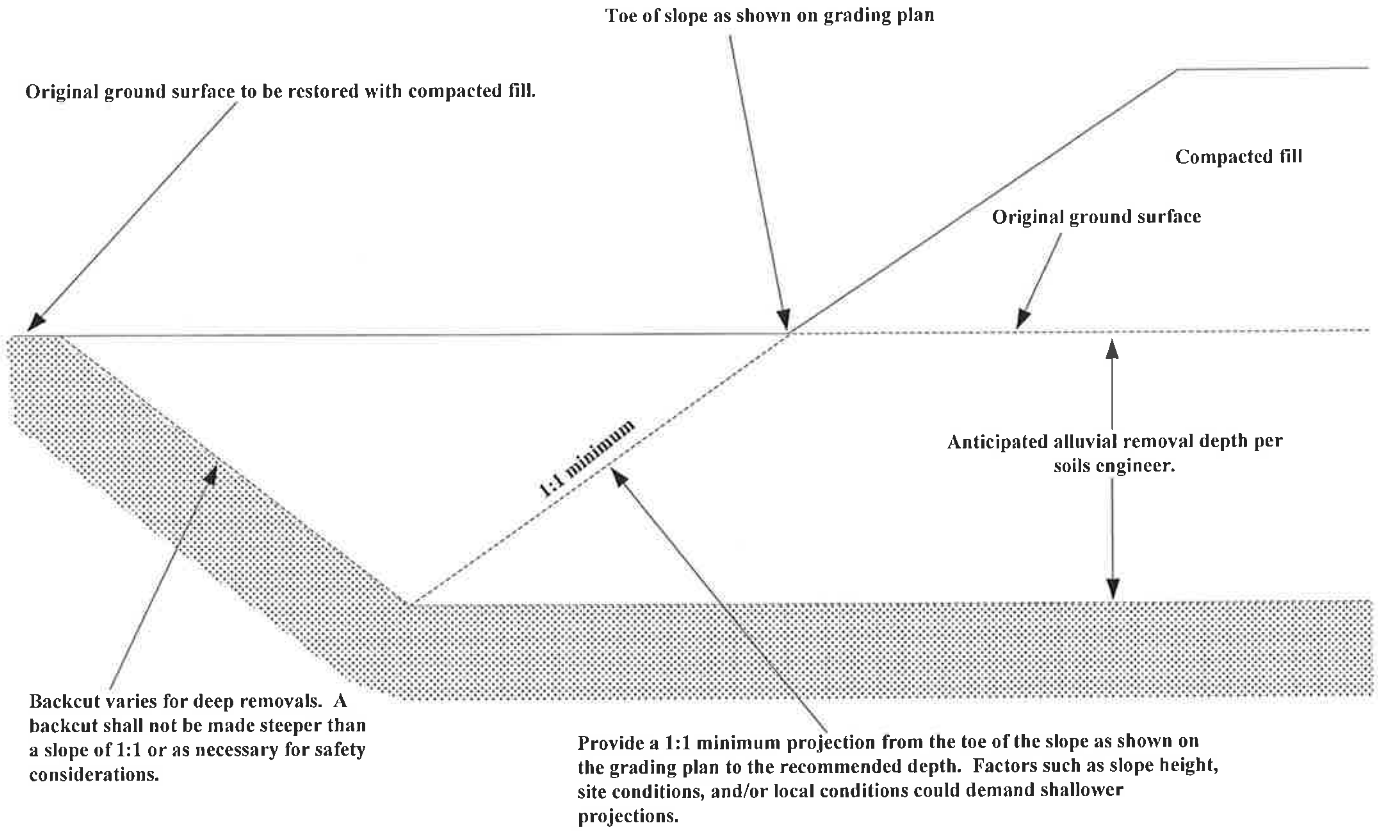
FIGURE C

DETAIL FOR FILL SLOPE TOEING OUT ON FLAT ALLUVIATED CANYON



Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
DETAIL FOR FILL SLOPE TOEING OUT ON A FLAT ALLUVIATED CANYON

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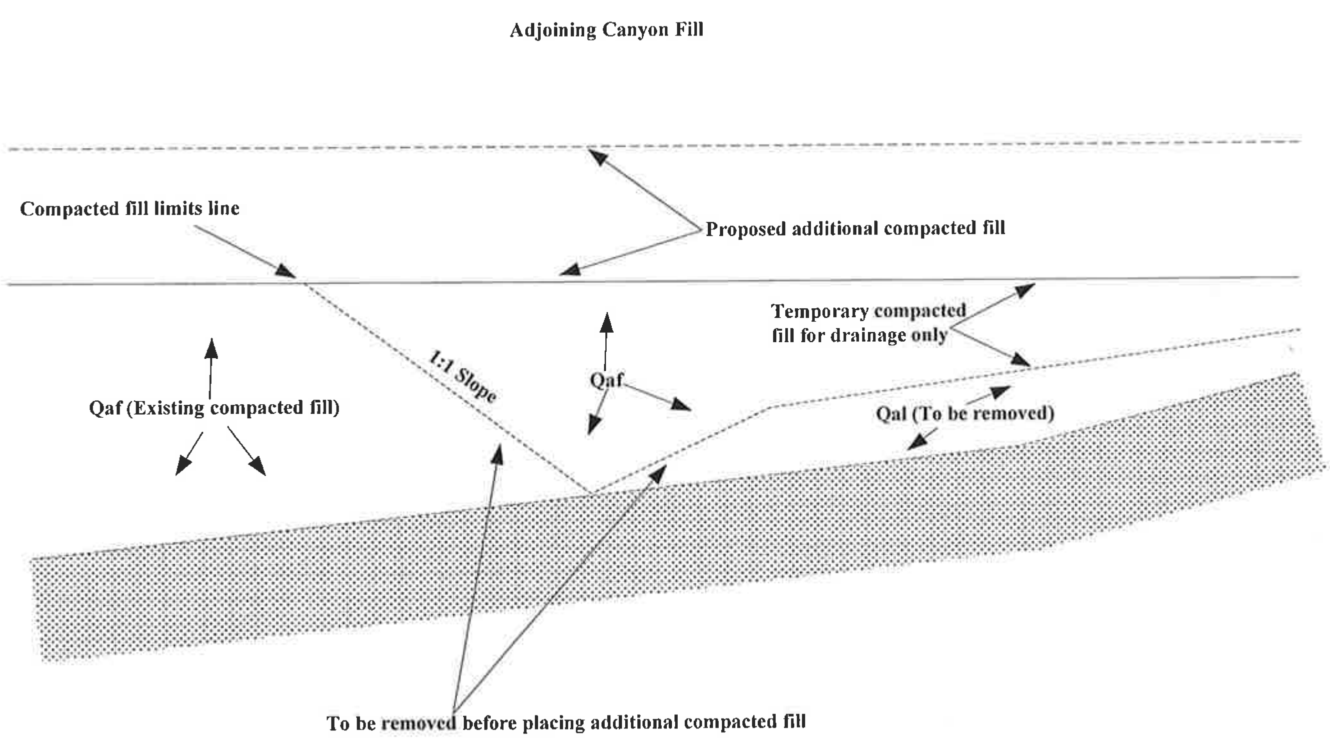
FIGURE D

REMOVAL ADJACENT TO EXISTING FILL



Legend

Qaf - Artificial Fill

Qal - Alluvium

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
REMOVAL ADJACENT TO EXISTING FILL

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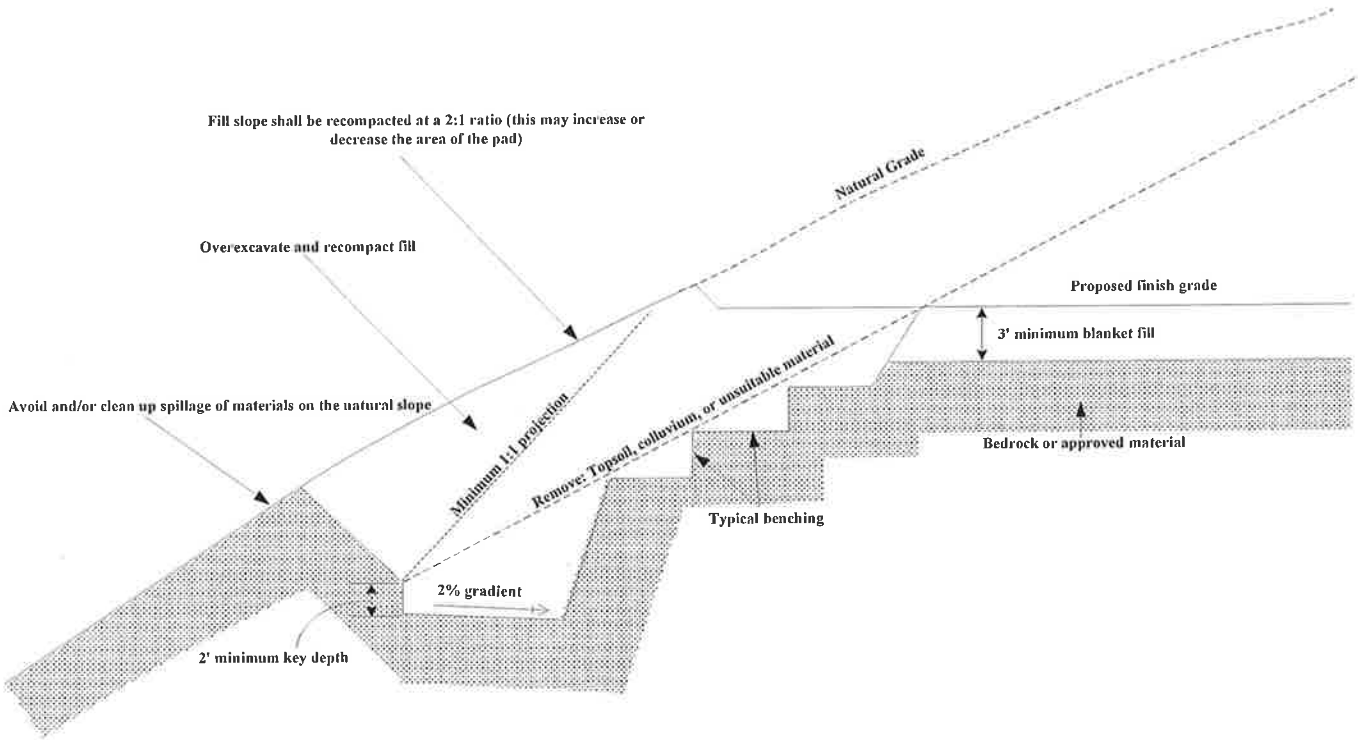
FIGURE E

DAYLIGHT CUT LOT DETAIL



Note: (1) Subdrain and key width requirements shall be determined based on exposed subsurface conditions and the thickness of overburden.

(2) Pad overexcavation and recompaction shall be completed if determined as necessary by the soils engineer and/or engineering geologist.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
DAYLIGHT CUT LOT DETAIL

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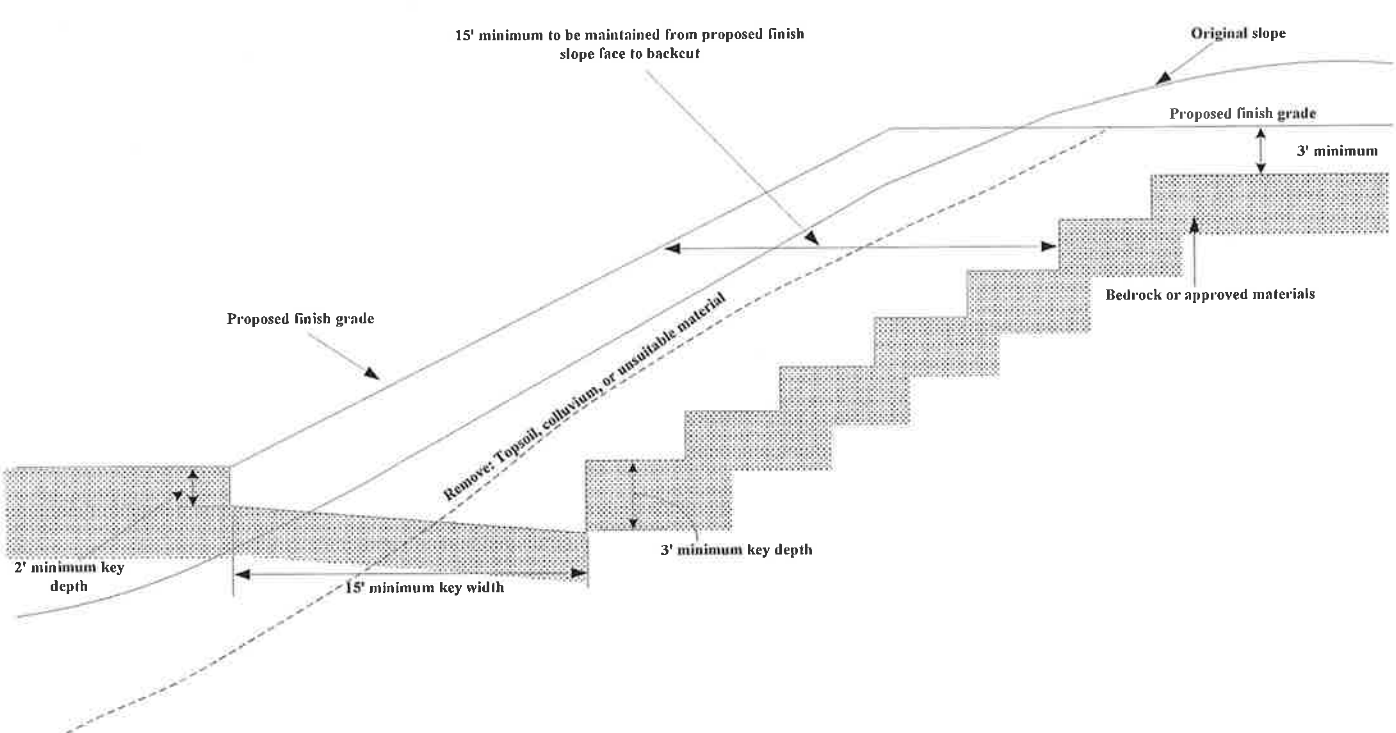
FIGURE F

SKIN FILL OF NATURAL GROUND



Note: (1) The need and disposition of drains will be determined by the soils engineer and/or engineering geologist based on site conditions.

(2) Pad overexcavation and recompaction shall be completed if determined as necessary by the soils engineer and/or engineering geologist.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
SKIN FILL OF NATURAL GROUND

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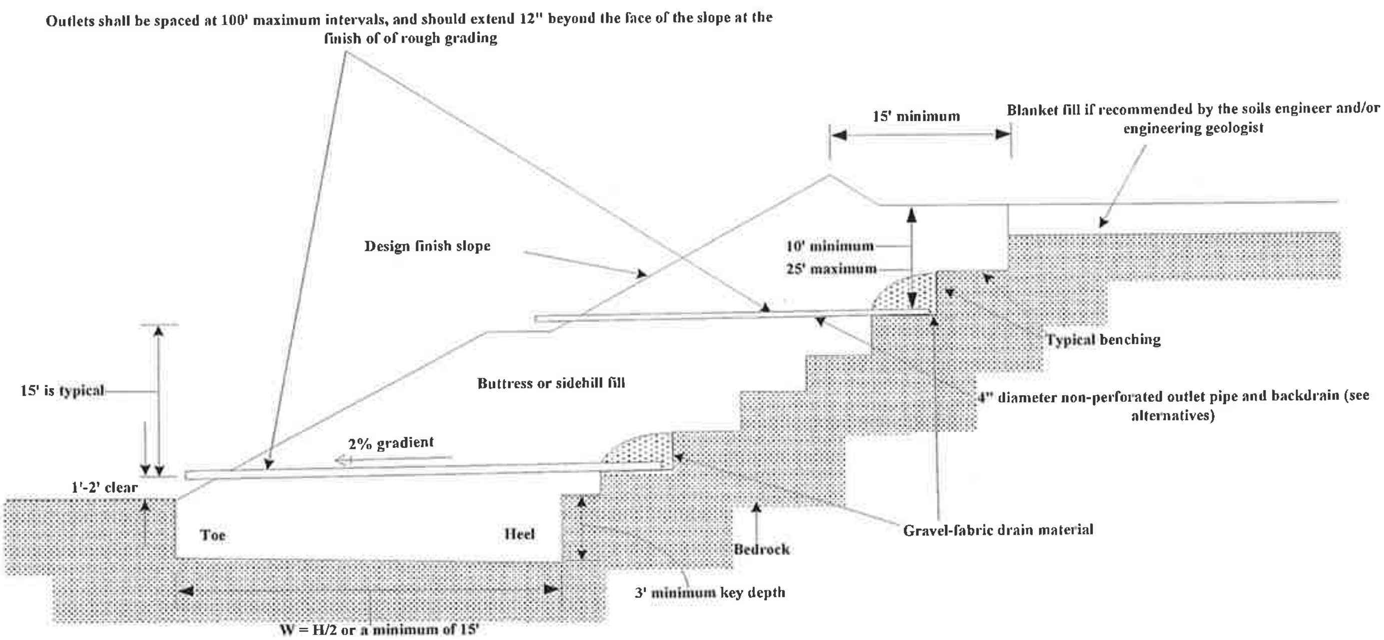
FIGURE G

TYPICAL STABILIZATION BUTTRESS FILL DESIGN



Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
TYPICAL STABILIZATION BUTTRESS FILL DESIGN

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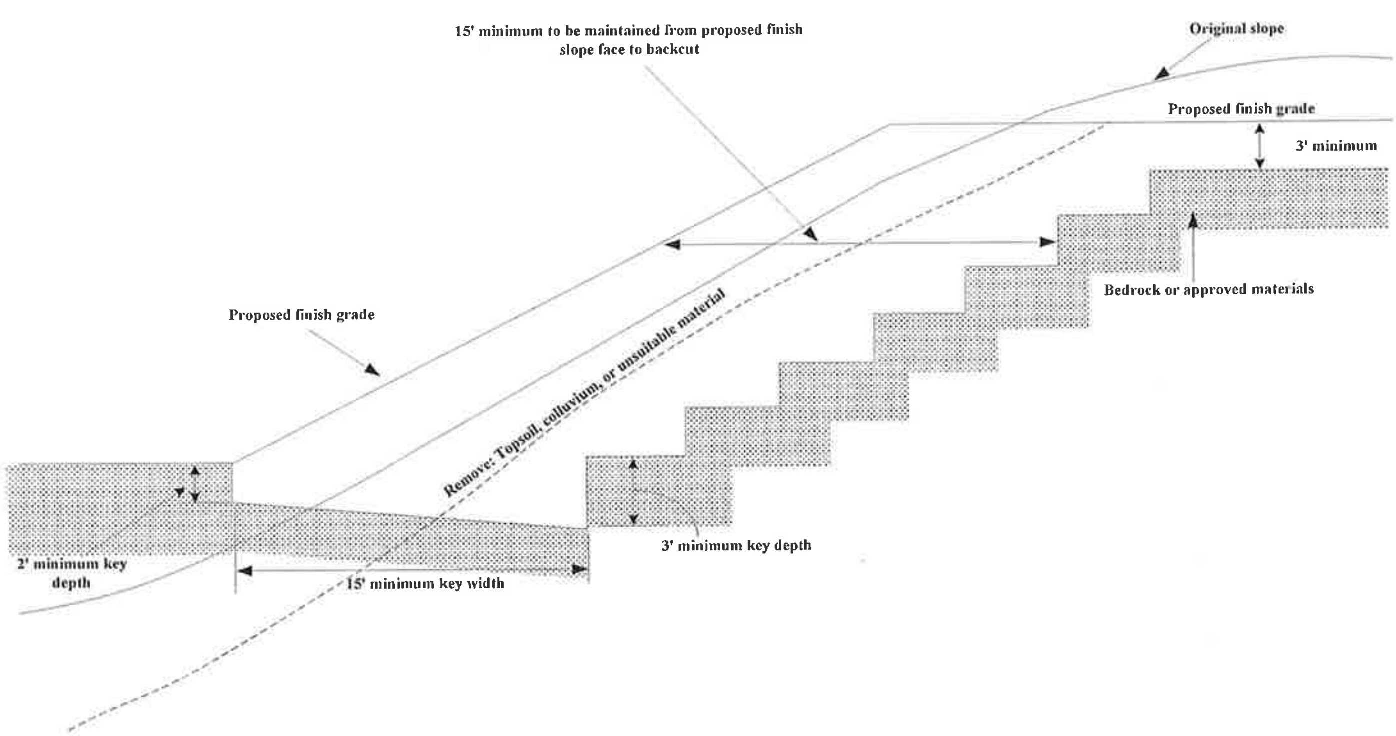
FIGURE H

SKIN FILL OF NATURAL GROUND



Note: (1) The need and disposition of drains will be determined by the soils engineer and/or engineering geologist based on site conditions.

(2) Pad overexcavation and recompaction shall be completed if determined as necessary by the soils engineer and/or engineering geologist.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
SKIN FILL OF NATURAL GROUND

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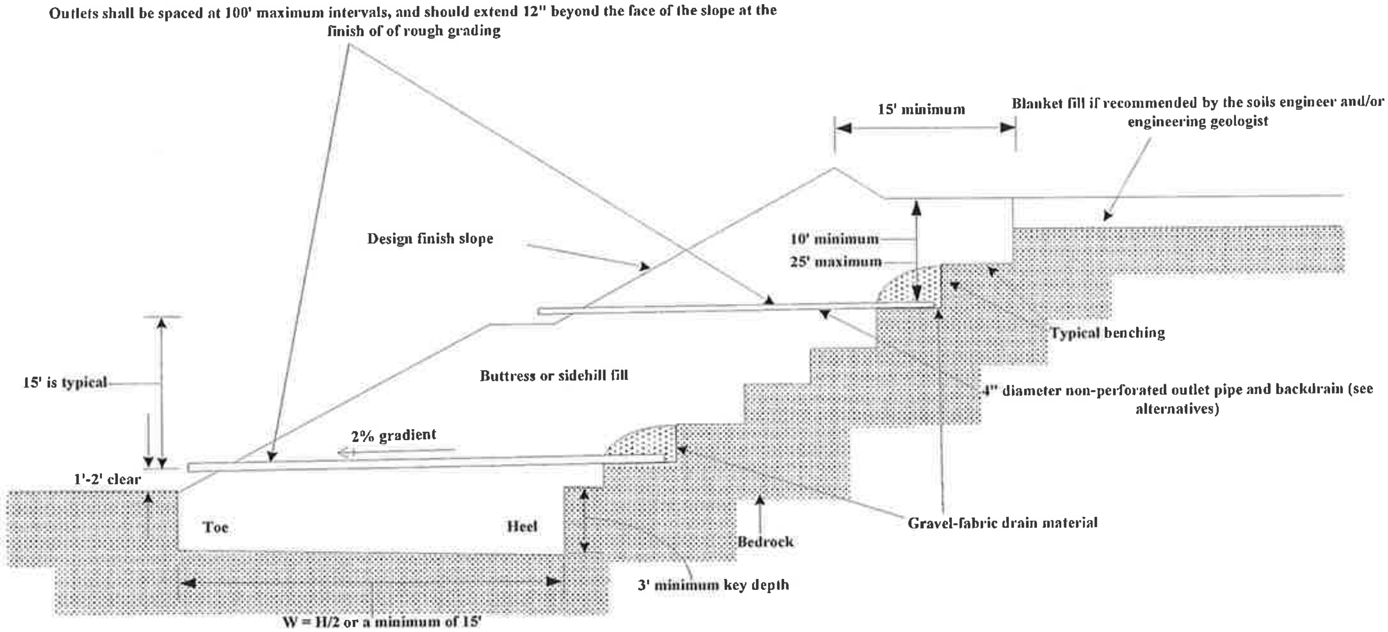
FIGURE G

TYPICAL STABILIZATION BUTTRESS FILL DESIGN



Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
TYPICAL STABILIZATION BUTTRESS FILL DESIGN

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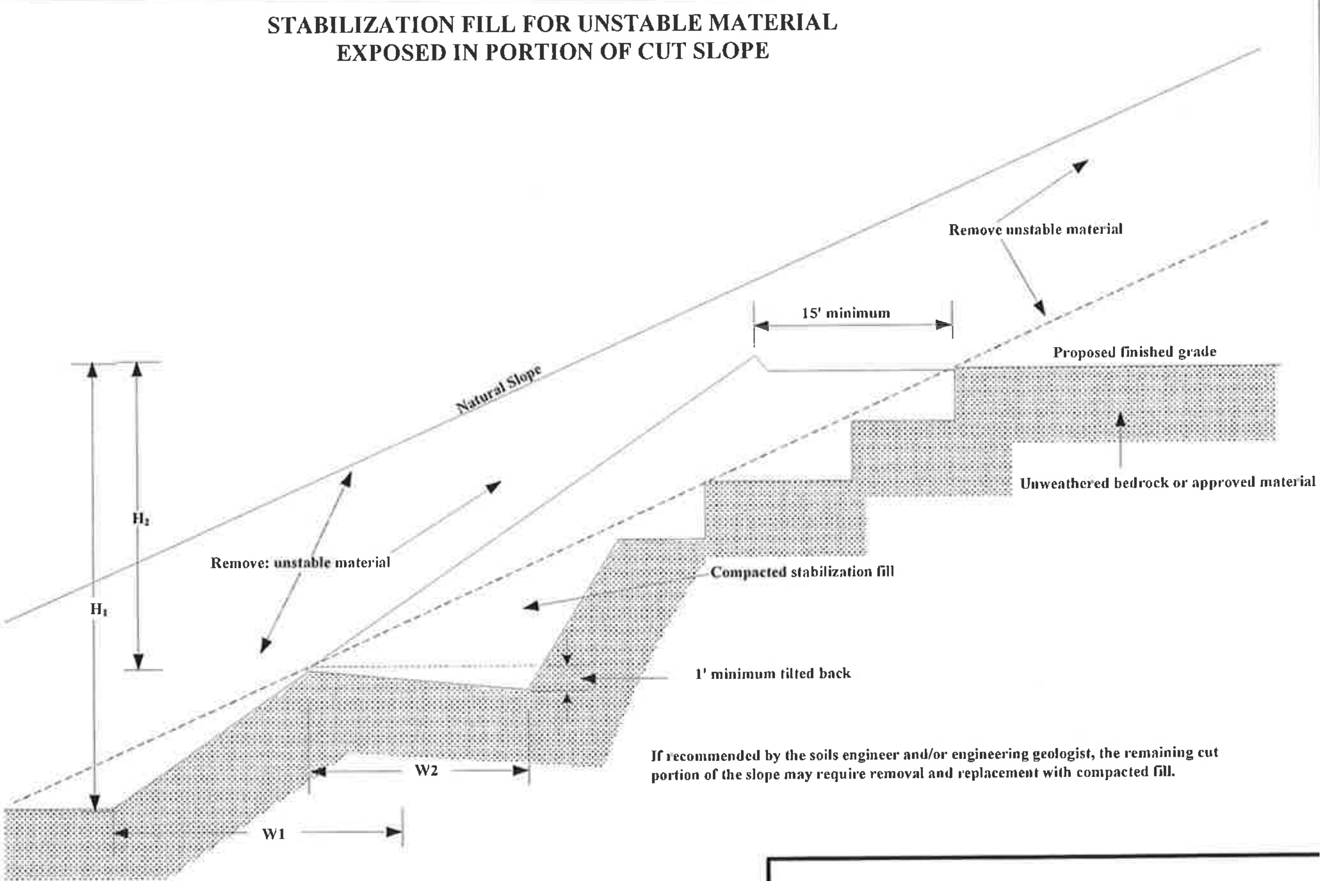
FIGURE H



Note: (1) Subdrains are required only if specified by the soils engineer and/or engineering geologist.
(2) "W" shall be the equipment width (15') for slope heights less than 25 feet. For slopes greater than 25 feet "W" shall be determined by the project soils engineer and/or the engineering geologist. "W" shall never be less than H/2.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
STABILIZATION FILL FOR UNSTABLE MATERIAL
EXPOSED IN PORTION OF CUT SLOPE

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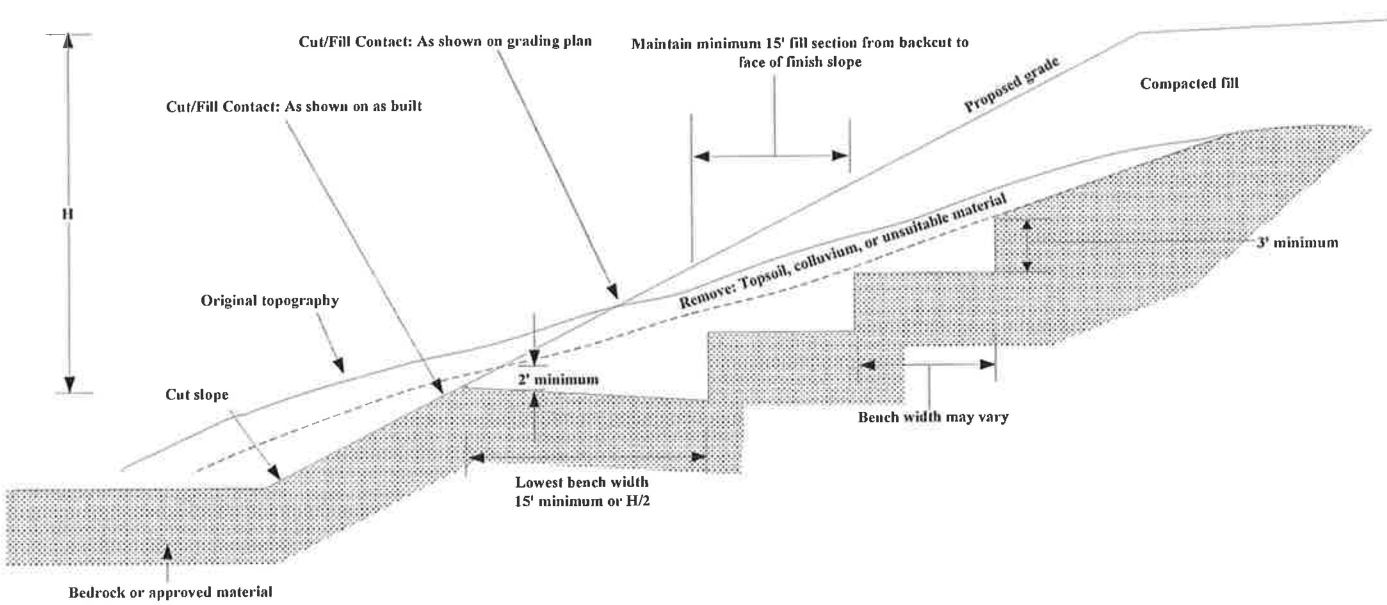
FIGURE I

FILL OVER CUT DETAIL



Note: The cut sectioin shall be excavated and evaluated by the soils engineer/engineering geologist prior to constructing the fill portion.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
FILL OVER CUT DETAIL

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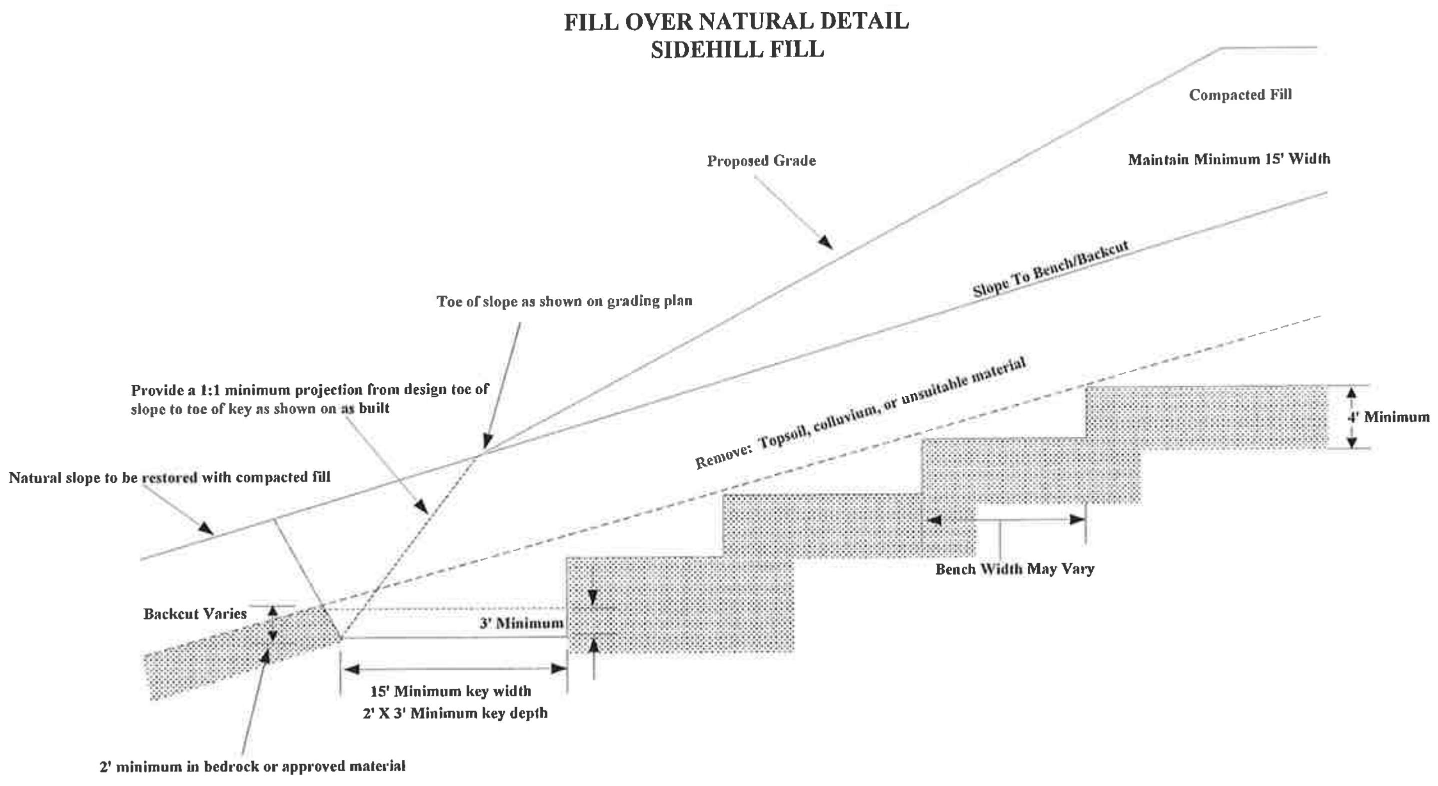
FIGURE J



Note: (1) Special recommendations shall be provided by the soils engineer/engineering geologist where the natural slope approaches or exceeds the design slope ratio.
(2) The need for and disposition of drains would be determined by the soils engineer/engineering geologist based upon exposed conditions.

Note: Figures not to scale

EARTHWORK AND GRADING GUIDELINES
FILL OVER NATURAL DETAIL
SIDEHILL FILL

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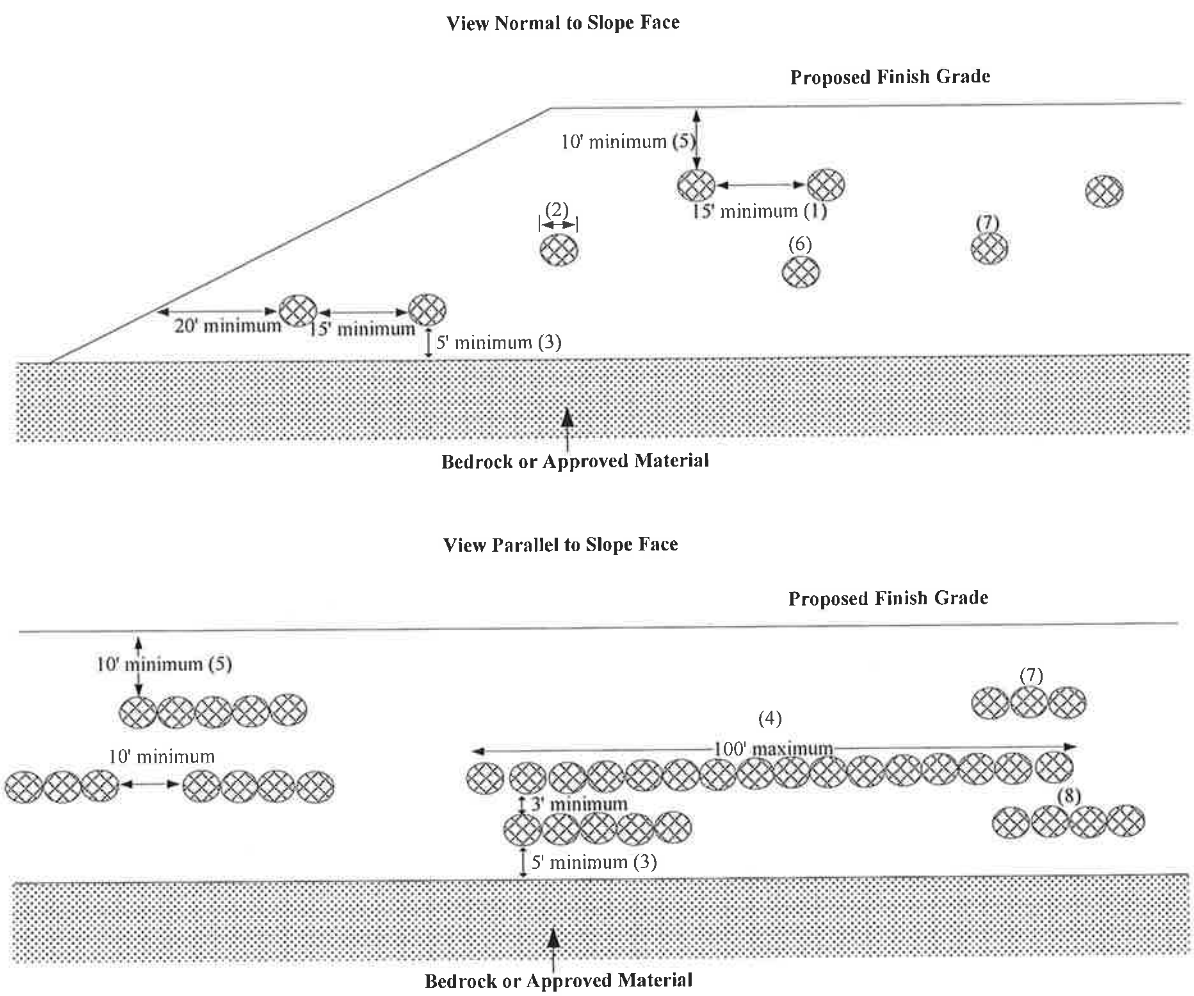
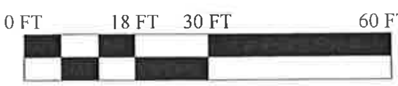
FIGURE K

OVERSIZE ROCK DISPOSAL



Note:
(1) One Equipment width or a minimum of 15 feet.
(2) Height and width may vary depending on rock size and type of equipment used. Length of windrow shall be no greater than 100 feet maximum.
(3) If approved by the soils engineer and/or engineering geologist.
(4) Orientation of windrows may vary but shall be as recommended by the soils engineer and/or engineering geologist. Unless recommended staggering of windrows is not necessary.
(5) Areas shall be cleared for utility trenches, foundations, and swimming pools.
(6) Voids in windrows shall be filled by flooding granular soil into place. Granular soil shall be any soil which has a unified soil classification system (Universal Building Code (UBC) 29-1). Designation of SM, SP, SW, GP, or GW.
(7) After fill between windrows is placed and compacted with the lift of fill covering windrow, windrow shall be proof rolled with a D-9 dozer or equivalent.
(8) Oversized rock is defined as larger than 12", and less than 4 feet in size.

Approximate Scale: 1" = 30'



Note: All distances are approximate

EARTHWORK AND GRADING GUIDELINES
OVERSIZE ROCK DISPOSAL

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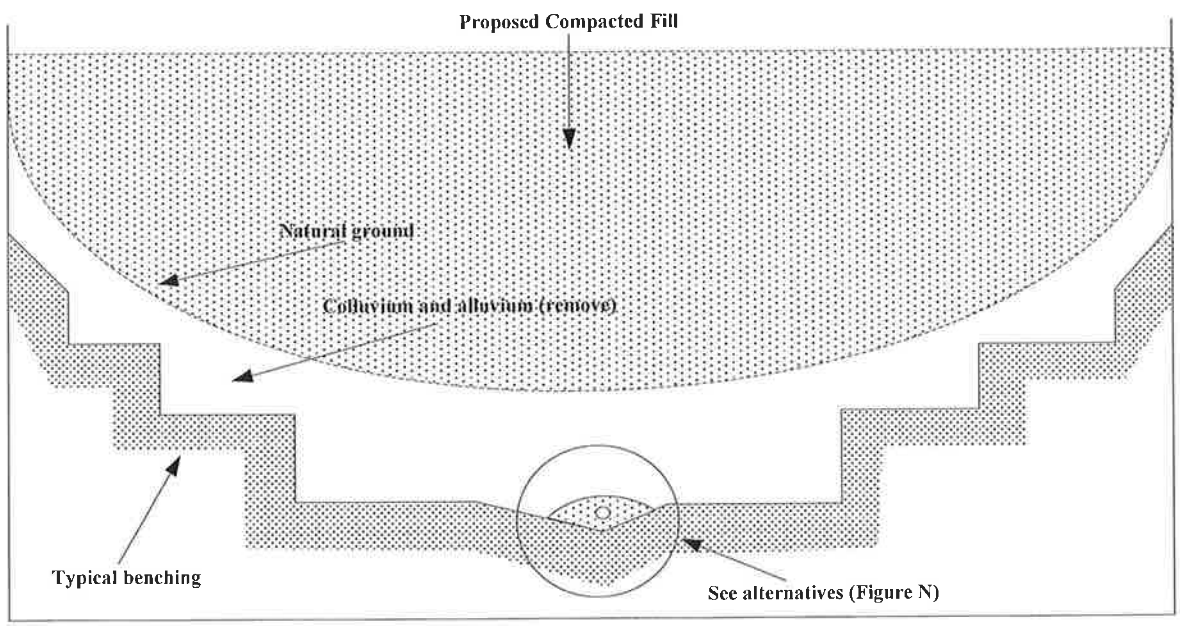
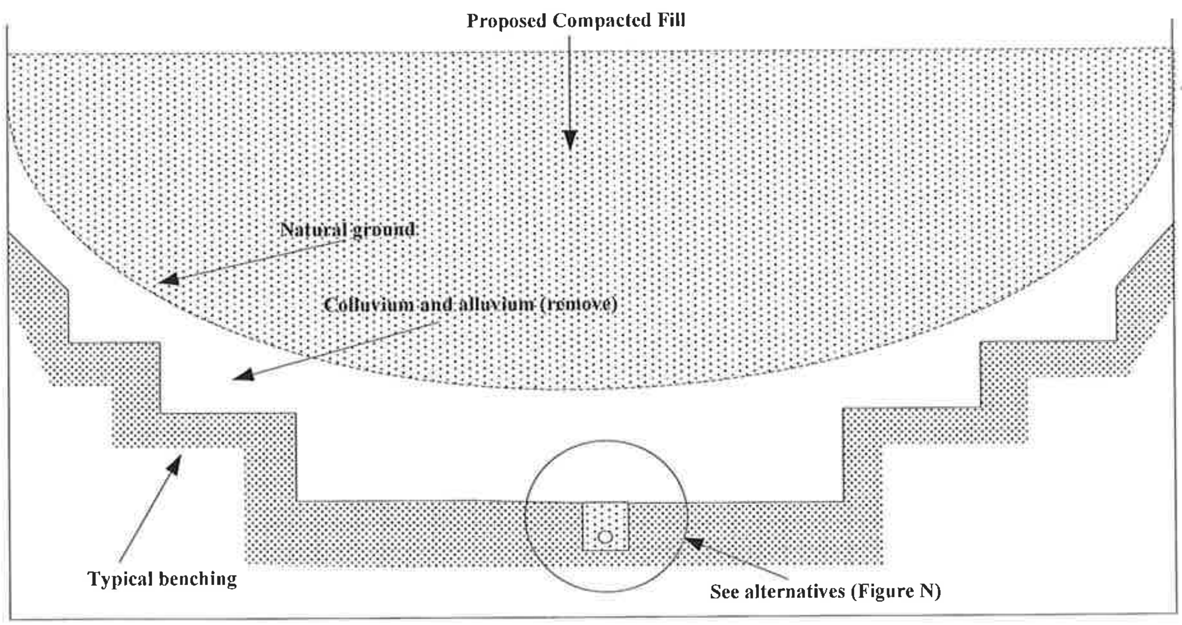
FIGURE L

CANYON SUBDRAIN DETAIL

Type A



Type B



Note: Alternatives, locations, and extent of subdrains should be determined by the soils engineer and/or engineering geologist during actual grading.

Note: Figures not to scale

EARTHWORK AND GRADING GUIDELINES
CANYON SUBDRAIN DETAIL

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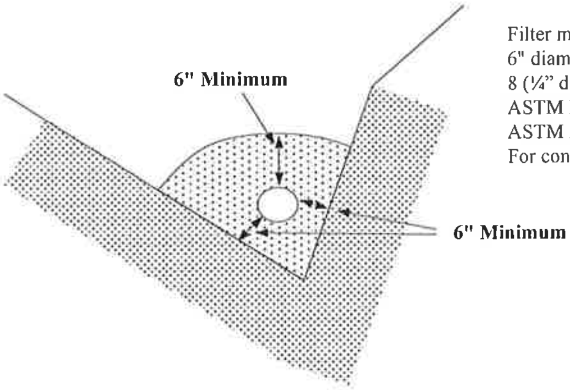
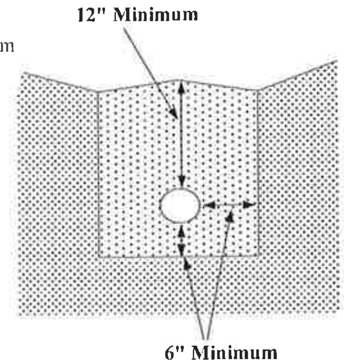
FIGURE M

CANYON SUBDRAIN ALTERNATE DETAILS

Alternate 1: Perforated Pipe and Filter Material



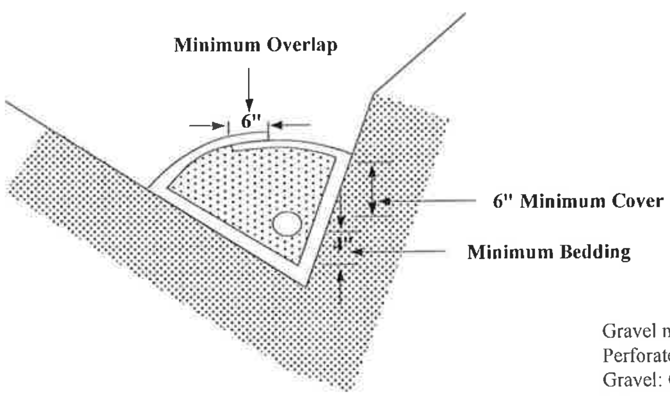
Filter material: Minimum volume of 9 feet^3/linear foot.
6" diameter ABS or PVC pipe or approved substitute with minimum 8 (¼" diameter) perforations per linear foot in bottom half of pipe.
ASTM D 2751, SDR 35 or ASTM D 1527, Schedule 40.
ASTM D 3034, SDR 35 or ASTM D 1785, Schedule 40.
For continuous run in excess of 500 feet use 8" diameter pipe.

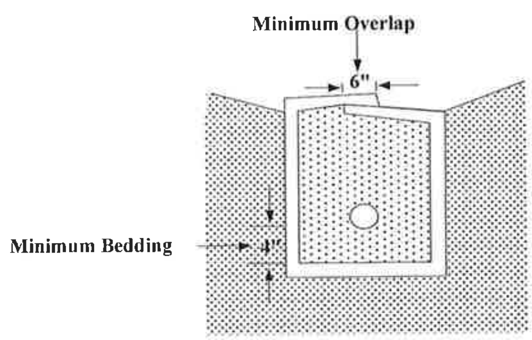


Filter Material

Sieve Size	Percent Passing
1"	100
¾"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

Alternate 2: Perforated Pipe, Gravel and Filter Fabric





Gravel material 9 feet^3/linear foot.
Perforated pipe: see alternate 1.
Gravel: Clean ¾" rock or approved substitute.
Filter Fabric: Mirafi 140 or approved substitute.

Note: Figures not to scale

EARTHWORK AND GRADING GUIDELINES
CANYON SUBDRAIN ALTERNATE DETAILS

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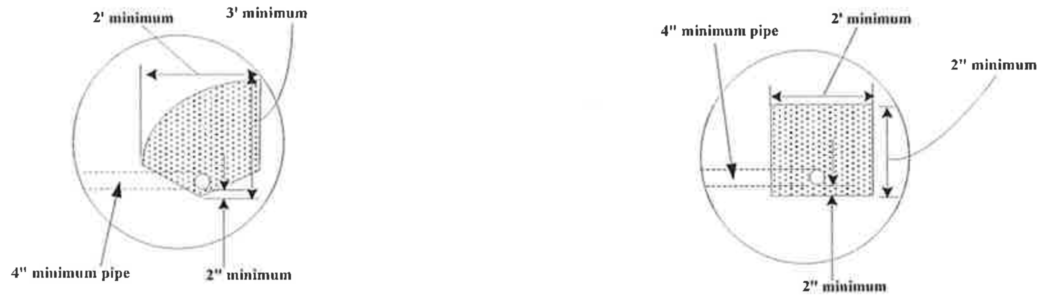
FIGURE N

TYPICAL STABILIZATION BUTTRESS SUBDRAIN DETAIL



Filter Material: Minimum of 5 ft^3/linear foot of pipe or 4 ft^3/linear foot of pipe when placed in square cut trench.

Alternative In Lieu Of Filter Material: Gravel may be encased in approved filter fabric. Filter fabric shall be mirafi 140 or equivalent. Filter fabric shall be lapped a minimum of 12" on all joints.

Minimum 4" Diameter Pipe: ABS-ASTM D-2751, SDR 35 or ASTM D-1527 schedule 40 PVC-ASTM D-3034, SDR 35 or ASTM D-1785 schedule 40 with a crushing strength of 1,000 pounds minimum, and a minimum of 8 uniformly spaced perforations per foot of pipe installed with perforations at bottom of pipe. Provide cap at upstream end of pipe. Slope at 2% to outlet pipe. Outlet pipe shall be connected to the subdrain pipe with tee or elbow.

Note: (1) Trench for outlet pipes shall be backfilled with onsite soil.
(2) Backdrains and lateral drains shall be located at the elevation of every bench drain. First drain shall be located at the elevation just above the lower lot grade. Additional drains may be required at the discretion of the soils engineer and/or engineering geologist.

Filter Material -- Shall be of the following specification or an approved equivalent:

Filter Material

Sieve Size	Percent Passing
1"	100
¾"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

Gravel - Shall be of the following specification or an approved equivalent:

Filter Material

Sieve Size	Percent Passing
1½"	100
No. 4	50
No. 200	8

Sand equivalent: Minimum of 50

Note: Figures not to scale

EARTHWORK AND GRADING GUIDELINES
TYPICAL STABILIZATION BUTTRESS SUBDRAIN DETAIL

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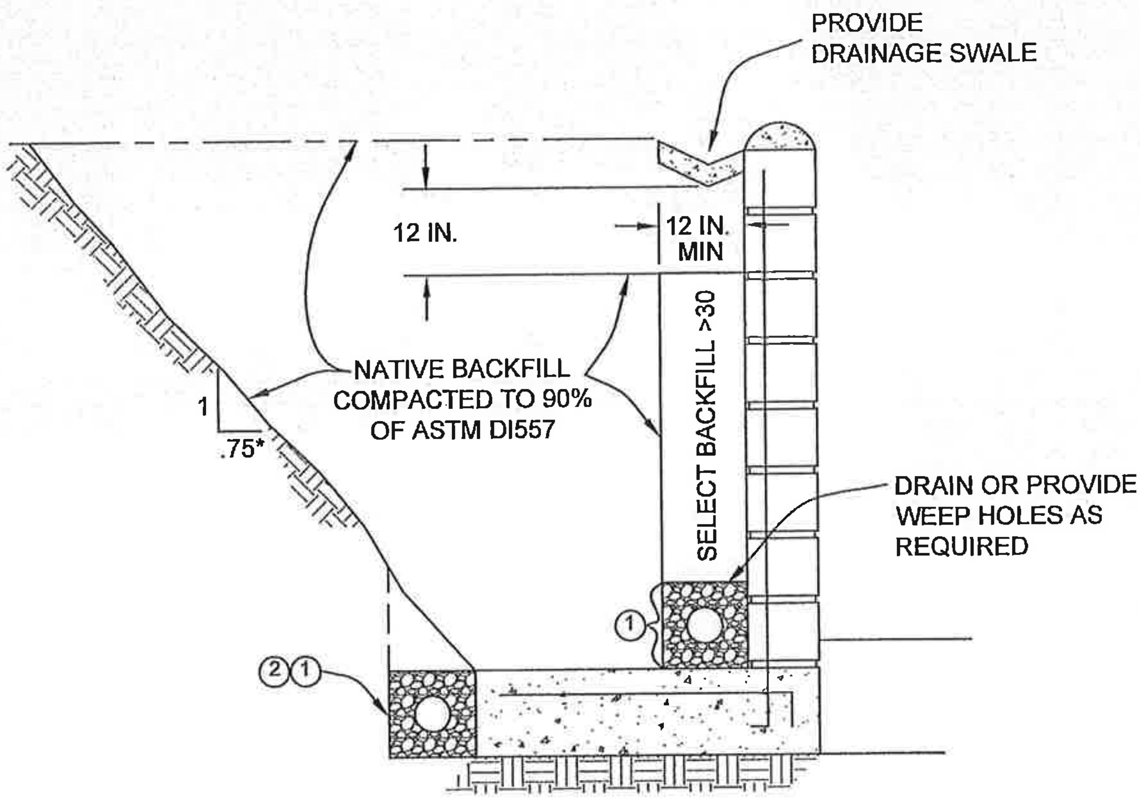
FIGURE O



* OR AS REQUIRED FOR SAFETY

NOTES

1. 4-INCH PERFORATED PVC SCHEDULE 40 OR APPROVED ALTERNATE. PLACE PERFORATION DOWN AND SURROUND WITH A MINIMUM OF 1 CUBIC FOOT PER LINEAL FOOT (1 FT. /FT.) OF 3/4 INCH ROCK OR APPROVED ALTERNATE AND WRAPPED IN FILTER FABRIC.
2. PLACE DRAIN AS SHOWN WHERE MOISTURE MIGRATION THROUGH THE WALL IS UNDESIRABLE.

NOTE: FIGURE NOT TO SCALE

EARTHWORK & GRADING GUIDELINES
TYPICAL RETAINING WALL BACKFILL

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FIGURE P

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SUPPLEMENTAL GEOTECHNICAL EVALUATION

Proposed Residential Development
NWC Ironwood Avenue and Oliver Street &
Tract No. 31556 Offsite Sewer
Oliver Street Extension/60 Freeway Undercrossing
Moreno Valley, Riverside County, California

May 18, 2015

EEI Project No. GLO-71982.4a

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SUPPLEMENTAL GEOTECHNICAL EVALUATION

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Oliver Street Extension/60 Freeway Undercrossing
Moreno Valley, Riverside County, California

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1.0 INTRODUCTION

1.1 Purpose

The purpose of this evaluation was two-fold. The first purpose was to provide supplemental geotechnical information to Anderson Consulting Engineers, Inc. ("Client"), regarding the undeveloped subject property at the northwest corner of Ironwood Avenue and Oliver Street (Tract No. 31556) in the City of Moreno Valley, Riverside County, California. The information developed in this Supplemental Geotechnical Evaluation is intended to provide the Client with additional/supplemental subsurface information for portions of the property that were not investigated during EEI's Feasibility-Level Geotechnical Investigation performed in 2014 and also to provide additional/supplemental conclusions and recommendations for the proposed property development.

The second purpose of this Supplemental Geotechnical Evaluation was to provide the Client with geotechnical information regarding the subsurface conditions at the proposed bore and receiving pit locations for the 60 Freeway undercrossing of Tract No. 31556 offsite sewer to determine general subsurface conditions and to provide conclusions/recommendations based on the ease/difficulty of excavations at the pit locations (Site Vicinity Map-**Figure 1**, Aerial Site Map-**Figure 2**).

This Supplemental Geotechnical Evaluation has been conducted in general accordance with the accepted geotechnical engineering principles and in general conformance with the proposed and optional scope of services presented in the approved proposal and cost estimate for the project by EEI, dated March 10, 2015.

EEI conducted an onsite field exploration on April 16 and 17, 2015 that included drilling and sampling of eight (8) hollow stem auger geotechnical borings (borings B-8 through B-15) for the proposed development at the undeveloped subject property. Two (2) additional hollow stem auger geotechnical borings (borings B-16 and B-17) were performed at the proposed bore and receiving pit locations at the 60 freeway undercrossing for Tract No. 31556 offsite sewer, located approximately 3,500 feet south of the undeveloped subject property at the northwest corner of the Ironwood Avenue/Oliver Street intersection. This Supplemental Geotechnical Evaluation has been prepared for the sole use of Anderson Consulting Engineers, Inc. Other parties, without the express written consent of EEI and the Client should not rely upon this Supplementa; Geotechnical Evaluation.

1.2 Project Description

The Client has requested that EEI perform a Supplemental Geotechnical Evaluation of the subject property (Tract No. 31556) consisting of approximately 80-acres of undeveloped vacant land located at the northwest corner of the intersection of Oliver Street and Ironwood Avenue, in the City of Moreno Valley, Riverside County, California. EEI has previously performed a Due Diligence Level Feasibility Geotechnical Evaluation for the property (EEI Project No. GLO-71982.4, Dated November 25, 2014) consisting of the excavation of four (4) small diameter borings (borings B-1 through B-4), 4 (four) backhoe test pits (T-1 through T-4) and three (3) percolation test pits (P-1 through P-3) on the property for the proposed residential development. Nason Street forms the majority of the western boundary; Ironwood borders the south; and Oliver Street forms the eastern boundary. Vacant land is present to the north. In general, the area is characterized by rural residential and vacant land. Proposed development is for 146 multi- or single-family residential lots.

Based on a review of the sewer plans provided by Anderson Consulting Engineers ("Client") and a review of the GoogleEarth© online database, the proposed project consists of the construction of an offsite sewer to service future Tract No. 31556.

The proposed offsite sewer alignment appears to begin at the northwest corner of the intersection of Ironwood Avenue and Oliver Street (which is the southeast corner of Tract No. 31556) and extends south along the existing alignment of Oliver Street which terminates at Carol Place and continues south along the alignment of the proposed future extension of Oliver Street to the 60 Freeway (Moreno Valley Freeway). The proposed offsite sewer would then extend under the 60 Freeway and continue southward along a proposed Eastern Municipal Water District (EMWD) easement to Eucalyptus Avenue where the proposed sewer would be tied-in to the existing sewer. The proposed offsite sewer extends approximately 3,500 feet from the Ironwood Avenue/Oliver Street intersection to Eucalyptus Avenue, including the 60 Freeway undercrossing. Based on a review of the sewer plans, it appears that the proposed offsite sewer will be 12-inches in diameter and composed of either PVC plastic or vitrified clay pipe (VCP).

For the proposed undercrossing of the 60 Freeway by the offsite sewer alignment, the bore and jack method will be utilized for the construction. Along the proposed sewer alignment immediately north of the 60 Freeway, a proposed 40-by 20-foot boring pit will be excavated to a depth of approximately 15 feet in order to accommodate horizontal drilling equipment. An approximately 15- by 20-foot receiving pit will be excavated to a depth of approximately 20 feet immediately adjacent to the south side of the 60 Freeway for the removal of drilling spoils. Once the pits are excavated and the drilling equipment is in place, a near horizontal boring will be drilled between the boring and receiving pits underneath the 60 Freeway and then shored with approximately 161 feet of 30-inch diameter steel casing. 189 feet of sewer pipe will then be placed through the steel casing and tied into the pipe sections on either side of the 60 Freeway. It appears that the depth from the surface to the top of the steel casing will vary from approximately 11 to 15 feet below existing grade. The drilling equipment will then be removed after pipe installation and the pits backfilled to complete the operation. The Client has requested that EEI conduct a Preliminary Geotechnical Evaluation of the subsurface conditions at the locations of the boring pit and receiving pit locations to determine the general subsurface conditions and the ease/difficulty of excavation at the pit locations.

1.3 Scope of Services

- Research of aerial photographs, readily available literature regarding local and regional geologic conditions, groundwater depth, fault rupture hazard zones and known fault locations, and other reasonably available geotechnical data or subsurface information relevant to the subject project(s).

- Conduct a geotechnical reconnaissance/site visit of the subject property(s) and nearby vicinity to mark boring locations for Underground Service Alert and to verify drilling rig access.

- Coordinate with Underground Service Alert to identify the presence of underground utilities for clearance of proposed boring and test pit locations.

- The drilling and logging of eight (8) small diameter exploratory borings (B-8 through B-15) in readily accessible areas of the subject property (Tract No. 31556) not previously investigated by EEI, ranging in depth from 15.5 to 42 feet below existing grade elevations (bgs).

- The drilling and logging of two (2) small diameter exploratory borings (B-16 and B-17) adjacent to each side of the proposed 60 Freeway undercrossing at the proposed bore and receiving pit locations for the Tract No. 31556 offsite sewer. Both borings were advanced to a depth of 21.5 feet below the existing grade elevations (bgs).

- The locations of the exploratory borings on the subject property (Tract No. 31556) are presented on **Figure 3** (Field Exploration Plan).

- The locations of each of the offsite exploratory borings (for the proposed offsite sewer boring and receiving pits) are presented on **Figure 4** (Offiste Sewer Boring Locations).
- An evaluation of seismicity and geologic hazards to include an evaluation of faulting.
- Completion of laboratory testing of representative earth materials encountered onsite to ascertain their pertinent soils engineering properties, including corrosion potential and excavation characteristics (**Appendix B**).
- The preparation of this report which presents our preliminary findings, conclusions, and recommendations for both the proposed Tract No. 31556 residential development and offsite sewer bore and receiving pit locations for the 60 Freeway undercrossing.

2.0 BACKGROUND

2.1 Subject Property Description

Based on the information provided by Anderson Consulting Engineers, Inc. ("Client"), and a review of the GoogleEarth© online database, and EEI's previous due diligence geotechnical evaluation, the subject property consists of approximately 80-acres of undeveloped vacant land (Tract No. 31556) located at the northwest corner of the intersection of Oliver Street and Ironwood Avenue, in the City of Moreno Valley, Riverside County, California. Nason Street forms the majority of the western boundary; Ironwood borders the south; and Oliver Street forms the eastern boundary. Vacant land is present to the north. In general, the area is characterized by rural residential and vacant land. Proposed development is for multi or single-family residential.

We understand that the proposed offsite sewer extends approximately 3,500 feet from the Ironwood Avenue/Oliver Street intersection (Tract No. 31556) to Eucalyptus Avenue, including the 60 Freeway undercrossing. Based on a review of the sewer plans, it appears that the proposed offsite sewer will be 12-inches in diameter and composed of either PVC plastic or vitrified clay pipe (VCP).

The subject property (Tract 31556) is approximately situated at 33.9448° north latitude and 117.1871° west longitude (GoogleEarth®, 2013).

2.2 Site Topography

A review of the Sunnymead, California 7.5-minute topographic quadrangle (USGS, 2012) and Project Exhibit/topographic map prepared by Anderson Consulting Engineers, Inc. indicates that the subject property (Tract No. 31556) elevation varies from approximately 1,840 to 1,980 feet above mean sea level (amsl). From east-west across the property is a series of north-south oriented ridges and alternating drainage gullies in the lower, southern portion of the property. The intervening ridges are generally about 5 to 10 feet higher in elevation than the adjacent drainage gullies. Rounded granitic outcrops are exposed in the northwestern and northeastern sections of the property. The property topography can be generally described as a relatively well-dissected alluvial fan descending from the eroded hills to the north. The overall surface gradient across the property is gently to moderately south or south-southeast.

2.3 Geologic Setting

The subject property and vicinity lies within the Peninsular Ranges Geomorphic Province of California (CGS, 2002). The Peninsular Ranges Geomorphic Province extends from the Transverse Ranges Geomorphic Province and the Los Angeles Basin, south to Baja California.

This province varies in width from about 30- to 100-miles. It is bounded on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province. The Transverse Ranges Geomorphic Province bounds the Peninsular Ranges on the north. The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks. Major fault zones and subordinate fault zones found in the Peninsular Ranges Province typically trend in a northwest-southeast direction.

Regional geologic maps of the subject property and vicinity (Morton et al., 2004) indicate the property is underlain by Cretaceous-age plutonic rocks composed of tonalite and Holocene age Younger Alluvial Fan deposits. Outcroppings of the weathered tonalite bedrock are exposed in the northwestern and northeastern portions of the property. Over the remainder of the property, the tonalite bedrock was found to be weathering into a soil with a "decomposed granite" or "dg" texture at depth in the exploratory borings in general is covered with several feet of alluvial and colluvial (younger alluvial fan) soils also derived from the weathered tonalite. The alluvial and colluvial soils are generally comprised of relatively loose to dense silty sand. The property is relatively undeveloped and artificial fill was not encountered during our field exploration at the property.

At the offsite sewer bore and receiving pit locations, several feet of artificial fill soils, likely associated with the construction of the 60 Freeway, were encountered at the surface and were underlain by alluvial soils to the maximum explored depth during our geotechnical evaluation.

Due to the proximity of the subject property area to several nearby active faults, strong ground shaking could occur at the property as a result of an earthquake on any one of the faults. Our review indicates that there are no known active faults crossing the property and the property is not within a State of California Earthquake Fault Zone (Jennings, 1994; Hart and Bryant, 1997, CDMG, 1974; 1998). Due to the presence of shallow bedrock and the lack of shallow groundwater at the property, the property is considered as having a low susceptibility to liquefaction.

2.4 Regional Groundwater

A seismic hazard zone map and report have not been completed for the Sunnymead Quadrangle, therefore, the depth to the historic high groundwater at the subject property is not known. Due to the presence of relatively shallow granitic bedrock at the property, static groundwater is not expected and groundwater was not encountered during our previous due diligence geotechnical evaluation or during our Supplementa; Geotechnical Evaluation to a maximum explored depth of 42 feet below the existing ground surface. Within the lower drainage gullies, up to 30 feet in thickness of silty sand alluvium was encountered. Although not encountered within the alluvium during our field excavation, during times of heavy precipitation or runoff, a localized perched groundwater condition could exist. A review of topographic maps of the general vicinity of the property indicates regional topographic relief slopes gently towards the south or south-southeast. This information suggests that regional groundwater in the property vicinity could be inferred to flow in the same general topographic direction.

3.0 FAULTING AND SEISMICITY

The portion of Southern California that includes the subject property is considered to be seismically active. Due to the proximity of the property area to several nearby active faults, strong ground shaking could occur at the property as a result of an earthquake on any one of the faults. Our review indicates that there are no known active faults crossing the property (Blake, 2000) and the property is not within an Earthquake Fault Zone (Hart and Bryant, 1997). It is our opinion, therefore, that the likelihood of surface fault rupture at the property is low. **Table 1** lists the major active faults within 25 miles that are likely to affect the property.

TABLE 1
Summary of Major Active Faults

	Fault Name	Approximate Distance From Site miles (kilometers)	Maximum Moment Magnitude
1	San Jacinto-San Jacinto Valley	1.5 (2.4)	6.9
2	San Jacinto-San Bernardino	5.8 (9.3)	6.7
3	San Andreas – San Bernardino M-1	12.1 (19.5)	7.5
4	San Andreas – SB-Coach. M-2b	12.1 (19.5)	7.7
5	San Andreas – SB-Coach. M-1b-2	12.1 (19.5)	7.7
6	San Andreas – Whole M-1a	12.1 (19.5)	8.0
7	North Frontal Fault Zone (West)	19.4 (31.2)	7.2
8	San Jacinto – Anza	21.0 (33.8)	7.2
9	Elsinore (Glen Ivy)	21.7 (35.0)	6.8
10	Cucamonga	21.9 (35.2)	6.9
11	Elsinore (Temecula)	22.8 (36.7)	6.8
12	Cleghorn	23.1 (37.2)	6.5
13	Chino-Central Ave. (Elsinore)	23.3 (37.5)	6.7

3.1 Seismic Parameters and Peak Ground Acceleration

Maximum considered ground motion maps provided in the California Building Code (CBC, 2013) were utilized with coordinates of 33.9448° north latitude and 117.1871° west longitude, to determine the subject property seismic parameters. EEI utilized seismic design criteria provided in the CBC (2013).

In accordance with the guidelines of the CBC (2013), the spectral parameters for the subject property (based on a Site Class B soil) are estimated to be S_s = 2.166g and S_1 = 0.982g. Review of the geotechnical data obtained during our subsurface exploration, however, indicates that the property should be classified as Class D per the CBC (Table 1613.5.2). Consequently, Site Coefficients F_a= 1.000 and F_v = 1.500 appear to be appropriate for the property. Based on this information, the adjusted maximum considered earthquake spectral response parameters S_{MS} = 2.166g and S_{M1} = 1.472g are recommended for seismic design of the project. Assuming an occupancy category of II (Table 1604A.5), an S_{DS} value of 1.444g and an S_{D1} value of 0.982g, the proposed building at the property can be assigned a seismic design category of D [Table 1613.5.6 (1) and (2)]. Final selection of the appropriate seismic design coefficients should be made by the structural consultant based on the local laws and ordinances, expected building response, and desired level of conservatism.

Seismic Hazard Response Parameters are listed in **Table 2**.

TABLE 2
Seismic Hazard Response Parameters and Design Parameters CBC (2013)

Latitude: 33.9448° - Longitude: -117.1871° Seismic Parameter	Period (Sec)		Value
Mapped Spectral Acceleration Value, Soil Class B	0.2	S_s	2.166g
Mapped Spectral Acceleration Value, Soil Class B	1.0	S_1	0.982g
Site Coefficient, Subject Site Soil Classification D per 2013 CBC Table 1613.5.2	--	F_a	1.000
Site Coefficient, Subject Site Soil Classification D per 2013 CBC Table 1613.5.2	--	F_v	1.500
Adjusted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Site Class D	0.2	S_{MS}	2.166g
Adjusted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Site Class D	1.0	S_{M1}	1.472g
Design Spectral Response Acceleration Occupancy Category II per 2013 CBC Table1604.5	0.2	S_{DS}	1.444g
Design Spectral Response Acceleration Occupancy Category II per 2013 CBC Table1604.5	1.0	S_{D1}	0.982g
Peak Ground Acceleration Adjusted For Site Class Effects.		PGA_M	0.837g
Building Assigned Seismic Design Category per Table 1613.5.6 (1) and (2)	--	--	D

3.2 Ground Lurching or Shallow Ground Rupture

Based on the geography, topography and site-specific geotechnical conditions encountered during our preliminary and Supplementa; Geotechnical Evaluations at the subject property, we consider the potential for ground lurching or shallow ground rupture at the property to be low; however, due to the active seismicity of California, this possibility cannot be completely ruled out. In light of this, the unlikely hazard of lurching or ground-rupture should not preclude consideration of "flexible" design for onsite utility lines and connections.

3.3 Liquefaction

Liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading. Liquefaction and related phenomena have been responsible for substantial structural damage in historical earthquakes, and are a design concern under certain conditions. Liquefaction occurs in saturated soils that are soils in which the space between individual particles is completely filled with water. This pore water exerts a pressure on the soil particles that influences how tightly the particles themselves are pressed together.

Prior to an earthquake, pore water pressure is typically low; however, earthquake motion can cause the pore water pressure to increase to the point where the soil particles can readily move with respect to each other. When liquefaction occurs; the strength of the soil decreases and the ability of a soil deposit to support structural loads are reduced.

A seismic hazard zone map and report for the Sunnymead Quadrangle has not been issued by the California Geological Survey (CGS) so the subject property is, therefore, not situated within a mapped Liquefaction Zone. The lower elevation portions of the property is generally underlain by generally loose to medium dense alluvial and colluvial deposits that overlie relatively shallow granitic bedrock while the upper elevation portions of the site are generally underlain by dense to very dense alluvial and colluvial deposits over granitic bedrock. The alluvial and colluvial soils are subject to partial and/or complete removal and recompaction during site grading for the proposed residential development. It appears that liquefaction is not a significant geotechnical concern at the property.

Cyclic mobility is a liquefaction phenomenon, triggered by cyclic loading, occurring in soil deposits with static shear stresses lower than the soil strength. Deformations due to cyclic mobility develop incrementally because of static and dynamic stresses that exist during an earthquake. Lateral spreading, a common result of cyclic mobility, can occur on gently sloping and on flat ground close to rivers and lakes. These conditions do exist within the subject property, however, based on the conceptual site plan, the property should be relatively level following rough grading with a lack of free channel faces and cyclic mobility should not be an issue post-grading.

3.4 Seismic Induced Settlement

Seismically induced settlement can occur due to reorientation of soil particles during strong shaking of unsaturated sands, as well as in response to liquefaction of saturated loose granular soils.

Based on our evaluation and the geotechnical data obtained from our exploratory borings, we estimate the total seismic-induced settlement to be less than 1-inch. Differential earthquake induced settlements are estimated to be less than 0.5-inches over a 50-foot span.

4.0 FIELD EXPLORATION AND LABORATORY TESTING

4.1 Field Exploration

Fieldwork for our geotechnical evaluation was conducted on April 16 and 17, 2015. The drilling and logging of eight (8) small diameter exploratory borings (B-8 through B-15) in readily accessible areas of the subject property (Tract No. 31556) not previously investigated by EEI, ranging in depth from 15.5 to 42 feet below existing grade elevations (bgs). Additionally, drilling and logging of two (2) small diameter exploratory borings (B-16 and B-17) was completed adjacent to each side of the proposed 60 Freeway undercrossing at the proposed bore and receiving pit locations for Tract No. 31556 offsite sewer. Both borings were advanced to a depth of 21.5 feet below the existing grade elevations (bgs). All exploratory borings were logged under the supervision of a Registered Professional Engineer and/or Certified Engineering Geologist at EEI. Boring locations were adjusted as necessary due to existing utilities and improvements.

Blow count (N) values were determined utilizing a 140-pound automatic hammer, falling 30-inches onto a Standard Penetration Test (SPT) split-spoon sampler and a Modified California split-tube sampler. A truck mounted hollow-stem auger (HSA) drill rig was used during fieldwork. The blows per foot (N value) required to advance the 18-inch long SPT and 12-inch long Modified California split-tube samplers was measured at various initial depths followed by 5-foot intervals, recorded on the boring logs. The boring logs for the field exploration are presented in **Appendix A**-Soil Classification Chart and Boring & Trench Logs. Relatively "undisturbed" samples were collected in a 2.42-inch (inside diameter) California Modified split-tube sampler for visual examination and laboratory testing in the exploratory borings. The soils were classified in accordance with the Unified Soil Classification System (ASTM, 2008). Representative bulk samples were also collected from the exploratory borings for appropriate laboratory testing.

4.2 Subsurface Conditions

The results of our geotechnical exploration indicate that the proposed residential development is underlain by weathered Cretaceous-age plutonic rocks composed of tonalite. This material was observed to extend beyond the maximum depth of our exploratory borings (approximately 42 feet below existing grades). Alluvial soils up to 30 feet thick were observed to mantle the weathered tonalite bedrock within the lower lying channel/drainage areas during our previous geotechnical site evaluation and were not penetrated during our maximum explored depth during our supplemental evaluation.

On the higher, elevated ridge areas on the subject property, colluvial soils were observed to mantle the weathered tonalite bedrock with a thickness varying between 2 and 21.5 feet (similar to the 3 to 14 feet encountered during due diligence evaluation). The weathered tonalite bedrock can generally be described as gray, white or black speckled or orange to dark grayish-orange (depending on degree of weathering) with a "granitic" or phaneritic texture and was generally unweathered to highly weathered. Outcroppings of the weathered tonalite bedrock are exposed in the northwestern and northeastern portions of the site. Over the remainder of the property, the tonalite bedrock was found to be weathering into a medium dense to very dense silty sand soil with a "decomposed granite" or "dg" texture at depth in the exploratory borings and test pits. The alluvial and colluvial (younger alluvial fan) soils are also derived from the weathered tonalite.

The alluvial and colluvial soils are generally comprised of orange-brown mottled or light brown, fine to coarse, damp to moist, loose to dense silty sand and gravelly sand. The property is relatively undeveloped and artificial fill was not encountered during our field exploration at the property.

Our exploratory excavations were performed utilizing light-duty equipment, which can provide general excavation characteristics of the onsite materials. Large granitic (tonalite) bedrock outcrops are present on the northeast and northwest portions of the property, along with some isolated rock outcrops within the areas of the proposed development area and generally on the higher elevations of the property. Boulders were present at the surface in these areas, some localized "core rock or floaters" should be anticipated at variable depths in these areas. Based on observed subsurface conditions in the exploratory borings, the "decomposed granite" or "dg" is moderately to highly weathered and/or fractured and was relatively easy to excavate to the depths indicated with a drill rig equipped with flight auger equipment. Refusal was encountered at a depth of 42 feet bgs in exploratory boring B-8 during our field exploration.

In general, the ease of rock excavation or rippability depends on various factors such as rock type, rock hardness and density, the amount of weathering, and the existence and characteristics of discontinuities such as joint spacing, foliation, or fractures.

Due to the relatively dense character of the granitic bedrock encountered onsite, it is likely that oversized rock materials will be created during grading operations. Native earth materials appear to be suitable for use as structural fill provided they are moisture conditioned (as needed), meet EEI's recommendations for size and are properly compacted. Dependent upon the grading plan, some of the oversized materials may be re-used in landscape areas.

For the proposed offsite sewer bore pit and receiving pit locations, alluvial soils at depth were overlain by artificial fill soils from the surface to a depth of approximately 11 feet bgs in exploratory boring B-16 and a depth of approximately 16 feet bgs in exploratory boring B-17. Alluvial soils were then encountered below the artificial fill to the maximum explored depth of 21.5 feet bgs. The offsite alluvial soils can generally be described as light brown to brown, fine to medium, moist, medium dense silty sand. The artificial fill soils encountered can be described as brown, red-brown or dark orange-brown, fine to coarse, damp to moist, loose to medium dense silty sand and sandy silt. Refusal was not encountered within either of our offsite exploratory borings. Detailed descriptions of the encountered soils are provided on the boring logs and test pit logs included as **Appendix A**.

Due to the presence of relatively shallow granitic bedrock at subject property, static groundwater is not expected and groundwater was not encountered in any of the exploratory borings excavated at the property to a maximum explored depth of 42 feet below the existing ground surface. Our review of ground water monitoring data from nearby wells suggests that the groundwater level may fluctuate seasonally and yearly.

It should be noted that fluctuations in the ground water level could also occur due to variations in ground surface topography, subsurface stratifications, precipitation, irrigation, and other factors which may not have been evident at the time of our exploration.

4.3 Laboratory Testing and Classification

Representative samples were selected for laboratory testing to confirm their field classification(s). Field descriptions and classifications were visually classified according to the American Society for Testing and Materials (ASTM) D2488 which classifies soils under the Unified Soil Classification System (USCS). Representative soil samples were tested in the lab for grain size distribution, liquid limits, and plastic limits to determine actual classifications by ASTM D2487-Standard Practice for Classification of Soils for Engineering Purposes in accordance to the USCS. Final classifications of soils can be found on the boring logs in **Appendix A** and the laboratory test data in **Appendix B**.

4.3.1 Moisture Content and Dry Density

The in-situ moisture content and dry density of soils were determined for soil samples obtained from the borings. Moisture contents and dry densities of soils help to determine engineering design parameters for foundations, retaining walls, and other engineered structures. Moisture content on soil samples was conducted in general accordance with ASTM D2216, and was recorded as a percentage. In-situ moisture content and dry density information for soil samples retrieved from the field can be found on the boring logs located in **Appendix A**.

4.3.2 Grain Size Distribution

To help check field classifications of soils, the grain size distribution of representative soil samples was determined. In order to find the percentages of different sized particles in a particular soil stratum, soils were tested in general accordance with ASTM D422-Standard Test Method for Particle-Size Analysis of Soils. Grain size distribution curves and gradation results are presented in **Appendix B.**

4.3.3 Maximum Dry Density and Optimum Moisture Content

The maximum dry density and optimum moisture content were determined from a bulk sample obtained from boring B-8 at depths between 0 and 5 feet below existing grade. Our testing was performed in general accordance with ASTM D1557, Method A. Results of our testing are presented in **Appendix B**.

4.3.4 Expansion Index

A soil sample from boring B-8 within the upper 5 feet of existing grade was tested for its expansion potential. Our expansion index testing was conducted in general accordance with ASTM D4829. The results of our expansion index testing are presented in **Appendix B.**

4.3.5 Sulfate/Corrosion

One representative sample of onsite earth material was collected for analysis at Clarkson Laboratory and Supply, Inc. located in Chula Vista, California for corrosion/soluble sulfate potential. This corrosion testing included soil minimum resistivity and pH by California Test 643, sulfate by California Test 417, and chloride by California Test 422. Results of these tests are presented in **Appendix B**.

It should be understood that the results provided in **Appendix B** are based upon pre-development conditions. Verification testing is recommended at the conclusion of grading on samples collected at or near finish grade.

5.0 CONCLUSIONS

Based on our field exploration, laboratory testing and engineering and geologic analysis, it is our opinion that the subject property is suitable for the proposed new development and associated improvements from a geotechnical engineering and geologic viewpoint; however, there are existing geotechnical conditions associated with the property that will warrant mitigation and/or consideration during planning stages. If site plans and/or the location of the proposed residential buildings or proposed offsite sewer bore and receiving pit locations are revised, additional field studies may be warranted to address proposed site-specific conditions.

In general, based on the results of EEI's supplemental investigation, conclusions are generally unchanged from those presented in our previous due diligence geotechnical report, dated November 25, 2014. As a result, EEI is providing the following conclusions:

- A total of eight (8) hollow stem auger borings were drilled on the subject property (Tract No. 31556). Boring depths ranged from 15.5 to 42 feet below the existing ground surface. Two (2) additional hollow stem auger borings were drilled offsite in the area of the proposed Tract No. 31556 offsite sewer line undercrossing of Freeway 60. Both of these borings were drilled to an approximate depth of 21.5 feet below existing grade. The results of our geotechnical exploration indicate that the subject property development is underlain by weathered Cretaceous-age plutonic rocks composed of tonalite. This material was observed to extend beyond the maximum depth of our exploratory borings (approximately 42 feet below existing grades). Alluvial soils up to 30 feet thick were observed to mantle the weathered tonalite bedrock within the lower lying channel/drainage areas during our previous geotechnical site evaluation and were not penetrated during our maximum explored depth during our supplemental evaluation.

- On the higher, elevated ridge areas on the subject property, colluvial soils were observed to mantle the weathered tonalite bedrock with a thickness varying between 2 and 21.5 feet (similar to the 3 to 14 feet encountered during due diligence evaluation). The weathered tonalite bedrock can generally be described as gray, white or black speckled or orange to dark grayish-orange (depending on degree of weathering) with a "granitic" or phaneritic texture and was generally unweathered to highly weathered. Outcroppings of the weathered tonalite bedrock are exposed in the northwestern and northeastern portions of the property. Over the remainder of the property, the tonalite bedrock was found to be weathering into a medium dense to very dense silty sand soil with a "decomposed granite" or "dg" texture at depth in the exploratory borings and test pits. The alluvial and colluvial (younger alluvial fan) soils are also derived from the weathered tonalite. The alluvial and colluvial soils are generally comprised of orange-brown mottled or light brown, fine to coarse, damp to moist, loose to dense silty sand and gravelly sand. Refusal was encountered at a depth of 42 feet bgs in exploratory boring B-8 during our field exploration.

- For the proposed offsite sewer bore pit and receiving pit locations, alluvial soils at depth were overlain by artificial fill soils from the surface to a depth of approximately 11 feet bgs in exploratory boring B-16 and a depth of approximately 16 feet bgs in exploratory boring B-17. Alluvial soils were then encountered below the artificial fill to the maximum explored depth of 21.5 feet bgs. The offsite alluvial soils can generally be described as light brown to brown, fine to medium, moist, medium dense silty sand. The artificial fill soils encountered can be described as brown, red-brown or dark orange-brown, fine to coarse, damp to moist, loose to medium dense silty sand and sandy silt. Refusal was not encountered within either of our offsite exploratory borings.

- Groundwater was not encountered in any of our onsite or offsite exploratory borings to the depths explored (approximately 42 feet below existing grades). It should be noted that variations in groundwater may result from fluctuations in the ground surface topography, subsurface stratification, precipitation, irrigation and other factors that may not have been evident at the time of our subsurface exploration.

- Laboratory test results indicate that the near surface materials are mildly alkaline (pH = 7.4) and are corrosive to ferrous metals with a minimum resistivity value of 3,500 ohm-cm. Laboratory testing of the upper soils yielded a soluble sulfate concentration of 0.003 percent and a chloride concentration of 0.001 percent, indicating a negligible corrosion potential to reinforced concrete.

- The results of our laboratory Expansion Index (EI) testing indicate an Expansion Index of 2, for the tested soils which represents a very low expansion potential.

- The subject property is located within an area of Southern California recognized as having a number of active and potentially active faults. Our review indicates that there are no known active faults crossing the property and the property is not located within an Earthquake Fault Zone. The nearest active faults that could affect the property are the San Jacinto Valley segment of the San Jacinto Fault Zone, located approximately 1.5 miles from the property, the San Bernardino segment of the San Jacinto Fault Zone, located approximately 5.8 miles from the area of study, the San Bernardino M-1 segment of the San Andreas Fault Zone, the San Bernardino-Coachella Valley M-2b segment of the San Andreas Fault Zone, the San Bernardino-Coachella Valley M-1b-2 segment of the San Andreas Fault Zone and the San Bernardino-Coachella Valley M-1a segment of the San Andreas Fault Zone, all located approximately 12.1 miles from the area of study. Each of these active faults is capable of generating severe ground shaking at the property. A list of active faults within an approximate 25-mile radius is presented in **Table 1**.

- Based on EEI's evaluation, earth materials underlying the subject property are not considered susceptible to liquefaction or significant amounts of seismic settlement. Based on EEI's evaluation, the earth materials underlying the property of the proposed development appear to be susceptible to some seismically induced settlement on the order of less than one-inch with differential settlements of less than 0.5-inches over a 50-foot span. Liquefaction-induced lateral spreading does not appear to be a concern at the property due to the lack of shallow groundwater, the lack of nearby open face channels and the relatively shallow depth to bedrock.

- At this time we cannot present specific footing recommendations that can be incorporated in the structural design, given that we do not have a scope of the proposed project, no grading or foundation plans were available at the time and no information was provided to us other than the Client is considering purchasing the property for future development.

6.0 RECOMMENDATIONS

The recommendations presented herein should be considered as preliminary for the purpose of characterizing the geotechnical and geologic conditions at the subject property prior to purchasing the property, and for preliminary information to aid the initial planning and design phases of development. Guidelines for site preparation, earthwork, and onsite improvements were previously provided in the Due Diligence Level Geotechnical Evaluation report by EEI dated November 25, 2014. Based on the results of our Supplemental Geotechnical Evaluation of the subject property, the following recommendations as presented are essentially unchanged from the 2014 EEI report, except where specifically discussed. The subsurface conditions encountered at the additional boring locations verified the subsurface conditions encountered in the 2014 exploratory borings and test pits and therefore, has verified the recommendations and conclusions of the earlier referenced EEI report, except where specifically discussed due to a change in subsurface conditions from the previous EEI report.

Our assumption is also that the onsite development will still consist of single-family, wood-frame, slab-on-grade 1- to 2-story residential structures and the planned offsite construction for the proposed sewer line including the bore-and-jack method for the 60 Freeway undercrossing of the sewer line.

6.1 General

Grading should conform to the guidelines presented in the 2013 California Building Code (CBC, 2013), as well as the requirements of the City of Moreno Valley and the County of Riverside. Additionally, general Earthwork and Grading Guidelines are provided herein as **Appendix C**.

During earthwork construction, removals and reprocessing of fill materials, as well as general grading procedures of the contractor should be observed and the fill placed selectively tested by representatives of the geotechnical engineer, EEI. If any unusual or unexpected conditions are exposed in the field, they should be reviewed by the Geotechnical Engineer and if warranted, modified and/or additional remedial recommendations will be offered. Specific guidelines and comments pertinent to the planned development are provided herein.

The recommendations presented herein have been completed using the preliminary information provided to us regarding site development. If information concerning the proposed development is revised, or any changes in the design and location of the proposed property improvements are made, the preliminary conclusions and recommendations contained in this report should not be considered applicable unless the changes are reviewed and conclusions of this report modified or approved in writing by this office.

6.2 Site Preparation and Grading

Debris and other deleterious material, such as organic soils and/or environmentally impacted earth materials should be removed from the subject property prior to the start of grading. Areas to receive fill should be properly benched in accordance with current industry standards of practice and guidelines specified in the CBC and the requirements of the local jurisdiction.

Existing utilities should be removed within the proposed building envelope. Abandoned trenches should be properly backfilled and tested. If unanticipated subsurface improvements (utility lines, septic systems, wells, utilities, etc.) are encountered during earthwork construction, the geotechnical engineer should be informed and appropriate remedial recommendations would then be provided.

6.3 Remedial Earthwork

The encountered portions of the existing surficial soils including the upper portions of the alluvial and colluvial soils were observed to be somewhat loose and variable in moisture content and relative density. As such, they are considered potentially compressible and unsuitable for the support of settlement-sensitive structures or engineered fill in their current condition. Therefore, where not already removed by the proposed site grading, the existing native materials should be completely removed and recompacted in the areas to receive the proposed building improvement and other settlement-sensitive improvements within some of the lower elevation portions of the property. Based on the results of our subsurface exploration, we recommend that these removals extend to approximate depths on the order of a minimum of 4 feet to a maximum of 30 feet below the existing ground surface, or 24-inches below the bottoms of the proposed foundations. At the approximate location of boring B-1, 30 feet of relatively loose to medium dense silty sand alluvium was encountered above the tonalite bedrock and should be removed to a depth of 30 feet. A similar situation likely exists in other, lower elevation portions of the property within the drainage channels. In the upper elevation portions of the property, alluvial and colluvial soils tend to be dense to very dense and relatively well cemented, will likely require a minimum depth of removal and recompaction, and will generally not require complete removal and recompaction to the granitic bedrock. Once grading plans become available to EEI or review, the estimated removal depth of the native materials at the property can be approximately determined and provided.

Following removal of the upper soils, the bottom of the resulting excavation(s) should be observed by a representative of EEI to check that unsuitable materials have been sufficiently removed. It should be understood that based on the observations of our field representative, localized deeper removals may be recommended. The base of the removal area should be level to avoid differential fill thicknesses under proposed improvements. This remedial earthwork should extend at least 5 feet outside the proposed building limits and/or 5 feet beyond the area to receive fill. Note that vertical sides exceeding 5 feet in depth may be prone to sloughing and may require laying back to an inclination of 1:1 (horizontal to vertical).

After removal of the upper soils and observation of the excavation bottoms, the over-excavated areas should be scarified to a minimum depth of 6-inches, moisture conditioned as needed to achieve at least optimum moisture content and re-compacted to at least 90 percent of the maximum dry density (based on ASTM D1557). The over-excavated areas should then be backfilled with onsite and/or imported soils that are placed and compacted as recommended herein until design finish grades are reached.

6.4 Fill Placement

Fill material should possess a very low expansion potential (expansion index of less than 21 as determined by ASTM D4829), be free of organic matter (less than 3 percent organics by weight) and other deleterious material. Much of the onsite materials appear to be suitable for re-use as fill, provided they do not contain rocks greater than 6-inches in maximum dimension, organic debris and other deleterious materials. Rock fragments exceeding 6-inches in one dimension should be segregated and exported from the subject property, or utilized for landscaping.

If import soils are needed, the earthwork contractor should ensure that all proposed fill materials are approved by the geotechnical engineer prior to use. Representative soil samples should be made available for testing at least ten working days prior to hauling to the subject property to allow for laboratory tests.

Fill materials should be placed in 6- to 8-inch loose lifts, moisture conditioned as necessary to at least optimum moisture and compacted to a minimum of 90 percent maximum dry density according to ASTM D1557. The upper 12-inches of pavement subgrade should be moisture conditioned to at least optimum moisture and compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557. Suitable heavy grading equipment should be utilized to properly mix, spread, moisture condition or dry, and compact each fill lift.

Earthwork may be affected by the existing soil moisture content exceeding optimum. Moist to very moist earth materials may be difficult to mix and compact in their native condition, and drying or mixing with drier soils may be warranted to achieve the recommended relative compaction.

Those areas to receive fill (including over-excavated areas) or surface improvements should be scarified at least 12-inches, moisture conditioned to at least optimum moisture content and recompacted to at least 90 percent of the maximum dry density (based on ASTM D1557).

6.5 Yielding Subgrade Conditions

The soils encountered at the subject property can often exhibit "pumping" or yielding once they become saturated. This can often occur in response to periods of significant precipitation, such as during the winter rainy season. If this occurs and in order to help stabilize the yielding subgrade soils within the bottom of the removal areas, the contractor can consider as an option, the placement of uniform sized, ¾- to 2-inch crushed rock within areas exhibiting the "pumping" conditions. The crushed rock should be properly tracked into the underlying soils such that it is adequately intruded into and interlocks with the soils. We expect that a 6- to 12-inch thick section of the crushed rock will be required.

Following the placement and tracking of the gravel layer into the underlying "pumping" soils, it is recommended that Mirafi 600X stabilization fabric (or approved equivalent) then be placed upon the gravel layer. Fill soils, which should be placed and compacted in accordance with the recommendations presented herein, should then be placed upon the fabric until design finish grades are reached. The gravel and stabilization fabric should extend at least 5 feet laterally beyond the limits of the "pumping" areas. These operations should be performed under the observation and testing of a representative of EEI in order to evaluate the effectiveness of these measures and to provide additional recommendations for mitigative measures, as warranted.

6.6 Shrinkage and Bulking

Several factors will affect earthwork balancing on the subject property, including shrinkage, bulking, subsidence, trench spoils from utilities and footing excavations, and final pavement section thickness as well as the accuracy of topography.

Shrinkage, bulking and subsidence are primarily dependent upon the degree of compactive effort achieved during construction. For planning purposes, the shrinkage factor is estimated to be about 10 to 15 percent for the onsite natural soils to be utilized as fill. This shrinkage factor may vary with methods employed by the contractor. Subsidence is estimated to be about 0.1 feet. For preliminary planning purposes, bulking of the granitic bedrock derived materials is estimated to be 0 to 10 percent. Losses from site clearing and removal of existing site improvements as well as generation of oversize material may affect earthwork quantity calculation and should be considered.

The previous estimates are intended as an aid for the project engineers in estimating earthwork quantities. It is recommended that the site development be planned to include an area that could be raised or lowered to accommodate final site balancing.

Several factors will affect earthwork balancing on the subject property, including shrinkage, bulking, subsidence, trench spoils from utilities and footing excavations, and final pavement section thickness as well as the accuracy of topography

7.0 PRELIMNARY FOUNDATION RECOMMENDATIONS

7.1 General

The conclusions and recommendations presented herein are based on the assumption that the planned development will consist of two- to four-story wood frame residential structures with slab-on-grade. It is our understanding that these conceptual plans are also part of the due diligence phase of the project and may or may not be the final design. As such, the conclusions and recommendations contained in this Supplemental Geotechnical Evaluation report should be considered preliminary, and should be reviewed, revised and/or approved in writing by EEI at the time the project design is finalized.

Be advised that as part of the foundation design election process, there is always a cost/benefit evaluation. Although we are providing alternatives for foundation design, we have not accomplished the cost/benefit evaluation.

7.2 Preliminary Foundation Design

Lightly loaded wood-frame, two- to four-story residential buildings with a slab-on-grade, can be supported on conventional continuous or isolated spread footings bearing upon at least 24-inches of properly compacted fill materials.

In preparation for foundation construction, the earthwork contractor should ensure that the site has been prepared as recommended, and that field density tests have been performed to adequately document the relative compaction of the structural fill.

Conventional foundations can be designed to impose dead plus long term live load bearing pressures of 2,000 pounds per square foot (psf). The allowable foundation bearing pressure is for footings having a minimum width of 15-inches and a minimum depth of 18-inches embedment below the lowest adjacent finish grade for one or two story buildings and 18-inches wide and a minimum 24-inches embedment below lowest adjacent finish grade for three or four-story buildings. The allowable soil bearing pressure can be increased by one-third when considering transient loads of short duration, such as wind or earthquake loads. Based on the prevailing geotechnical conditions encountered during our subsurface exploration, we recommend that foundations be reinforced with at least two No. 4 bars placed at the top of the footing and two placed at the bottom.

Horizontal loads acting on foundations and stem walls cast in open excavations against undisturbed native soil or against properly placed and compacted fill will be resisted by friction acting along the base of the footing and by passive earth pressures against the side of the footing and stem wall. The frictional resistance acting along the base of footings founded on suitable foundation soils may be computed using a coefficient of friction equal to 0.30 with the normal dead load.

Passive earth pressures acting against the side of footings and stem walls may be assumed to be equivalent to a fluid weighing 250 pounds per cubic foot. Passive pressure in the upper 1.0-foot should be neglected unless confined by concrete slabs-on-grade or asphalt concrete pavement. The values given above may be increased by one-third for transient wind or seismic loads.

7.3 Footing Setbacks

All footings should maintain a minimum 7-foot horizontal setback from the base of the footing to any descending slope (if existing onsite). This distance is measured from the outside footing face at the bearing elevation. Footings should maintain a minimum horizontal setback of H/3 (H=slope height) from the base of the footing to the descending slope face and no less than 7 feet, or greater than 40 feet.

Footings adjacent to unlined drainage swales or underground utilities (if any) should be deepened to a minimum of 6-inches below the invert of the adjacent unlined swale or utilities. This distance is measured from the footing face at the bearing elevation. Footings for structures adjacent to retaining walls should be deepened so as to extend below a 1:1 projection from the heel of the wall. Alternatively, walls may be designed to accommodate structural loads from buildings or appurtenances.

7.4 Construction

The foundation construction considerations contained herein are presented as minimum preliminary recommendations from a soils engineering standpoint. Laboratory test results indicate the onsite soils' swell (expansion) potential is very low. During grading of the site, we recommend that no soil possessing an Expansion Index of more than 20 be placed within 18-inches of finish grade, if possible. As such, design parameters provided herein assume that finish grade soil materials will have a low expansion potential.

Recommendations by the project's design-structural engineer or architect, which may exceed the soils engineer's recommendations, should take precedence over the following minimum preliminary considerations. Final foundation design should be provided based on the expansion potential of the near surface soils encountered during grading.

7.5 Concrete Slab-on-Grade

Interior slabs can be grade supported by structural fill whose placement/compaction is documented by the project soils engineer/engineer geologist as recommended herein. The thickness of the slab should be in accordance with the structural engineer's design. However, based on geotechnical considerations, we recommend that concrete slabs be a minimum of 4-inches in thickness. Concrete slabs should be underlain by at least 2-inches of clean sand with a Sand Equivalent (SE) of at least 30. Where moisture condensation is undesirable, concrete slabs should be underlain with a moisture/vapor retarder consisting of a minimum 10-mil, visqueen membrane, with all laps sealed. The membrane should be underlain by a 2-inch layer of clean sand with the aforementioned sand layer placed over the visqueen to aid concrete curing. To reduce the potential for buildup of hydrostatic pressures, the free draining material under the slabs should have positive drainage with no low lying areas (i.e., depressions) created.

Floor slabs should be suitably reinforced and jointed (in accordance with Structural Engineer's recommendations) so that a small amount of independent movement can occur without causing damage. Based on the encountered geotechnical conditions, we recommend that floor slabs be reinforced with No. 4 bars spaced on 18-inch centers (each way)

The contractor should take the appropriate precautions to make sure that the reinforcement is placed and maintained within the middle one-third of the slab. Exterior slabs, such as walkways and driveways, can be adequately supported on documented structural fill that is at minimum 12-inches in thickness, and placed and compacted in accordance with the recommendations contained herein.

In preparation for slab or flatwork construction, the earthwork contractor should ensure that the onsite soils have been prepared as recommended and that field density tests have been performed to adequately document the relative compaction of the structural fill. Preparation of the native soils should be documented prior to placement of aggregate, structural components and/or fill.

Some minor cracking of slabs can be expected due to shrinkage. The potential for this slab cracking can be reduced by careful control of water/cement ratios in the concrete. The contractor should take appropriate curing precautions during the pouring of concrete in hot or windy weather to reduce the potential for cracking of slabs. We recommend that a slipsheet (or equivalent) be utilized if grouted fill, tile, or other crack-sensitive floor covering is planned directly on concrete slabs. All slabs should be designed in accordance with structural considerations.

All dedicated exterior flatwork should conform to standards provided by the governing agency including section composition, supporting material thickness and any requirements for reinforcing steel. Concrete mix proportions and construction techniques, including the addition of water and improper curing, can adversely affect the finished quality of the concrete and result in cracking and spalling of the slab. We recommend that all placement and curing be performed in accordance with procedures outlined by the American Concrete Institute and/or Portland Cement Association. Special consideration should be given to concrete placed and cured during hot or cold weather conditions. Proper control joints should be provided to reduce the potential for damage resulting from shrinkage.

Laboratory test results indicate that the upper soils contain soluble sulfate concentrations of 0.003 percent and chloride concentrations of 0.001 percent. The results of these analyses indicate a negligible corrosion potential to concrete. As such, Type II cement can be used in concrete elements that will be in contact with the upper soils.

8.0 PAVEMENT DESIGN RECOMMENDATIONS

Deleterious material, excessively wet or dry pockets, concentrated zones of oversized rock fragments, and any other unsuitable yielding materials encountered during grading should be removed. Once compacted fill and/or native soils are brought to the proposed pavement subgrade elevations, the subgrade should be proof-rolled in order to check for a uniform firm and unyielding surface. Representatives of the project geotechnical engineer should observe all grading and fill placement.

The upper 12-inches of pavement subgrade soils should be scarified; moisture conditioned to at least optimum moisture content and compacted to at least 95 percent of the laboratory standard (ASTM D1557). If loose or yielding materials are encountered during subgrade preparation, evaluation should be performed by EEI. Aggregate base materials should be properly prepared (i.e., processed and moisture conditioned) and compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557. Aggregate base materials should conform to Caltrans specifications for Class 2 aggregate base.

All pavement section changes should be properly transitioned. Although not anticipated, if adverse conditions are encountered during the preparation of subgrade materials, special construction methods may need to be employed. A representative of the project geotechnical engineer should be present for the preparation of subgrade and aggregate base.

For design purposes, we have assumed a Traffic Index (TI) of 4.5 for the proposed parking areas and 6.0 for drive areas at the subject property. These assumed TI's should be verified as necessary by the Civil Engineer or Traffic Engineer. For preliminary design purposes, we have conservatively assumed a preliminary R-Value of 20 for the materials likely to be exposed at subgrade. The modulus of subgrade reaction (K-Value) was estimated at 70 pounds per square inch per inch (psi/in) for an R-Value of 20 (Caltrans, 1974).

TABLE 3
Preliminary Pavement Design Recommendations

Traffic Index (TI)	Pavement Surface	Aggregate Base Material (1)
4.5 – Parking Stalls	3.0-inches Asphalt Concrete	6.0-inches
6.0 – Main Drive Areas	4.0-inches Asphalt Concrete	8.0-inches
Trash Area and Concrete Pavement	5.5-inches Portland Cement Concrete (2)	Optional

(1) R-Value of 78 for Caltrans Class 2 aggregate base
(2) Reinforcement and control joints placed in accordance with the structural engineer's requirements

The recommended pavement sections provided above are intended as a preliminary minimum guideline. If thinner or highly variable pavement sections are constructed, increased maintenance and repair could be expected. If the ADT (average daily traffic) or ADTT (average daily truck traffic) increases beyond that intended, as reflected by the assumed traffic index used for design, increased maintenance and repair could be required for the pavement section. Final pavement design should be verified by testing of soils exposed at subgrade after grading has been completed. Thicker pavement sections could result if R-Value testing indicates lower values.

9.0 DEVELOPMENT RECOMMENDATIONS

9.1 Landscape Maintenance and Planting

Water is known to decrease the physical strength of earth materials, significantly reducing stability by high moisture conditions. Surface drainage away from foundations and graded slopes should be maintained. Only the volume and frequency of irrigation necessary to sustain plant life should be applied.

Consideration should be given to selecting lightweight, deep rooted types of landscape vegetation which require low irrigation that are capable of surviving the local climate. From a soils engineering viewpoint, "leaching" of the onsite soils is not recommended for establishing landscaping. If landscape soils are processed for the addition of amendments, the processed soils should be re-compacted to at least 90 percent relative compaction (based on ASTM D1557).

9.2 Site Drainage

Positive site drainage should be maintained at all times. Drainage should not flow uncontrolled over slopes or the subject property. Runoff should be channeled away from slopes and structures and not allowed to pond and/or seep uncontrolled into the ground. Pad drainage should be directed toward an acceptable outlet. Although not required, roof gutters and down spouts may be considered to control roof drainage, discharging a minimum of 10 feet from the proposed structures, or into a subsurface drainage system. Consideration should be given to eliminating open bottom planters directly adjacent to proposed structures for a minimum distance of 10 feet. As an alternative, closed-bottom type planters could be utilized, with a properly designed drain outlet placed in the bottom of the planter.

9.3 Stormwater Disposal Systems

EEI understands that current plans call for runoff generated from the facility to be disposed of in engineered subsurface features onsite. Percolation testing was conducted at three widely separated locations for proposed onsite detention basins during our Due Diligence Level Geotechnical Evaluation performed in 2014 and the percolation testing results are presented in the referenced report by EEI dated November 25, 2014.

9.4 Additional Site Improvements

Recommendations for additional grading, exterior concrete flatwork design and construction can be provided upon request. If in the future, additional property improvements are planned for the subject property, recommendations concerning the design and construction of improvements would be provided upon request.

9.5 Trenching

All temporary excavations for grading purposes and installation of underground utilities should be constructed in accordance with OSHA guidelines and local safety codes. Temporary excavations over 5 feet in height should be evaluated by the project engineer, and could require shoring, sloping, or a combination thereof. Temporary excavations within the onsite materials should be stable at 1:1 inclinations for cuts less than 10 feet in height.

Footing trench excavations for structures and walls should be observed and approved by a representative of the project soils engineer prior to placing reinforcement. Footing trench spoil and excess soils generated from utility trench excavations should be compacted to a minimum relative compaction of 90 percent (based on ASTM D1557) if not removed from the subject property. All excavations should conform to OSHA and local safety codes.

9.6 Utility Backfill

Fill around the pipe should be placed in accordance with details shown on the drawings, and should be placed in layers not to exceed 8-inches loose (unless otherwise approved by the geotechnical engineer) and compacted to at least 90 percent of the maximum dry density as determined in accordance with ASTM D1557 (Modified Proctor). The geotechnical engineer should approve all backfill material. Select material should be used when called for on the drawings, or when recommended by the geotechnical engineer. Care should be taken during backfill and compaction operations to maintain alignment and prevent damage to the joints. The backfill should be kept free from oversized material, chunks of highly plastic clay, or other objectionable material. Backfill soils should be non-expansive, non-corrosive, and compatible with native earth materials. Backfill materials and testing should be in accordance with the CBC (2013), and the requirements of the local governing jurisdiction.

Pipe backfill areas should be graded and maintained in such a condition that erosion or saturation will not damage the pipe bed or backfill. Flooding trench backfill is not recommended. Heavy equipment should not be operated over any pipe until it has been properly backfilled with a minimum of 2 to 3 feet of cover. The utility trench should be systematically backfilled to allow maximum time for natural settlement. Backfill should not occur over porous, wet, or spongy subgrade surfaces. Should these conditions exist, the areas should be removed, replaced and recompacted.

10.0 BORE & JACK RECOMMENDATIONS

Based on the results of our subsurface exploration, it is our opinion that the proposed trenchless (bore-and-jack) operations are feasible and that sufficient ground cover exists to provide stable conditions adjacent to the 60 Freeway for the proposed Tract No. 31556 offsite sewer freeway undercrossing, provided such operations are adequately performed by a qualified contractor(s) who is experienced in bore-and-jack pipe installation methods in the local area. Geotechnical data, obtained from our subsurface exploration, indicates that potential settlement and heave problems are not likely at or adjacent to the proposed bore-and-jack locations, assuming adequate procedures are performed.

It is the contractor's responsibility to design and select the appropriate tunnel construction method, support system and to follow the requirements of the health and safety rules of the State of California pertaining to bore-and-jack/tunnel construction and permit requirements of local agencies such as the City of Moreno Valley or County of Riverside. The contractor should develop an appropriate mitigation plan for deficient soil conditions, as well as a contingency plan for potential emergency conditions, such as loss of ground, excessive settlement and other construction problems. Provisions for controlling running sand and groundwater at localized areas should be provided during the boring operation to reduce the potential for ground loss and ground subsidence. The following geotechnical recommendations are provided for bore-and-jack operations at the offsite sewer alignment location undercrossing, based on our subsurface exploration.

10.1 Utilities and Subsurface Obstructions

The EEI exploratory borings completed during the Supplemental Geotechnical Evaluation (borings B-16 and B-17) were both advanced to a depth of approximately 21.5 feet below the existing ground surface with boring B-16 located immediately north of the 60 Freeway at the proposed "boring" pit location and boring B-17 being located immediately south of the 60 Freeway at the proposed "receiving" pit location. Artificial fill soils were encountered from the surface to depths of 11 feet and 16 feet below existing grade, respectively. The artificial fill soils were generally composed of loose to medium dense, damp to moist, fine to coarse silty sand and sandy silt. The artificial fill soils were underlain by generally medium dense, moist, fine to medium silty sand.

It is possible that underground utilities and other subsurface obstructions will be encountered within the proposed bore-and-jack location undercrossing the 60 Freeway right-of-way, but not likely. However, we recommend that the contractor perform a comprehensive evaluation of the locations of buried utilities and other structures within the proposed bore-and-jack location. Such an evaluation can include, but is not necessarily limited to, advancing a series of potholes and using geophysical methods to help identify the locations of the utilities/structures. It should be understood that if utilities are present within the proposed pipeline alignment, the nature of the utilities' backfill materials might differ from the materials encountered during our subsurface exploration.

10.2 Tunnelman's Ground Classification

Attempts to classify soil characteristics for tunneling operations include the Rock Quality Designation (RQD) by Deere, Rock Mass Rating (RMR) by Bieniawski, Rock Tunneling Quality Index (Q) by Barton, and Tunnelman's Ground Classification by Terzaghi. The RQD, RMR, and Q designations characterize rock masses while the Tunnelman's Ground Classification was derived to describe soil conditions for tunneling through soft sediments. The Tunnelman's Ground Classification **(Table 4)** categorizes predictive soil behaviors for saturated and unsaturated conditions.

Based on the geotechnical conditions observed during our subsurface exploration, we consider the encountered portions of the artificial fill and alluvial soils are comprised of loose to medium dense running soils.

10.3 Jacking and Receiving Pits

Bore-and-jack operations involve the initial construction of a jacking/tunneling pit and a receiving pit at each end of the pipe segment to be jacked. The jacking and receiving pits should be shored as required. The shoring system should be designed as recommended below. The jacking equipment should not impose a reaction of more than 4,000 psf on the soils within the jacking pit. Pipes for use with microtunnelling systems must be designed to withstand the high axial jacking forces, and this is likely to be a far more significant design parameter than any post installation loading. Jacking operations and tunneling operations should be performed in accordance with the Standard Specifications for Public Works Construction, Sections 306-2 and 306-3 of the latest edition. Grouting through the pipe casing after jacking is recommended to fill any possible voids created by the jacking operation.

TABLE 4
TUNNELMAN'S GROUND CLASSIFICATION FOR SOIL

GROUND CLASSIFICATIONS	GROUND BEHAVIOR	TYPICAL SOIL TYPES
Hard	Tunnel heading may be advanced without roof support.	Cemented sand and gravel and over consolidated clay above the groundwater table.
Firm	Ground in which a roof section of a tunnel can be left unsupported for several days without inducing a perceptible movement of the ground.	Loess above the water table, hard clay, marl, cemented sand and gravel when not highly overstressed.
Raveling	Chunks or flakes of soil begin to drop out of roof at some point during the ground-movement period.	Residual soils or soils with clay binder may be fast raveling below the groundwater table and slow raveling above the groundwater table. Stiff fissured clays may be slow raveling or fast raveling depending on the degree of overstress.

TABLE 4
TUNNELMAN'S GROUND CLASSIFICATION FOR SOIL

GROUND CLASSIFICATIONS	GROUND BEHAVIOR	TYPICAL SOIL TYPES
Slow Raveling	The time required to excavate 5-feet of tunnel and install a rib set and lagging in a small tunnel is about 6-hours. Therefore, if the stand-up time of raveling ground is more than 6-hours, using ribs and lagging, such a soil would be classed as slow raveling.	
Fast Raveling	If the stand-up time is less than 6-hours, using ribs and lagging, such a soil would be classed as fast raveling.	
Squeezing	Ground slowly advances into tunnel without any signs of fracturing. The loss of ground caused by squeeze and the resulting settlement of the ground surface can be substantial	Ground with low frictional strength. Rate of squeeze depends on degree of overstress. Stiff to hard clay under high cover may move in combination of raveling at execution surface and squeezing at depths.
Swelling	Ground slowly advances into the tunnel partly or chiefly because of an increase in the volume of the ground. The volume increase is in response to an increase of water content. In every other respect, swelling ground in a tunnel behaves like a stiff non-squeezing, or slowly squeezing, non-swelling clay.	Highly preconsolidated clay with plasticity index greater than about 30, generally containing significant percentages of montmorillonite clay
Running	The removal of lateral support on any surface rising at an angle more than 34° (to the horizontal) is immediately followed by a running movement of the soil particles.	Clean, dry granular materials.
Cohesive Running	If the running ground has a trace of cohesion, then the run is preceded by a brief period of progressive raveling.	Apparent cohesion in moist sand or weak cementation in any granular soil may allow the material to stand for a brief period of raveling before it breaks down and runs. Such behavior is cohesive running.
Very Soft Squeezing	Ground advances rapidly into tunnel in a plastic flow.	
Flowing	Ground supporting a tunnel cannot be classified as flowing ground unless water flows or seeps through it toward the tunnel. For this reason, a flowing condition is encountered only in free air tunnels below the water table or under compressed air when the pressure is not high enough in the tunnel to dry the bottom.	Only occurs in inorganic silt, fine silty sand, clean sand or gravel, or sand-and-gravel with some clay binder. Organic silt may behave either as a flowing or as a very soft, squeezing ground.

10.4 Shoring

The vertical face of the jacking pit and receiving pit may be shored with sheet piles and/or soldier piles and lagging. The face of the shaft also can be supported by ribs and lagging. The details of sheet piling, soldier beam and lagging system may be designed according to the recommendations provided in the following sections of this report. Frequent contact grouting may be necessary to backpack the support during construction to reduce the potential for settlement. While groundwater was not encountered during our subsurface exploration, the shoring contractor should also consider the possibility of localized perched groundwater in the design and installation procedures of the shoring system.

10.5 Lateral Earth Pressures

The shoring system should be designed to resist the pressure exerted by the retained soils and any additional lateral forces due to loads applied near the top of the excavations. A cantilevered shoring system should be designed for an equivalent fluid weight of 35 pcf. Braced shoring walls supporting a level ground surface should be designed for a uniform lateral pressure of 20H psf, where H is the height of the retained earth in feet.

For surcharge loads due to traffic, the shoring should be designed for an additional uniform horizontal pressure of 75 psf for passenger car traffic and 150 psf for heavy truck traffic. For other surcharge loads, the wall should be designed for a uniform horizontal pressure equal to one-third the anticipated surcharge pressure. These parameters all assume a level ground surface and that temporary shoring will not be subject to hydrostatic pressures. The shoring system should be properly embedded beneath the toe of the excavation to provide adequate structural stability.

10.6 Passive Resistance

It is recommended that the design of the shoring system incorporates a passive equivalent fluid weight of 350 pcf for the shoring embedded within relatively competent older alluvium. If utilized, soldier piles should be spaced no closer than 3 diameters on center. The soldier piles should be drilled and backfilled with concrete to the full depth of the passive resistance zone. The area providing the passive resistance can be assumed to have a width equal to twice the concrete pile diameter. The recommended passive pressure for the shoring assumes a horizontal surface for the soil mass extending at least 10 feet in front of the face of the shoring, or three times the height of the surface generating passive pressure, whichever is greater. The shoring system should be embedded a sufficient depth beneath the toe of the excavation to provide structural stability. We recommend that a factor of safety of at least 1.2 be applied to the calculated embedment depth and that the passive pressure be limited to 2,500 psf. The assumed geotechnical conditions should be verified as necessary during shoring construction by a representative of this firm.

10.7 Lagging

If soldier piles are used as shoring, timber lagging may be used between the soldier piles to help support the exposed soils. If lagging is to remain after construction, treated lumber should be used. Lagging should be designed for the full lateral pressure recommended on the previous page. Voids between the soil and lagging should be grouted or slurried to reduce the potential for the voids to propagate to the surface.

10.8 Utility Backfill

Fill around the pipe should be placed in accordance with details shown on the drawings, and should be placed in layers not to exceed 8 inches loose (unless otherwise approved by the geotechnical engineer) and compacted to at least 90 percent of the maximum dry density as determined in accordance with ASTM D 1557 (Modified Proctor). The geotechnical engineer should approve all backfill material. Select material should be used when called for on the drawings, or when required by the geotechnical engineer. Care should be taken during backfill and compaction operations to maintain alignment and prevent damage to the joints. The backfill should be kept free from stones, chunks of highly plastic clay, or other objectionable material. Backfill soils should be non-expansive, non-corrosive, and compatible with native earth materials. Backfill materials and testing should be in accordance with the 2013 CBC, and/or the City of Moreno Valley specifications.

All pipe backfill areas should be graded and maintained in such a condition that erosion or saturation will not damage the pipe bed or backfill. Flooding trench backfill is not recommended. Heavy equipment should not be operated over any pipe until it has been properly backfilled with a minimum two to three feet of cover. The utility trench should be systematically backfilled to allow maximum time for natural settlement. Backfill should not occur over porous, wet, or spongy subgrade surfaces. Should these conditions exist, the areas should be removed, replaced, and recompacted.

10.9 Pre-Construction Survey and Monitoring

Consideration should be given to performing a pre-condition survey of improvements in the area prior to construction, to document any current existing distress. Settlement points should be considered to monitor any settlement of adjacent facilities during construction.

10.10 Other Design Considerations

Excavation, shoring and dewatering systems should be properly designed and installed to minimize the effects of aerial settlement, during construction. The preparation of plans for the excavations, shoring, sheeting, and dewatering systems is normally the responsibility of the contractor. Consideration should be given to characterize the material as the bore-and-jack operations proceed; and based on the behavior of the soil; the support system and method of trenchless construction may be altered accordingly.

10.11 Plan Review

It is recommended that EEI be provided the opportunity to review the final project plans prior to construction. The purpose of this review is to assess the general compliance of the plans with the recommendations provided in this report and the incorporation of these recommendations into the project plans and specifications.

10.12 Observation and Testing During Construction

It is recommended that EEI be retained to observe the bore-and-jack operations as they progress; provide observation and testing services during placement and backfill of underground utilities, observe drilling of soldier piles (if warranted), and to observe final site drainage. This is to observe compliance with the design concepts, specifications and recommendations, and to allow for possible changes in the event that subsurface conditions differ from those anticipated prior to the start of construction

11.0 PLAN REVIEW

Once detailed site and grading plans are available, they should be submitted to this office for review and comment, to reduce the potential for discrepancies between plans and the preliminary recommendations presented herein. If conditions are found to differ substantially from those stated, appropriate recommendations would be provided. Additional field studies may be warranted.

12.0 LIMITATIONS

This Supplemental Geotechnical Evaluation has been conducted in accordance with generally accepted geotechnical engineering principles and practices. Findings provided herein have been derived in accordance with current standards of practice, and no warranty is expressed or implied. Standards of practice are subject to change with time. This Supplemental Geotechnical Evaluation report has been prepared for the sole use of Anderson Consulting Engineers, Inc. (Client), within a reasonable time from its authorization. Site conditions, land use (both onsite and offsite), or other factors may change as a result of man-made influences, and additional work may be required with the passage of time.

This Supplemental Geotechnical Evaluation should not be relied upon by other parties without the express written consent of EEI and the Client; therefore, any use or reliance upon this geotechnical evaluation by a party other than the Client should be solely at the risk of such third party and without legal recourse against EEI, its employees, officers, or directors, regardless of whether the action in which recovery of damages is brought or based upon contract, tort, statue, or otherwise.

The Client has the responsibility to see that all parties to the project, including the designer, contractor, subcontractor, and building official, etc. are aware of this report in its complete form. This report contains information that may be used in the preparation of contract specifications; however, the report is not designed as a specification document, and may not contain sufficient information for use without additional assessment. EEI assumes no responsibility or liability for work or testing performed by others. In addition, this report may be subject to review by the controlling authorities.

13.0 REFERENCES

American Society of Civil Engineers (ASCE), 2005, Minimum Design Loads for Buildings and Other Structures, ASCE Document ASCE/SEI 7-05.

American Society for Testing and Materials (ASTM), 2008, Annual Book of ASTM Standards, Volume 04.08, Construction: Soil and Rock (I), Standards D 420 - D 5876.

Anderson Consulting Engineers, Inc., 2014, Ironwood – Project Exhibit, scale: 1”=100’, dated September 16, 2014.

Blake, T., 2000, “EQFAULT, version 3.0”, a Computer Program for Probabilistic Estimation of Peak Acceleration from 3-D Fault Sources,” Thomas F. Blake Computer Services and Software, Newbury Park, California.

California Building Code (CBC), 2013, California Code of Regulations, Title 24, Part 2, Volume 2 of 2, California Building Standards Commission, Based on 2012 International Building Code; 2013 California Historical Building Code, Title 24, Part 8; effective January 1, 2014.

California Department of Transportation (Caltrans), 1974, Highway Design Manual, dated October 1.

California Division of Mines and Geology (CDMG), 1974, State of California Special Studies Zones, Sunnymead Quadrangle. Official Map, Effective July 1, 1974, scale 1:24,000.

California Geological Survey (CGS), 2002, California Geomorphic Provinces Note 36, Electronic Copy, Revised December 2002.

California Geological Survey (CGS), 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117, revised and re-adopted September 11, 2008.

Coduto, D. P., 2001, Foundation Design Principles and Practices, Second Edition.

DeLORME, 1999, 3-D TopoQuads, California South, Region 7.

EEI, 2014, Proposed Residential Development, NWC Ironwood Avenue and Oliver Street, Moreno Valley, Riverside County, California, Dated November 25, 2014, EEI Project No. GLO-71982.4.

Google Earth®, 2014, Version 6.0.

Hart, E.W., and Bryant, W.A. (Hart and Bryant), 1997, Fault-Rupture Hazard Zones in California: California Department of Conservation, Division of Mines and Geology, Special Publication 42.

Jennings, C.W., 1994, Fault Activity Map of California and Adjacent Areas: California Division of Mines and Geology (CDMG), Map Sheet No. 6, scale 1:750,000.

Myers & Associates Civil Engineering, Inc., 2014, City of Moreno Valley, Offsite Sewer Plans for Tract No. 31556, Dated September 17, 2014, Scale: 1”= 40’, 8 Sheets.

Morton, D.M., 2004, Preliminary Digital Geologic Map of the Santa Ana 30' x 60' Quadrangle, Southern California, Version 2.0: U.S. Geological Survey Open-File Report 99-0172.

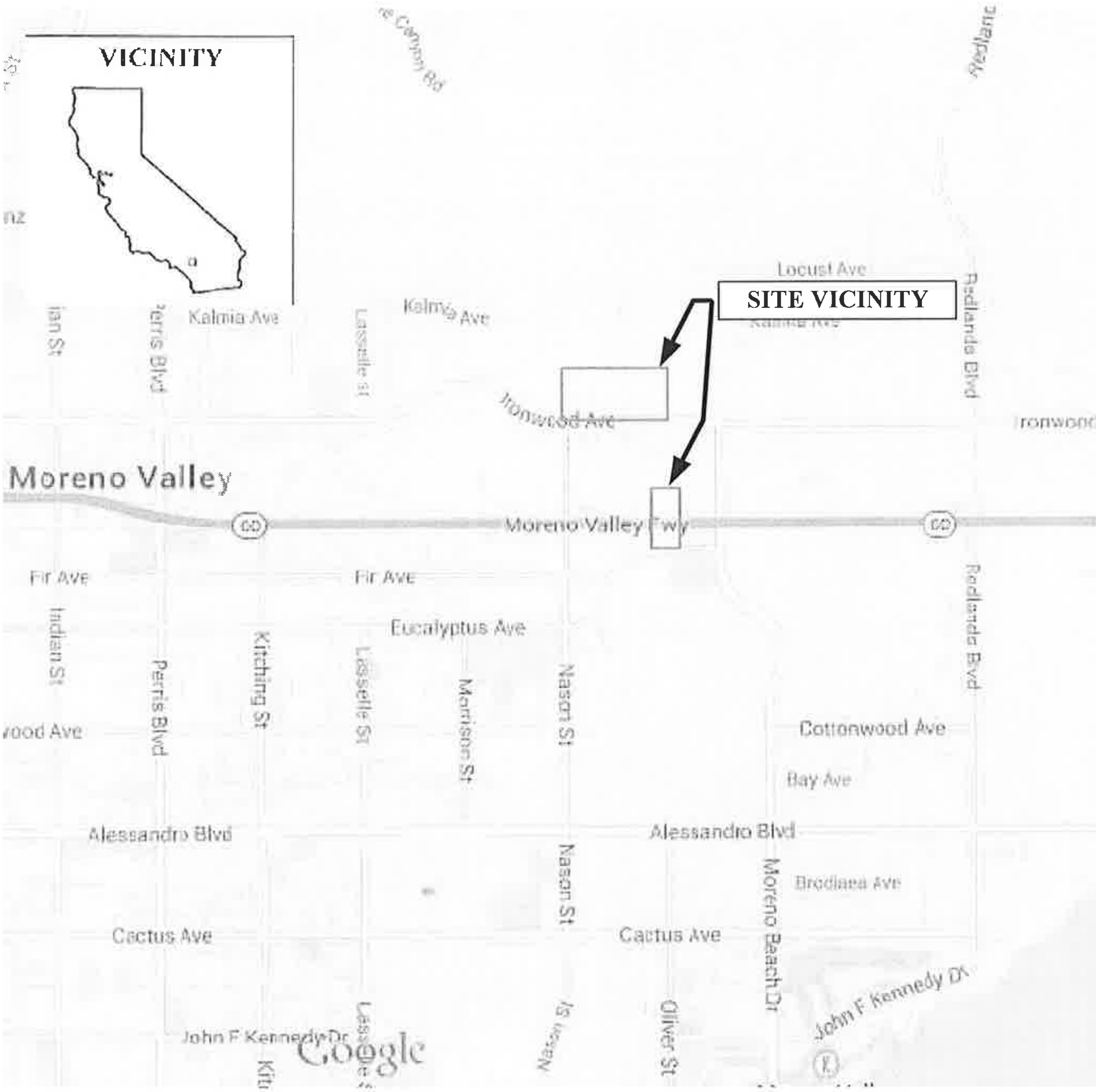
Sowers and Sowers, 1970, Unified Soil Classification System (After U. S. Waterways Experiment Station and ASTM 02487-667) in Introductory Soil Mechanics, New York.

Tokimatsu, K. and Seed, H.B., 1987, "Evaluation of Settlements in Sands Due to Earthquake Shaking," American Society of Civil Engineers Journal of Geotechnical Engineering, Vol. 113, No. 8, pp. 861-878.

United States Geological Survey (USGS), 2002, Earthquake Hazards Program, Interpolated Probalistic Ground Motion for the Conterminous 48 States, http://earthquake.usgs.gov/research/hazmaps/design/.

United States Geological Survey (USGS), 2012, 7.5 Minute Topographic Map, Sunnymead Quadrangle, California, Scale 1:24,000.

FIGURES



Map Source: Google Maps®; Accessed 2015

LEGEND

N

Scale: 1" = 1mi

0 1mi 2mi

Note: All Locations Are Approximate

SITE VICINITY MAP

BELLACAP, LLC

North of Ironwood Ave Between Oliver St & Nason St

Moreno Valley, California 92555

EEI Project No. GLO-71982.4a

Created April 2015

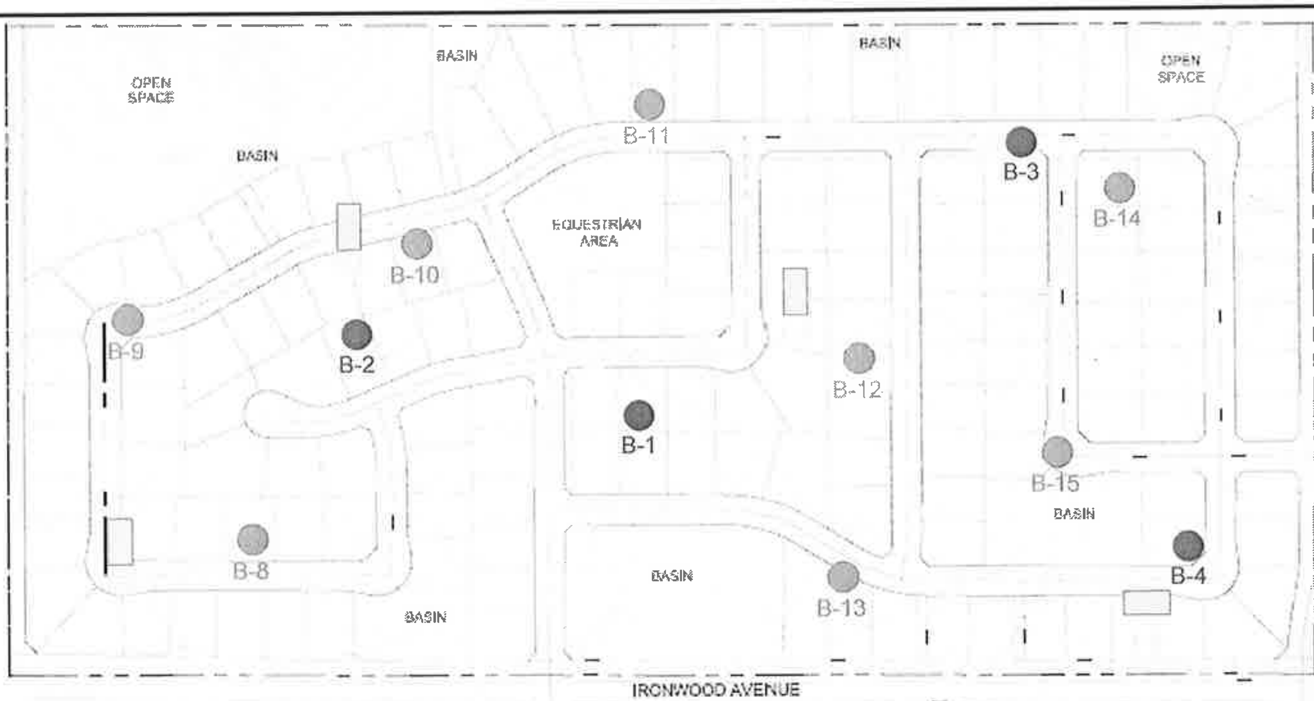
EEI

FIGURE 1

Source: Google Earth, 2015; Image Date: April 20, 2015

LEGEND	AERIAL SITE MAP & OFFSITE BORINGS BELLACAP, LLC North of Ironwood Avenue Between Oliver St & Nason St Moreno Valley, California EEI Project No. GLO-71982.4a Created April 2015
N Scale: 1" = 900' 0 900 FT 1800 FT Note: All Locations Are Approximate	EEI — FIGURE 2

Attachment: Preliminary Geotechnical Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))



Source: Anderson Consulting Engineers, IronwoodProject Exhibit

LEGEND

B-15 **Approximate Boring Locations (4/16-17/15)**

B-4 **Previous Boring Locations (10/17/14)**

Previous Test Pit Locations (10/16/14)

Scale: 1" = 300'

0 FT 300 FT 600 FT

FIELD EXPLORATION PLAN
BELLACAP, LLC
Oliver Street North & South of Moreno Valley Fwy
Moreno Valley, California
EEI Project No. GLO-71982.4a
Created April 2015

EEI

FIGURE 3

LEGEND

B-17 **Approximate Boring Location**

N

Scale: 1" = 35'

0 35 FT 70 FT

SCALE 1"=35'

North

OFFSITE SEWER BORING LOCATIONS
BELLACAP, LLC
Oliver Street North & South of Moreno Valley Fwy
Moreno Valley, California
EEI Project No. GLO-71982.4a
Created April 2015

EEI

FIGURE 4

APPENDIX A
SOIL CLASSIFICATION CHART,
BORING LOGS

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS: GRAPH	SYMBOLS: LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
CLAYSTONE				CL	CLAYSTONE, Piocene Fernando Formation/late Miocene Puente Formation

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

EEI Geotechnical & Environmental Solutions	BOREHOLE LOG	Number: B-1
	Client: Global - Anderson Consulting Engineers	Sheet: 1 of 2
Date Started: 10/17/2014 / Date Finished: 10/17/2014	Location: Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca	
EEI Rep: BM / Project No.: GLO-71982.4	Drill Rig/Sampling Method: Track Mounted CMB-75 / 140 lb Auto Hammer	Borehole Diameter: 6-inch

Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth in Feet	USCS Symbol	Geologic Description (Soil Type, Color, Grain, Minor Soil Component, Moisture, Density, Other, Etc.)
					0	SM	**ALLUVIUM** **SILTY-SAND**, orange-brown mottled, fine to coarse grained, damp, loose
X	MC	3 4 5	105	3	3		
	MC	4 6 8	108	3	5		
	MC	3 3 4	138	3	8		
	MC	4 5 6	104	7	10		@ 10' Becomes fine to medium grained, moist, loose; micaceous
	SPT	3 3 3		9	15	SM	
	MC	8 11 16	122	8	20		@ 20' becomes medium dense
	SPT	6 8 8		7	25		
	MC	8 10 11	124	7	30–31	SM	**WEATHERED BEDROCK: TONALITE (Kt)** DECOMPOSED GRANITICS ("DG"), gray-white to black speckled, damp, dense; weathered, friable, phaneritic texture, moderate to heavily weathered

BOREHOLE LOG VES-71982.4.GPJ EEI.GDT 11/25/14

Attachment: Preliminary Geotechnical Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

BOREHOLE LOG

Number:	B-1
Client:	Global - Anderson Consulting Engineers
Sheet:	2 of 2
Location:	Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca
Date Started:	10/17/2014
Date Finished:	10/17/2014
EEI Rep:	BM
Project No.:	GLO-71982.4
Drill Rig/Sampling Method:	Truck Mounted CME-75 / 140 lb Auto Hammer
Borehole Diameter:	6-inch

Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Geologic Description (Soil Type, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
	SPT	50-4"		4	35	SM	@ 35' Becomes very dense
	MC	50-3"	103	7	40	SM	
	SPT	50-5"		7	45	SM	@ 45' DECOMPOSED GRANITICS ("DG"), dark gray, orange and white speckled, damp, medium dense to dense; moderately weathered
	NR	50-3"			50	SM	@ 50' No sample recovery

Total depth: 50.5-feet
No groundwater encountered

Hole backfilled on 10/17/2014 with drilled cuttings

BOREHOLE LOG VES-71982.4.GPJ EEI.GDT 11/25/14

EEI Geotechnical & Environmental Solutions

BOREHOLE LOG

Number: B-2	Client: Global - Anderson Consulting Engineers	Sheet: 1 of 1	
Date Started: 10/17/2014	Date Finished: 10/17/2014	Location: Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca	
EEI Rep: BM	Project No.: GLO-71982.4	Drill Rig/Sampling Method: Truck Mounted CME-75 / 140 lb Auto Hammer	Borehole Diameter: 6-inch

SAMPLE LOG / BOREHOLE LOG

Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Geologic Description (Soil Type, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					0–11	SM	**COLLUVIUM** SILTY-SAND, orange-brown mottled, fine to coarse grained, damp, loose
	MC	4 6 8	111	2	3		
	MC	7 8 15	137	3	5.5		
	MC	5 6 9	115	4	8		
	MC	5 31 50-3"	126	5	10.5		
					11–15.75	SM	**WEATHERED BEDROCK: TONALITE (Kt)** DECOMPOSED GRANITICS ("DG"), white, orange and black speckled, damp, dense to very dense; unweathered to moderately weathered
	SPT	23 50-3"		4	15		

Total depth: 15.75-feet
No groundwater encountered

Hole backfilled on 10/17/2014 with drilled cuttings

BOREHOLE LOG YES-71982.4.GPJ EEI.GDT 11/25/14

Attachment: Preliminary Geotechnical Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

BOREHOLE LOG

EEI Geotechnical & Environmental Solutions		**Client:** Global - Anderson Consulting Engineers	**Number:** B-3
			Sheet: 1 of 1
Date Started: 10/17/2014	**Date Finished:** 10/17/2014	**Location:** Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca	
EEI Rep: BM	**Project No.:** GLO-71982.4	**Drill Rig/Sampling Method:** Truck Mounted CME-75 / 140 lb Auto Hammer	**Borehole Diameter:** 6-inch

Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth in Feet	USCS Symbol	Geologic Description (Soil Type, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					0–10	SM	**COLLUVIUM** SILTY-SAND, red-brown, fine to coarse grained with occasional gravels, dry to damp, dense
	MC	50-3"	85	5	3		
	MC	20 22 26	119	2	5		@ 5' Becomes medium dense
	MC	23 31 34	123	4	8		@ 8' Becomes dense
					10–21.5	SM	**WEATHERED BEDROCK: TONALITE (Kt)** DECOMPOSED GRANITICS ("DG"), orange, brown and black speckled, damp, medium dense to dense; occasional unweathered to moderately weathered
	MC	9 13 18	113	2	10		
	SPT	8 9 10		4	15		
					19		@ 19' Becomes very dense
	MC	23 44 45-6"	128	8	20		

Total depth: 21.5-feet
No groundwater encountered

Hole backfilled on 10/17/2014 with drilled cuttings

BOREHOLE LOG VES-71982.4.GPJ EEI.GDT 11/25/14

Attachment: Preliminary Geotechnical Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

BOREHOLE LOG

EEI Geotechnical & Environmental Solutions		**Client:** Global - Anderson Consulting Engineers	**Number:** B-4
			Sheet: 1 of 1
Date Started: 10/17/2014	**Date Finished:** 10/17/2014	**Location:** Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca	
EEI Rep: BM	**Project No.:** GLO-71982.4	**Drill Rig/Sampling Method:** Truck Mounted CME-75 / 140 lb Auto Hammer	**Borehole Diameter:** 6-inch

Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Geologic Description (Soil Type, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					0–14	SM	**COLLUVIUM** SILTY-SAND, red-brown, fine to coarse grained with occasional gravels, moist, medium dense
	MC	13 13 16	111	4	3		
	MC	6 7 7	111	3	5.5		@ 5' Becomes loose
	MC	7 21 50-5"	115	5	8		@ 8' Becomes dense to very dense
	MC	39 50-4"	118	8	10.5		
					14–16.5	SM	**WEATHERED BEDROCK: TONALITE (Kt)** DECOMPOSED GRANITICS ("DG"), orange, brown and black speckled, moist, medium dense; weathered
	SPT	8 9 9		4	15.5		

Total depth: 16.5-feet
No groundwater encountered

Hole backfilled on 10/17/2014 with drilled cuttings

BOREHOLE LOG VES-71982.4.GPJ EEI.GDT 11/25/14

EEI Geotechnical & Environmental Solutions	BOREHOLE LOG		Number: B-5
	Client: Global - Anderson Consulting Engineers		Sheet: 1 of 1
Date Started: 10/17/2014	Date Finished: 10/17/2014	Location: Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca	
EEI Rep: BM	Project No.: GLO-71982.4	Drill Rig/Sampling Method: Truck Mounted CME-75 / 140 lb Auto Hammer	Borehole Diameter: 6-inch

SAMPLE LOG								BOREHOLE LOG
Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Graphic Log	Geologic Description (Soil Type, Color, Grain, Minor Soil Component, Moisture, Density, Other, Etc.)
X					0–15	SM		**ALLUVIUM** SILTY-SAND, Orange-brown mottled, fine to coarse grained, poorly sorted, damp, loose to medium dense
	MC	3 5 6	106	3	5			
	MC	5 9 16	123	5	10			
	SPT	10 10 15		6	15	SM		**WEATHERED BEDROCK: TONALITE (Kt)** DECOMPOSED GRANITICS ("DG"), orange, brown and black speckled, moist, medium dense; weathered
	MC	10 20 25	124	12	20			
	SPT	10 12 18		11	25			
					26.5–31			Total depth: 26.5-feet No groundwater encountered Hole backfilled on 10/17/2014 with drilled cuttings

BOREHOLE LOG VER-71982.4.GPJ EEI.GDT 11/25/14

BOREHOLE LOG

EEI Geotechnical & Environmental Solutions	Client: Global - Anderson Consulting Engineers	Number: B-6	Sheet: 1 of 1
Date Started: 10/17/2014	Date Finished: 10/17/2014	Location: Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca	
EEI Rep: BM	Project No.: GLO-71982.4	Drill Rig/Sampling Method: Truck Mounted CME-75 / 140 lb Auto Hammer	Borehole Diameter: 6-inch

Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Geologic Description (Soil Type, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					0–10	SM	**FILL** SILTY-SAND, light brown, fine to coarse grained, damp, loose
	MC	5 7 8	116	2	5	SM	
	MC	8 11 13	111	7	10	ML	**COLLUVIUM** SANDY-SILT, orange-brown, fine to medium grained, moderately sorted, moist, medium dense
	SPT	5 6 6		5	15	ML	
	MC	8 13 16	118	3	20	ML	
	SPT	8 10 12		6	25	ML	

Total depth: 26.5-feet
No groundwater encountered

Hole backfilled on 10/17/2014 with drilled cuttings

EEI Geotechnical & Environmental Solutions

BOREHOLE LOG

Number:	B-7
Client:	Global - Anderson Consulting Engineers
Sheet:	1 of 1
Location:	Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca
Date Started:	10/17/2014
Date Finished:	10/17/2014
EEI Rep:	BM
Project No.:	GLO-71982.4
Drill Rig/Sampling Method:	Truck Mounted CME-75 / 140 lb Auto Hammer
Borehole Diameter:	6-inch

SAMPLE LOG						BOREHOLE LOG		
Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Graphic Log	Geologic Description (Soil Type, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					1	SM		COLLUVIUM SILTY-SAND, brown to orange-brown, fine to coarse grained, moist, medium dense
	MC	11 / 21 / 26	115	3	5	SM		
	MC	8 / 14 / 21	112	3	10	SM		
	SPT	6 / 10 / 10		8	15	ML		@ 15' SANDY-SILT, brown, fine to coarse, moist, medium dense, micaceous
	MC	6 / 13 / 16	122	7	20	ML		
	SPT	8 / 10 / 12		5	25	ML		

Total depth: 26.5-feet
No groundwater encountered

Hole backfilled on 10/17/2014 with drilled cuttings

BOREHOLE LOG VES-71982.4.GPJ EEI.GDT 11/23/14

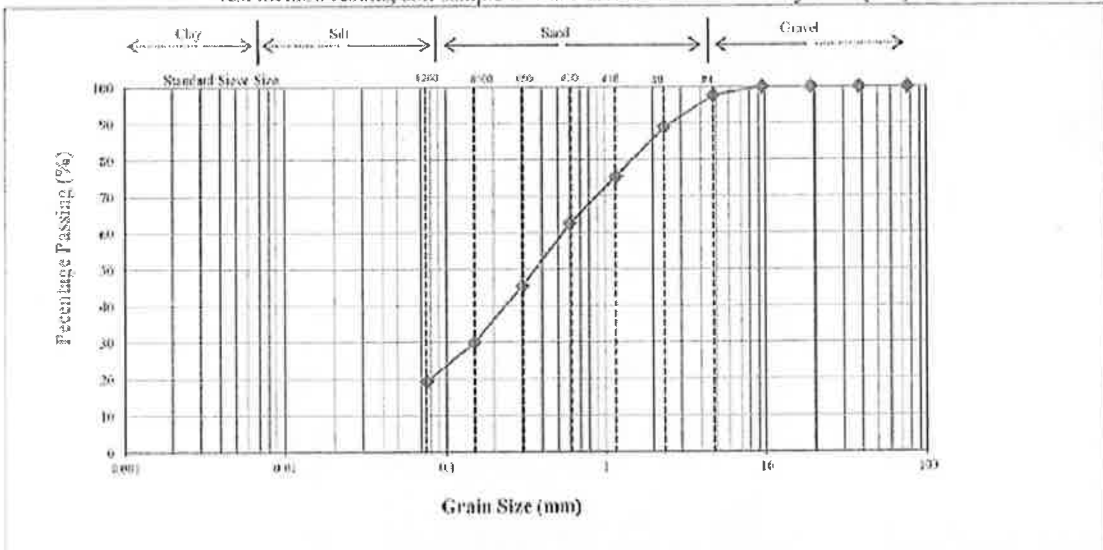
Attachment: Preliminary Geotechnical Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

APPENDIX B
LABORATORY TEST DATA

PARTICLE-SIZE ANALYSIS OF SOILS
ASTM METHOD D 422 (SIEVE ANALYSIS)

Sample :	B-1 @ 5 ft.	D10 (mm)	N/A
Total Weight (g)	129.2	D30 (mm)	0.15
Dry Weight (g)	125.8	D60 (mm)	0.53
Wet Sieve Weight (g)	101.5	Cu	N/A
Initial Moisture (%)	2.7	Cc	N/A

According to ASTM D 2487 Unified Soil Classification System (USCS) and ASTM D 422 (Standard Test Method for Particle-Size Analysis) test method results, soil sample B-1 at 5 feet is classified as Silty Sand (SM)



Sieve Size (in)	Sieve Size (mm)	Cumulative Weight of dry soil (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	3.0	2.4	97.6
#8	2.36	14.0	11.1	88.9
#16	1.18	31.0	24.6	75.4
#30	0.6	47.2	37.5	62.5
#50	0.3	68.7	54.6	45.4
#100	0.15	88.2	70.1	29.9
#200	0.075	101.5	80.7	19.3

Client: Anderson Consulting Engineers

Project Name: Ironwood

Job Number: GLO-71982.4

Date: 10/24/14

Boring Number: B-1

Depth: 5 ft.

Soil Description: Brown Mottled Silty Sand SM

Tested by: B D

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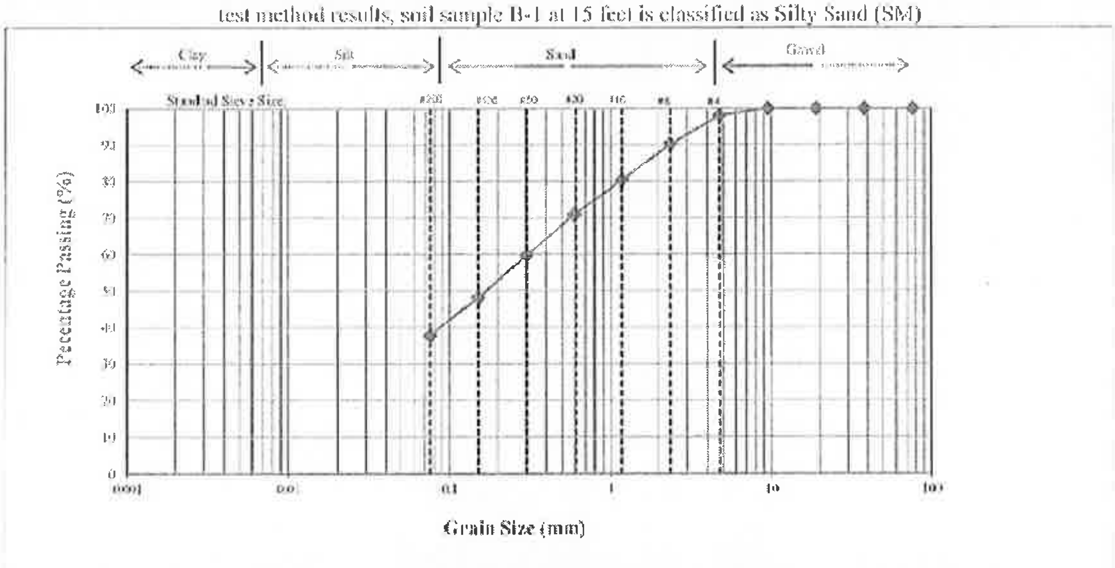
PARTICLE-SIZE ANALYSIS OF SOILS
ASTM METHOD D 422 (SIEVE ANALYSIS)

Sample :	B-1 @15 ft.	D10 (mm)	N/A
Total Weight (g)	117.5	D30 (mm)	N/A
Dry Weight (g)	108.1	D60 (mm)	0.30
Wet Sieve Weight (g)	67.3	Cu	N/A
Initial Moisture (%)	8.7	Cc	N/A

According to ASTM D 2487 Unified Soil Classification System (USCS) and ASTM D 422 (Standard Test Method for Particle-Size Analysis) test method results, soil sample B-1 at 15 feet is classified as Silty Sand (SM)



Sieve Size (in)	Sieve Size (mm)	Cumulative Weight of dry soil (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	2.1	1.9	98.1
#8	2.36	10.6	9.8	90.2
#16	1.18	21.4	19.8	80.2
#30	0.6	31.4	29.0	71.0
#50	0.3	43.6	40.3	59.7
#100	0.15	56.1	51.9	48.1
#200	0.075	67.3	62.3	37.7

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Client: Anderson Consulting Engineers

Project Name: Ironwood

Job Number: GLO-71982.4

Date: 10/24/14

Boring Number: B-1

Depth: 15 ft.

Soil Description: Brown Mottled Silty Sand SM

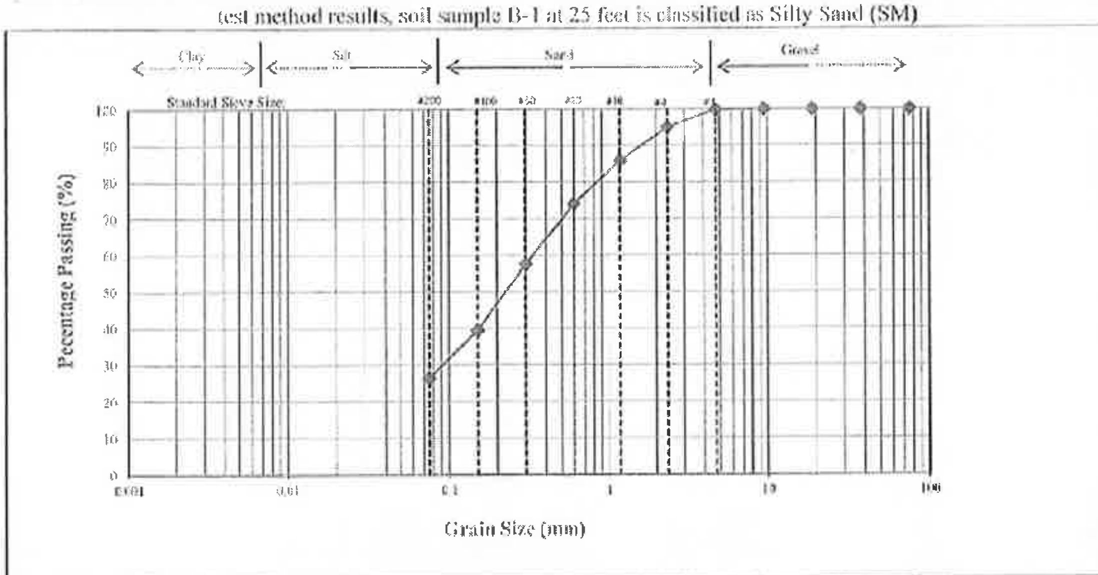
Tested by: B D

PARTICLE-SIZE ANALYSIS OF SOILS
ASTM METHOD D 422 (SIEVE ANALYSIS)

Sample :	B-1 @ 25 ft.
Total Weight (g)	123.6
Dry Weight (g)	115.8
Wet Sieve Weight (g)	85.3
Initial Moisture (%)	6.7

D_{10} (mm)	N/A
D_{30} (mm)	0.08
D_{60} (mm)	0.33
Cu	N/A
Cc	N/A

According to ASTM D 2487 Unified Soil Classification System (USCS) and ASTM D 422 (Standard Test Method for Particle-Size Analysis) test method results, soil sample B-1 at 25 feet is classified as Silty Sand (SM)



Sieve Size (in)	Sieve Size (mm)	Cumulative Weight of dry soil (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	0.2	0.2	99.8
#8	2.36	5.7	4.9	95.1
#16	1.18	16.4	14.2	85.8
#30	0.6	30.1	26.0	74.0
#50	0.3	49.2	42.5	57.5
#100	0.15	70.1	60.5	39.5
#200	0.075	85.3	73.7	26.3

Client: Anderson Consulting Engineers

Project Name: Ironwood

Job Number: GLO-71982.4

Date: 10/24/14

Boring Number: B-1

Depth: 25 ft.

Soil Description: Brown Mottled Silty Sand SM

Tested by: B D

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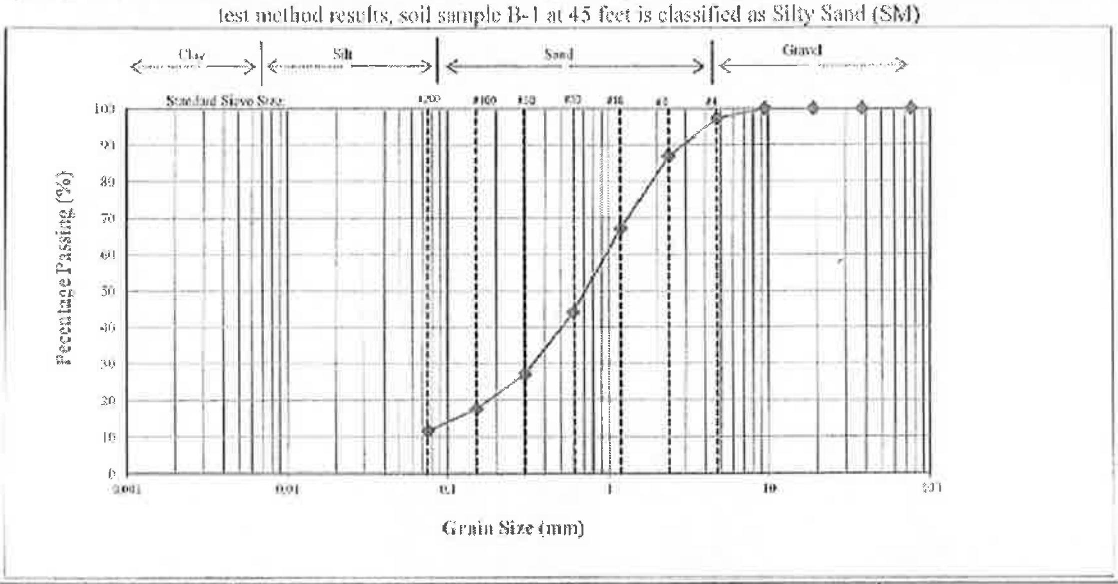
PARTICLE-SIZE ANALYSIS OF SOILS
ASTM METHOD D 422 (SIEVE ANALYSIS)

Sample :	B-1 @ 35 ft.	D_{10} (mm)	N/A
Total Weight (g)	126.5	D_{30} (mm)	0.30
Dry Weight (g)	122.1	D_{60} (mm)	0.90
Wet Sieve Weight (g)	108.0	Cu	N/A
Initial Moisture (%)	3.6	Cc	N/A

According to ASTM D 2487 Unified Soil Classification System (USCS) and ASTM D 422 (Standard Test Method for Particle-Size Analysis) test method results, soil sample B-1 at 45 feet is classified as Silty Sand (SM)



Sieve Size (in)	Sieve Size (mm)	Cumulative Weight of dry soil (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	3.3	2.7	97.3
#8	2.36	15.9	13.0	87.0
#16	1.18	40.3	33.0	67.0
#30	0.6	68.2	55.9	44.1
#50	0.3	89.0	72.9	27.1
#100	0.15	100.5	82.3	17.7
#200	0.075	108.0	88.5	11.5

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Client: Anderson Consulting Engineers

Project Name: Ironwood

Job Number: GLO-71982.4

Date: 10/24/14

Boring Number: B-1

Depth: 35 ft.

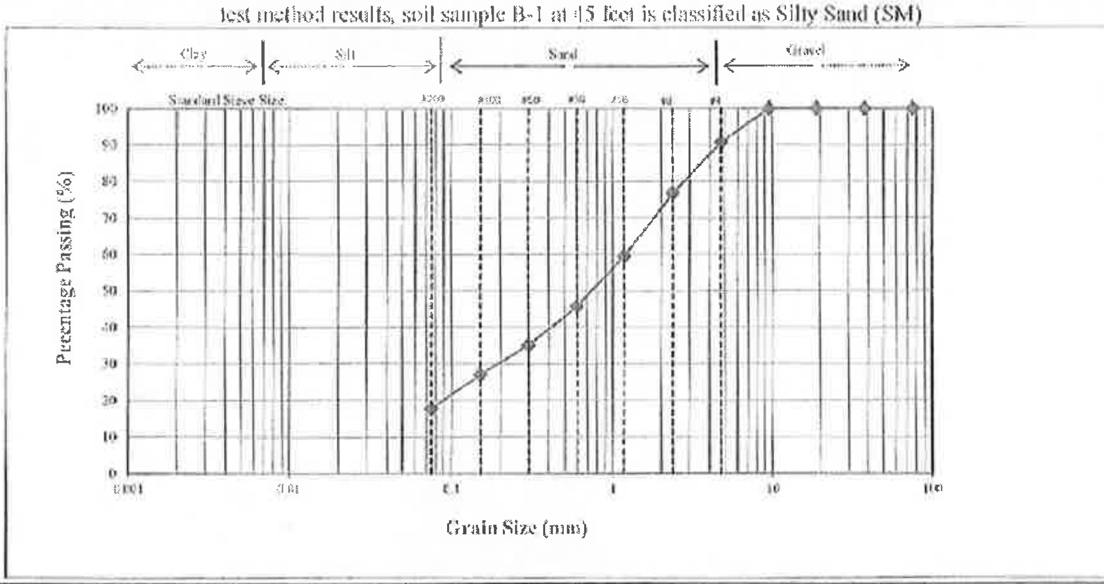
Soil Description: Gray-Green Mottled Silty Sand SM

Tested by: B D

PARTICLE-SIZE ANALYSIS OF SOILS
ASTM METHOD D 422 (SIEVE ANALYSIS)

Sample :	B-1 @ 45 ft.	D10 (mm)	N/A
Total Weight (g)	120.2	D30 (mm)	0.20
Dry Weight (g)	112.2	D60 (mm)	1.18
Wet Sieve Weight (g)	92.3	Cu	N/A
Initial Moisture (%)	7.1	Cc	N/A

According to ASTM D 2487 Unified Soil Classification System (USCS) and ASTM D 422 (Standard Test Method for Particle-Size Analysis) test method results, soil sample B-1 at 45 feet is classified as Silty Sand (SM)



Sieve Size (in)	Sieve Size (mm)	Cumulative Weight of dry soil (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	10.4	9.3	90.7
#8	2.36	26.1	23.3	76.7
#16	1.18	45.6	40.6	59.4
#30	0.6	60.9	54.3	45.7
#50	0.3	72.8	64.9	35.1
#100	0.15	81.9	73.0	27.0
#200	0.075	92.3	82.3	17.7

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Client: Anderson Consulting Engineers

Project Name: Ironwood

Job Number: GLO-71982.4

Date: 10/24/14

Boring Number: B-1

Depth: 45 ft.

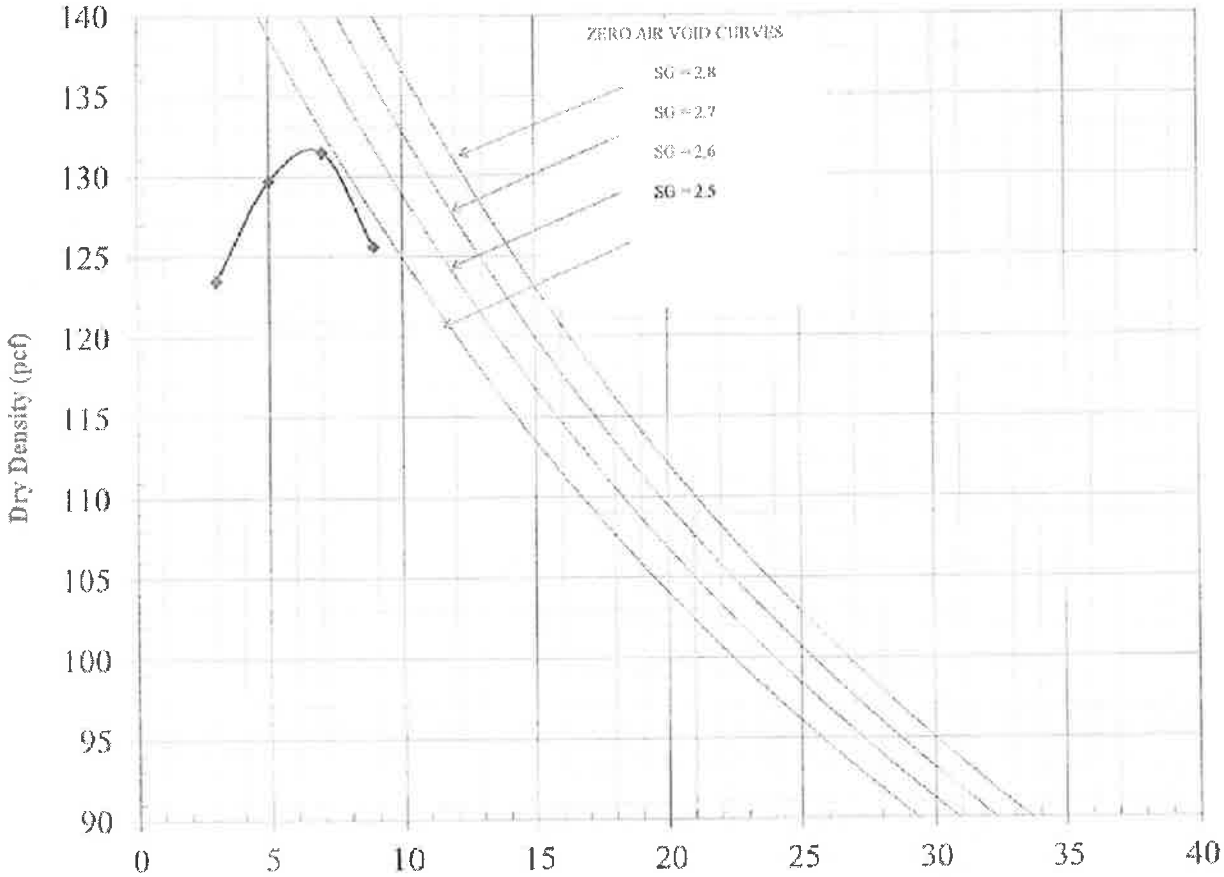
Soil Description: Orange-Gray Mottled Silty Sand (SM)

Tested by: B D

Attachment: Preliminary Geotechnical Study (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

LABORATORY COMPACTION ASTM D 1557

Sample	1	2	3	4
Mold and wet soil (lbs.)	8.550	8.850	9.000	8.870
Mold (lbs.)	4.310	4.310	4.310	4.310
Wet Soil (lbs.)	4.240	4.540	4.690	4.560
Wet Density (pcf)	127.20	136.20	140.70	136.80
Moisture (%)	3.0	5.0	7.0	8.9
Dry Density (pcf)	123.5	129.7	131.5	125.6



Maximum density 132.0 pcf @ 6.5% moisture

Client: Anderson Consulting Engineers
Project Name: Ironwood
Procedure: Method A
Job Number: GLO-71982.4
Date: 10/21/14
Boring Number: B-1
Location: 0-5 ft.
Soil Description: Brown Mottled Silty Sand SM
Tested by: B D

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EXPANSION INDEX TEST

ASTM METHOD D 4829

B-1 @ 1-5 ft.

Moisture Content of Initial Sample		% Saturation of Re-molded Sample		Moisture Content of Final Sample	
Tare No. -	S6	Wt. of Soil and Ring (g) -	615.2	Wt. of Soil and Ring (g) -	641.3
Wet Weight and Tare (g) -	134.0	Ring Weight (g) -	199.0	Ring Weight (g) -	199.0
Dry Weight and Tare (g) -	128.8	Wet Weight of Soil (g) -	416.2	Wet Weight of Soil (g) -	442.3
Tare Weight (g) -	51.2	Dry Weight of Soil (g) -	390.1	Dry Weight of Soil (g) -	390.1
Water Loss (g) -	5.2	Volume of Ring (ft^3) -	0.0073	Weight of Water (g) -	52.2
Dry Weight (g) -	77.6	Dry Density (pcf) -	117.8	*Final Moisture (%)*	*13.4*
Initial Moisture (%) -	*6.7*	*Initial Saturation (%) -*	*42.1*	*Final Saturation (%) -*	*84.0*

Expansion Test - UBC (144 PSF)				
	Date	Time	Reading	
Add Weight	10/21/2014	10:20	0.000	
10 Minutes		10:30	0.000	Initial Reading
Add Water		11:30	0.002	
		3:00	0.002	
	10/22/2014	6:17	0.002	Final Reading

EImeasured	=	2
EI_{50}	**=**	**0**

Expansion Index, EI_{50}	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
>130	Very High

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Client: Anderson Consulting Engineers

Job Name: Ironwood

Job Number: GLO-71982.4

Date: 10/21/14

Boring Number: B-1

Depth: 0-5 ft.

Soil Description: Brown Mottled Silty Sand SM

Tested by: BD

DIRECT SHEAR TEST ASTM D 3080

Job Data
Job No.: GLO-71982.4
Client: Anderson Consulting Engineers
Date: 10/22/14
Sample Data
Sample: B-1 @ 0 - 5 ft.
Remolded: 90 % Relative Compaction
Remarks: Soaked Before Placing in Shear Box
Soil Description: Brown Silty Sand (SM)

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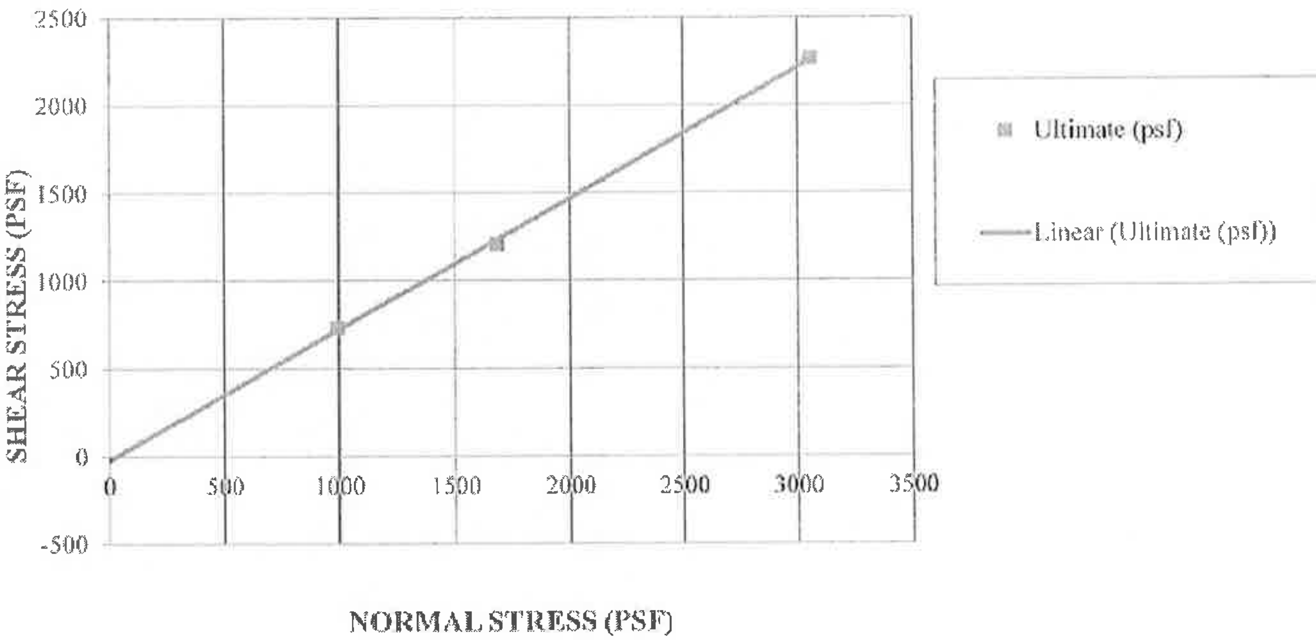
SHEAR TEST DIAGRAM



Test Results

	Phi		Cohesion	
Ultimate (psf)	37	degrees	-20	psf

Average Initial Moisture	6.5%
Average Dry Density	118.7 pcf
Average Final Moisture	12.9%

DIRECT SHEAR TEST ASTM D 3080

Job Data
Job No.: GLO-71982.4
Client: Anderson Consulting Engineers
Date: 10/24/14
Sample Data
Sample: B-1 @ 5 ft.
Remolded: 90 % Relative Compaction
Remarks: Soaked Before Placing in Shear Box
Soil Description: Brown Silty Sand (SM)

Geotechnical & Environmental Solutions

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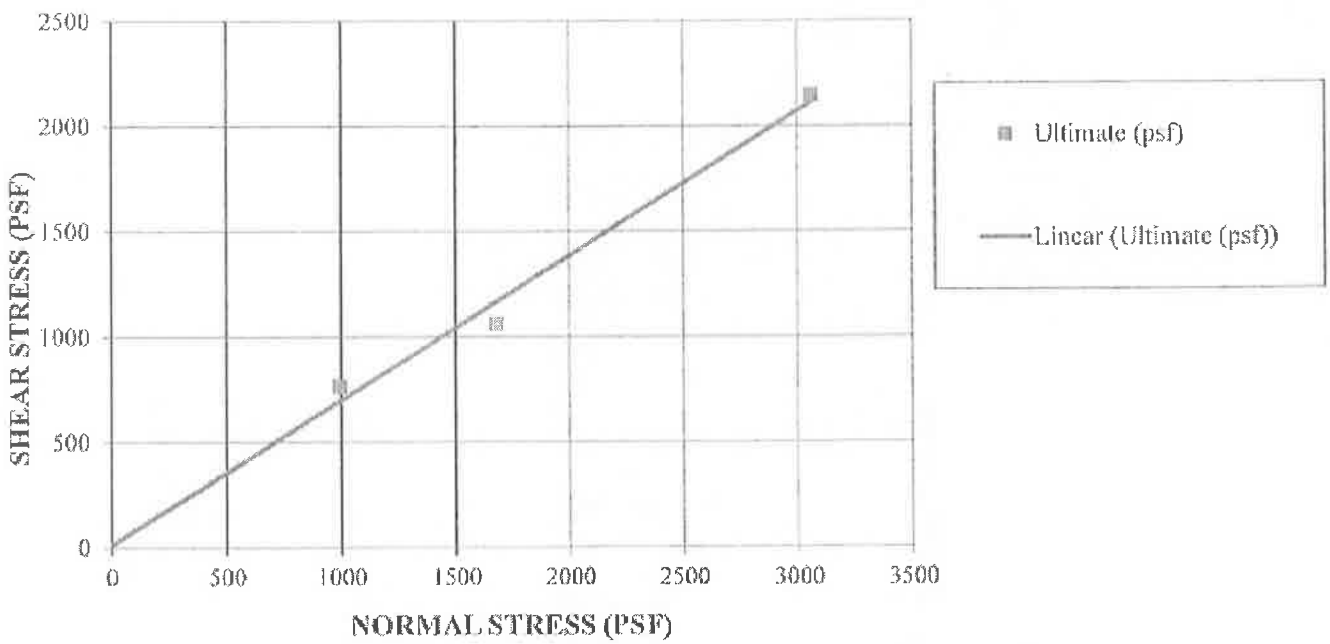
SHEAR TEST DIAGRAM



Test Results

	Phi		Cohesion	
Ultimate (psf)	34	degrees	12	psf

Average Initial Moisture	2.7%
Average Dry Density	109.7 pcf
Average Final Moisture	15.4%

DIRECT SHEAR TEST ASTM D 3080

Job Data	
Job No.:	GLO-71982.4
Client:	Anderson Consulting Engineers
Date:	10/24/14
Sample Data	
Sample:	B-2 @ 5 ft.
Remolded:	90 % Relative Compaction
Remarks:	Soaked Before Placing in Shear Box
Soil Description:	Orange-Brown Silty Sand (SM)

EEI Geotechnical & Environmental Solutions

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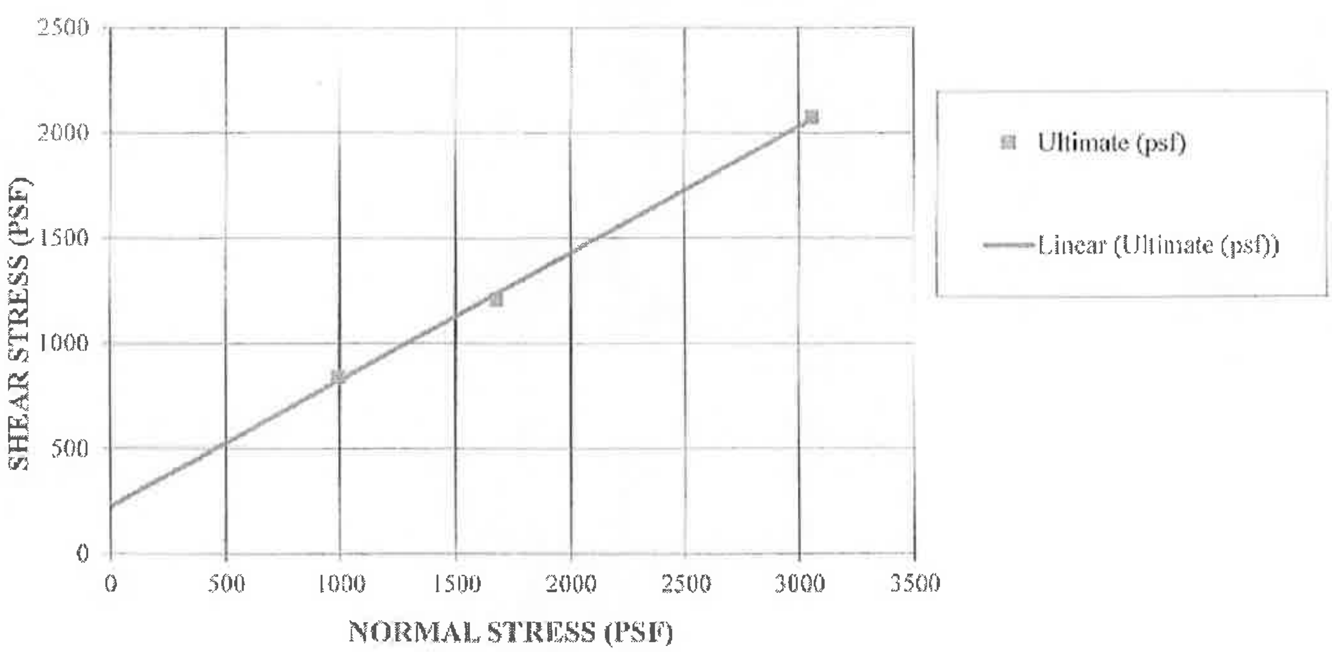
SHEAR TEST DIAGRAM



Test Results

	Phi		Cohesion	
Ultimate (psf)	31	degrees	225	psf

Average Initial Moisture	3.0%
Average Dry Density	112.9 pcf
Average Final Moisture	15.7%

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Date: October 29, 2014
Purchase Order Number: GLO-71982-4
Sales Order Number: 24454
Account Number: EEI
To:
--
EEI Environmental Equalizers Inc
2195 Faraday Avenue Suite K
Carlsbad, CA 92008
Attention: Hector Estrella/Jeff Blake

Laboratory Number: SO5463   Customers Phone: 760-431-3747

Sample Designation:
--
One soil sample received on 10/23/14 at 3:00pm, from Global - Ironwood Project# GLO-70982-4, marked as B-1 @ 0'-5' SM.

Analysis By California Test 643, 1999, Department of Transportation Division of Construction, Method for Estimating the Service Life of Steel Culverts.

pH 7.1

Water Added (ml)	Resistivity (ohm-cm)
10	13000
5	9500
5	7800
5	7300
5	6400
5	5800
5	5200
5	5500
5	5800

35 years to perforation for a 16 gauge metal culvert.
46 years to perforation for a 14 gauge metal culvert.
63 years to perforation for a 12 gauge metal culvert.
81 years to perforation for a 10 gauge metal culvert.
98 years to perforation for a 8 gauge metal culvert.

Water Soluble Sulfate	Calif. Test 417	0.005%
Water Soluble Chloride	Calif. Test 422	0.007%

Laura Torres

Laura Torres
LT/dbb

APPENDIX C
EARTHWORK AND GRADING GUIDELINES

Geotechnical & Environmental Solutions

EARTHWORK AND GRADING GUIDELINES

GENERAL

These guidelines present general procedures and recommendations for earthwork and grading as required on the approved grading plans, including preparation of areas to be filled, placement of fill and installation of subdrains and excavations. The recommendations contained in the geotechnical report are applicable to each specific project, are part of the earthwork and grading guidelines and would supersede the provisions contained hereafter in the case of conflict. Observations and/or testing performed by the consultant during the course of grading may result in revised recommendations which could supersede these guidelines or the recommendations contained in the geotechnical report. Figures A through O are provided at the back of this appendix, exhibiting generalized cross sections relating to these guidelines.

The contractor is responsible for the satisfactory completion of all earthworks in accordance with provisions of the project plans and specifications. The project soil engineer and engineering geologist (geotechnical consultant) or their representatives should provide observation and testing services, and geotechnical consultation throughout the duration of the project.

EARTHWORK OBSERVATIONS AND TESTING

Geotechnical Consultant

Prior to the commencement of grading, a qualified geotechnical consultant (a soil engineer and engineering geologist) should be employed for the purpose of observing earthwork procedures and testing the fills for conformance with the recommendations of the geotechnical report, the approved grading plans, and applicable grading codes and ordinances.

The geotechnical consultant should provide testing and observation so that determination may be made that the work is being completed as specified. It is the responsibility of the contractor to assist the consultant and keep them aware of work schedules and predicted changes, so that the consultant may schedule their personnel accordingly.

All removals, prepared ground to receive fill, key excavations, and subdrains should be observed and documented by the project engineering geologist and/or soil engineer prior to placing any fill. It is the contractor's responsibility to notify the engineering geologist and soil engineer when such areas are ready for observation.

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Laboratory and Field Tests

Maximum dry density tests to determine the degree of compaction should be performed in accordance with American Standard Testing Materials test method ASTM designation D-1557-78. Random field compaction tests should be performed in accordance with test method ASTM designations D-1556-82, D-2937 or D-2922 & D-3017, at intervals of approximately two (2) feet of fill height per 10,000 sq. ft. or every one thousand cubic yards of fill placed. These criteria would vary depending on the soil conditions and the size of the project. The location and frequency of testing would be at the discretion of the geotechnical consultant

Contractor's Responsibility

All clearing, site preparation, and earthwork performed on the project should be conducted by the contractor, with observation by geotechnical consultants and staged approval by the appropriate governing agencies. It is the contractor's responsibility to prepare the ground surface to receive the fill to the satisfaction of the soil engineer, and to place, spread, moisture condition, mix and compact the fill in accordance with the recommendations of the soil engineer. The contractor should also remove all major deleterious material considered unsatisfactory by the soil engineer.

It is the sole responsibility of the contractor to provide adequate equipment and methods to accomplish the earthwork in accordance with applicable grading guidelines, codes or agency ordinances, and approved grading plans. Sufficient watering apparatus and compaction equipment should be provided by the contractor with due consideration for the fill material, rate of placement, and climatic conditions. If, in the opinion of the geotechnical consultant, unsatisfactory conditions such as questionable weather, excessive oversized rock, deleterious material or insufficient support equipment are resulting in a quality of work that is not acceptable, the consultant will inform the contractor, and the contractor is expected to rectify the conditions, and if necessary, stop work until conditions are satisfactory.

The contractor will properly grade all surfaces to maintain good drainage and prevent ponding of water. The contractor will take action to control surface water and to prevent erosion control measures that have been installed.

SITE PREPARATION

All vegetation including brush, trees, thick grasses, organic debris, and other deleterious material should be removed and disposed of offsite, and must be concluded prior to placing fill. Existing fill, soil, alluvium, colluvium, or rock materials determined by the soil engineer or engineering geologist as unsuitable for structural in-place support should be removed prior to fill placement. Depending upon the soil conditions, these materials may be reused as compacted fills. Any materials incorporated as part of the compacted fills should be approved by the soil engineer.

Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, or other structures not located prior to grading are to be removed or treated in a manner recommended by the soil engineer. Soft, dry, spongy, highly fractured, or otherwise unsuitable ground extending to such a depth that surface processing cannot adequately improve the condition should be over excavated down to firm ground and approved by the soil engineer before compaction and filling operations continue. Over excavated and processed soils which have been properly mixed and moisture-conditioned should be recompacted to the minimum relative compaction as specified in these guidelines.

Existing ground which is determined to be satisfactory for support of the fills should be scarified to a minimum depth of six (6) inches, or as directed by the soil engineer. After the scarified ground is brought to optimum moisture (or greater) and mixed, the materials should be compacted as specified herein. If the scarified zone is greater than 6 inches in depth, it may be necessary to remove the excess and place the material in lifts restricted to six (6) inches in compacted thickness.

Existing grind which is not satisfactory to support compacted fill should be over excavated as required in the geotechnical report or by the onsite soils engineer and/or engineering geologists. Scarification, discing, or other acceptable form of mixing should continue until the soils are broken down and free of large fragments or clods, until the working surface is reasonably uniform and free from ruts, hollows, hummocks, or other uneven features which would inhibit compaction as described above.

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical) gradient, the ground should be benched. The lowest bench, which will act as a key, should be a minimum of 12 feet wide and should be at least two (2) feet deep into competent material, approved by the soil engineer and/or engineering geologist. In fill over cut slope conditions, the recommended minimum width of the lowest bench or key is at least 15 feet with the key excavated on competent material, as designated by the Geotechnical Consultant. As a general rule, unless superseded by the Soil Engineer, the minimum width of fill keys should be approximately equal to one-half (½) the height of the slope.

Standard benching is typically four feet (minimum) vertically, exposing competent material. Benching may be used to remove unsuitable materials, although it is understood that the vertical height of the bench may exceed four feet. Pre stripping may be considered for removal of unsuitable materials in excess of four feet in thickness.

All areas to receive fill, including processed areas, removal areas, and toe of fill benches should be observed and approved by the soil engineer and/or engineering geologist prior to placement of fill. Fills may then be properly placed and compacted until design grades are attained.

COMPACTED FILLS

Earth materials imported or excavated on the property may be utilized as fill provided that each soil type has been accepted by the soil engineer. These materials should be free of roots, tree branches, other organic matter or other deleterious materials. All unsuitable materials should be removed from the fill as directed by the soil engineer. Soils of poor gradation, undesirable expansion potential, or substandard strength characteristics may be designated unsuitable by the consultant and may require mixing with other earth materials to serve as a satisfactory fill material.

Fill materials generated from benching operations should be dispersed throughout the fill area. Benching operations should not result in the benched material being placed only within a single equipment width away from the fill/bedrock contact.

Earthwork and Grading Guidelines

Oversized materials, defined as rock or other irreducible materials with a maximum size exceeding 12 inches in one dimension, should not be buried or placed in fills unless the location of materials and disposal methods are specifically approved by the soil engineer. Oversized material should be taken offsite or placed in accordance with recommendations of the soil engineer in areas designated as suitable for rock disposal. Oversized material should not be placed vertically within 10 feet of finish grade or horizontally within 20 feet of slope faces.

To facilitate trenching, rock should not be placed within the range of foundation excavations or future utilities unless specifically approved by the soil engineer and/or the representative developers.

If import fill material is required for grading, representative samples of the material should be analyzed in the laboratory by the soil engineer to determine its physical properties. If any material other than that previously analyzed is imported to the fill or encountered during grading, analysis of this material should be conducted by the soil engineer as soon as practical.

Fill material should be placed in areas prepared to receive fill in near-horizontal layers that should not exceed six (6) inches compacted in thickness. The soil engineer may approve thicker lifts if testing indicates the grading procedures are such that adequate compaction is being achieved. Each layer should be spread evenly and mixed to attain uniformity of material and moisture suitable for compaction.

Fill materials at moisture content less than optimum should be watered and mixed, and "wet" fill materials should be aerated by scarification, or should be mixed with drier material. Moisture conditioning and mixing of fill materials should continue until the fill materials have uniform moisture content at or above optimum moisture.

After each layer has been evenly spread, moisture-conditioned and mixed, it should be uniformly compacted to a minimum of 90 percent of maximum density as determined by ASTM test designation, D 1557-78, or as otherwise recommended by the soil engineer. Compaction equipment should be adequately sized and should be reliable to efficiently achieve the required degree of compaction.

Where tests indicate that the density of any layer of fill, or portion thereof, is below the required relative compaction or improper moisture content, the particular layer or portion will be reworked until the required density and/or moisture content has been attained. No additional fill will be placed in an area until the last placed lift of fill has been tested and found to meet the density and moisture requirements, and is approved by the soil engineer.

Compaction of slopes should be accomplished by over-building the outside edge a minimum of three (3) feet horizontally, and subsequently trimming back to the finish design slope configuration. Testing will be performed as the fill is horizontally placed to evaluate compaction as the fill core is being developed. Special efforts may be necessary to attain the specified compaction in the fill slope zone. Final slope shaping should be performed by trimming and removing loose materials with appropriate equipment. A final determination of fill slope compaction should be based on observation and/or testing of the finished slope face.

If an alternative to over-building and cutting back the compacted fill slope is selected, then additional efforts should be made to achieve the required compaction in the outer 10 feet of each lift of fill by undertaking the following:

- Equipment consisting of a heavy short-shanked sheepsfoot should be used to roll (horizontal) parallel to the slopes continuously as fill is placed. The sheepsfoot roller should also be used to roll perpendicular to the slopes, and extend out over the slope to provide adequate compaction to the face slope.

- Loose fill should not be spilled out over the face of the slope as each lift is compacted. Any loose fill spilled over a previously completed slope face should be trimmed off or be subject to re-rolling.

- Field compaction tests will be made in the outer two (2) to five (5) feet of the slope at two (2) to three (3) foot vertical intervals, subsequent to compaction operations.

- After completion of the slope, the slope face should be shaped with a small dozer and then re-rolled with a sheepsfoot to achieve compaction to near the slope face. Subsequent to testing to verify compaction, the slopes should be grid-rolled to achieve adequate compaction to the slope face. Final testing should be used to confirm compaction after grid rolling.

- Where testing indicates less than adequate compaction, the contractor will be responsible to process, moisture condition, mix and recompact the slope materials as necessary to achieve compaction. Additional testing should be performed to verify compaction.

- Erosion control and drainage devices should be designed by the project civil engineer in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the soil engineer or engineering geologist.

EXCAVATIONS

Excavations and cut slopes should be observed and mapped during grading by the engineering geologist. If directed by the engineering geologist, further excavations or over-excavation and refilling of cut areas should be performed. When fills over cut slopes are to be graded, the cut portion of the slope should be observed by the engineering geologist prior to placement of the overlying fill portion of the slope. The engineering geologist should observe all cut slopes and should be notified by the contractor when cut slopes are started.

If, during the course of grading, unanticipated adverse or potentially adverse geologic conditions are encountered, the engineering geologist and soil engineer should investigate, evaluate and make recommendations to mitigate (or limit) these conditions. The need for cut slope buttressing or stabilizing should be based on as-grading evaluations by the engineering geologist, whether anticipated previously or not.

Unless otherwise specified in soil and geological reports, no cut slopes should be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies. Additionally, short-term stability of temporary cut slopes is the contractor's responsibility.

Erosion control and drainage devices should be designed by the project civil engineer and should be constructed in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the soil engineer or engineering geologist.

SUBDRAIN INSTALLATION

Subdrains should be installed in accordance with the approved embedment material, alignment and details indicated by the geotechnical consultant. Subdrain locations or construction materials should not be changed or modified without approval of the geotechnical consultant. The soil engineer and/or engineering geologist may recommend and direct changes in subdrain line, grade and drain material in the field, pending exposed conditions. The location of constructed subdrains should be recorded by the project civil engineer.

COMPLETION

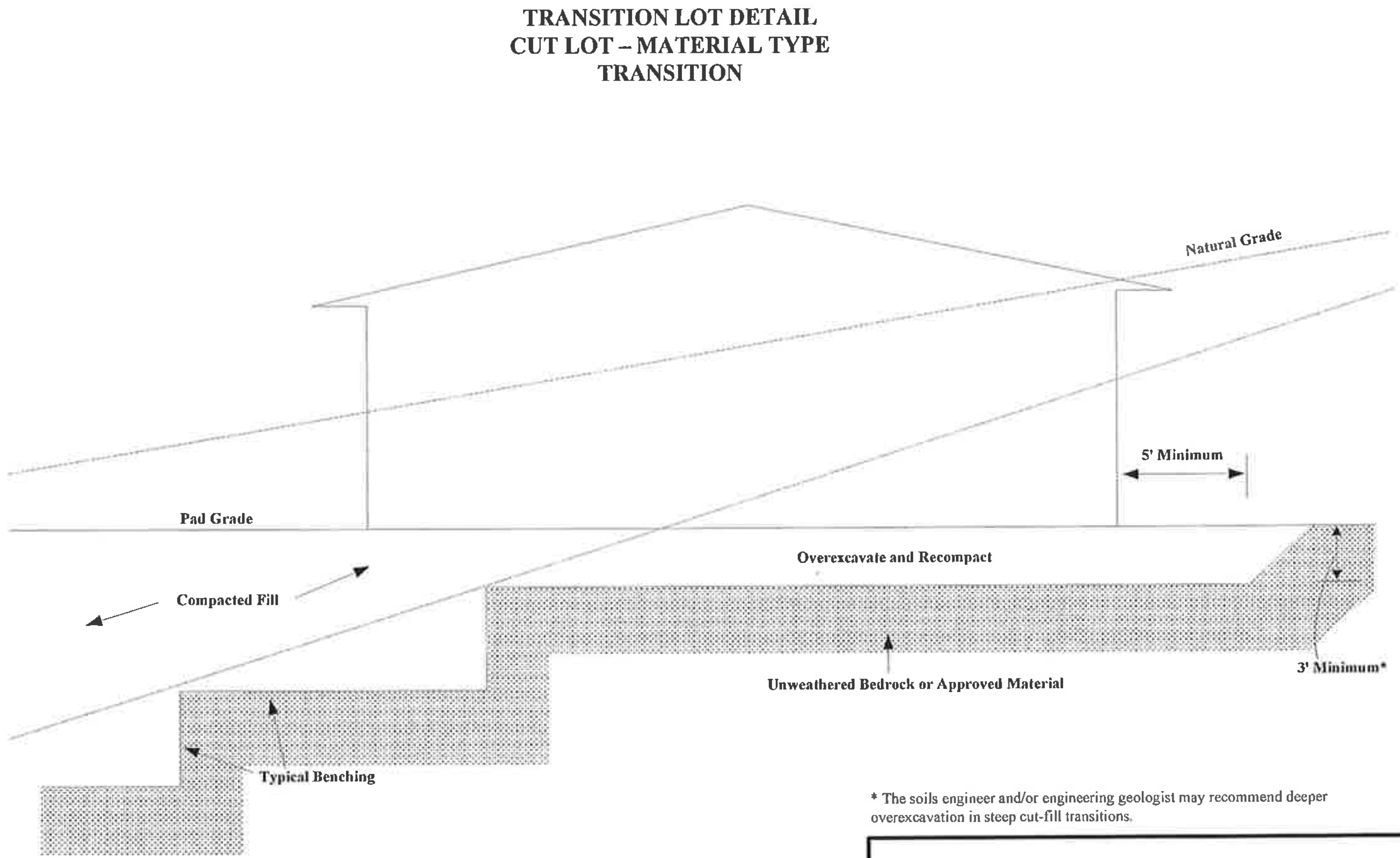
Consultation, observation and testing by the geotechnical consultant should be completed during grading operations in order to state an opinion that all cut and filled areas are graded in accordance with the approved project specifications.

After completion of grading and after the soil engineer and engineering geologist have finished their observations, final reports should be submitted subject to review by the controlling governmental agencies. No additional grading should be undertaken without prior notification of the soil engineer and/or engineering geologist.

All finished cut and fill slopes should be protected from erosion, including but not limited to planting in accordance with the plan design specifications and/or as recommended by a landscape architect. Such protection and/or planning should be undertaken as soon as possible after completion of grading.

ATTACHMENTS

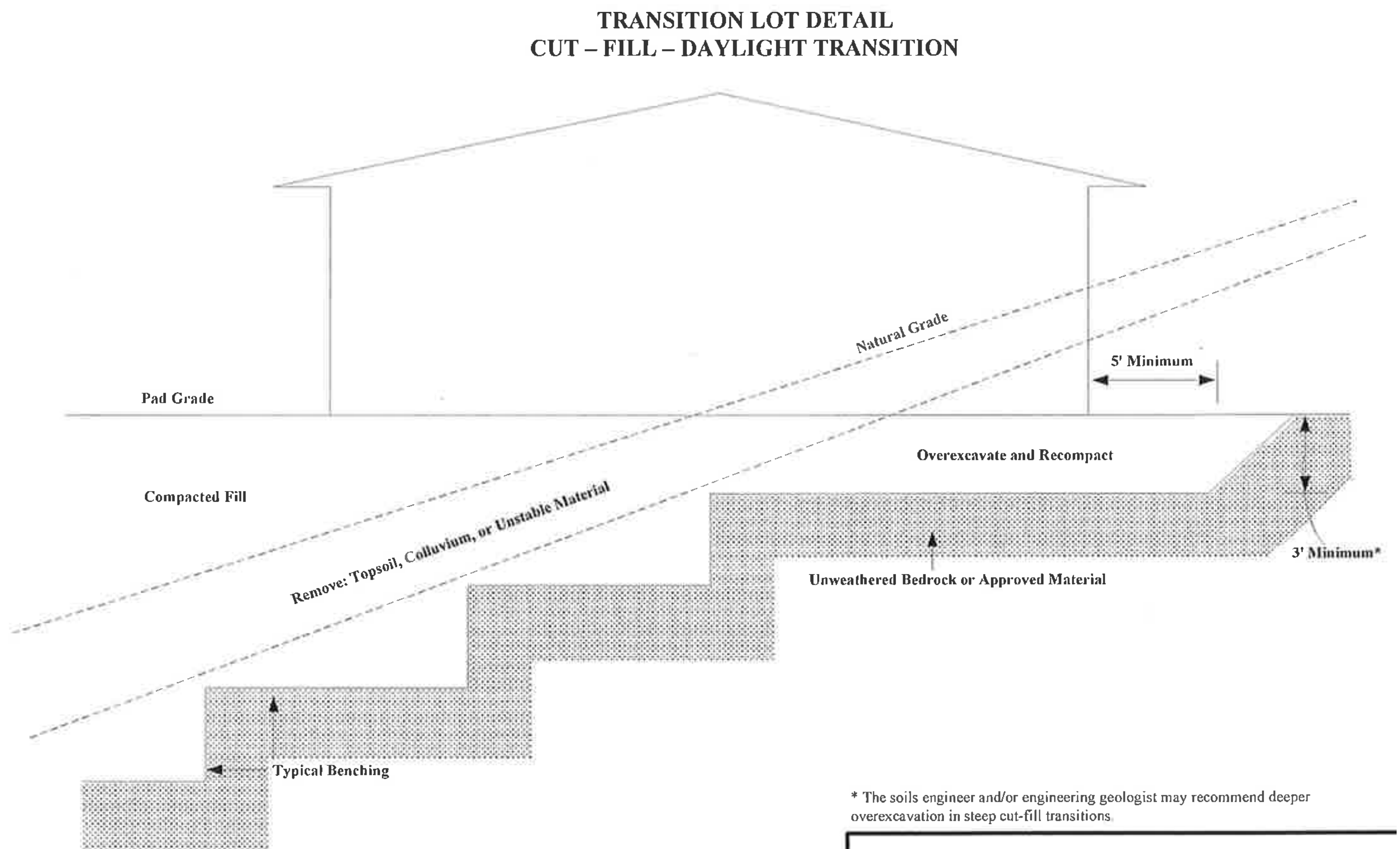
Figure A – Transition Lot Detail Cut Lot
Figure B – Transition Lot Detail Cut - Fill
Figure C – Rock Disposal Pits
Figure D – Detail for Fill Slope Toeing out on a Flat Alluviated Canyon
Figure E – Removal Adjacent to Existing Fill
Figure F – Daylight Cut Lot Detail
Figure G – Skin Fill of Natural Ground
Figure H – Typical Stabilization Buttress Fill Design
Figure I – Stabilization Fill for Unstable Material Exposed in Portion of Cut Slope
Figure J – Fill Over Cut Detail
Figure K – Fill Over Natural Detail
Figure L – Oversize Rock Disposal
Figure M – Canyon Subdrain Detail
Figure N – Canyon Subdrain Alternate Details
Figure O – Typical Stabilization Buttress Subdrain Detail
Figure P – Retaining Wall Backfill



* The soils engineer and/or engineering geologist may recommend deeper overexcavation in steep cut-fill transitions.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES TRANSITION LOT DETAIL CUT LOT – MATERIAL TYPE TRANSITION	
EEI Expertise . . Service . . Solutions	FIGURE A



* The soils engineer and/or engineering geologist may recommend deeper overexcavation in steep cut-fill transitions.

EARTHWORK AND GRADING GUIDELINES
TRANSITION LOT DETAIL
CUT – FILL – DAYLIGHT TRANSITION

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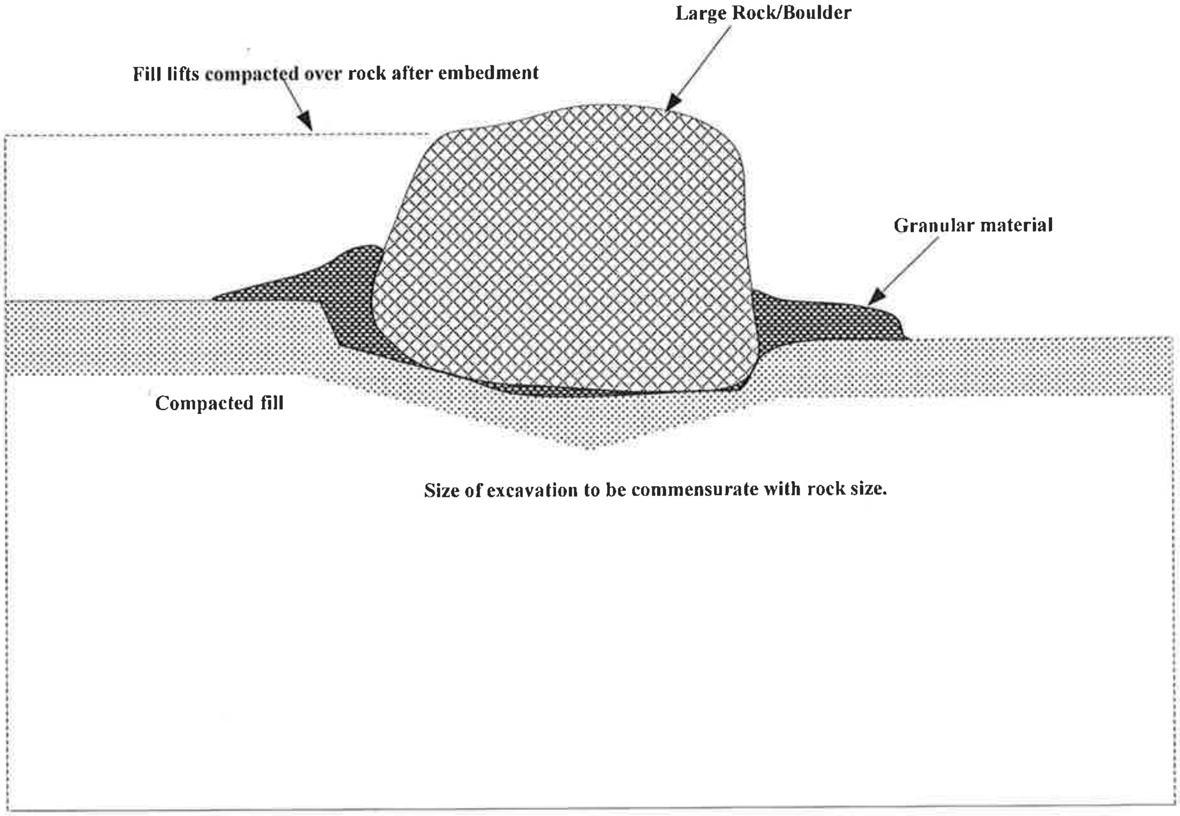
FIGURE B

Note: Figure not to scale

ROCK DISPOSAL PITS



Note:
(1) Large rock is defined as having a diameter larger than 3 feet in maximum size.
(2) Pit shall be excavated into compacted fill to a depth equal to half of the rock size.
(3) Granular soil shall be pushed into the pit and then flooded around the rock using a sheepsfoot to help with compaction.
(4) A minimum of 3 feet of compacted fill should be laid over each pit.
(5) Pits shall have at least 15 feet of separation between one another, horizontally.
(6) Pits shall be placed at least 20 feet from any fill slope.
(7) Pits shall be used only in deep fill areas.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
ROCK DISPOSAL PITS

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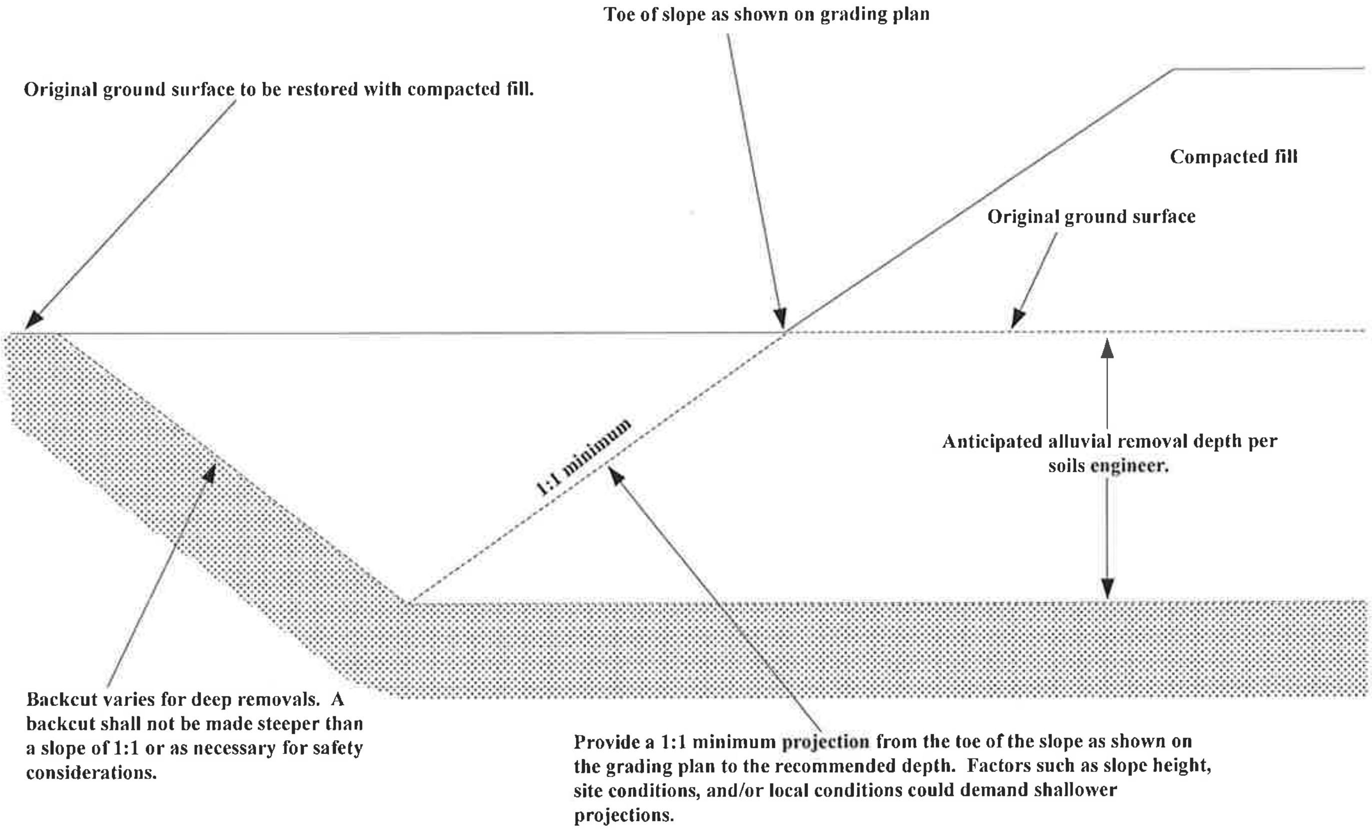
FIGURE C

DETAIL FOR FILL SLOPE TOEING OUT ON FLAT ALLUVIATED CANYON



Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
DETAIL FOR FILL SLOPE TOEING OUT ON A FLAT ALLUVIATED CANYON

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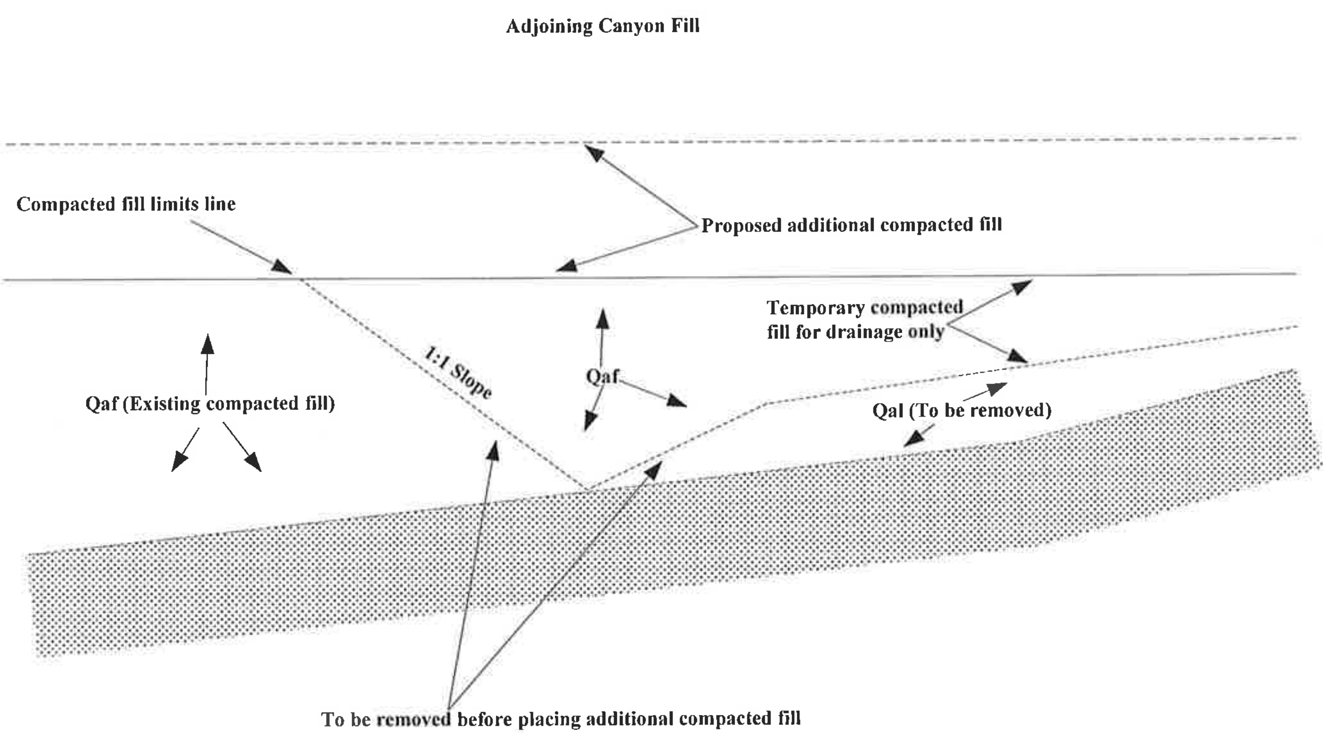
FIGURE D

REMOVAL ADJACENT TO EXISTING FILL



Legend		
Qaf -	Artificial Fill	
Qal -	Alluvium	

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
REMOVAL ADJACENT TO EXISTING FILL

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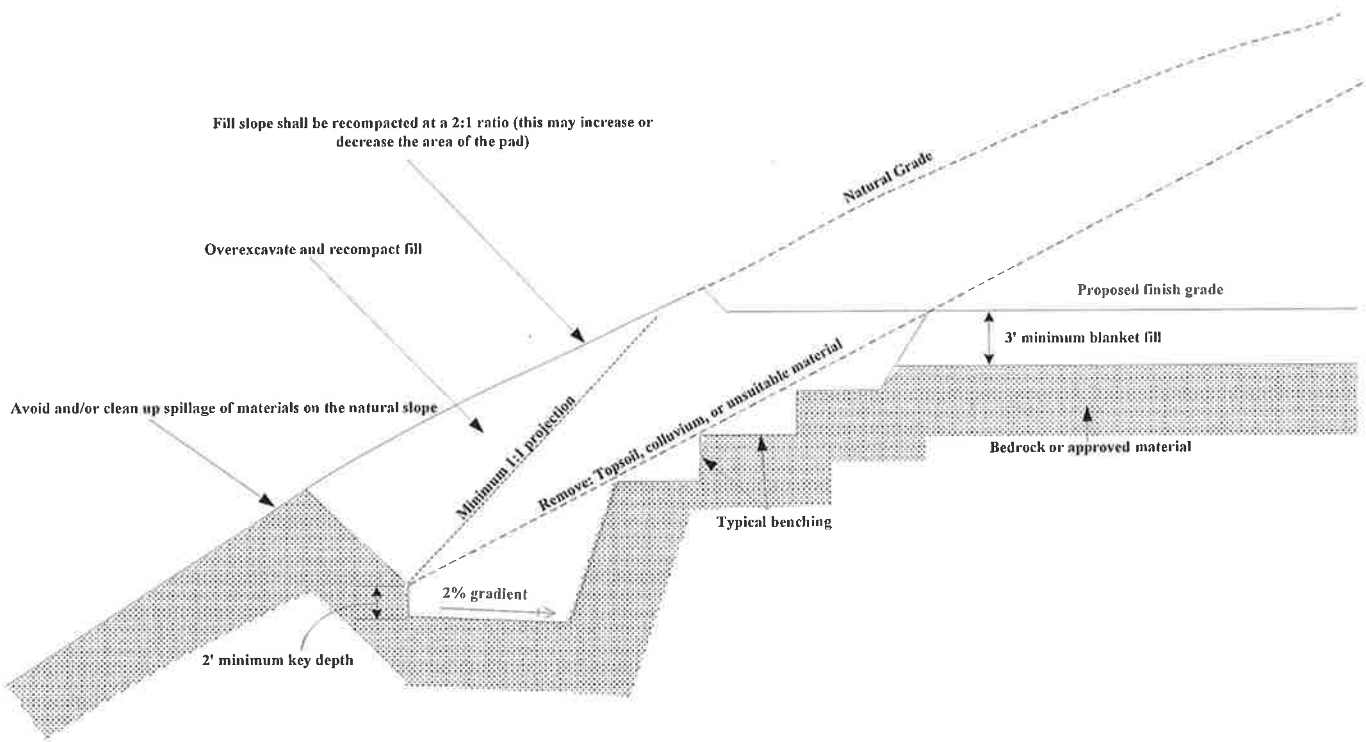
FIGURE E

DAYLIGHT CUT LOT DETAIL



Note: (1) Subdrain and key width requirements shall be determined based on exposed subsurface conditions and the thickness of overburden.

(2) Pad overexcavation and recompaction shall be completed if determined as necessary by the soils engineer and/or engineering geologist.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
DAYLIGHT CUT LOT DETAIL

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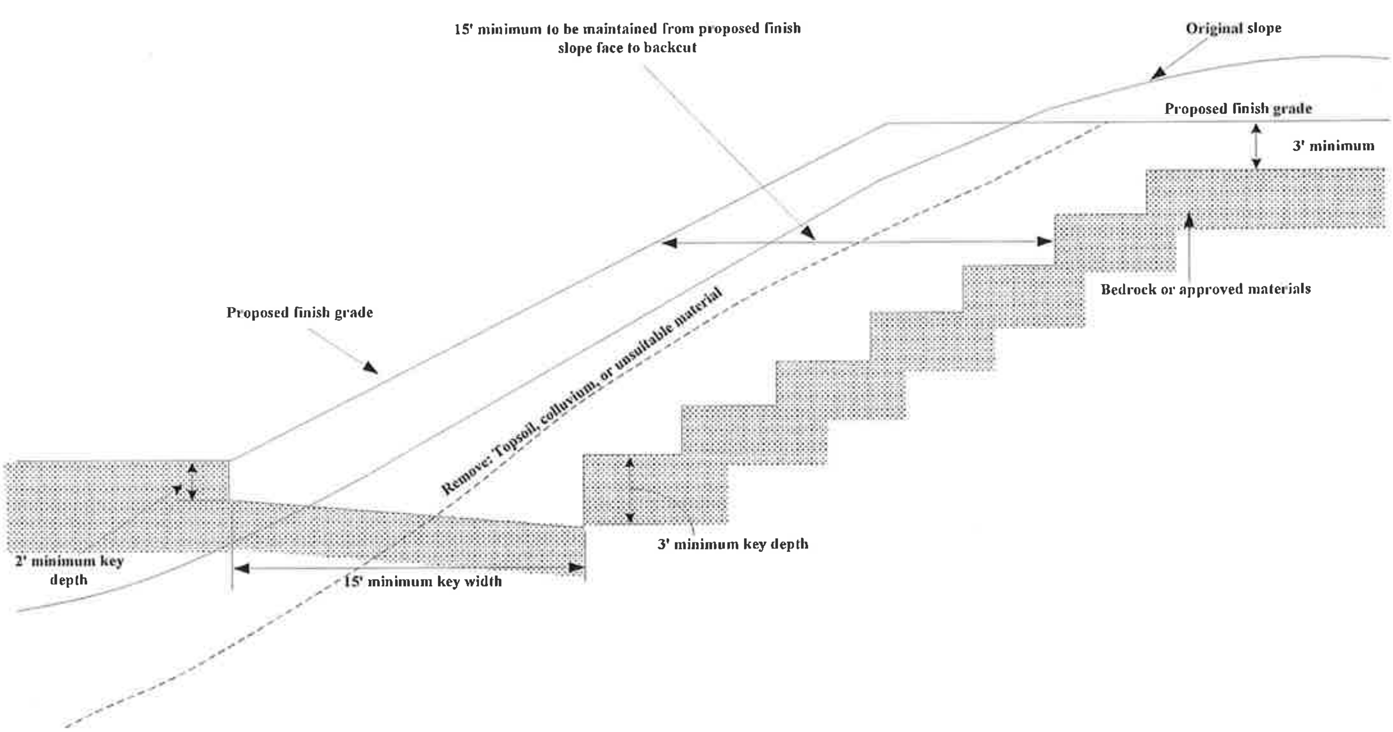
FIGURE F

SKIN FILL OF NATURAL GROUND



Note: (1) The need and disposition of drains will be determined by the soils engineer and/or engineering geologist based on site conditions.

(2) Pad overexcavation and recompaction shall be completed if determined as necessary by the soils engineer and/or engineering geologist

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
SKIN FILL OF NATURAL GROUND

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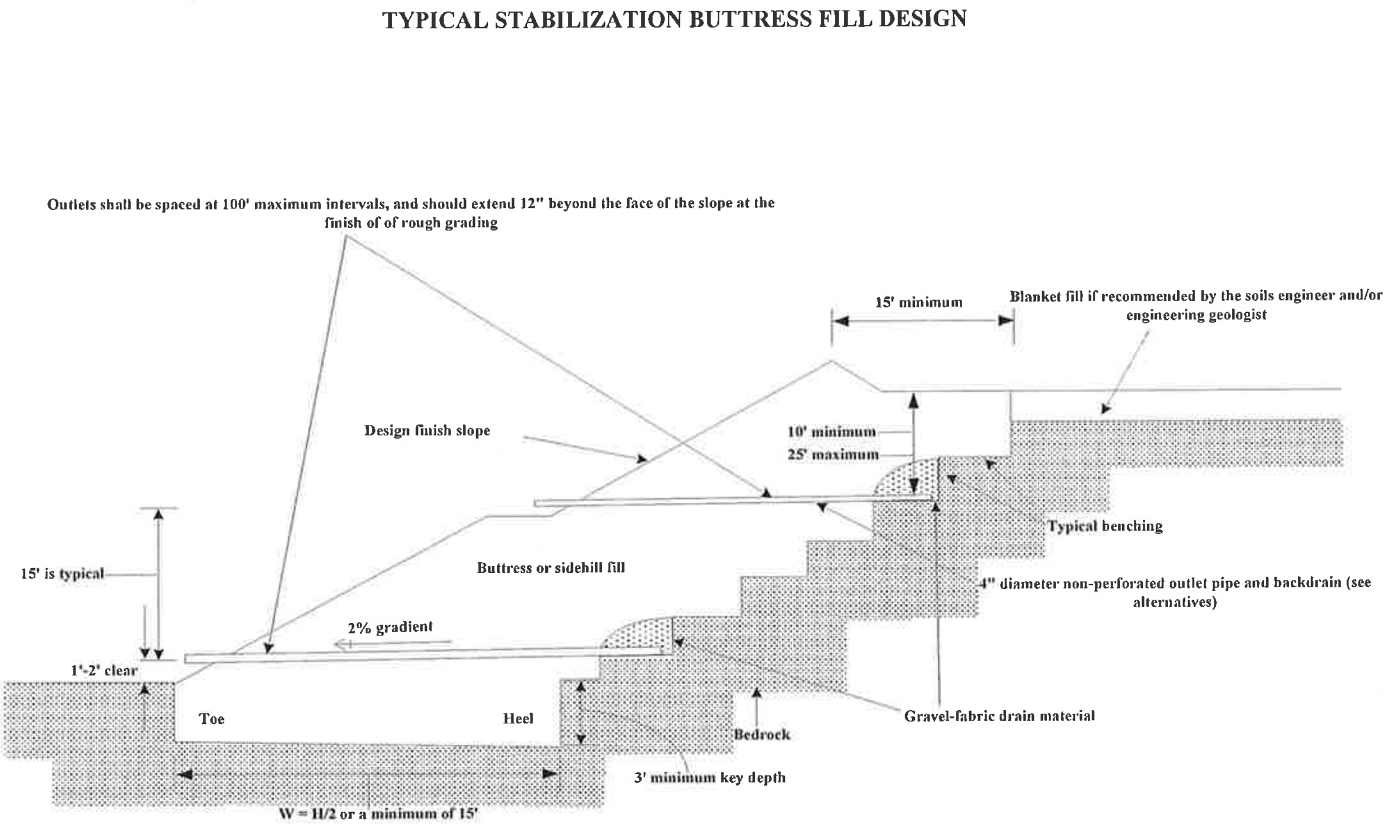
FIGURE G



Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
TYPICAL STABILIZATION BUTTRESS FILL DESIGN

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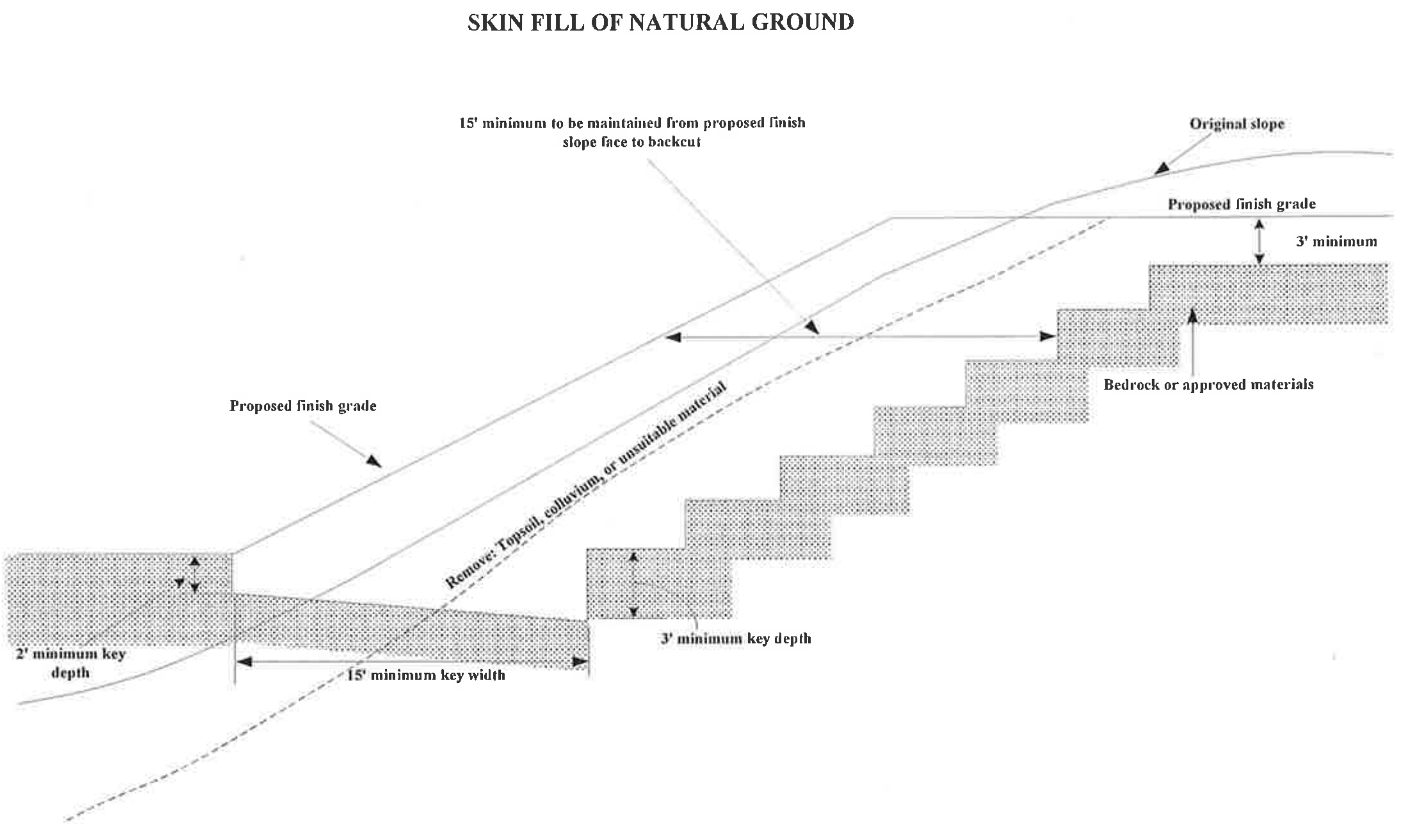
FIGURE H



Note: (1) The need and disposition of drains will be determined by the soils engineer and/or engineering geologist based on site conditions.

(2) Pad overexcavation and recompaction shall be completed if determined as necessary by the soils engineer and/or engineering geologist.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
SKIN FILL OF NATURAL GROUND

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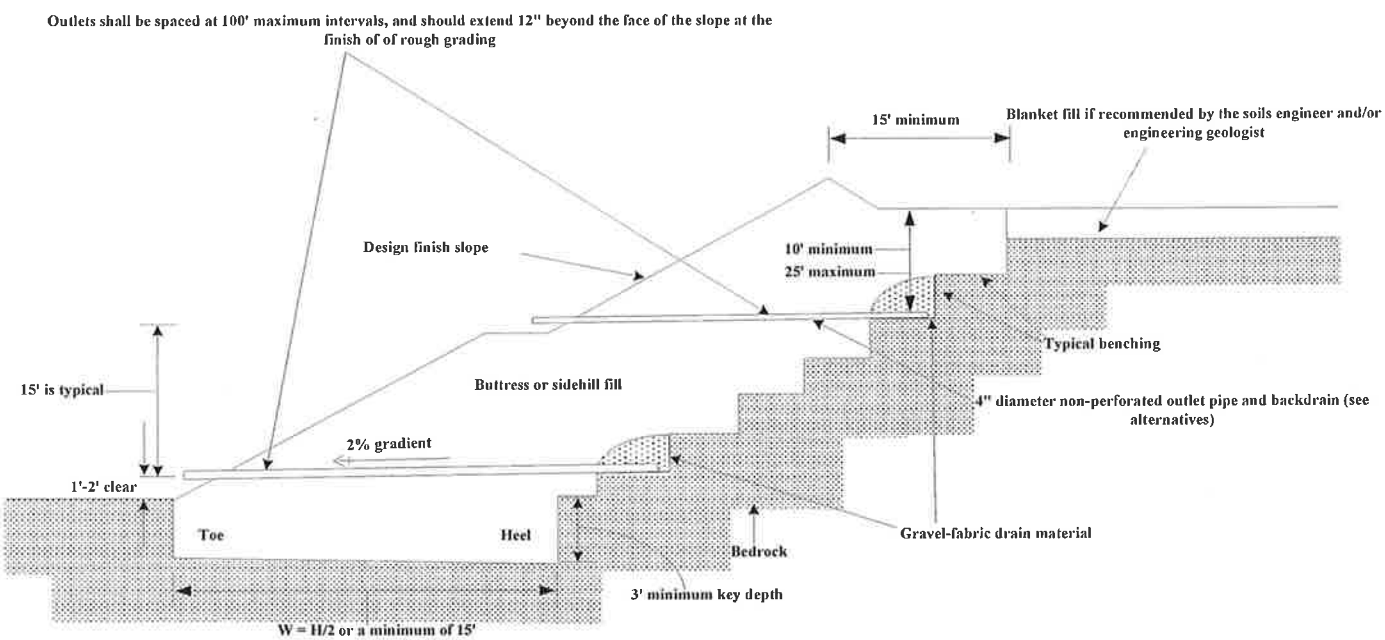
FIGURE G

TYPICAL STABILIZATION BUTTRESS FILL DESIGN



Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
TYPICAL STABILIZATION BUTTRESS FILL DESIGN

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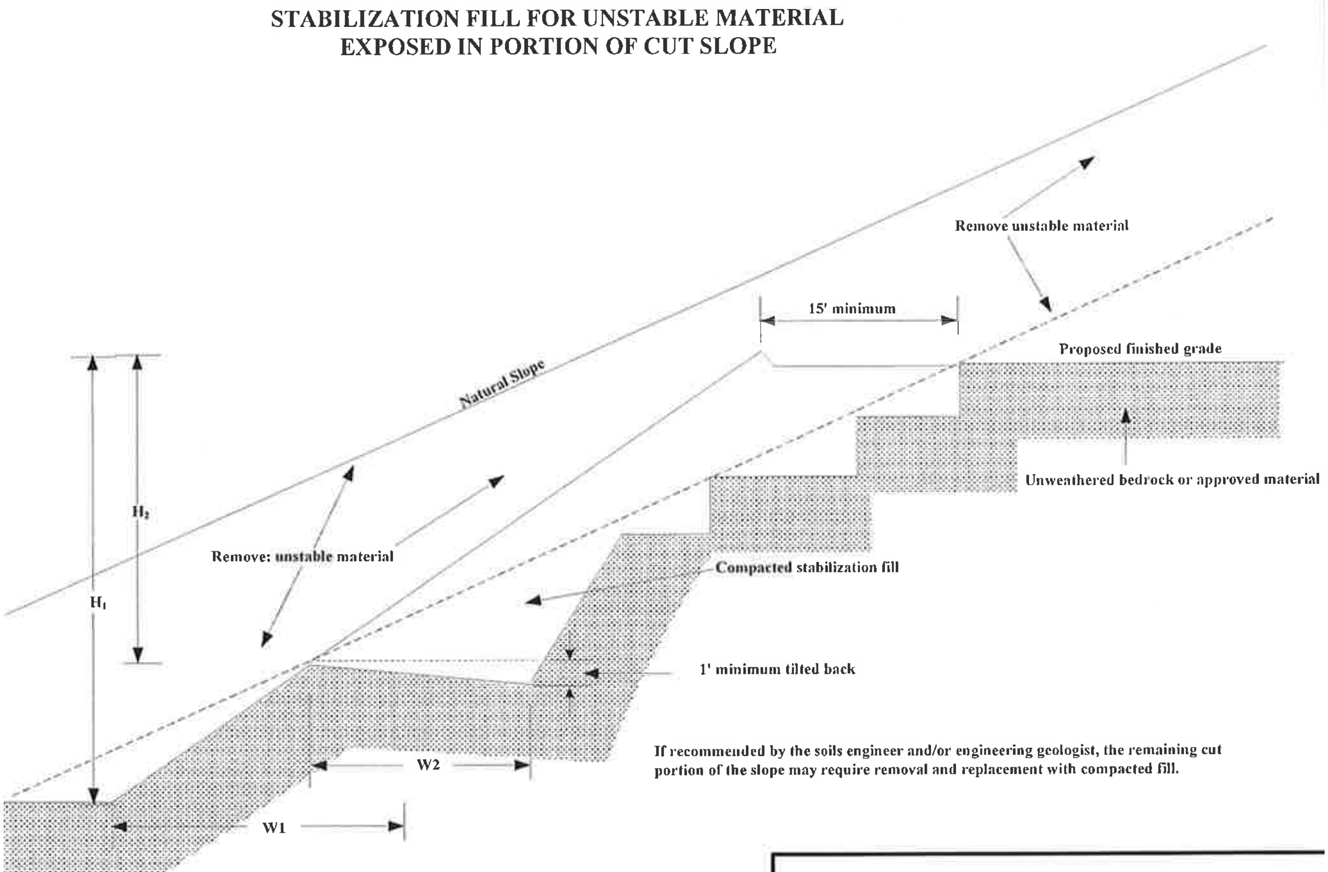
FIGURE H



Note: (1) Subdrains are required only if specified by the soils engineer and/or engineering geologist.
(2) "W" shall be the equipment width (15') for slope heights less than 25 feet. For slopes greater than 25 feet "W" shall be determined by the project soils engineer and/or the engineering geologist. "W" shall never be less than H/2.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
STABILIZATION FILL FOR UNSTABLE MATERIAL
EXPOSED IN PORTION OF CUT SLOPE

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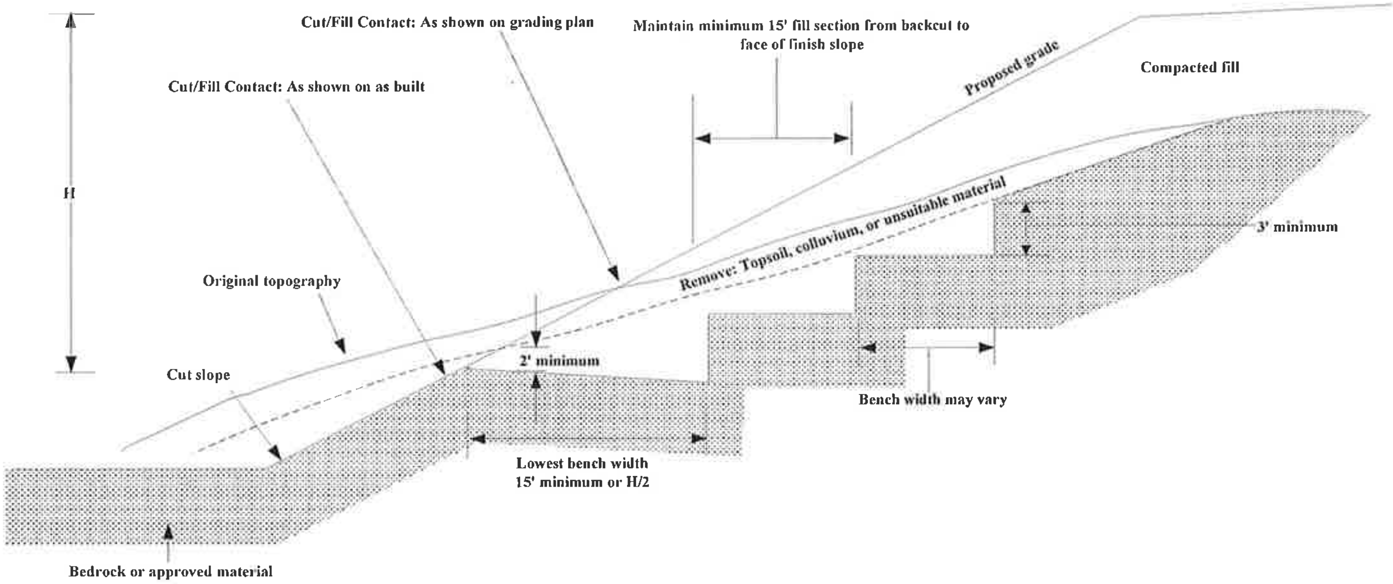
FIGURE I

FILL OVER CUT DETAIL



Note: The cut sectioin shall be excavated and evaluated by the soils engineer/engineering geologist prior to constructing the fill portion.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
FILL OVER CUT DETAIL

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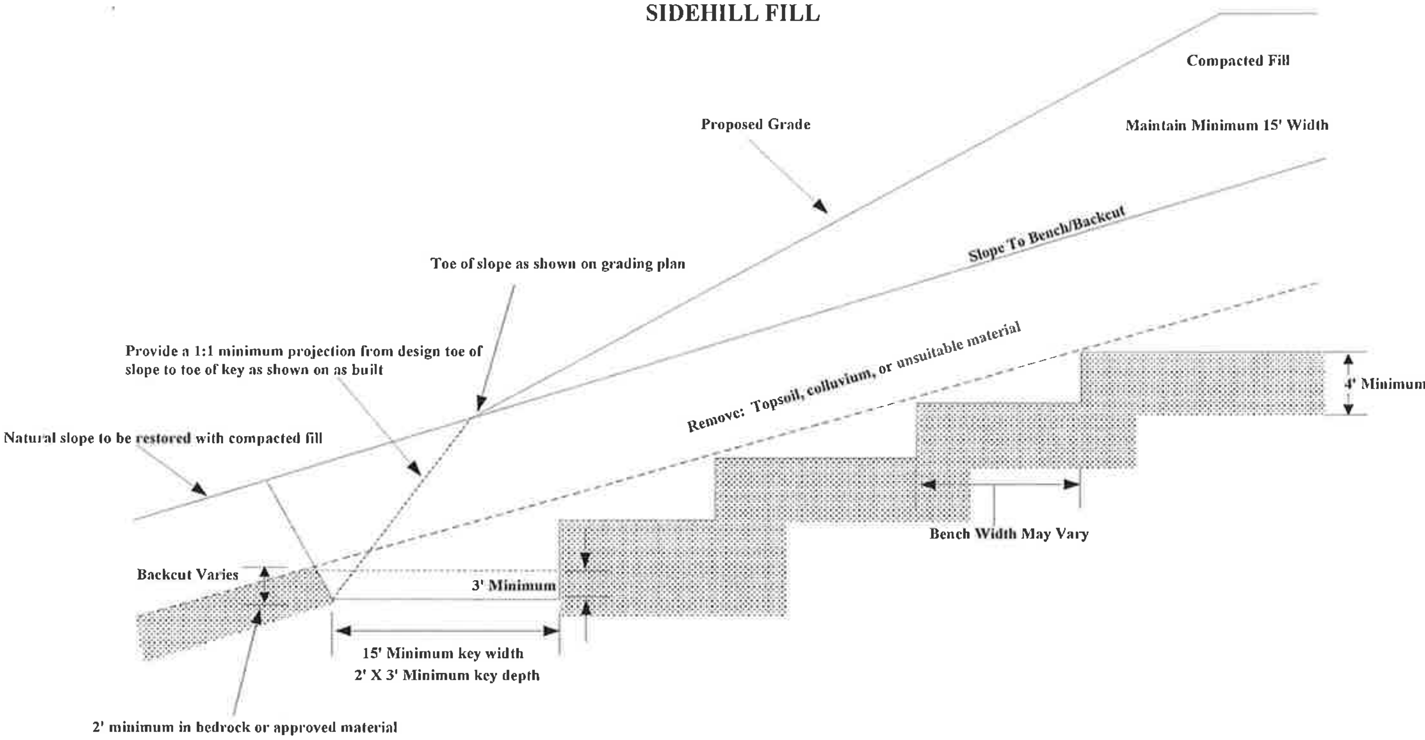
FIGURE J

FILL OVER NATURAL DETAIL
SIDEHILL FILL



Note: (1) Special recommendations shall be provided by the soils engineer/engineering geologist where the natural slope approaches or exceeds the design slope ratio.
(2) The need for and disposition of drains would be determined by the soils engineer/engineering geologist based upon exposed conditions.

Note: Figures not to scale

EARTHWORK AND GRADING GUIDELINES
FILL OVER NATURAL DETAIL
SIDEHILL FILL

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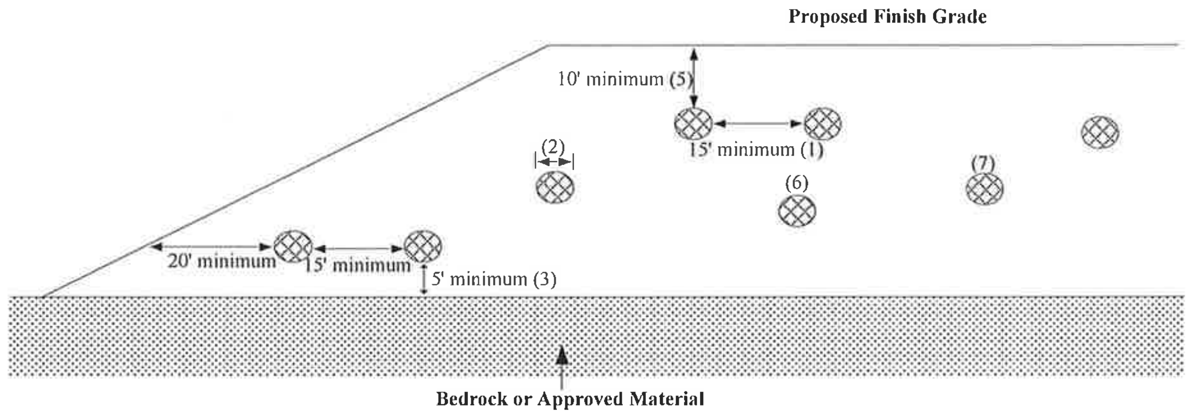
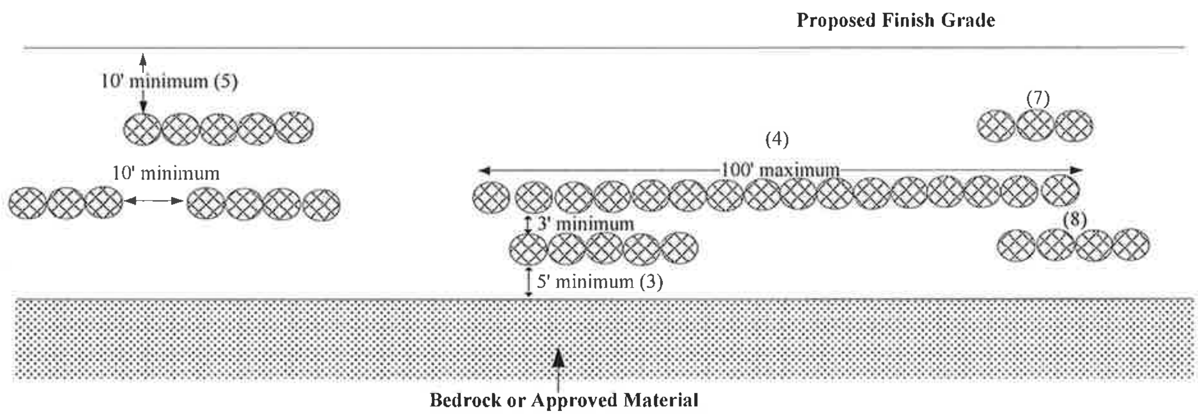
FIGURE K

OVERSIZE ROCK DISPOSAL

View Normal to Slope Face

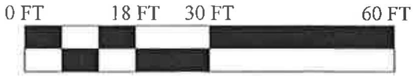


View Parallel to Slope Face



Note:
(1) One Equipment width or a minimum of 15 feet.
(2) Height and width may vary depending on rock size and type of equipment used. Length of windrow shall be no greater than 100 feet maximum.
(3) If approved by the soils engineer and/or engineering geologist.
(4) Orientation of windrows may vary but shall be as recommended by the soils engineer and/or engineering geologist. Unless recommended staggering of windrows is not necessary.
(5) Areas shall be cleared for utility trenches, foundations, and swimming pools.
(6) Voids in windrows shall be filled by flooding granular soil into place. Granular soil shall be any soil which has a unified soil classification system (Universal Building Code (UBC) 29-1). Designation of SM, SP, SW, GP, or GW.
(7) After fill between windrows is placed and compacted with the lift of fill covering windrow, windrow shall be proof rolled with a D-9 dozer or equivalent.
(8) Oversized rock is defined as larger than 12", and less than 4 feet in size.

Approximate Scale: 1" = 30'



Note: All distances are approximate

EARTHWORK AND GRADING GUIDELINES
OVERSIZE ROCK DISPOSAL

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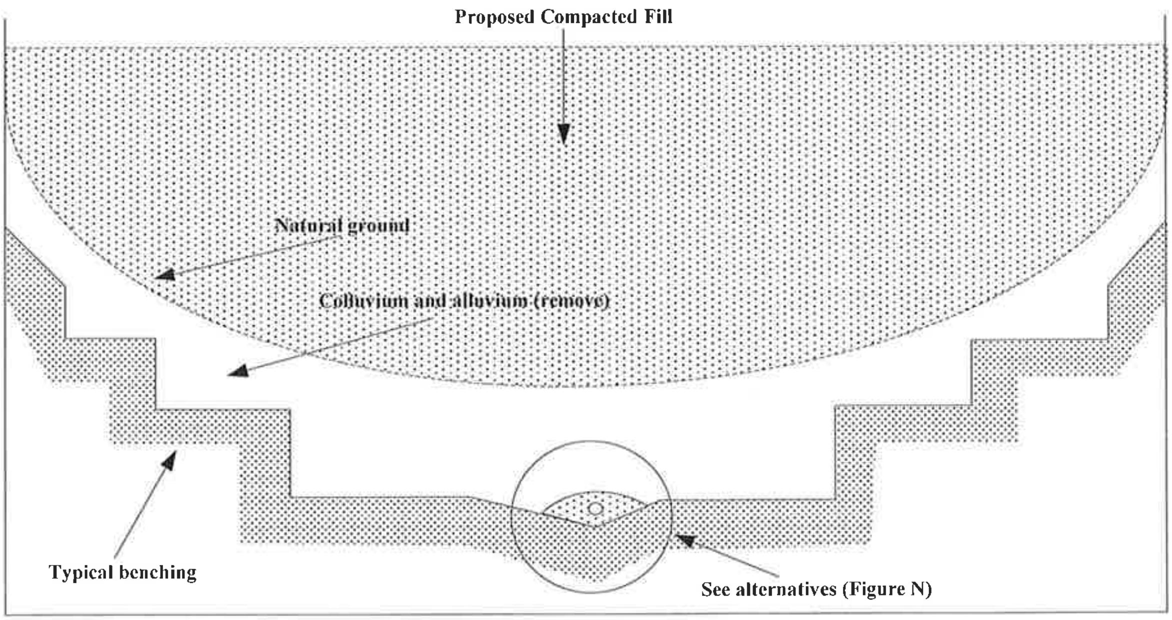
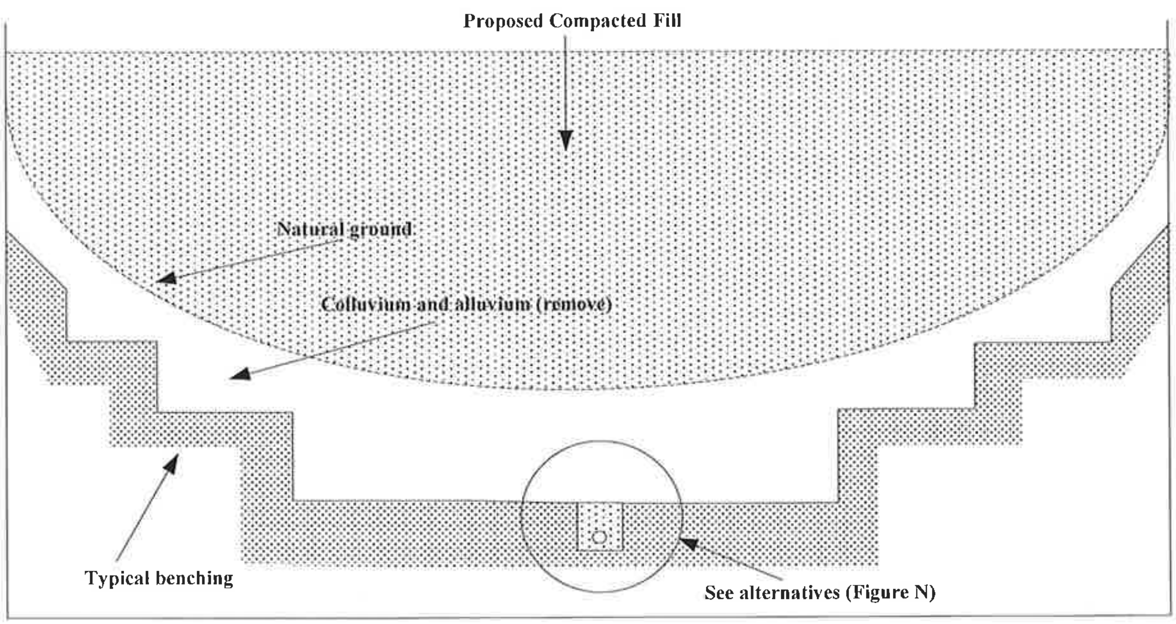
FIGURE L

CANYON SUBDRAIN DETAIL

Type A



Type B



Note: Alternatives, locations, and extent of subdrains should be determined by the soils engineer and/or engineering geologist during actual grading.

Note: Figures not to scale

EARTHWORK AND GRADING GUIDELINES
CANYON SUBDRAIN DETAIL

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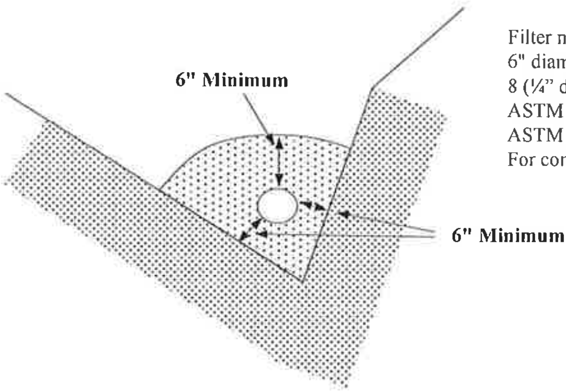
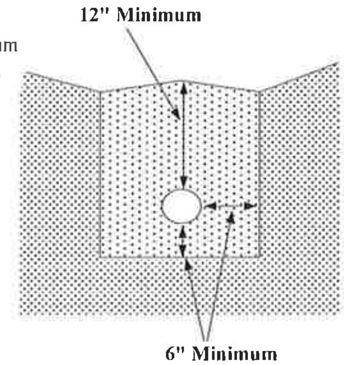
FIGURE M

CANYON SUBDRAIN ALTERNATE DETAILS

Alternate 1: Perforated Pipe and Filter Material



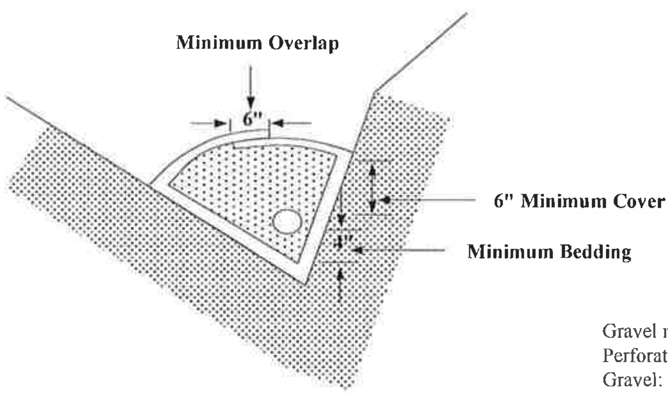
Filter material: Minimum volume of 9 feet^3/linear foot.
6" diameter ABS or PVC pipe or approved substitute with minimum 8 (¼" diameter) perforations per linear foot in bottom half of pipe.
ASTM D 2751, SDR 35 or ASTM D 1527, Schedule 40.
ASTM D 3034, SDR 35 or ASTM D 1785, Schedule 40.
For continuous run in excess of 500 feet use 8" diameter pipe.

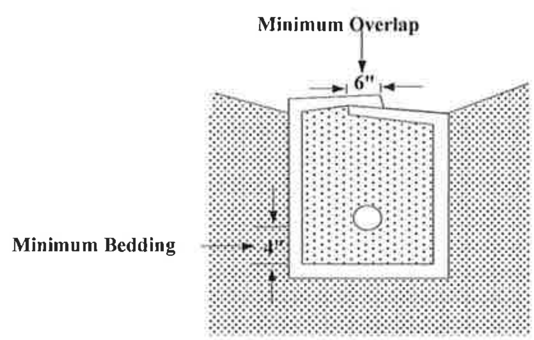


Filter Material

Sieve Size	Percent Passing
1"	100
¾"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

Alternate 2: Perforated Pipe, Gravel and Filter Fabric





Gravel material 9 feet^3/linear foot.
Perforated pipe: see alternate 1.
Gravel: Clean ¾" rock or approved substitute.
Filter Fabric: Mirafi 140 or approved substitute.

Note: Figures not to scale

EARTHWORK AND GRADING GUIDELINES
CANYON SUBDRAIN ALTERNATE DETAILS

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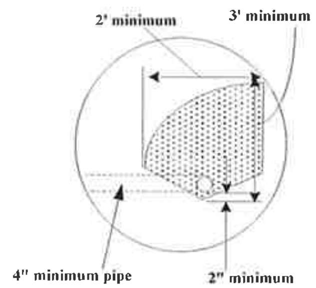
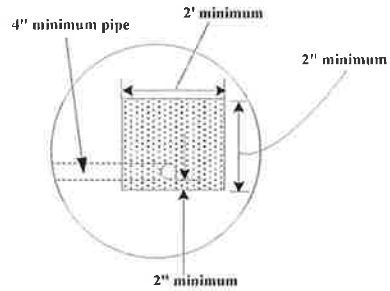
FIGURE N

TYPICAL STABILIZATION BUTTRESS SUBDRAIN DETAIL





Filter Material: Minimum of 5 ft^3/linear foot of pipe or 4 ft^3/linear foot of pipe when placed in square cut trench.

Alternative In Lieu Of Filter Material: Gravel may be encased in approved filter fabric. Filter fabric shall be mirafi 140 or equivalent. Filter fabric shall be lapped a minimum of 12" on all joints.

Minimum 4" Diameter Pipe: ABS-ASTM D-2751, SDR 35 or ASTM D-1527 schedule 40 PVC-ASTM D-3034, SDR 35 or ASTM D-1785 schedule 40 with a crushing strength of 1,000 pounds minimum, and a minimum of 8 uniformly spaced perforations per foot of pipe installed with perforations at bottom of pipe. Provide cap at upstream end of pipe. Slope at 2% to outlet pipe. Outlet pipe shall be connected to the subdrain pipe with tee or elbow.

Note: (1) Trench for outlet pipes shall be backfilled with onsite soil.
(2) Backdrains and lateral drains shall be located at the elevation of every bench drain. First drain shall be located at the elevation just above the lower lot grade. Additional drains may be required at the discretion of the soils engineer and/or engineering geologist.

Filter Material – Shall be of the following specification or an approved equivalent:

Filter Material

Sieve Size	Percent Passing
1"	100
¾"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

Gravel - Shall be of the following specification or an approved equivalent:

Filter Material

Sieve Size	Percent Passing
1½"	100
No. 4	50
No. 200	8

Sand equivalent: Minimum of 50

Note: Figures not to scale

EARTHWORK AND GRADING GUIDELINES
TYPICAL STABILIZATION BUTTRESS SUBDRAIN DETAIL

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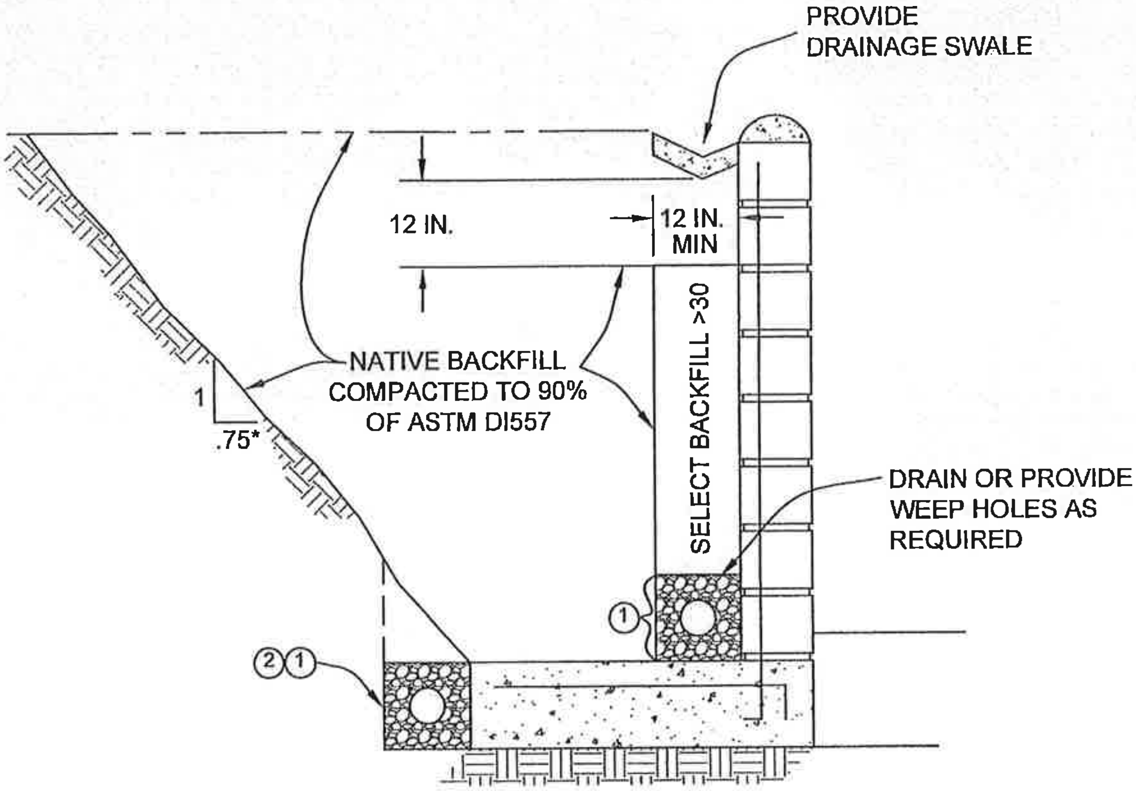
FIGURE O



* OR AS REQUIRED FOR SAFETY

NOTES

1. 4-INCH PERFORATED PVC SCHEDULE 40 OR APPROVED ALTERNATE. PLACE PERFORATION DOWN AND SURROUND WITH A MINIMUM OF 1 CUBIC FOOT PER LINEAL FOOT (1 FT. /FT.) OF 3/4 INCH ROCK OR APPROVED ALTERNATE AND WRAPPED IN FILTER FABRIC.

2. PLACE DRAIN AS SHOWN WHERE MOISTURE MIGRATION THROUGH THE WALL IS UNDESIRABLE.

NOTE: FIGURE NOT TO SCALE

EARTHWORK & GRADING GUIDELINES
TYPICAL RETAINING WALL BACKFILL

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FIGURE P

PHONE: 951.486.6780
FAX: 951.486.6790
WWW.MORENO-VALLEY.CA.US

MORENO VALLEY
WHERE DREAMS SOAR

22850 CALLE SAN JUAN DE LOS LAGOS
P.O. BOX 88005
MORENO VALLEY, CA 92552-0805

July 25, 2016

ESA PCR
c/o Brian Allee
2121 Alton Parkway
Suite 100
Irvine, CA 92606ay

Re: Fire Department Response to Request for Information Regarding Fire Protection and Emergency Medical Services for the Ironwood Villages Project

Dear Mr. Allee,

My staff and I have carefully reviewed the Ironwood Villages Proposed Project, Tentative Tract Map No. 37001. We have carefully researched and analyzed the information you provided to the City in order to determine what the impacts to the Fire Department will be due to your proposed project. Our responses below contain information from historical data, current records, and industry standards so that we could provide you with as comprehensive of a review as possible based on the initial data you have provided to the City.

1. **Service Area and Facilities.** The Moreno Valley Fire Department has a service area of 51.5 square miles and a population estimate of 197,695 (2011). Our facilities and daily staffing consist of:

Station Number	***Station Address***	***Daily Personnel***	***Equipment***
Station 2 (Sunnymead)	24935 Hemlock Ave.	7 Firefighters	1 engine 1 aerial ladder truck 1 urban search & rescue trailer 1 rescue Squad
Station 6 (Towngate)	22250 Eucalyptus Ave.	3 Firefighters	1 engine 1 reserve aerial ladder truck 1 reserve engine
Station 48 (Sunnymead Ranch)	10511 Village Rd.	3 Firefighters	1 engine
Station 58 (Moreno Beach)	28040 Eucalyptus Ave.	3 Firefighters	1 engine 1 rescue squad
Station 65 (Kennedy Park)	15111 Indian St.	3 Firefighters	1 engine 1 reserve engine
Station 91 (College Park)	16110 Lasselle St.	7 Firefighters	1 engine 1 rescue squad

Station 99 (Morrison Park)	13400 Morrison St.	3 Firefighters 1 Battalion Chief	1 Engine 1 Staff Vehicle

2. **Standard Response.** A Standard Response is defined as the minimum amount of staffing and equipment that must reach a specific emergency response location within a maximum prescribed travel time. Standard response coverage consists of three key elements:
    a. Distribution – Station and resource locations needed to ensure rapid response. Per the National Fire Protection Association (NFPA) 1710 standard and the Moreno Valley Fire Department Strategic Plan 2012-2022, an engine company is to arrive on scene within four minutes of travel time to fire incidents and emergency medical aid calls 90% of the time.
    b. Concentration – Spacing of multiple resources arranged so that an initial effective response force can arrive on scene within sufficient time frames. Per NFPA 1710 and the Moreno Valley Fire Department Strategic Plan 2012-2022, a complete first alarm fire assignment is to arrive on scene within eight minutes of travel time 90% of the time.
    c. Staffing levels – number of personnel and their task assignment. This consists of four person truck companies and three person engine companies.
    d. The standard amount of equipment dispatched to emergency calls for service is listed in the table below:

Incident Type	**Engine**	**Truck**
Medical	Minimum of 1 engine or 1 truck, whichever is closest.	
Vehicle Fire	2	0
Residential Structure Fire	3	1
Commercial Structure Fire	4	1
Hazardous Materials Incident	1 Engine, 1 Hazardous Materials Unit, 1 Hazardous Materials Squad, 1 Battalion Chief, and Environmental Health.	
Traffic Accident	Minimum of 1 engine or 1 truck, whichever is closest. Could be 2 engines and 1 truck depending on the nature of the incident	

    e. As part of CAL Fire / Riverside County Fire, the typical first alarm fire response to a commercial structure fire will consist of four Type 1 fire engines, one aerial ladder truck, and one Chief Officer. While Fire Station 58, 99, 2, and 91 are the closest fire stations (respectfully) to the proposed Ironwood Villages Project, it cannot be confirmed that an initial response would in fact include resources from those facilities due to the possibility that the equipment may be committed to other emergency calls for services. However, the City of Moreno Valley Fire Department does participate in the Regionalized Cooperative Fire Protection Delivery System of CAL Fire / Riverside County Fire. This system provides assurances that the closest and most appropriate resources are dispatched to all requests for Fire Department emergency services regardless of jurisdiction.

f. Fire Station 58 is the closest fire station to the proposed Ironwood Villages Project. The approximate distance from Fire Station 58 to the middle of the project area utilizing existing roads is 2.0 miles. This equates to an estimated travel time of 5 minutes for the first arriving engine for any emergency incidents and a 6 minute response time for the first arriving aerial ladder truck company. A full first alarm fire response to a commercial fire occurring within the proposed Ironwood Villages Project would minimally take 11 minutes 45 seconds, exceeding the NFPA 1710 standard.

g. The current Insurance Services Offices (ISO) Rating of the City Moreno Valley Fire Department is Class 4.

3. **Fire Risk.** Risk assessment involves analyzing threats or hazards facing a community. This includes: 1) performing a hazard assessment which examines building type, density of structures, occupant loading, and life safety; 2) performing a vulnerability assessment which evaluates the negative economic valuation and impact on the community; and 3) conducting a capacity assessment which analyzes the resources available to mitigate hazards, both from a pre-planning perspective and fire suppression ability. The buildings being proposed for the Ironwood Villages project are considered to be in both the high fire risk category and non-fire high hazard risk category.

4. **Risk for emergency incidents during construction.** Emergency incidents during construction are considered to be low frequency, high-risk occurrences. The closest existing fire services to the project area, which is Fire Station 58, will be impacted by the occurrence of both fire and non-fire related emergency incidents. The arrival times to the Ironwood Villages project for Moreno Valley Fire Department units from existing Moreno Valley Fire station locations will be extended since no existing fire station lies within the proposed project area and the project area lies well outside the NFPA 1710 standard of four minutes of travel time for the first engine to arrive on scene of an emergency response and eight minutes of travel time for a full first alarm fire assignment to arrive on scene of a fire emergency.

   a. **Fire Emergencies.** Buildings under construction are susceptible to fire and are more likely to have a high rate of fire spread due to absence of fire protection systems, fire detection systems, and fire protection features. These buildings also lack compartmentalization of the interior to slow the rate of fire spread. Regardless of the types of building materials present, the construction, alteration or demolition operations for a building can cause severe fires to occur which may result in significant dollar loss, injuries, and death. The probability of these incidents occurring can be reduced by the application of adopted fire codes and safe work practices. Additionally, the extent of fire damage can be limited with proper fire protection management, pre-fire planning and reasonable fire protection requirements.

b. **Non Fire Emergencies.** Non-fire related emergencies will occur during construction within a project area. These emergencies include hazardous materials incidents, confined space rescues, falls from significant heights, transportation related accidents and exposure related incidents. Mitigation of these types of accidents typically occurs through following CAL OSHA requirements with the exception of transportation related accidents.

5. **Equipment.** Fire Station 58 will remain the closest fire station to the proposed Ironwood Villages Project for responding to emergency calls for service. An aerial ladder truck in Moreno Valley will remain stationed at Fire Station 2 and provides aerial capabilities within eight minutes of travel time.

   The proposed Ironwood Villages project when fully constructed will benefit from existing fire protection located in the City of Moreno Valley. Also, fire protection serving the proposed project is consistent with NFPA 1710 recommended response time of four minutes of travel time for a first arriving fire engine as well as having a full first alarm fire assignment on scene within eight minutes of travel time. As such, the Fire Department would be able to mitigate an emergency requiring the specialized services of either a fire engine or an aerial ladder truck with its current equipment and three closest fire station locations in a timely manner.

6. **Service Levels.** The Moreno Valley Fire Department currently maintains fire services at a level that is sufficient to accommodate municipal demands such as residential, commercial, industrial, and wildland urban interface resource needs. The proposed Ironwood Villages project will not impact this service and service levels will be sufficient without the addition of equipment and/or fire station locations.

7. **Mutual Assistance.** As stated previously, the City of Moreno Valley participates in the Regionalized Cooperative Fire Protection Delivery System of CAL Fire/Riverside County Fire Department. This system provides assurances that the closest and most appropriate resources are dispatched to all requests for Fire Department emergency services regardless of jurisdictional boundaries. The Riverside County Department of Environmental Health has the regulatory authority throughout the County for Hazardous Materials and will provide assistance when requested to do so. The Fire Department anticipates that a project of this magnitude will not significantly increase the number of hazardous materials incidents experienced within the City of Moreno Valley.

8. **Impacts and Mitigation.** The proposed Ironwood Villages project is not expected to significantly increase the calls for services of the Fire Department. The Fire Department operates a fire station within four minutes of travel time to the project area for emergency responses and an aerial ladder truck within eight minutes of travel time for a first alarm fire assignment. As such, this will result in the Fire Department being able to achieve the NFPA 1710 response standard for a residential first alarm fire assignment. This type of assignment requires all first alarm fire apparatus to be on scene within eight minutes of travel time. Utilizing existing fire services will not result in significant impacts to the

public and businesses neither within the project area, nor to the existing citizens and areas of the community that currently exist.

The information provided in this analysis is based on current data obtained from the information submitted to the City for the proposed Ironwood Villages project. The findings in this letter are non-inclusive as other issues may arise during actual plan review. All final recommendations in regards to this project will be based on plan review at the time of plan submittal and current code requirements.

Should you have any questions, or wish to discuss the contents of this report, please feel free to contact me at (951) 486-6780 or by email at abdula@moval.org.

Sincerely,

Abdul R. Ahmad
Fire Chief

c: Richard Sandzimier, Planning Official
Adria Reinertson, Fire Marshal

David Crook

From: Reilly, Matthew <mjreilly@riversidesheriff.org>
Sent: Tuesday, June 07, 2016 2:43 PM
To: Brian Allee
Subject: Ironwood Village Project
Attachments: planning project response plan.docx

Good afternoon Brian,

Sorry for the delay in response. I have attached the response from the police department for your project. If you have any questions or need any more information please contact me

Thanks

Deputy M. Reilly #4695
Moreno Valley Police Department
Community Services Unit
Station 951-486-6700
Desk 951-486-6715
Fax 951-486-6750

Moreno Valley Unified School District

25634 Alessandro Boulevard
Moreno Valley, California 92553
951-571-7500
www.mvusd.net

The mission of Moreno Valley Unified School District is to ensure all students graduate high school prepared to successfully enter into higher education and/or pursue a viable career path.

May 18, 2016

Mr. Brian Allee
Senior Environmental Planner
ESA PCR
2121 Alton Parkway, Suite 100
Irvine, CA 92606

Re: Information Requested Regarding School Services for the Ironwood Village Project in the City of Moreno Valley

Dear Mr. Allee:

We hope to be able to answer all your questions for the MND you are preparing for the Ironwood Village Project.

SCHOOLS OF ATTENDANCE:
Currently, the schools that will provide educational services in the area of this project is:

Elementary: Grades TK – 5
Cloverdale Elementary
12050 Kitching St, Moreno Valley, CA 92557

Middle: Grades 6 – 8
Palm Middle
11900 Swanson Avenue, Moreno Valley, CA 92557

High: Grades 9-12
Valley View High School*
13135 Nason Street, Moreno Valley, CA 92557

*New High School: We are in the process of constructing a fifth (5) high school that would serve this area. The land has been purchased and due diligence is being performed. We hope to have this new high school ready for occupancy by 2020, with a capacity of 2,400 students. Initial enrollment will be 9th grade students only; second year 9th and 10th; third year 9-11; and fourth year 9-12.

STUDENT GENERATION RATES sourced from the Fee Justification Report for New Residential & Commercial/Industrial Development dated April 21, 2016:
Elementary: .3019
Middle: .1500
High: .1973

EXISTING PERMANENT AND PORTABLE CLASSROOMS:

Cloverdale:	12 Portables, 22 Permanent Classrooms
Palm:	5 Portables, 51 Permanent Classrooms
Valley view:	27 Portables, 73 Permanent Classrooms

EXISTING ENROLLMENT:
As of CBEDS Day, October 7, 2015, the enrollment including SELPA SDC and Middle College students was:

Cloverdale:	770
Palm:	1,243
Valley View:	2,636

PROJECTED ENROLLMENT 2019/2020:		DESIGN CAPACITY 2019/2020:	
Cloverdale:	800	Cloverdale:	850
Palm:	1300	Palm:	1465
Valley View:	2636	Valley View:	2638

IMPROVEMENTS TO EXISTING SCHOOLS:

Moreno Valley Unified School District has created a 2013/2014 Facilities Master Plan that was adopted by our Board November 12, 2013. This Facilities Master Plan can be found on our District's website, www.mvusd.net.

Within this document, the following improvements have been identified, dependent upon funding availability:

Cloverdale Elementary:
Removal of all 12 portable classrooms and 1 portable restroom building.
The construction of a 2-story permanent classroom building (10 classrooms + restrooms), to replace the 12 classroom portables and 1 portable restroom building.
Add staff toilets to Classroom Building C and D.
21st Century Technology Upgrades

Palm Middle:
Parking Expansion and reconfiguration; separate bus and parent drop off.
Upgrades to the Library and Multipurpose Room.
Replacement of drinking fountains.
Upgrade exterior fencing and gates.
New enclosed gymnasium to replace existing pavilion.
Food Service and Locker Room Transformation.
Classroom Building Transformation including Science classrooms (interior finishes, ceilings and energy efficient lighting).

Valley View High:
Classroom Buildings Transformation including Science and Special Education (SDC Therapy) Classrooms.
New defined and secured point of entry.
Transformation of gymnasium, locker rooms and weight rooms.
Food Service Area Transformation.
New girls' softball field.
New lunch shelter
New Guard Shack at main parking lot entrance.
Removal of portable classrooms after construction of High School No. 5.
New Culinary Arts program.
21st Century Technology Upgrades

We hope this has answered all of your questions. If we can be of further assistance, please do not hesitate to contact us, (951) 571-7690.

Sincerely,

Sergio San Martin
Director
Facilities Planning and Development
MORENO VALLEY USD

/cla

1. Police station(s) and/or other facilities providing police services to the Project site;
   - The city of Moreno Valley contracts their police service with the Riverside County Sheriff's Department.

2. Please provide information regarding police station(s) serving the Project site, including:
   - The Moreno Valley Police Station is located at 22850 Calle San Juan de Los Lagos, Moreno Valley 92552. The station phone number is 951-486-6700 and the non-emergency crime reporting phone number is 951-247-8700

a. Staffing and equipment for each police facility serving the Project site (i.e., patrol cars, total full-time and part-time staff, number of officers on 24-hour duty):
   - Currently, the Moreno Valley Police Dept. has 199 full time employees. 150 sworn officers and 49 non-sworn (front office staff, support personnel). The number of deputies patrolling during a 24 hour period varies during time of day.

b. Population served and boundaries of police facilities;
   - The population of Moreno Valley is approximately 207,000.

c. Special service teams (i.e., SWAT and K-9) available within the police stations;
   - Because Moreno Valley contracts their police service through the Riverside County Sheriff's Department, they have access to all of the county services; SWAT Team, helicopter, dive team, off highway enforcement team, bomb squad, etc.

d. A general overview of the MVPD's emergency response system (i.e., dispatch system, standard procedures and protocols, etc.);
   - Emergencies are handled on a case by case basis and, if needed, the Moreno Valley Police Dept. can request assistance from surrounding agencies. Moreno Valley Police Dept. also utilizes the Sheriff's Department dispatching system. Dispatch phone number is 951-776-1099

e. Most recent data on associated response times for the station/facility serving the Project area and the overall MVPD, if known;
   - Response times vary depending on the nature of the call. The dispatchers and police department use a priority system. Serious in-progress crimes or crimes that threaten life are priority 1. Priority 1 calls will immediately be handled by any available officer. An example of a priority 2 call would be a residential alarm. Priority 2 calls will be handled once an officer becomes available. Priority 3 and 4 calls are crimes that are not in progress and an officer will respond once all priority 1 and 2 calls have been handled.

f. Crime statistics for police facilities serving the Project site.
   - Crime statistics are available at www.crimereports.com or www.spotcrime.com

3. What is the MVPD's response time goals(s)?
   - The goal is to handle all high priority calls immediately.

4. What would be the anticipated MVPD response time for crime incidents to the Project site with the project? What would be the response time goal to the site with the Project?
   - Response time will depend on the nature and priority of the call.

5. Any planned improvements to the police protection facilities in the service area of the Project site (i.e., expansion, new facilities, additional staffing, etc.)? If so, please describe.

- At this time, there are no planned improvements for the police department facilities.

6. Would Project implementation require the physical expansion of an existing police station(s), a new police station, or additional staffing to the police protection facilities servicing the Project site? If so, please describe.

- This project does not require the Moreno Valley Police Department to expand their existing facility

a. If any new staff required, how many and what position?

- No new staff will be required due to the implementation of this project

b. If any new staff required, could the new staff be accommodated within existing police station(s) without the need for physical expansion of the existing stations(s)? N/A

7. Any other design features or special police protection requirements due to the specific attributes of the project?

Some of the recommendations from the police department for this project would be;

- Address numbers on all buildings/residences should be placed in the most visible location on the building and be illuminated. Address numbers should also be painted on the curb in front of each residence.
- The parking lots, walking trails, street and buildings should be well lit. Minimize the shadows cast by landscaping and trees on the property, walkways and public areas.
- Addition of a city wide camera system at the corner of Nason Street and Ironwood Avenue.
- If there will be one or more community mailbox areas they need to be well lit, in a highly visible public place and designed to resist mail theft.
- The long south main street should have some type of design, like speed bumps, dips or similar objects, to reduce vehicle speed.

David Crook

From: Claudia Manrique <claudiam@moval.org>
Sent: Monday, July 18, 2016 10:58 AM
To: Brian Allee
Subject: FW: Moreno Valley Public Library Request (Ironwood Village)

Brian:

Please let me know if you have any more questions regarding the library questions or any of the other requests that you sent out.

Sincerely,
Claudia

From: Terrie Stevens
Sent: Monday, July 18, 2016 10:28 AM
To: Claudia Manrique
Cc: Allen D. Brock, CBO; Richard Sandzimier
Subject: RE: Moreno Valley Public Library Request

Claudia,
Sorry, I didn't remember that you were waiting on anything from me. My information in blue below:

Please provide facility information for each MVPL library serving the Project site, including
a. Size of library buildings (square footage); 15,000 sq. ft.
b. Personnel (paid employees and volunteers); 23 employees, Avg. 32 volunteers per month at avg. 10 hrs. each. (most of these are individuals who come in from other agencies and provide assistance with income tax, Covered California, veteran's services… Gardening classes, art classes…
c. Collection size and amenities; collection size 82,405.
d. Programmed or target service population (please indicate the basis for the population);
I assume this would be the entire MV population
e. Actual population served; Same as above
f. Census tracts that compromise each of the library's service area (if known) and; Entire City

2. Planned, funded, and/or scheduled service improvements, construction or expansions to MVPL facilities that would serve the Project site; N/A

3. Would Project implementation require the physical expansion of an existing library(s) or a new library serving the Project site? If so, please describe. NO

4. Please confirm MVPL's standards and goals used to assess the adequacy of library facilities and potential impacts from Project development. N/A

Terrie Stevens
Administrative Services Director
Administrative Services
City of Moreno Valley

p: 951.413.3043 | e: terries@moval.org w: www.moval.org
14177 Frederick St., Moreno Valley, CA 92553

From: Claudia Manrique
Sent: Monday, July 18, 2016 8:11 AM
To: Richard Sandzimier
Cc: Terrie Stevens; Allen D. Brock, CBO
Subject: RE: Moreno Valley Public Library Request

Rick:

I met with Terrie regarding the Library questions – we went over the Development Impact fees that would go to the Library.
It was my understanding that HR/Library Services were still working on the other questions (employee #s, where a future branch may go, etc) and would send them directly to PCR.

Claudia

Claudia Manrique
Associate Planner
Community Development
City of Moreno Valley
p: 951.413.3225 | e: claudiam@moval.org w: www.moval.org
14177 Frederick St., Moreno Valley, CA 92553

From: Richard Sandzimier
Sent: Sunday, July 17, 2016 11:45 AM
To: Planning Staff
Subject: Fwd: Moreno Valley Public Library Request

Please look at the email below and let me know if you or anyone you are aware of in Planning that is working on this. Thanks

Rick Sandzimier, Planning Official
City of Moreno Valley

Sent from my iPhone

Richard Sandzimier
Planning Official
Community Development
City of Moreno Valley
p: 951.413.3214 | e: richardsa@moval.org w: www.moval.org
14177 Frederick St., Moreno Valley, CA 92553

Begin forwarded message:

> **From:** Terrie Stevens <terries@moval.org>
> **Date:** July 16, 2016 at 1:20:21 PM PDT
> **To:** "Allen D. Brock, CBO" <allenb@moval.org>, Richard Sandzimier <richardsa@moval.org>
> **Subject: Fwd: Moreno Valley Public Library Request**
>
> I met with someone from Planning on this a month or two ago and I apologize that I don't recall what her name was. I gave her the request for information. Can one of you respond to Brian Allee on Monday and copy me? Thanks so much.

Sent from my iPad

Terrie Stevens
Administrative Services Director
Administrative Services
City of Moreno Valley
p: 951.413.3043 | e: terries@moval.org w: www.moval.org
14177 Frederick St., Moreno Valley, CA 92553

Begin forwarded message:

From: Brian Allee <B.Allee@pcrnet.com>
Date: July 15, 2016 at 3:51:08 PM PDT
To: Terrie Stevens <terries@moval.org>
Cc: Ivorie Franks <IVORIE.FRANKS@lsslibraries.com>
Subject: RE: Moreno Valley Public Library Request

Good afternoon Terrie. I wanted to check in on the status of our information request for libraries originally submitted on May 11th. Please let me know how it's coming along and if you have any questions. Thanks in advance.

Brian J. Allee
Senior Planner
ESA PCR
949.753.7001 main

From: Brian Allee
Sent: Tuesday, June 7, 2016 3:13 PM
To: terries@moval.org
Subject: FW: Moreno Valley Public Library Request

Good afternoon Terrie. I just wanted to check in on the status of our library services information request regarding the Ironwood Village Project. Thanks in advance.

Brian J. Allee
Senior Planner
ESA PCR
949.753.7001 main

From: Ivorie Franks [mailto:IVORIE.FRANKS@lsslibraries.com]
Sent: Tuesday, June 7, 2016 3:11 PM
To: Brian Allee <B.Allee@pcrnet.com>
Subject: Re: Moreno Valley Public Library Request

Good afternoon Brian,

The City of Moreno Valley staff will provide you with information related to your information request. For more information, please feel free to contact Terrie Stevens. Contact information is the following:

Terrie Stevens
Administrative Services Director
Administrative Services

City of Moreno Valley
p: 951.413.3043 | e: terries@moval.org

Ivorie Franks
Library Director

Moreno Valley Public Library
25480 Alessandro Blvd

Moreno Valley, CA 92553
Office: 951-413-3882

www.LSSLIBRARIES.com | Facebook | Twitter | LinkedIn

From: Brian Allee <B.Allee@pcrnet.com>
Sent: Tuesday, June 7, 2016 2:56 PM
To: Ivorie Franks
Cc: David Crook
Subject: RE: Moreno Valley Public Library Request

Good afternoon Ivorie. I just wanted to check in on the status of our library services information request regarding the Ironwood Village Project. Thanks in advance.

Brian J. Allee
Senior Planner
ESA PCR
949.753.7001 main

From: Ivorie Franks [mailto:IVORIE.FRANKS@lsslibraries.com]
Sent: Friday, May 13, 2016 9:04 AM
To: Brian Allee <B.Allee@pcrnet.com>
Subject: Moreno Valley Public Library Request

Good morning Brian,

I received your request for library services information. I will send you library services information as soon as possible. If you need to contact me in the future, please feel free to contact me at (951) 413-3882 or ivorie.franks@lsslibraries.com.

Respectfully,

Ivorie Franks
Library Director

Moreno Valley Public Library
25480 Alessandro Blvd

Moreno Valley, CA 92553
Office: 951-413-3882

www.LSSLIBRARIES.com | Facebook | Twitter | LinkedIn

URBAN CROSSROADS

Ironwood Residential (TTM No. 37001)

TRAFFIC IMPACT ANALYSIS
CITY OF MORENO VALLEY

PREPARED BY:

Aric Evatt, PTP
aevatt@urbanxroads.com
(949) 336-5978

Charlene So, P.E.
cso@urbanxroads.com
(949) 336-5982

MARCH 9, 2016

09386-06 TIA Report.docx

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APPENDICES

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LIST OF EXHIBITS

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LIST OF TABLES

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
DIF	Development Impact Fee
E+P	Existing Plus Project
FHWA	Federal Highway Administration
HCM	Highway Capacity Manual
ITE	Institute of Transportation Engineers
LOS	Level of Service
MUTCD	Manual on Uniform Traffic Control Devices
NCHRP	National Cooperative Highway Research Program
PHF	Peak Hour Factor
Project	Ironwood Residential (TTM No. 37001)
RivTAM	Riverside County Transportation Analysis Model
RTP	Regional Transportation Plan
SCAG	Southern California Association of Governments
sf	Square Feet
TIA	Traffic Impact Analysis
tsf	Thousand Square Feet
TUMF	Transportation Uniform Mitigation Fee Program
vphg	Vehicles per Hour of Green
WRCOG	Western Riverside Council of Governments

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1 INTRODUCTION

This report presents the results of the traffic impact analysis (TIA) for the proposed Ironwood Residential (TTM No. 37001) ("Project"), which is located north of Ironwood Avenue and between Nason Street and Oliver Street, in the City of Moreno Valley as shown on Exhibit 1-1.

The purpose of this traffic impact analysis is to evaluate the potential impacts to traffic and circulation associated with the development of the proposed Project, and recommend improvements to mitigate impacts considered significant in comparison to established regulatory thresholds. As directed by City of Moreno Valley staff, this TIA has been prepared in accordance with the City of Moreno Valley Transportation Engineering Division's *Traffic Impact Analysis Preparation Guide* (August 2007). (1)

1.1 PROJECT OVERVIEW

The Project is proposed to consist of 181 single family detached residential dwelling units. Per the City's traffic study guidelines, the Opening Year will have a five (5) year minimum horizon. As such, the Opening Year analysis will assess 2020 traffic conditions.

Trips generated by the Project's proposed land uses have been estimated based on trip generation rates collected by the Institute of Transportation Engineers (ITE) and presented in ITE's most recent edition of *Trip Generation* (9th Edition, 2012). (2) The Project is anticipated to generate a net total of approximately 1,723 trip-ends per day with 136 AM peak hour trips and 181 PM peak hour trips. The assumptions and methods used to estimate the Project's trip generation characteristics are discussed in detail in Section 4.1 *Project Trip Generation* of this report.

1.2 ANALYSIS SCENARIOS

Consistent with the City of Moreno Valley traffic study guidelines, potential impacts to traffic and circulation will be assessed for each of the following conditions:

- Existing (2015) (1 scenario)
- Existing plus Project (1 scenario)
- Opening Year Cumulative (2020), Without and With Project (2 scenarios)

1.2.1 EXISTING (2015) CONDITIONS

Information for Existing conditions is disclosed to represent the baseline traffic conditions as they existed at the time this report was prepared.

EXHIBIT 1-1: PRELIMINARY TENTATIVE TRACT MAP

1.2.2 Existing Plus Project Conditions

The Existing Plus Project (E+P) analysis determines significant traffic impacts that would occur on the existing roadway system with the addition of Project traffic. The E+P analysis is intended to identify the Project-specific impacts associated solely with the development of the proposed Project based on a comparison of the E+P traffic conditions to Existing conditions.

1.2.3 Opening Year Cumulative (2020) Conditions

To account for background traffic, other known cumulative development projects in the study area were included in addition to 10.41% of ambient growth for Opening Year Cumulative traffic conditions in conjunction with traffic associated with the proposed Project. Although it is unlikely that these cumulative projects would be fully built and occupied by Year 2020, they have been included in an effort to conduct a conservative analysis and overstate and opposed to understate potential cumulative traffic impacts.

The currently adopted Southern California Association of Governments (SCAG) 2012 Regional Transportation Plan (RTP) (April 2012) growth forecasts for the unincorporated areas of the City of Moreno Valley identifies projected growth in population of 187,400 in 2008 to 255,200 in 2035, or a 36.2 percent increase over the 27 year period. (3) The change in population equates to roughly a 1.15 percent growth rate compounded annually. Similarly, growth over the same 27 year period in households is projected to increase by 42.5 percent, or 1.32 percent annual growth rate. Finally, growth in employment over the same 27 year period is projected to increase by 99.4 percent, or a 2.59 percent annual growth rate.

Based on a comparison of Existing traffic volumes to the Horizon Year (2035) forecasts, the average growth rate is estimated at approximately 3.17 percent compounded annually between Existing and Horizon Year (2035) traffic conditions. The annual growth rate at each individual intersection is not lower than 2.08 percent compounded annually to as high as 4.20 percent compounded annually over the same time period. Therefore, the annual growth rate utilized for the purposes of this analysis would appear to conservatively approximate the anticipated regional growth in traffic volumes in the City of Moreno Valley for both Opening Year Cumulative and Horizon Year (2035) traffic conditions, especially when considered along with the addition of project-related traffic. As such, the growth in traffic volumes assumed in this traffic impact analysis would tend to overstate as opposed to understate the potential impacts to traffic and circulation.

1.2.4 Horizon Year (2035) Conditions

The Horizon Year (2035) Without Project traffic conditions were derived from the Riverside County Transportation Analysis Model (RivTAM) modified to represent Horizon Year conditions for the City of Moreno Valley using accepted procedures for model forecast refinement and smoothing. The traffic forecasts reflect the area-wide growth anticipated between Existing conditions and Horizon Year conditions. The Horizon Year With Project traffic forecasts were determined by adding the Project traffic to the Horizon Year Without Project traffic forecasts from the RivTAM model. The Horizon Year traffic forecasts used in the traffic analysis were refined with existing peak hour traffic count data collected at intersection analysis locations. The initial estimate of the future peak hour turning movements has, therefore, been reviewed for reasonableness. The reasonableness checks performed include a review of traffic flow conservation in addition to a comparison with the Existing and Opening Year Cumulative traffic volumes. Where necessary, the Horizon Year volumes have been adjusted to achieve flow conservation, reasonable growth, and reasonable diversion between parallel routes.

The Horizon Year Without and With Project traffic conditions analyses will be utilized to determine if improvements funded through regional transportation mitigation fee programs, such as the TUMF and DIF programs, or other approved funding mechanism can accommodate the long-range cumulative traffic at the target LOS identified in the City of Moreno Valley General Plan. (4) If the "funded" improvements can provide the target LOS, then the Project's payment into TUMF and/or DIF will be considered as long-range cumulative mitigation through the conditions of approval. Other improvements needed beyond the "funded" improvements (such as localized improvements to non-TUMF facilities) are identified as such.

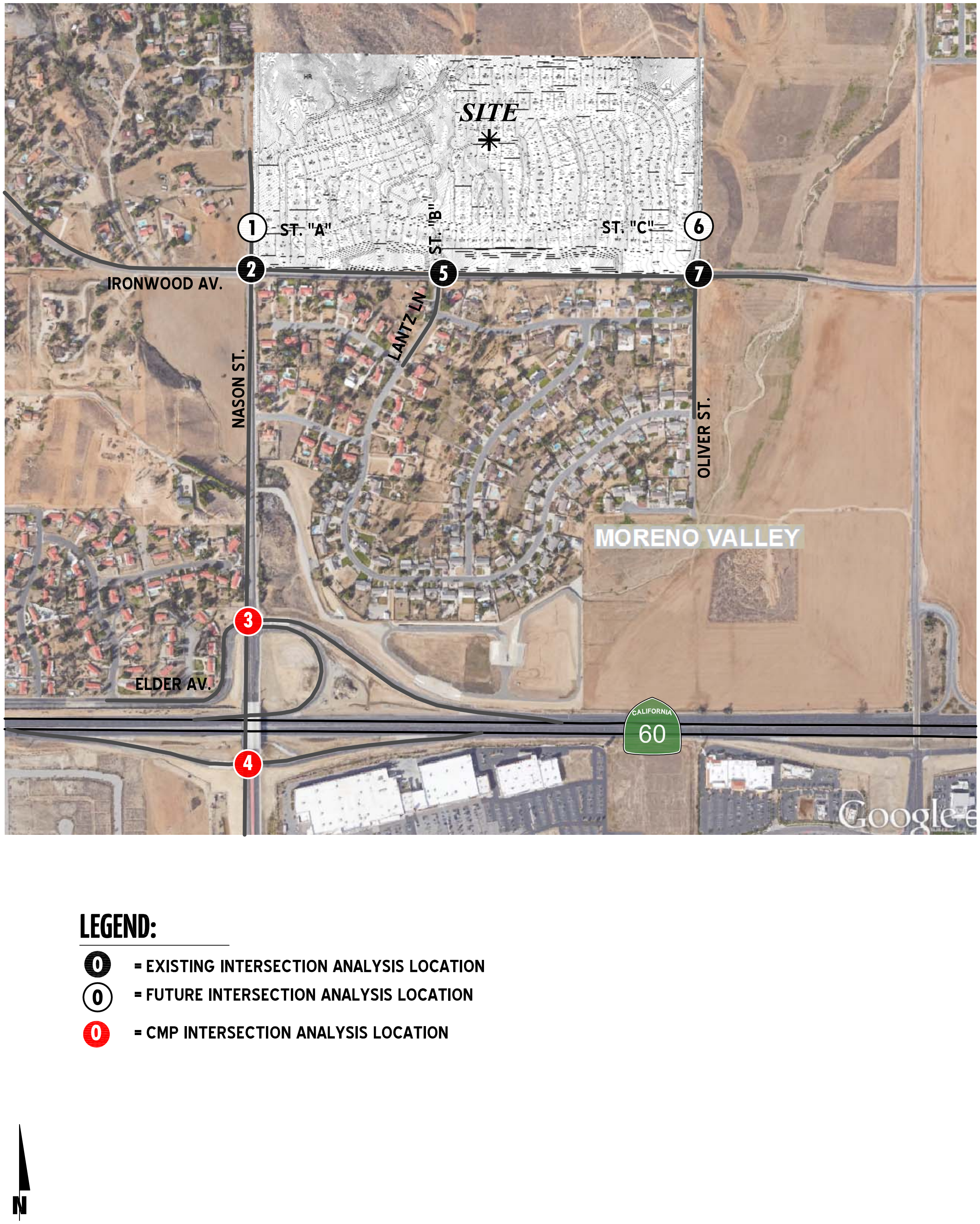
1.3 STUDY AREA

The traffic impact study area was defined in coordination with the City of Moreno Valley and in conformance with the requirements of the City's TIA preparation guidelines. Based on these guidelines, the minimum area to be studied shall include any intersection of "Collector" or higher classification street, with "Collector" or higher classification streets, at which the proposed project will add 50 or more peak hour trips. Exhibit 1-2 presents the study area roadway network and intersection analysis locations.

It should be pointed out that the "50 peak hour trip" criteria utilized by the City of Moreno Valley is consistent with the methodology employed by other jurisdictions throughout Riverside County and generally represents a threshold of trips at which a typical intersection would have the potential to be impacted. Although each intersection may have unique operating characteristics, this traffic engineering rule of thumb is a valid and proven way to establish a study area.

To ensure that this TIA satisfies the needs of the City of Moreno Valley and complies with the City's TIA preparation guidelines, Urban Crossroads, Inc. prepared a Project Traffic Study Scoping Agreement for review by City staff prior to the preparation of this TIA. The Agreement provides an outline of the Project study area, trip generation, trip distribution, and analysis methodology. The Agreement approved by the City of Moreno Valley is included in Appendix "1.1".

EXHIBIT 1-2: LOCATION MAP



1.3.1 INTERSECTIONS

The following seven Project study area intersection locations shown on Exhibit 1-2 and listed on Table 1-1 were selected for this TIA based on the City's TIA analysis methodology that requires analysis of intersection locations with 50 or more peak-hour Project trips and input from the City of Moreno Valley Traffic Engineering Division.

TABLE 1-1: INTERSECTION ANALYSIS LOCATIONS

ID	Intersection Location	Jurisdiction
1	Nason Street / Street "A" – Future Intersection	Moreno Valley
2	Nason Street / Ironwood Avenue	Moreno Valley
3	Nason Street / SR-60 Westbound Ramps	Moreno Valley, Caltrans
4	Nason Street / SR-60 Eastbound Ramps	Moreno Valley, Caltrans
5	Street "B"/Lantz Lane / Ironwood Avenue	Moreno Valley
6	Oliver Street / Street "C"	Moreno Valley
7	Oliver Street / Ironwood Avenue	Moreno Valley

1.3.2 ROADWAY SEGMENTS

The roadway segment study area utilized for this analysis is based on a review of the key roadway segments in which the Project is anticipated to contribute 50 or more peak hour trips as shown on Exhibit 1-2. The study area identifies a total of 10 existing/future roadway segments. Table 1-2 provides a summary of the study area roadway segments.

TABLE 1-2: ROADWAY SEGMENT ANALYSIS LOCATIONS

ID	Roadway Segments	Jurisdiction
1	Nason Street, Street "A" to Ironwood Avenue	Moreno Valley
2	Nason Street, South of Ironwood Avenue	Moreno Valley
3	Nason Street, North of SR-60 Westbound Ramps	Moreno Valley
4	Nason Street, SR-60 Westbound Ramps to SR-60 Eastbound Ramps	Moreno Valley
5	Nason Street South of SR-60 Eastbound Ramps	Moreno Valley
6	Ironwood Avenue, West of Nason Street	Moreno Valley
7	Ironwood Avenue, Nason Street to Lantz Lane	Moreno Valley
8	Ironwood Avenue, Lantz Lane to Oliver Street	Moreno Valley
9	Ironwood Avenue, East of Oliver Street	Moreno Valley
10	Oliver Street, Street "C" and Ironwood Avenue	Moreno Valley

1.4 CIRCULATION SYSTEM DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

A summary of the operationally deficient study area intersections, deficient roadway segments, and recommended improvements required to achieve acceptable circulation system operational conditions are described in detail within Section 3.0 *Existing Conditions*, Section 5.0 *E+P Traffic Analysis*, Section 6.0 *Opening Year Cumulative (2020) Traffic Analysis*, and Section 7.0 *Horizon Year (2035) Traffic Analysis* of this report. The peak hour intersection LOS are summarized on

Table 1-3 for each of the analysis scenarios and the roadway segment LOS are summarized on Table 1-4.

Table 1-5 lists the recommended improvements necessary to reduce the identified intersection LOS deficiencies by traffic condition. Street and intersection improvements that may be funded though the City's DIF and/or TUMF programs are noted. If a particular facility tentatively listed in Table 1-5 is ultimately excluded from either the DIF or TUMF programs, the Project would be responsible for, and would be required to pay, fair share fees for improvement of affected facilities. These fees are collected as part of a funding mechanism aimed at ensuring that regional highways and arterial expansions keep pace with the projected vehicle trip increases. Alternatively, minor fair share responsibilities may be waived when collection is infeasible or where other mitigation assignments substantially exceed the Project's demonstrated impacts.

Roadway widening has been recommended consistent with the improvements necessary to achieve acceptable peak hour intersection operations (see Table 1-5), however, additional roadway widening has not been recommended if the adjacent study area intersection of the deficient roadway segment is anticipated to operate at acceptable LOS without additional through lanes.

1.5 LOCAL AND REGIONAL FUNDING MECHANISMS

Transportation improvements throughout the City of Moreno Valley are funded through a combination of project mitigation, fair share contributions or development impact fee programs, such as Transportation Uniform Mitigation Fee (TUMF) program or the County's Development Impact Fee (DIF) program. Identification and timing of needed improvements is generally determined through local jurisdictions based upon a variety of factors.

1.5.1 TRANSPORTATION UNIFORM MITIGATION FEE (TUMF) PROGRAM

The Western Riverside Council of Governments (WRCOG) is responsible for establishing and updating TUMF rates. The County may grant to developers a credit against the specific components of fees for the dedication of land or the construction of facilities identified in the list of improvements funded by each of these fee programs. Fees are based upon projected land uses and a related transportation needs to address growth based upon a 2009 Nexus study.

TUMF is an ambitious regional program created to address cumulative impacts of growth throughout western Riverside County. Program guidelines are being handled on an iterative basis. Exemptions, credits, reimbursements and local administration are being deferred to primary agencies. The County of Riverside serves this function for the proposed Project. Fees submitted to the County are passed on to the WRCOG as the ultimate program administrator.

Table 1-3

Summary of Intersection Level of Service

#	Intersection	Traffic Control[2]	Existing Level of Service		E+P Level of Service		2020 NP Level of Service		2020 WP Level of Service		2035 NP Level of Service		2035 WP Level of Service	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	Nason St. / Street "A"	**CSS**	NA[3]		A	A	NA[3]		A	A	NA[3]		A	A
2	Nason St. / Ironwood Av.	TS	B	B	B	B	D	C	D	C	**F**	**F**	**F**	**F**
3	Nason St. / SR-60 WB Ramps	TS	B	C	C	C	C	C	C	C	C	C	C	C
4	Nason St. / SR-60 EB Ramps	TS	B	B	B	B	C	B	C	B	C	C	C	C
5	Lantz Ln. / Ironwood Av.	CCS	B	B	B	B	B	B	B	B	B	B	C	B
6	Oliver St. / Street "C"	**CSS**	NA[3]		A	A	NA[3]		A	A	NA[3]		A	A
7	Oliver St. / Ironwood Av.	CCS	B	B	B	B	B	B	B	B	B	B	C	B

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; TS = Traffic Signal

[3] NA = Not applicable; intersection does not exist for analysis scenario.

Table 1-4

Summary of Roadway Segment Level of Service

#	Roadway	Segment Limits	Roadway Section	Existing LOS[2]	E+P LOS[2]	2020 NP LOS[2]	2020 WP LOS[2]	2035 NP LOS[2]	2035 WP LOS[2]	Acceptable LOS[2]
1	Nason Street	Street "A" to Ironwood Avenue	**2U**	NA[3]	A	NA[3]	A	NA[3]	A	C
2		South of Ironwood Avenue	2U	A	A	C	C	C	D	D
3		North of SR-60 WB Ramps	4D	A	A	A	A	A	A	D
4		SR-60 WB Ramps to SR-60 EB Ramps	4D	A	A	A	A	A	A	D
5		South of SR-60 EB Ramps	4D	A	A	B	B	C	C	D
6	Ironwood Avenue	West of Nason Street	2U	A	A	**E**	**E**	**F**	**F**	C
7		Nason Street to Lantz Lane	2U	A	A	B	B	B	C	C
8		Lantz Lane to Oliver Street	2U	A	A	A	B	B	B	C
9		East of Oliver Street	2U	A	A	A	B	B	B	C
10	Oliver Street	Between Street "C" and Ironwood Avenue	**2U**	NA[3]	A	NA[3]	A	NA[3]	A	C

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

N/A = Not Applicable; Segment does not exist.

[1] These maximum roadway capacities have been extracted from the City of Moreno Valley's Transportation Division's Traffic Impact Analysis Transportation Division's Traffic Impact Analysis Preparation Guidelines (August 2007). These roadway capacities are "rule of thumb" estimates for planning purposes. The LOS "E" service volumes are estimated maximum daily capacity for respective classifications. Capacity is affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian and bicycle traffic.

[2] LOS = Level of Service.

[3] NA = Not applicable; intersection does not exist for analysis scenario.

Table 1-5

Summary of Improvements for Horizon Year (2035) Conditions

#	Intersection Location	2035 Recommended Improvements	Program Improvements[1]	Fair Share[2]
2	Nason St. / Ironwood Av.	NBL turn lane	No	13.0%
		SBL turn lane	No	
		EBR turn lane	No	
		Modify the traffic signal to implement protected left turn phasing for the NB/SB approaches and overlap phasing on the EBR turn lane	No	

[1] Improvements included in TUMF Nexus or City of Moreno Valley DIF programs.

[2] Program improvements constructed by project may be eligible for fee credit. In lieu fee payment is at discretion of City.
Represents the fair share percentage for the Project during the most impacted peak hour.

TUMF guidelines empower a local zone committee to prioritize and arbitrate certain projects. The Project is located in the Central Zone. The zone has developed a 5-year capital improvement program to prioritize public construction of certain roads. TUMF is focused on improvements necessitated by regional growth. The SR-60/Nason Street interchange, Nason Street, and Ironwood Avenue are designated TUMF roadways/facilities within the Project's traffic study area.

1.5.2 CITY OF MORENO VALLEY DEVELOPMENT IMPACT FEE (DIF) PROGRAM

The City of Moreno Valley has created its own local Development Impact Fee (DIF) program to impose and collect fees from new residential, commercial and industrial development for the purpose of funding roadways and intersections necessary to accommodate City growth as identified in the City's General Plan Circulation Element. The City's DIF program includes facilities that are not part of, or which may exceed improvements identified and covered by the TUMF program. As a result, the pairing of the regional and local fee programs provides a more comprehensive funding and implementation plan to ensure an adequate and interconnected transportation system. Under the City's DIF program, the City may grant to developers a credit against specific components of fees when those developers construct certain facilities and landscaped medians identified in the list of improvements funded by the DIF program.

The timing to use the DIF fees is established through periodic capital improvement programs which are overseen by the City's Public Works Department. Periodic traffic counts, review of traffic accidents, and a review of traffic trends throughout the City are also periodically performed by City staff and consultants. The City uses this data to determine the timing of implementing the improvements listed in its facilities list.

The Project applicant will be subject to the City's DIF fee program, and will pay the requisite City DIF fees at the rates then in effect pursuant to the City's ordinance. The Project Applicant's payment of the requisite DIF fees at the rates then in effect pursuant to the DIF Program will mitigate its impacts to DIF-funded facilities.

1.5.3 FAIR SHARE CONTRIBUTION

Project mitigation may include a combination of fee payments to established programs (e.g., TUMF and/or DIF), construction of specific improvements, payment of a fair share contribution toward future improvements or a combination of these approaches. Improvements constructed by development may be eligible for a fee credit or reimbursement through the program where appropriate (to be determined at the City of Moreno Valley's discretion).

When off-site improvements are identified with a minor share of responsibility assigned to proposed development, the approving jurisdiction may elect to collect a fair share contribution or require the development to construct improvements. Detailed fair share calculations, for each peak hour, has been provided on Table 1-6 for the applicable deficient intersections shown previously on Table 1-5. Improvements included in a defined program and constructed by development may be eligible for a fee credit or reimbursement through the program where appropriate.

Table 1-6

Project Fair Share Calculations

#	Intersection	Existing	Project	2035 WP	Total New Traffic	Project % of New Traffic[1]
2	Nason St. / Ironwood Av.					
	AM:	955	102	1,741	786	**13.0%**
	PM:	785	136	1,789	1,004	13.5%

[1] Project percentage of new traffic between Existing (2015) and Horizon Year (2035) traffic conditions.

BOLD = Peak hour with the highest delay.

1.6 On-Site Roadway and Site Access Improvements

The Project is proposed to have access on Nason Street via Street "A", Ironwood Avenue via Street "B" (northern extension of Lantz Lane), and Oliver Street via Street "C". All Project driveways are proposed to accommodate full-access (e.g., no turning movement restrictions).

1.6.1 Site Adjacent Roadway and Site Access Improvements

The recommended site-adjacent roadway improvements for the Project are described below. These improvements need to be incorporated into the project description prior to Project approval or imposed as conditions of approval as part of the Project approval. Exhibit 1-3 illustrates the site-adjacent roadway improvement recommendations for the Project.

Exhibit 1-3 also illustrates the on-site and site adjacent recommended intersection improvements at the Project driveways. Construction of on-site and site adjacent improvements are recommended to occur in conjunction with adjacent Project development activity, or as needed for Project access purposes.

Ironwood Avenue – Ironwood Avenue is an east-west oriented roadway located along the Project's southern boundary. Construct Ironwood Avenue from Nason Street to Oliver Street at its ultimate half-section width as a minor arterial (88-foot right-of-way), in compliance with applicable City of Moreno Valley standards. Improvements along the Project's frontage (north side of Ironwood Avenue) would be those required by final conditions of approval for the proposed project and applicable City of Moreno Valley standards.

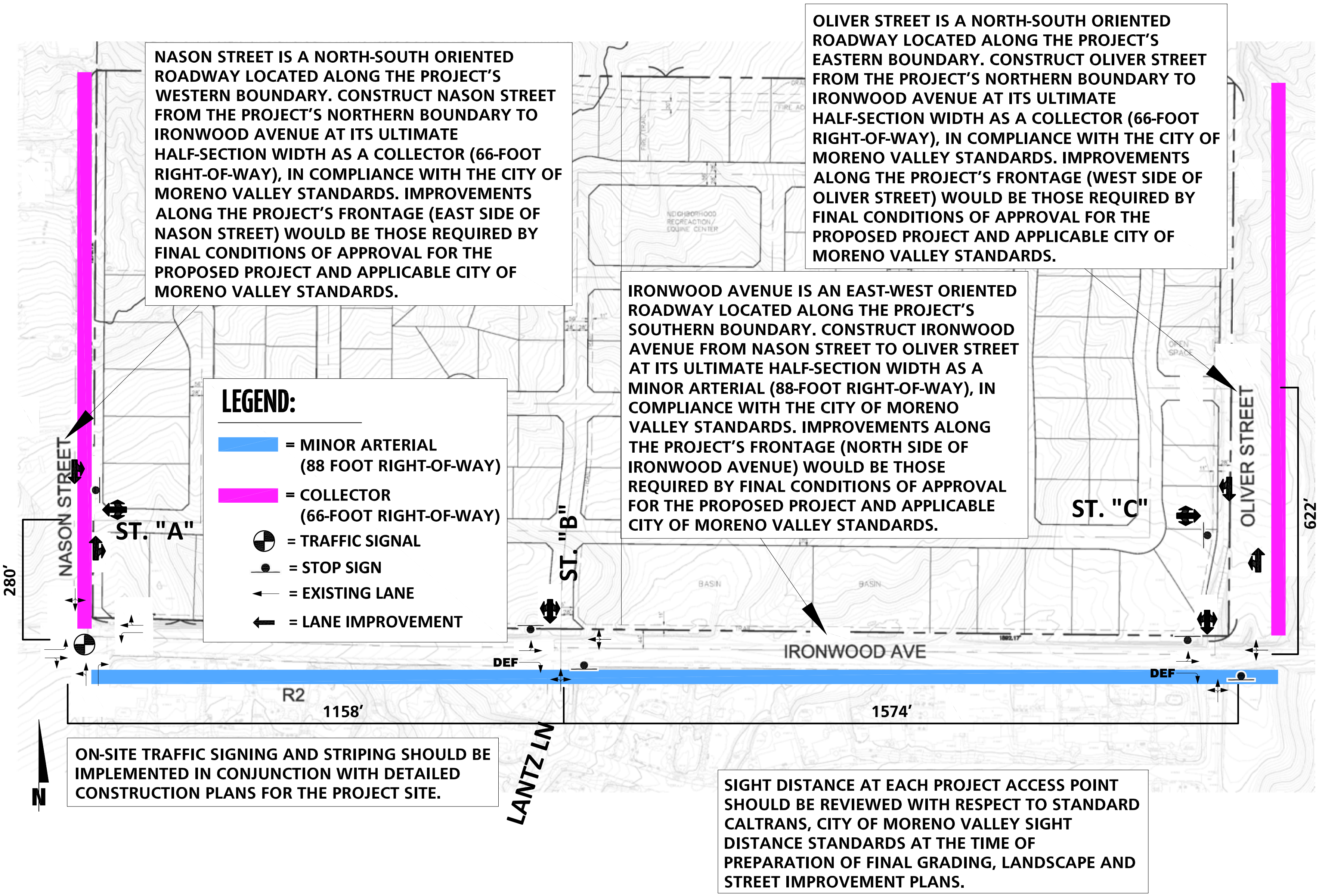
Nason Street – Nason Street is a north-south oriented roadway located along the Project's western boundary. Construct Nason Street from the Project's northern boundary to Ironwood Avenue at its ultimate half-section width as a collector (66-foot right-of-way), in compliance with applicable City of Moreno Valley standards. Improvements along the Project's frontage (east side of Nason Street) would be those required by final conditions of approval for the proposed Project and applicable City of Moreno Valley standards.

Oliver Street – Oliver Street is a north-south oriented roadway located along the Project's eastern boundary. Construct Oliver Street from the Project's northern boundary to Ironwood Avenue at its ultimate half-section width as a collector (66-foot right-of-way), in compliance with applicable City of Moreno Valley standards. Improvements along the Project's frontage (west side of Oliver Street) would be those required by final conditions of approval for the proposed Project and applicable City of Moreno Valley standards.

On-site traffic signing and striping should be implemented in conjunction with detailed construction plans for the Project site.

Sight distance at each project access point should be reviewed with respect to standard Caltrans and City of Moreno Valley sight distance standards at the time of preparation of final grading, landscape and street improvement plans.

Exhibit 1-3: Site Adjacent Roadway and Site Access Recommendations



1.7 ON-SITE TRAFFIC CALMING MEASURES

The immediate purpose of traffic calming is to reduce the speed and volume of traffic to acceptable levels (“acceptable” for the functional class of a street and the nature of bordering activity). Reductions in traffic speed and volume, however, are just means to other ends such as traffic safety and active street life. Calming traffic through the application of project design features intended to achieve slower speeds for motor vehicles, increase safety and the perception of safety for pedestrians and bicyclists, and increase access for all modes of transportation is the primary goal of any well designed residential street system.

In particular, some traffic calming elements should be incorporated in the design in and around schools to provide a comfortable and friendly environment for walking and to tightly control the behavior of cars and parents. If the school is located on a principal roadway carrying more than 4,000 vehicles per day, appropriate traffic calming features should be used to hold speeds down to 25 mph – even when children are not in school. Some typical traffic calming/management principles for school areas include: (5)

- Separate modes of transportation (i.e., cars, buses, pedestrians)
- Keep all turning movements low speed
- Provide 24-hour low speed (i.e., 25 mph or less) through design
- Provide well identified pedestrian crossings
- Give priority to pedestrians and bicyclists

The following traffic calming or traffic management design features can be used to achieve the aforementioned goals. Examples of each of the following traffic calming design features are shown on Exhibit 1-4.

1.7.1 ALL-WAY STOP CONTROL

All-way stop controls require motorists in all approaches to stop before continuing on in the direction of travel. However, implementation of an all-way stop control is only recommended if volume warrants are met.

Purpose:

- Reduce vehicle speeds
- Improve safety

Considerations:

- Potential adverse reaction by drivers due to increased delays.

Estimated Cost:

- The cost for implementation is low and requires only signage and striping.

EXHIBIT 1-4: POTENTIAL TRAFFIC CALMING MEASURES

ALL-WAY STOP

SPEED HUMPS/SPEED BUMPS

N

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1.7.2 Speed Humps or Speed Bumps

Speed humps are typically paved with asphalt, approximately 3-6 inches high at their center, and extend the full width of the street.

Purpose:

- Traffic calming narrow streets.
- Reducing speeds where crosswalks cross local and low-volume collector roadways.

Considerations:

- Has minimum effect on trucks and sport utility vehicles and may worsen speeding problems.
- Use when problems are very localized and can be controlled with a single measure.
- Often found to be noisy by adjacent neighbors.
- Lowest priced traffic calming features.

Estimated Cost:

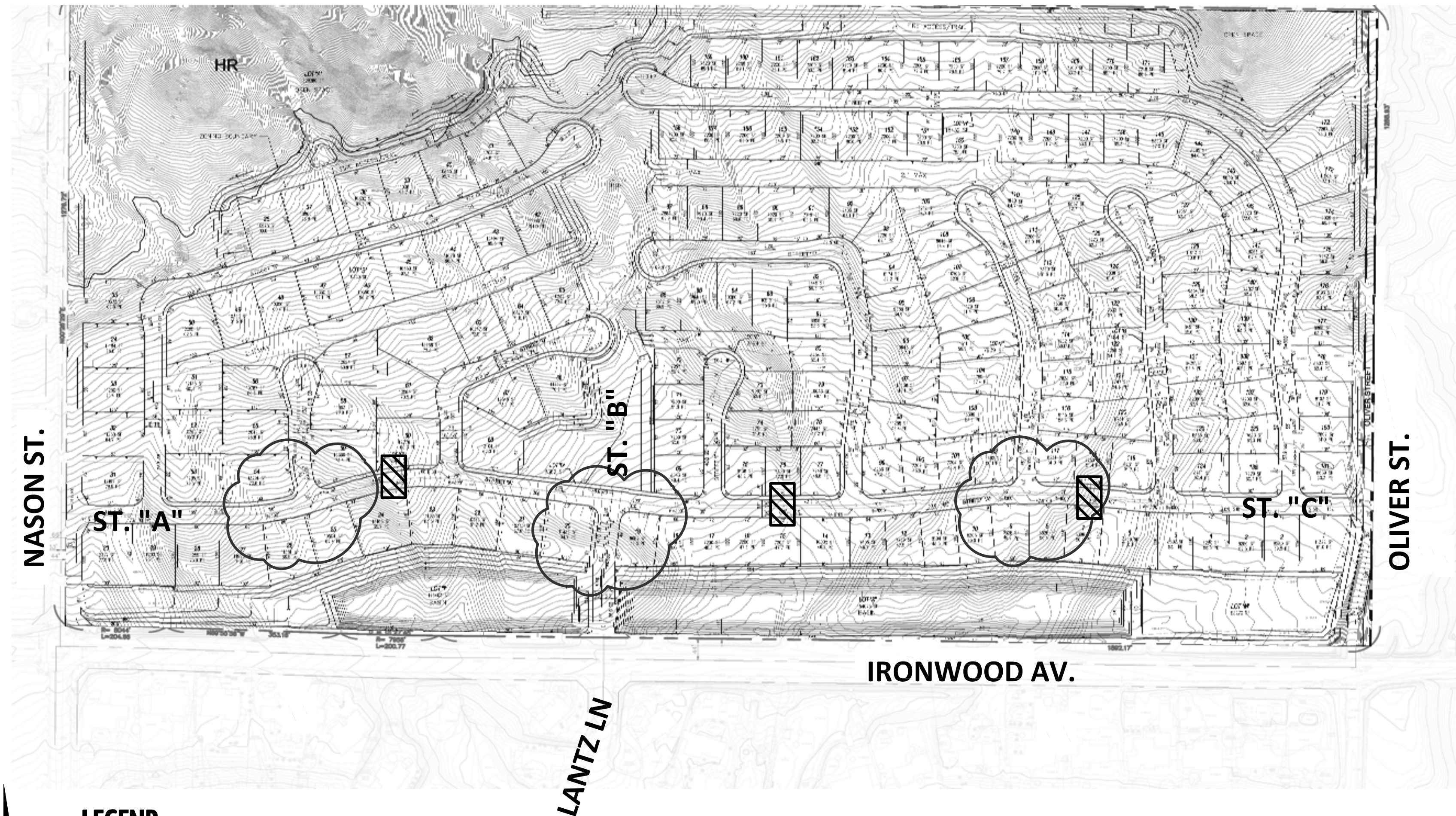
- Approximately $2,000.

1.7.3 Recommendations

As shown on Exhibit 1-5, potential all-way stop locations along Street "A" could be a relatively low cost solution to discourage speeding along this street segment, if speeding becomes an issue after the Project is constructed and occupied and appropriate warrants are met. As these particular street sections are bounded on either side by private residential units, the use of midblock chokers or street narrowing measures were considered, but have not been recommended as they would reduce the amount of on-street parking in front of nearby residential units.

Potential speed hump locations are also identified on Exhibit 1-5. No other local residential street segments were identified to require additional traffic calming design features beyond those already contemplated by the local street design.

EXHIBIT 1-5: TRAFFIC CALMING RECOMMENDATIONS



LEGEND:

= POSSIBLE SPEED HUMP LOCATION (FINAL LOCATIONS TO BE DETERMINED BY THE CITY'S TRAFFIC ENGINEER)

= POSSIBLE ALL-WAY STOP LOCATION (TO BE DETERMINED IF WARRANTED)

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2 METHODOLOGIES

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are consistent with City of Moreno Valley traffic study guidelines.

2.1 LEVEL OF SERVICE

Traffic operations of roadway facilities are described using the term "Level of Service" (LOS). LOS is a qualitative description of traffic flow based on several factors such as speed, travel time, delay, and freedom to maneuver. Six levels are typically defined ranging from LOS A, representing completely free-flow conditions, to LOS F, representing breakdown in flow resulting in stop-and-go conditions. LOS E represents operations at or near capacity, an unstable level where vehicles are operating with the minimum spacing for maintaining uniform flow.

2.2 INTERSECTION CAPACITY ANALYSIS

The definitions of LOS for interrupted traffic flow (flow restrained by the existence of traffic signals and other traffic control devices) differ slightly depending on the type of traffic control. The LOS is typically dependent on the quality of traffic flow at the intersections along a roadway. The *Highway Capacity Manual* (HCM) 2010 methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. (6) The HCM uses different procedures depending on the type of intersection control.

2.2.1 SIGNALIZED INTERSECTIONS

The City of Moreno Valley requires signalized intersection operations analysis based on the methodology described in Chapter 18 and Chapter 31 of the HCM 2010. (6) Intersection LOS operations are based on an intersection's average control delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. For signalized intersections LOS is directly related to the average control delay per vehicle and is correlated to a LOS designation as described in Table 2-1.

TABLE 2-1: SIGNALIZED INTERSECTION HCM 2010 LOS THRESHOLDS

Description	Average Control Delay (Seconds) V/C ≤ 1.0	Level of Service V/C ≤ 1.0	Level of Service V/C > 1.0
Operations with very low delay occurring with favorable progression and/or short cycle length.	0 to 10.00	A	F
Operations with low delay occurring with good progression and/or short cycle lengths.	10.01 to 20.00	B	F
Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.01 to 35.00	C	F
Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.01 to 55.00	D	F
Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.01 to 80.00	E	F
Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths	80.01 and up	F	F

Source: HCM 2010, Chapter 18

All signalized study area intersections have utilized the Vistro software (Version 2.0-08), with the exception of the SR-60 Freeway ramps at Nason Street which have utilized the Synchro software (Version 8.0, Build 801, Revision 563), within the study area. Synchro is a macroscopic traffic software program that is based on the signalized intersection capacity analysis as specified in the Chapters 18 and 31 of the HCM 2010. (6) Macroscopic level models represent traffic in terms of aggregate measures for each movement at the study intersections. Equations are used to determine measures of effectiveness such as delay and queue length. The LOS and capacity analysis performed by Synchro takes into consideration optimization and coordination of signalized intersections within a network.

The LOS analysis for signalized intersections has been performed using optimal cycle lengths, splits and offsets for the study area intersections. Appropriate time for pedestrian crossings has also been considered in the signalized intersection analysis.

The peak hour traffic volumes have been adjusted using a peak hour factor (PHF) to reflect peak 15 minute volumes. Common practice for LOS analysis is to use a peak 15-mintue rate of flow. However, flow rates are typically expressed in vehicles per hour. The PHF is the relationship between the peak 15-minute flow rate and the full hourly volume (e.g. PHF = [Hourly Volume] / [4 x Peak 15-minute Flow Rate]). The use of a 15-minute PHF produces a more detailed analysis as compared to analyzing vehicles per hour. In an effort to conduct a conservative analysis, existing PHFs have been used for all analysis scenarios. Per Chapter 4 of the HCM 2010, PHF values over 0.95 often are indicative of high traffic volumes with capacity constraints on peak hour flows while lower PHF values are indicative of greater variability of flow during the peak hour. (6)

2.2.2 UNSIGNALIZED INTERSECTIONS

The City of Moreno Valley requires the operations of unsignalized intersections be evaluated using the methodology described in Chapter 19, Chapter 20, Chapter 32 of the HCM 2010. (6) The LOS rating is based on the weighted average control delay expressed in seconds per vehicle (see Table 2-2).

TABLE 2-2: UNSIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay Per Vehicle (Seconds)	Level of Service, V/C ≤ 1.0	Level of Service, V/C > 1.0
Little or no delays.	0 to 10.00	A	F
Short traffic delays.	10.01 to 15.00	B	F
Average traffic delays.	15.01 to 25.00	C	F
Long traffic delays.	25.01 to 35.00	D	F
Very long traffic delays.	35.01 to 50.00	E	F
Extreme traffic delays with intersection capacity exceeded.	> 50.00	F	F

Source: HCM 2010, Chapter 19 and Chapter 20

At two-way or side-street stop-controlled intersections, The LOS criteria apply to each lane on a given approach and to each approach on the minor street. LOS is not calculated for major-street approaches or for the intersection as a whole. For all-way stop controlled intersections, LOS is based solely on control delay for assessment of LOS at the approach and intersection levels.

2.3 ROADWAY SEGMENT CAPACITY ANALYSIS

Roadway segment operations have been evaluated using the City of Moreno Valley Daily Roadway Capacity Values provided in the *City of Moreno Valley Transportation Engineering Division Traffic Impact Analysis (TIA) Preparation Guide* (dated August 2007). (1) Per the City of Moreno Valley TIA guidelines, roadway segments within the study area should maintain the LOS capacities illustrated on Exhibit 2-1. The daily roadway segment capacities for each type of roadway are summarized in Table 2-3. These roadway capacities are “rule of thumb” estimates for planning purposes and are affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian bicycle traffic. As such, where the ADT-based roadway segment analysis indicates a deficiency (unacceptable LOS), a review of the more detailed peak hour intersection analysis and progression analysis are undertaken. The more detailed peak hour intersection analysis explicitly accounts for factors that affect roadway capacity. Therefore, roadway segment widening is typically only recommended if the peak hour intersection analysis indicates the need for additional through lanes.

TABLE 2-3: ROADWAY SEGMENT CAPACITY LOS THRESHOLDS

Facility Type	Level of Service Capacity[1]				
	A	B	C	D	E
Six Lane Divided Arterial	33,900	39,400	45,000	50,600	56,300
Four Lane Divided Arterial	22,500	26,300	30,000	33,800	37,500
Four Lane Undivided Arterial	15,000	17,500	20,000	22,500	25,000
Two Lane Industrial Collector	7,500	8,800	10,000	11,300	12,500
Two Lane Undivided Residential	N/A	N/A	N/A	N/A	2,000

[1] These maximum roadway capacities have been extracted from the City of Moreno Valley's Transportation Division's TIA Preparation Guidelines (August 2007). These roadway capacities are "rule of thumb" estimates for planning purposes. The LOS "E" service volumes are estimated maximum daily capacity for respective roadway classifications. Capacity is affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian and bicycle traffic.

2.4 TRAFFIC SIGNAL WARRANT ANALYSIS METHODOLOGY

The term "signal warrants" refers to the list of established criteria used by Caltrans and other public agencies to quantitatively justify or ascertain the potential need for installation of a traffic signal at an otherwise unsignalized intersection. This TIA uses the signal warrant criteria presented in the latest edition of the Federal Highway Administration's (FHWA) *Manual on Uniform Traffic Control Devices (MUTCD)*, as amended by *the MUTCD 2012 California Supplement*, for all study area intersections. (7)

The signal warrant criteria for Existing conditions are based upon several factors, including volume of vehicular and pedestrian traffic, frequency of accidents, and location of school areas. Both the FHWA's *MUTCD* and the *MUTCD 2012 California Supplement* indicate that the installation of a traffic signal should be considered if one or more of the signal warrants are met. (7) Specifically, this TIA utilizes the Peak Hour Volume-based Warrant 3 as the appropriate representative traffic signal warrant analysis for Existing traffic conditions. Warrant 3 criteria are basically identical for both the FHWA's *MUTCD* and the *MUTCD 2012 California Supplement*. Warrant 3 is appropriate to use for this TIA because it provides specialized warrant criteria for intersections with rural characteristics (e.g. located in communities with populations of less than 10,000 persons or with adjacent major streets operating above 40 miles per hour). For the purposes of this study, the speed limit was the basis for determining whether Urban or Rural warrants were used for a given intersection.

Future unsignalized intersections have been assessed regarding the potential need for new traffic signals based on future average daily traffic (ADT) volumes, using the Caltrans planning level ADT-based signal warrant analysis worksheets.

Traffic signal warrant analyses were performed for the following unsignalized study area intersections listed on Table 2-4.

TABLE 2-4: TRAFFIC SIGNAL WARRANT ANALYSIS LOCATIONS

ID	Intersection Location	Jurisdiction
1	Nason Street / Street "A"	Moreno Valley
5	Street "B" / Ironwood Avenue	Moreno Valley
6	Oliver Street / Street "C"	Moreno Valley
7	Oliver Street / Ironwood Avenue	Moreno Valley

It is important to note that a signal warrant defines the minimum condition under which the installation of a traffic signal might be warranted. Meeting this threshold condition does not require that a traffic control signal be installed at a particular location, but rather, that other traffic factors and conditions be evaluated in order to determine whether the signal is truly justified. It should also be noted that signal warrants do not necessarily correlate with LOS. An intersection may satisfy a signal warrant condition and operate at or above acceptable LOS or operate below acceptable LOS and not meet a signal warrant.

2.5 LOS CRITERIA

The definition of an intersection deficiency in the City of Moreno Valley is based on the City of Moreno Valley General Plan Circulation Element. The City of Moreno Valley General Plan states that target LOS "C" or LOS "D" be maintained along City roads (including intersections) wherever possible. An exhibit depicting the level of service standards within the City was previously provided on Exhibit 2-1.

A summary of jurisdiction, LOS methodology and acceptable LOS for all the study area intersections in this TIA is shown on Table 2-5.

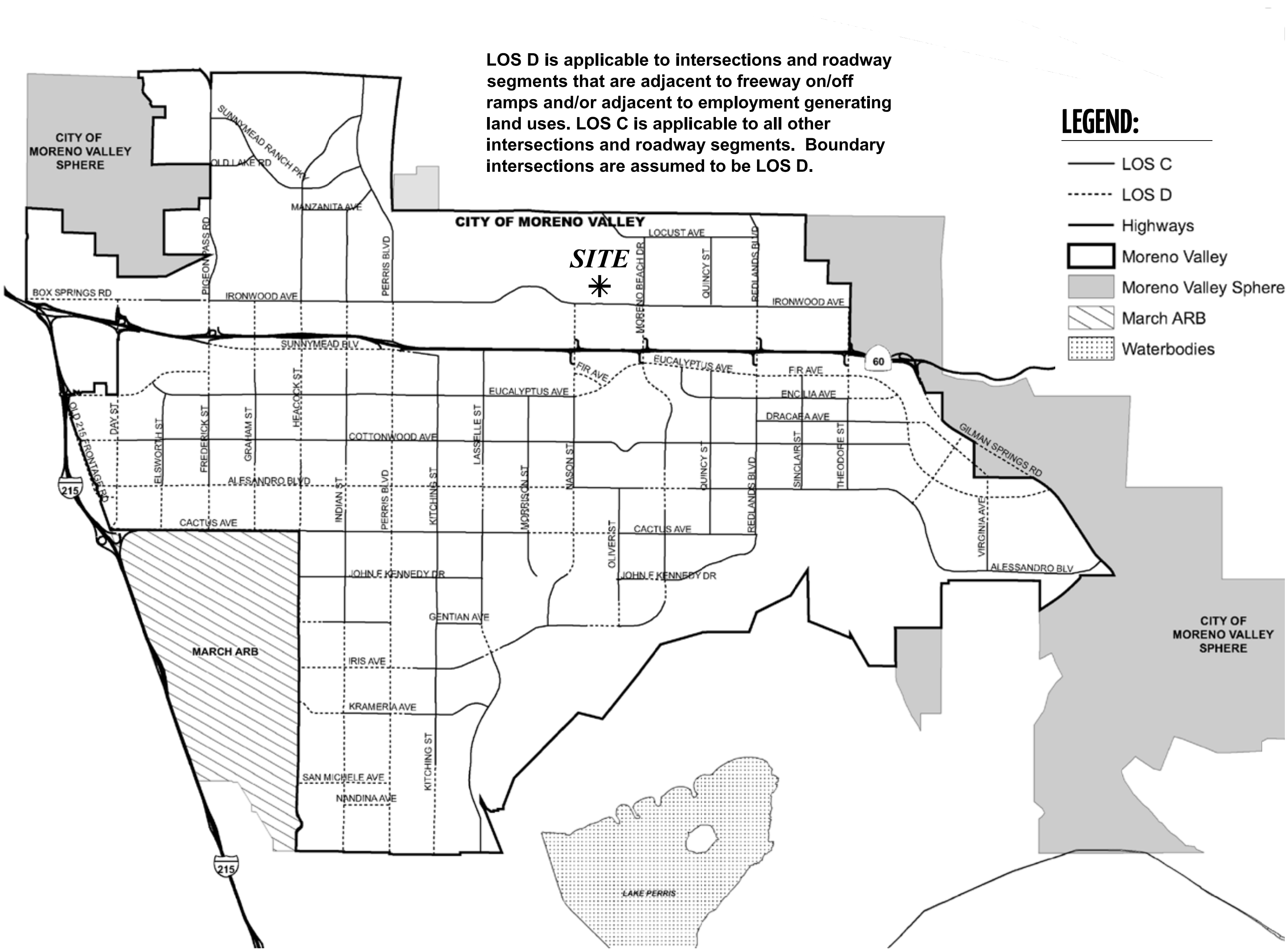
TABLE 2-5: SUMMARY OF LOS CRITERIA AND FOR STUDY AREA INTERSECTIONS

#	Intersection	Traffic Control[2]	Jurisdiction	LOS Methodology[1]	Acceptable LOS
1	Nason Street / Street "A"	CSS	Moreno Valley	HCM 2010	C
2	Nason Street / Ironwood Avenue	TS	Moreno Valley	HCM 2010	D
3	Nason Street / SR-60 WB Ramps	TS	Moreno Valley	HCM 2010	D
4	Nason Street / SR-60 EB Ramps	TS	Moreno Valley	HCM 2010	D
5	Lantz Lane / Ironwood Avenue	CSS	Moreno Valley	HCM 2010	C
6	Oliver Street / Street "C"	CSS	Moreno Valley	HCM 2010	C
7	Oliver Street / Ironwood Avenue	CSS	Moreno Valley	HCM 2010	C

[1] HCM 2010 = Highway Capacity Manual 2010 Methodology

[2]CSS = Cross-street Stop; TS = Traffic Signal

EXHIBIT 2-1: CITY OF MORENO VALLEY LEVEL OF SERVICE (LOS) STANDARDS



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URBAN CROSSROADS

3 AREA CONDITIONS

This section provides a summary of the existing circulation network, the City of Moreno Valley and a review of existing peak hour intersection operations, roadway segment analyses, and traffic signal warrants.

3.1 EXISTING CIRCULATION NETWORK

The study area includes a total of seven existing and future intersections as shown previously on Exhibit 1-2. Of these seven intersections, the existing study area circulation network includes five intersections. Nason Street / Street “A” and Oliver Street / Street “C” are planned future intersections that do not currently exist. Exhibit 3-1 illustrates the study area intersections located near the proposed Project and identifies the number of through traffic lanes for existing roadways and intersection traffic controls.

3.2 CITY OF MORENO VALLEY GENERAL PLAN CIRCULATION ELEMENT

As previously noted, the Project site is located within the City of Moreno Valley. Exhibit 3-2 shows the City of Moreno Valley General Plan Circulation Element. Exhibit 3-3 shows the City of Moreno Valley’s General Plan Roadway Cross-Sections.

3.3 TRANSIT SERVICE

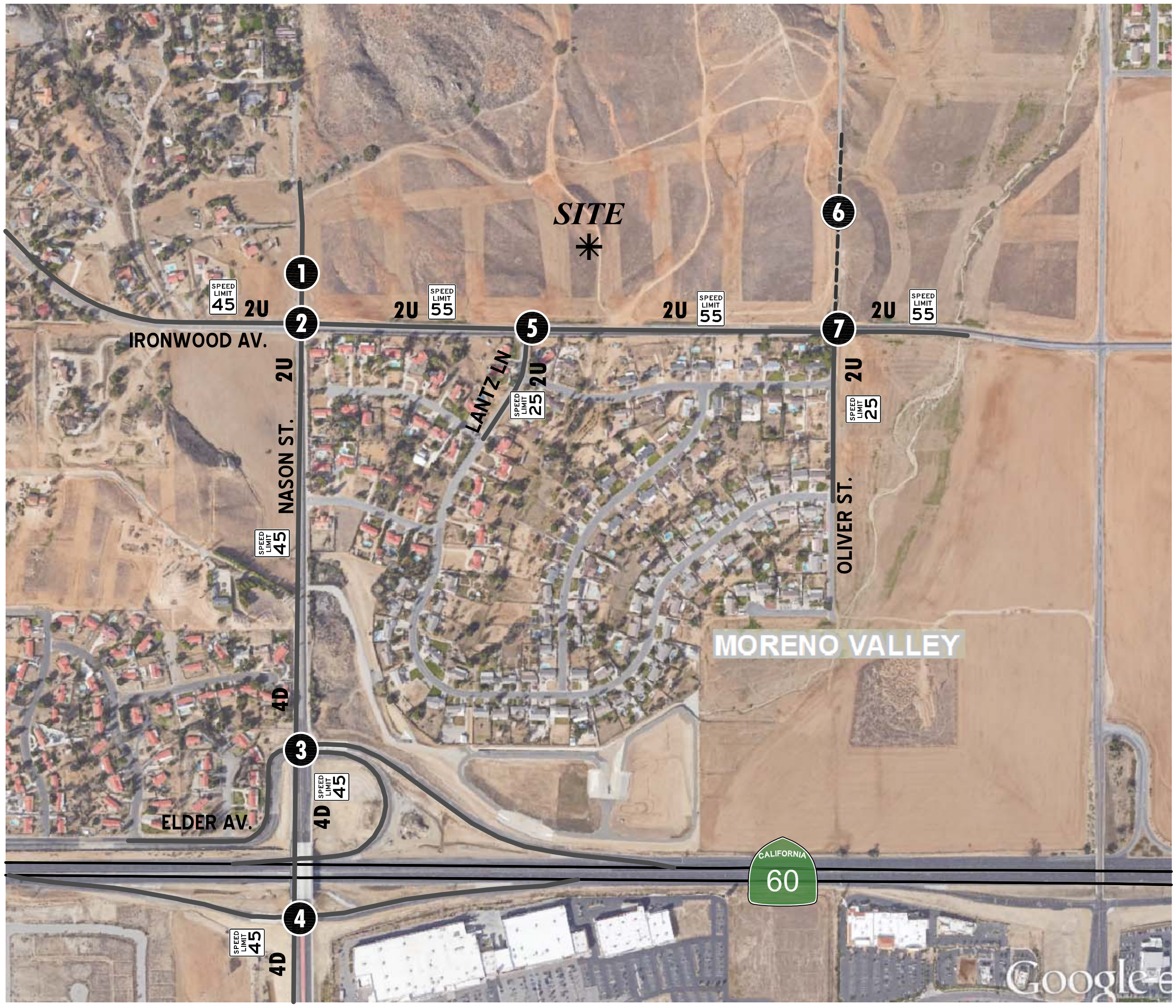
The study area is currently not being served by any direct transit line. The Riverside Transit Agency (RTA) has existing bus services running along Nason Street, south of the SR-60 Freeway via Route 210. The existing Route 210 is illustrated on Exhibit 3-4. Transit service is reviewed and updated by RTA periodically to address ridership, budget and community demand needs. Changes in land use can affect these periodic adjustments which may lead to either enhanced or reduced service where appropriate. As such, it is recommended that the applicant work in conjunction with RTA to potentially provide bus service to the site.

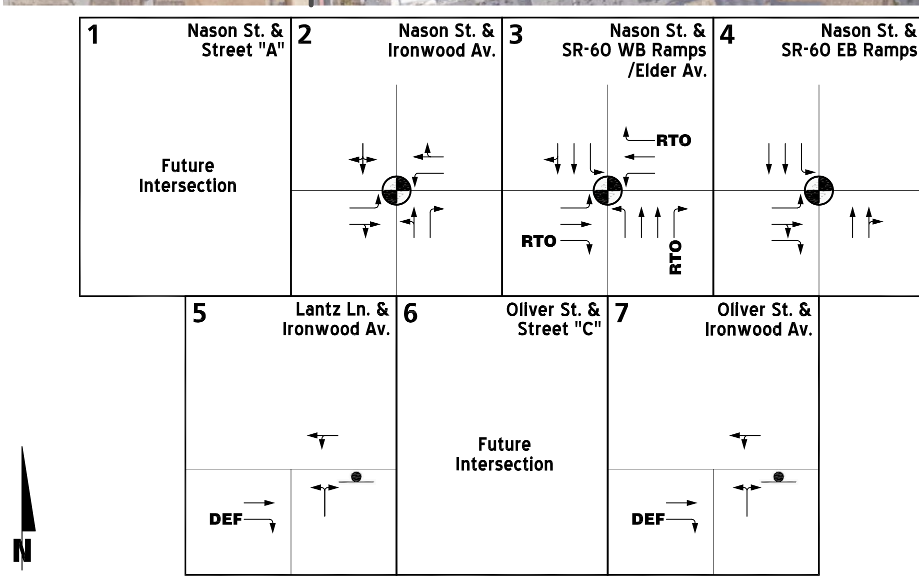
3.4 BICYCLE & PEDESTRIAN FACILITIES

Field observations conducted in January 2015 indicate nominal pedestrian and bicycle activity within the study area. Existing pedestrian facilities (sidewalk and crosswalk) locations within the study area are shown on Exhibit 3-5. The City of Moreno Valley’s Master Plan of Trails is shown on Exhibit 3-6. As shown on Exhibit 3-6, there are proposed trails along Ironwood Avenue east of Nason Street and along Oliver Street.

Class I bikeways are off-road bicycle and pedestrian facilities. Class II bikeways are intended to delineate the right-of-way assigned to bicyclists and motorists, and to provide for more predictable movements. Bike lane signs and pavement marking help define the type of bikeway. Class II bikeways are on-road, but are not delineated through pavement markings and only through signage. A more important reason for bike lanes is to better accommodate bicyclists through corridors where insufficient room exists for safe bicycling on existing streets.

EXHIBIT 3-1: EXISTING NUMBER OF THROUGH LANES AND INTERSECTION CONTROLS





LEGEND:

- = TRAFFIC SIGNAL
- = STOP SIGN
- 4 = NUMBER OF LANES
- D = DIVIDED
- U = UNDIVIDED
- RTO = RIGHT TURN OVERLAP
- DEF = DEFACTO RIGHT TURN
- SPEED LIMIT 25 = SPEED LIMIT (MPH)
- - - - = FUTURE ROAD

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URBAN CROSSROADS

EXHIBIT 3-2: CITY OF MORENO VALLEY GENERAL PLAN CIRCULATION ELEMENT

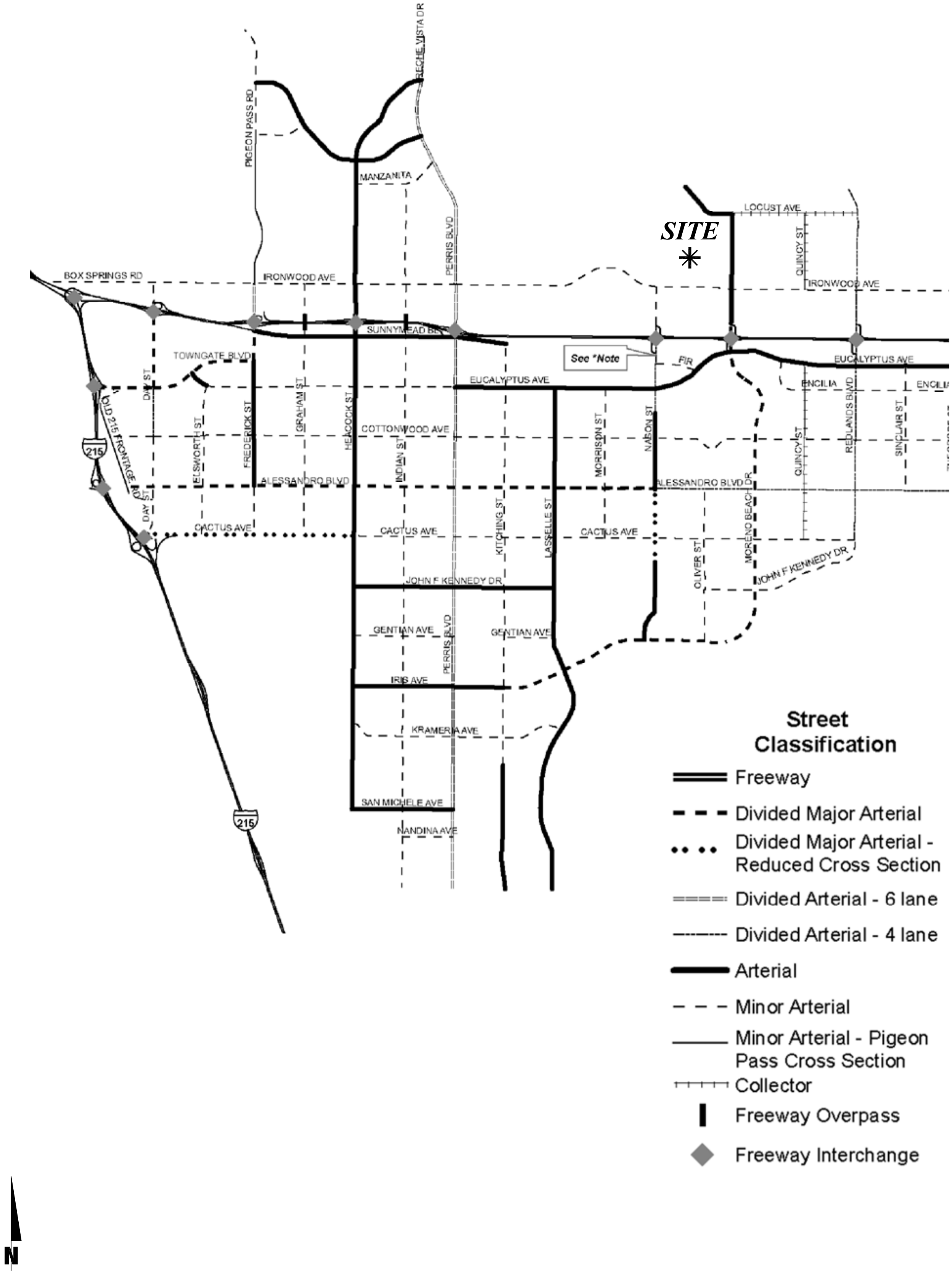

EXHIBIT 3-3: CITY OF MORENO VALLEY GENERAL PLAN ROADWAY CROSS-SECTIONS

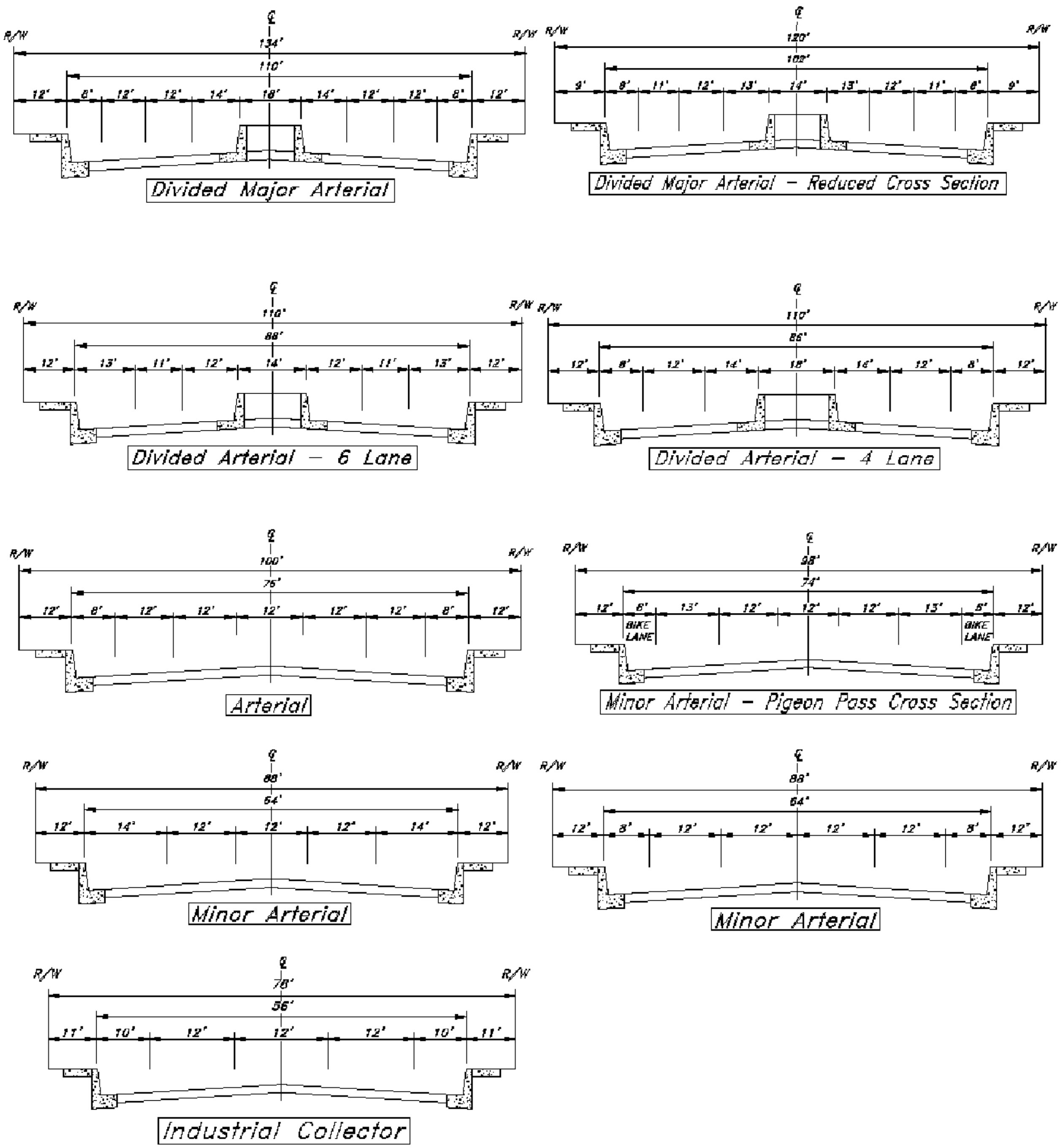

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EXHIBIT 3-4: EXISTING TRANSIT ROUTES

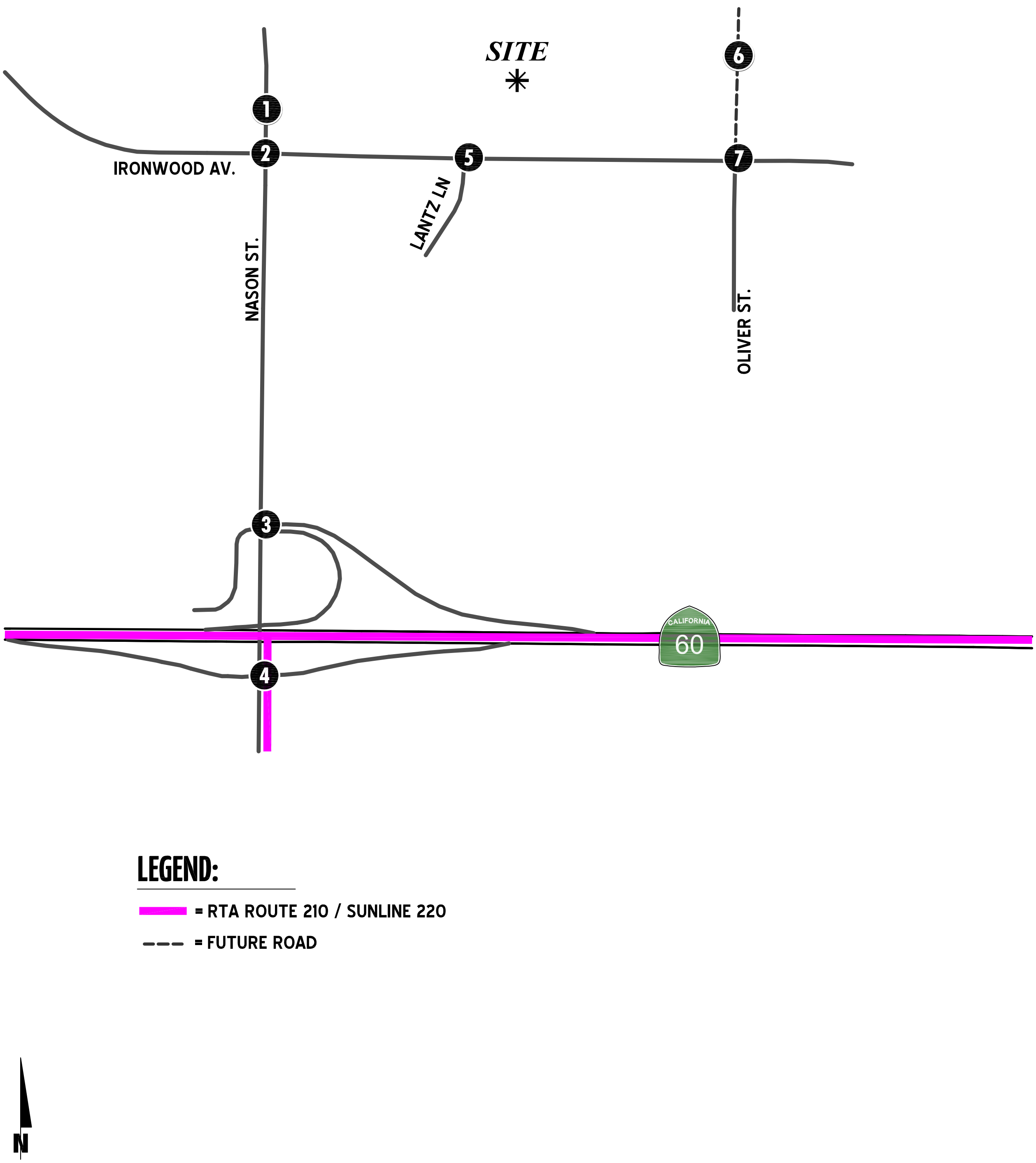


EXHIBIT 3-5: EXISTING PEDESTRIAN FACILITIES

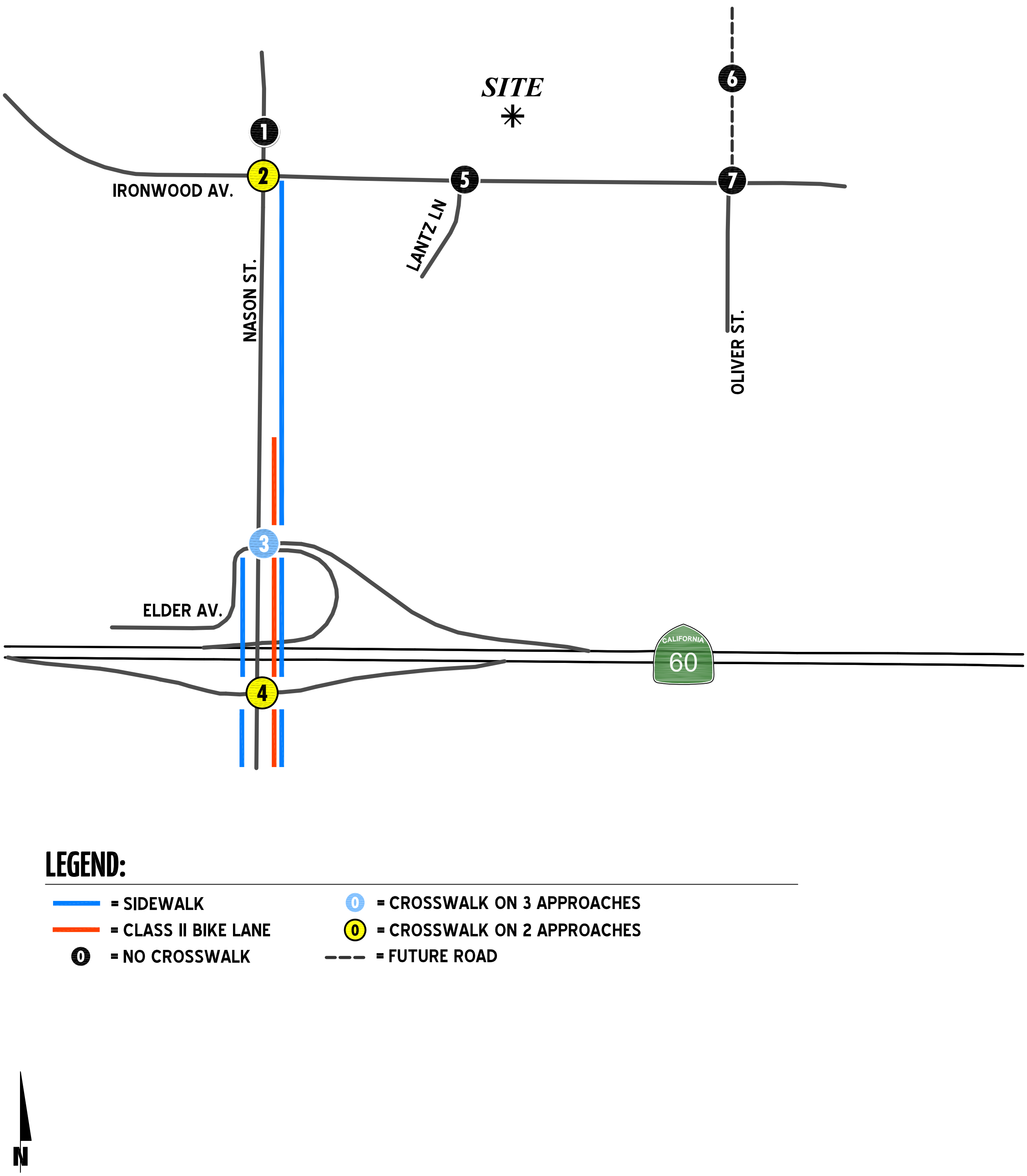
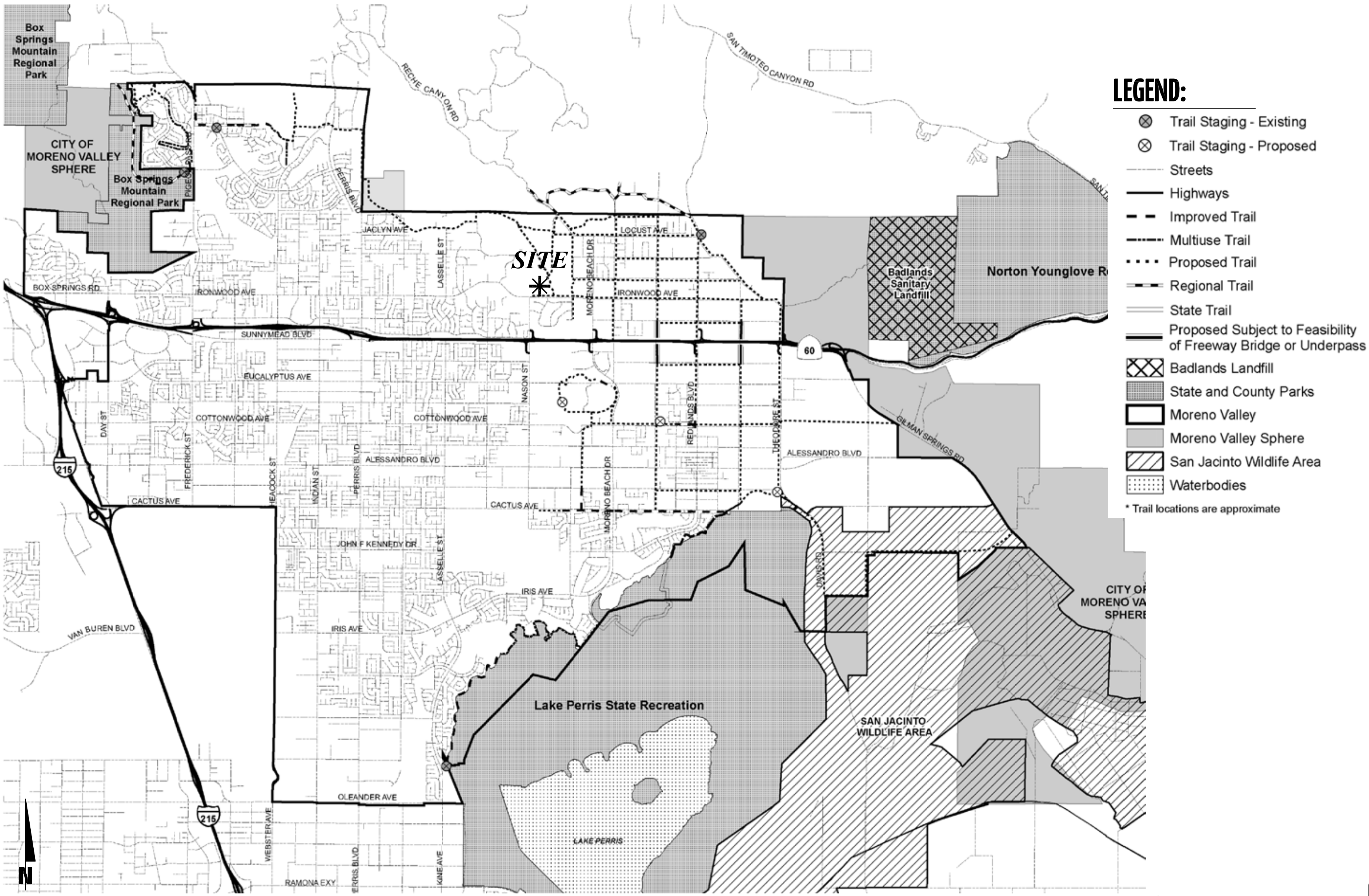


EXHIBIT 3-6: CITY OF MORENO VALLEY MASTER PLAN OF TRAILS



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There are existing Class II bike lanes on Nason Street south of the SR-60 WB Ramps interchange. Class II bikeways are proposed along Nason Street (south of Ironwood Avenue), Ironwood Avenue. The City of Moreno Valley's Bike Plan is shown on Exhibit 3-7.

3.5 EXISTING TRAFFIC COUNTS

The AM peak hour traffic volumes were determined by counting traffic volumes in the two hour period between 7:00 and 9:00 AM on January 29, 2015. Similarly, the PM peak hour traffic volumes were identified by counting traffic volumes in the two-hour period from 4:00 to 6:00 PM on January 29, 2015. The January 29, 2015 (Thursday) count data is representative of typical weekday peak hour traffic conditions in the study area. There were no observations made in the field that would indicate a typical traffic conditions on this date, such as construction activity or detour routes. All near-by schools were in session and operating on normal bell schedules. The raw manual peak hour turning movement traffic count data sheets are included in Appendix "3.1". Where actual 24-hour tube count data was not available, Existing ADT volumes were based upon factored intersection peak hour counts collected by Urban Crossroads, Inc. using the following formula for each intersection leg:

Weekday PM Peak Hour (Approach Volume + Exit Volume) x 10.0210

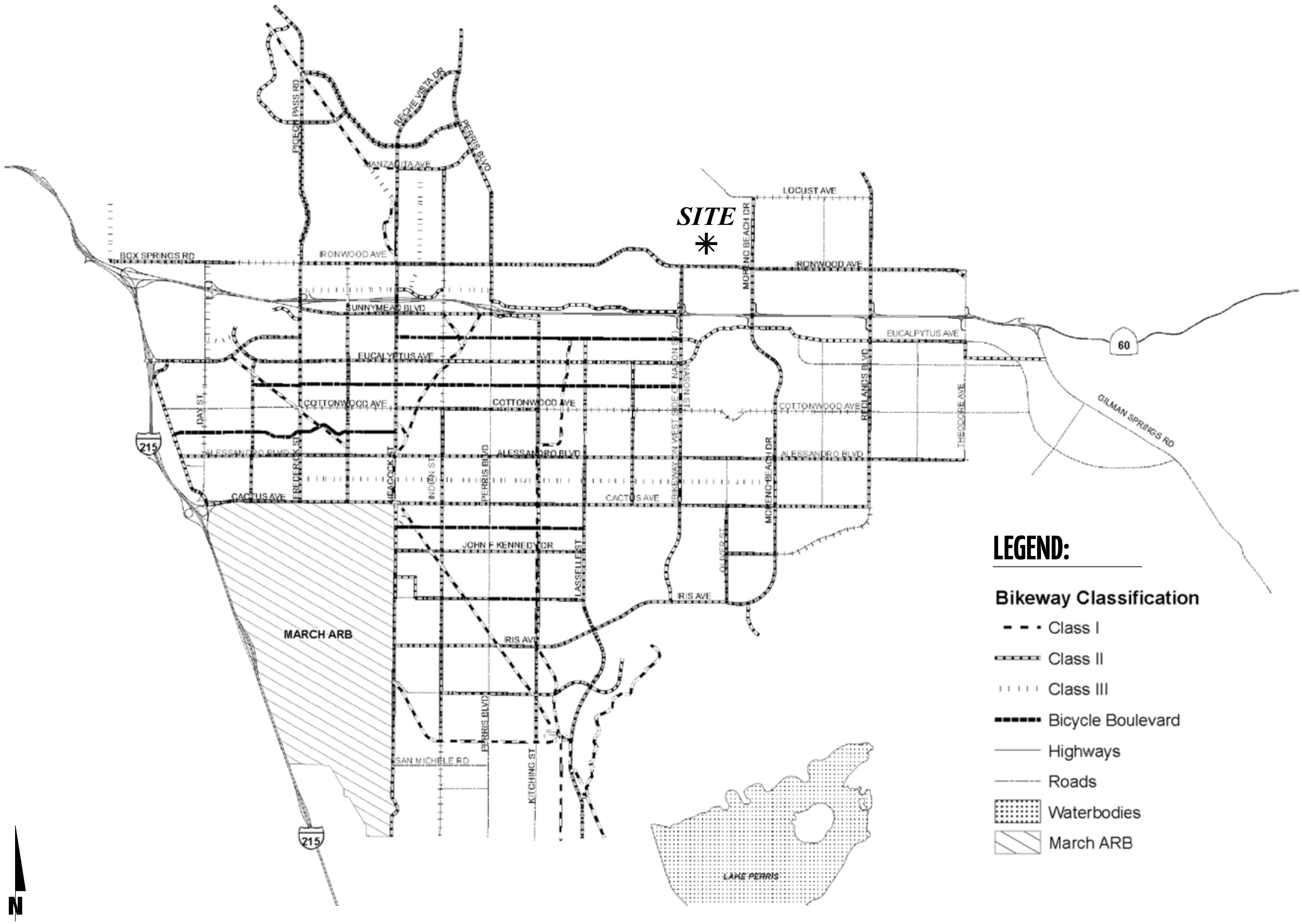
It should be noted that for those roadway segments which have 24-hour tube count data available (as provided in Appendix "3.1"), a comparison between the PM peak hour and daily traffic volumes indicated that the peak-to-daily relationship was approximately 9.80 percent (i.e., the PM peak hour volumes are approximately ten percent of the total daily traffic volume). As such, the above equation utilizing a factor of 10 estimated the ADT volumes on the study area roadway segments assuming a peak-to-daily relationship of 9.80 percent (i.e., 1/0.100210 = 9.80). Existing ADT, AM and PM peak hour intersection volumes are shown on Exhibit 3-8.

3.6 EXISTING CONDITIONS INTERSECTION OPERATIONS ANALYSIS

Existing peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2.2 *Intersection Capacity Analysis* of this report. The intersection operations analysis results are summarized in Table 3-1 which indicates that the existing study area intersections are currently operating at an acceptable LOS during the peak hours, based on applicable jurisdiction's LOS criteria.

Consistent with Table 3-1, a summary of the peak hour intersection LOS for Existing conditions are shown on Exhibit 3-9. The intersection operations analysis worksheets are included in Appendix "3.2" of this TIA.

EXHIBIT 3-7: CITY OF MORENO VALLEY BIKE PLAN



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URBAN CROSSROADS

EXHIBIT 3-8: EXISTING (2015) TRAFFIC VOLUMES

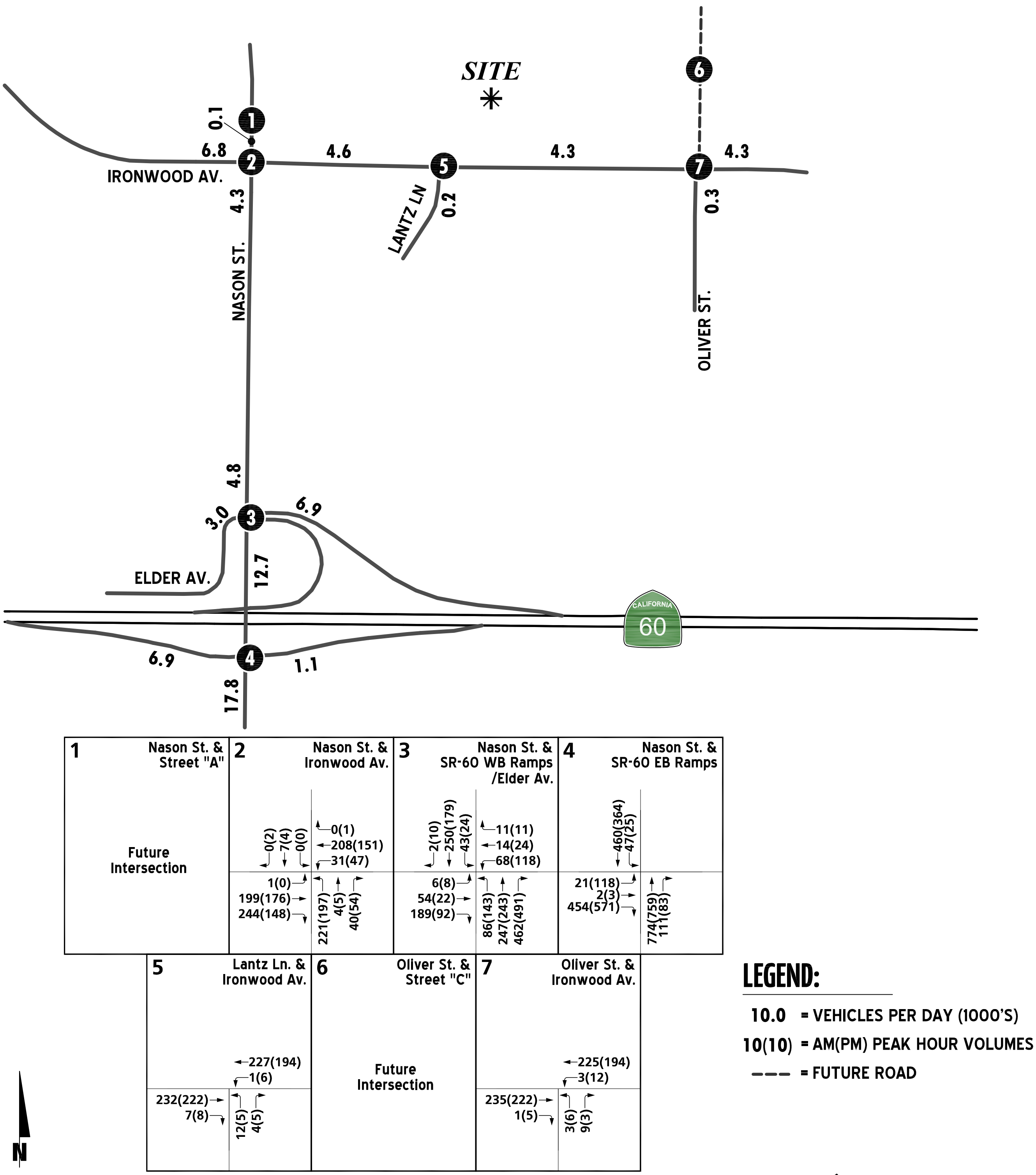

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Exhibit 3-9: Summary of Peak Hour Intersection LOS for Existing (2015) Conditions

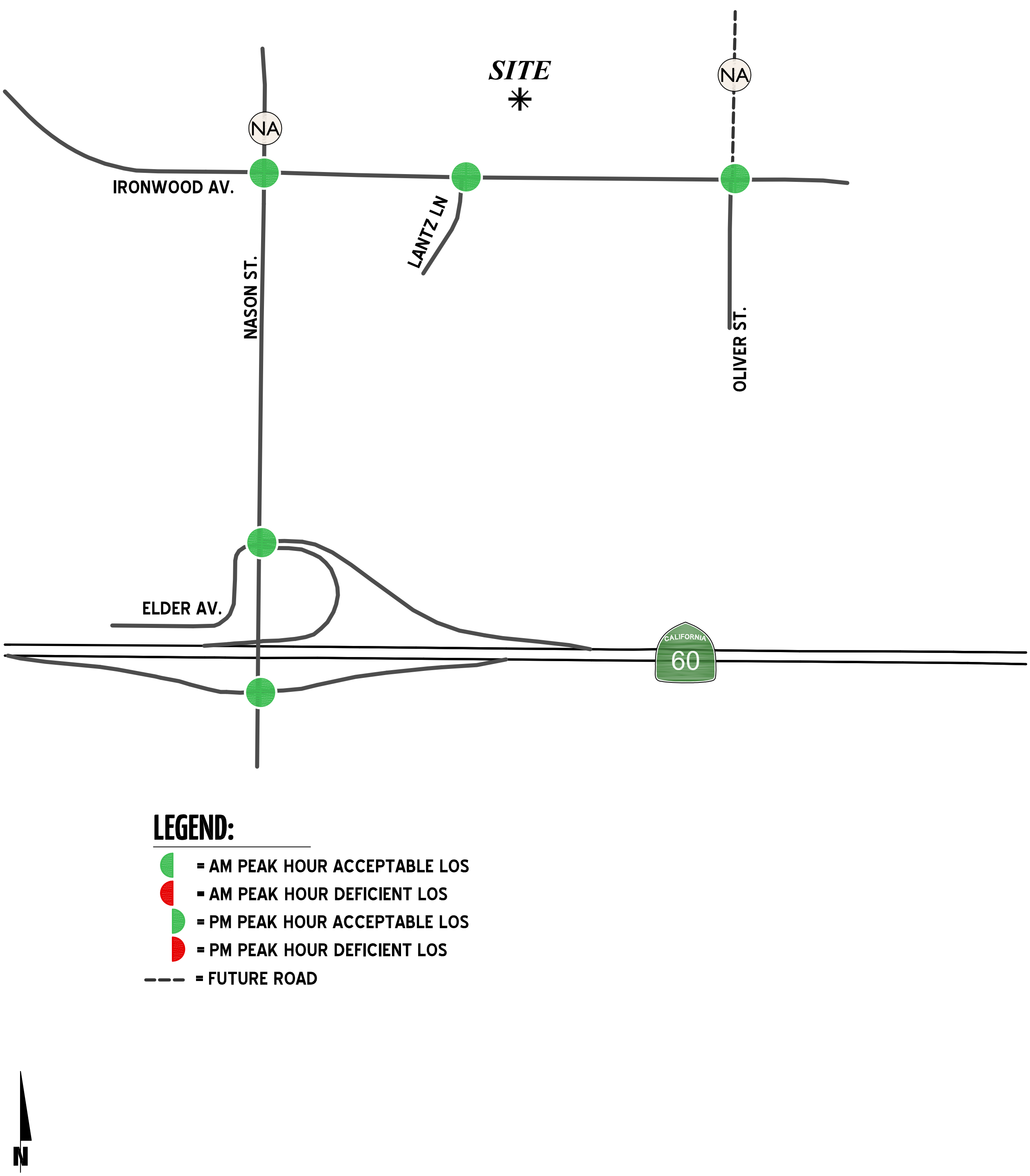

Table 3-1

Intersection Analysis for Existing (2015) Conditions

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Delay[2] (secs.)		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
1	Nason St. / Street "A"		Future Intersection															
2	Nason St. / Ironwood Av.	TS	0	1	1	0	1	0	1	1	0	1	1	0	18.1	16.7	B	B
3	Nason St. / SR-60 WB Ramps	TS	1	2	1>	1	2	0	1	1	1>	1	1	1>	19.1	20.3	B	C
4	Nason St. / SR-60 EB Ramps	TS	0	2	0	1	2	0	1	1	1	0	0	0	11.9	14.1	B	B
5	Lantz Ln. / Ironwood Av.	CCS	0	1	0	0	0	0	0	1	d	0	1	0	11.6	11.0	B	B
6	Oliver St. / Street "C"		Future Intersection															
7	Oliver St. / Ironwood Av.	CCS	0	1	0	0	1	0	0	1	d	0	1	0	11.5	11.2	B	B

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; > = Right-Turn Overlap Phasing; d= Defacto Right Turn Lane

[2] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] CSS = Cross-street Stop; TS = Traffic Signal

3.7 EXISTING CONDITIONS ROADWAY SEGMENT CAPACITY ANALYSIS

The City of Moreno Valley General Plan Circulation Element provides roadway volume capacity values presented previously on Table 2-3. The roadway segment capacities are approximate figures only, and are used at the General Plan level to assist in determining the roadway functional classification (number of through lanes) needed to meet traffic demand. Table 3-2 provides a summary of the Existing conditions roadway segment capacity analysis based on the City of Moreno Valley General Plan Circulation Element Roadway Segment Capacity (LOS) Thresholds identified previously on Table 2-3. As shown on Table 3-2, all of the study area segments currently operate at acceptable LOS based on the City's planning level daily roadway capacity thresholds.

3.8 EXISTING CONDITIONS TRAFFIC SIGNAL WARRANTS ANALYSIS

Traffic signal warrants for Existing traffic conditions are based on existing peak hour intersection turning volumes. For Existing traffic conditions, no study area intersections appear to currently warrant a traffic signal (See Appendix "3.3").

3.9 EXISTING CONDITIONS OFF-RAMP QUEUING ANALYSIS

A queuing analysis was performed for the off-ramps at the SR-60 Freeway at Nason Street interchange to assess vehicle queues for the off ramps that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the SR-60 Freeway mainline. Queuing analysis findings are presented in Table 3-3. It is important to note that off-ramp lengths are consistent with the measured distance between the intersection and the freeway mainline. As shown on Table 3-3, there are no queuing issues during the peak 95th percentile traffic flows under Existing traffic conditions. Worksheets for Existing traffic conditions off-ramp queuing analysis are provided in Appendix "3.4".

Table 3-2

Roadway Volume/Capacity Analysis for Existing (2015) Conditions

#	Roadway	Segment Limits	Roadway Section	LOS Capacity[1]	Existing (2015)	V/C	LOS	Acceptable LOS
1	Nason Street	Street "A" to Ironwood Avenue			N/A			C
2		South of Ironwood Avenue	2U	12,500	4,306	0.34	A	D
3		North of SR-60 WB Ramps	4D	37,500	4,760	0.38	A	D
4		SR-60 WB Ramps to SR-60 EB Ramps	4D	37,500	12,687	0.34	A	D
5		South of SR-60 EB Ramps	4D	37,500	17,807	0.47	A	D
6	Ironwood Avenue	West of Nason Street	2U	12,500	6,754	0.54	A	C
7		Nason Street to Lantz Lane	2U	12,500	4,568	0.37	A	C
8		Lantz Lane to Oliver Street	2U	12,500	4,279	0.34	A	C
9		East of Oliver Street	2U	12,500	4,319	0.35	A	C
10	Oliver Street	Between Street "C" and Ironwood Avenue			N/A			C

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

N/A = Not Applicable; Segment does not exist.

[1] These maximum roadway capacities have been extracted from the City of Moreno Valley's Transportation Division's Traffic Impact Analysis
Transportation Division's Traffic Impact Analysis Preparation Guidelines (August 2007). These roadway capacities are "rule of thumb" estimates for planning purposes. The LOS "E" service volumes are estimated maximum daily capacity for respective classifications. Capacity is affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian and bicycle traffic.

Table 3-3

Peak Hour Freeway Off-Ramp Queuing Summary for Existing (2015) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	95th Percentile Queue (Feet) [2]		Acceptable? [1]	
			AM Peak Hour	PM Peak Hour	AM	PM
Nason St. / SR-60 WB Ramps	WBL	1,370	83	132	Yes	Yes
	WBT	2,140	21	31	Yes	Yes
	WBR	190	0	0	Yes	Yes
Nason St. / SR-60 EB Ramps	EBL	805	27	96	Yes	Yes
	EBT	1,300	46	66	Yes	Yes
	EBR	225	45	63	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] Maximum queue length for the approach reported.

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4 PROJECTED FUTURE TRAFFIC

This section presents the traffic volumes estimated to be generated by the Project, as well as the Project's trip assignment onto the study area roadway network. The Project is located east of Nason Street and north of Ironwood Avenue in the City of Moreno Valley, and is proposed to consist of 181 single family detached residential dwelling units. For the purposes of this traffic study, the Project is assumed to be built and fully occupied by Year 2020.

The Project is proposed to have access on Nason Street via Street "A", Ironwood Avenue via Street "B" (northern extension of Lantz Lane), and Oliver Street via Street "C". All Project driveways are proposed to accommodate full-access (e.g., no turning movement restrictions).

4.1 PROJECT TRIP GENERATION

Trip generation represents the amount of traffic which is both attracted to and produced by a development. Determining traffic generation for a specific project is therefore based upon forecasting the amount of traffic that is expected to be both attracted to and produced by the specific land uses being proposed for a given development.

Trip generation rates used to estimate Project traffic and a summary of Project's trip generation are shown in Table 4-1. The trip generation rates are based upon data collected by the Institute of Transportation Engineers (ITE) and presented in ITE's most recent edition of *Trip Generation* manual. (2)

The Project is anticipated to generate a net total of approximately 1,723 trip-ends per day with 136 AM peak hour trips and 181 PM peak hour trips.

4.2 PROJECT TRIP DISTRIBUTION

Trip distribution is the process of identifying the probable destinations, directions or traffic routes that will be utilized by Project traffic. The potential interaction between the planned land uses and surrounding regional access routes are considered, to identify the route where the Project traffic would distribute. The Project trip distribution was developed based on anticipated travel patterns to and from the Project site for the traffic associated with the proposed residential use.

The total volume on each roadway was divided by the total site traffic generation to indicate the percentage of Project traffic that would use each component of the regional roadway system in each relevant direction. The Project trip distribution patterns are graphically depicted on Exhibit 4-1.

4.3 MODAL SPLIT

The traffic reducing potential of public transit, walking or bicycling have not been considered in this TIA. Essentially, the traffic projections are "conservative" in that these alternative travel modes might be able to reduce the forecasted traffic volumes.

Table 4-1

Project Trip Generation Summary

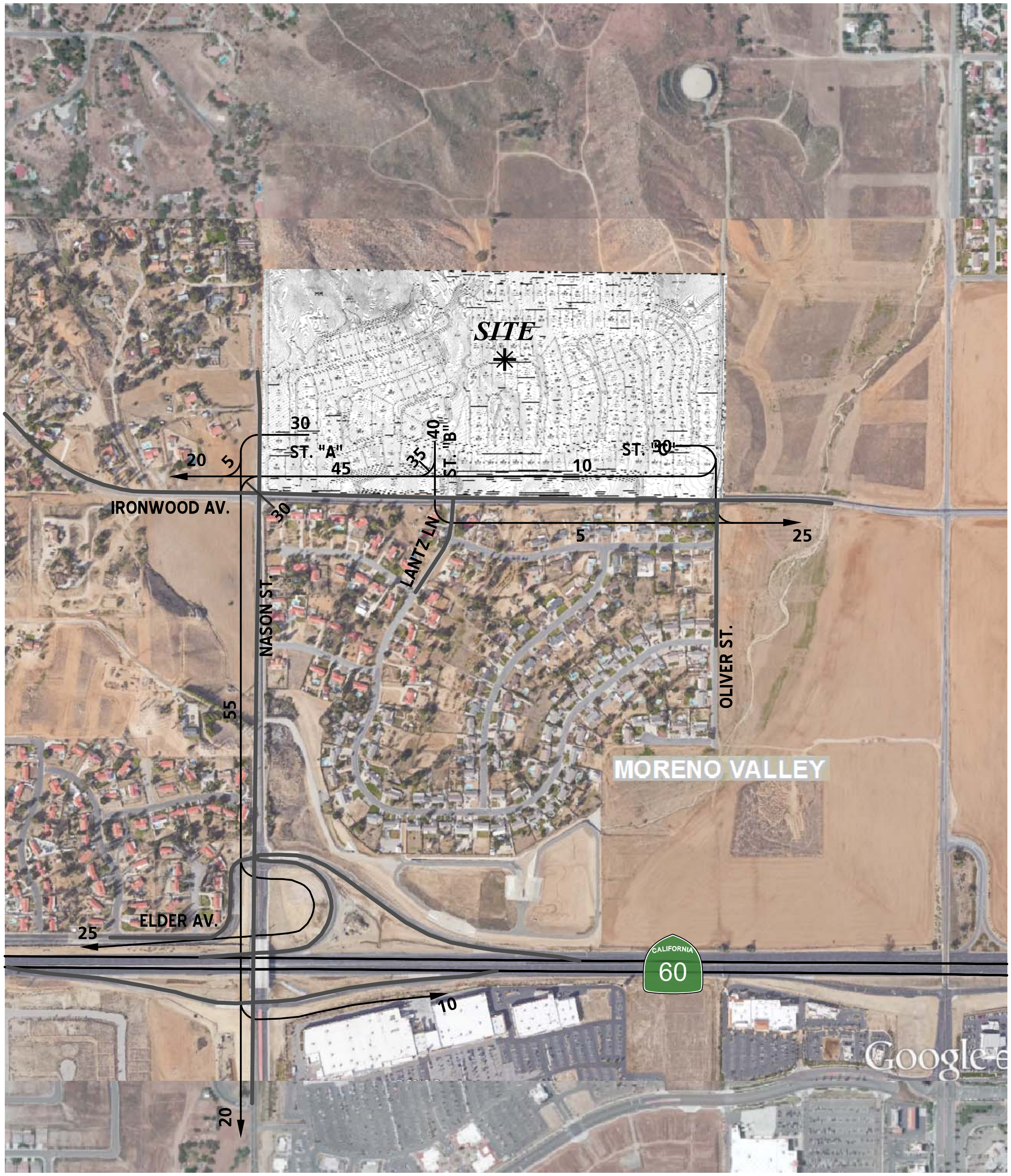
Land Use	ITE Code	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Project Trip Generation Rates[1]									
Single Family Detached Residential	210	DU	0.19	0.56	0.75	0.63	0.37	1.00	9.52

Land Use	Quantity	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Project Trip Generation Summary									
Single Family Detached Residential	181	DU	34	102	136	114	67	181	1,723

[1] Source: ITE (Institute of Transportation Engineers) Trip Generation Manual, 9th Edition, 2012.

[2] DU = Dwelling Units

EXHIBIT 4-1: PROJECT TRIP DISTRIBUTION



LEGEND:

10 = PERCENT TO/FROM PROJECT

N

4.4 PROJECT TRIP ASSIGNMENT

The assignment of traffic from the Project area to the adjoining roadway system is based upon the Project trip generation, trip distribution, and the arterial highway and local street system improvements that would be in place by the time of initial occupancy of the Project. Based on the identified Project traffic generation and trip distribution patterns, Project ADT, AM and PM peak hour traffic volumes are shown on Exhibit 4-2.

4.5 BACKGROUND TRAFFIC

Future year traffic forecasts have been based upon five (5) years of background (ambient) growth at 2% per year for 2020 traffic conditions. The ambient growth factor is intended to approximate regional traffic growth. The total ambient growth is 10.41% for 2020 traffic conditions (compounded growth of two percent per year over five years or $1.02^{5\ \text{years}}$). This ambient growth rate is added to existing traffic volumes to account for area-wide growth not reflected by cumulative development projects. Ambient growth has been added to daily and peak hour traffic volumes on surrounding roadways, in addition to traffic generated by the development of future projects, located within or in close proximity to the study area, that have been approved but not yet built and/or for which development applications have been filed and are under consideration by governing agencies.

4.6 CUMULATIVE DEVELOPMENT TRAFFIC

CEQA guidelines require that other reasonably foreseeable development projects which are either approved or being processed concurrently in the study area also be included as part of a cumulative analysis scenario. A cumulative project list was developed for the purposes of this analysis through consultation with planning and engineering staff from the City of Moreno Valley and adjacent jurisdictions. Exhibit 4-3 illustrates the cumulative development location map. A summary of cumulative development projects and their proposed land uses are shown on Table 4-2. If applicable, the traffic generated by individual cumulative projects was manually added to the Opening Year and Horizon Year forecasts to ensure that traffic generated by the listed cumulative development projects in Table 4-2 are reflected as part of the background traffic.

4.7 OPENING YEAR CUMULATIVE (2020) CONDITIONS

To provide a comprehensive assessment of potential transportation network deficiencies, two types of analyses, “buildup” and “buildout”, were performed in support of this work effort. The “buildup” method was used to approximate the Opening Year Cumulative traffic forecasts, and is intended to identify the cumulative impacts on both the existing and planned near-term circulation system. The Opening Year Cumulative traffic forecasts include background traffic, traffic generated by other cumulative development projects within the study area, and the traffic generated by the proposed Project. The “buildout” approach is used to forecast the Horizon Year Without and With Project conditions of the study area.

EXHIBIT 4-2: PROJECT ONLY TRAFFIC VOLUMES

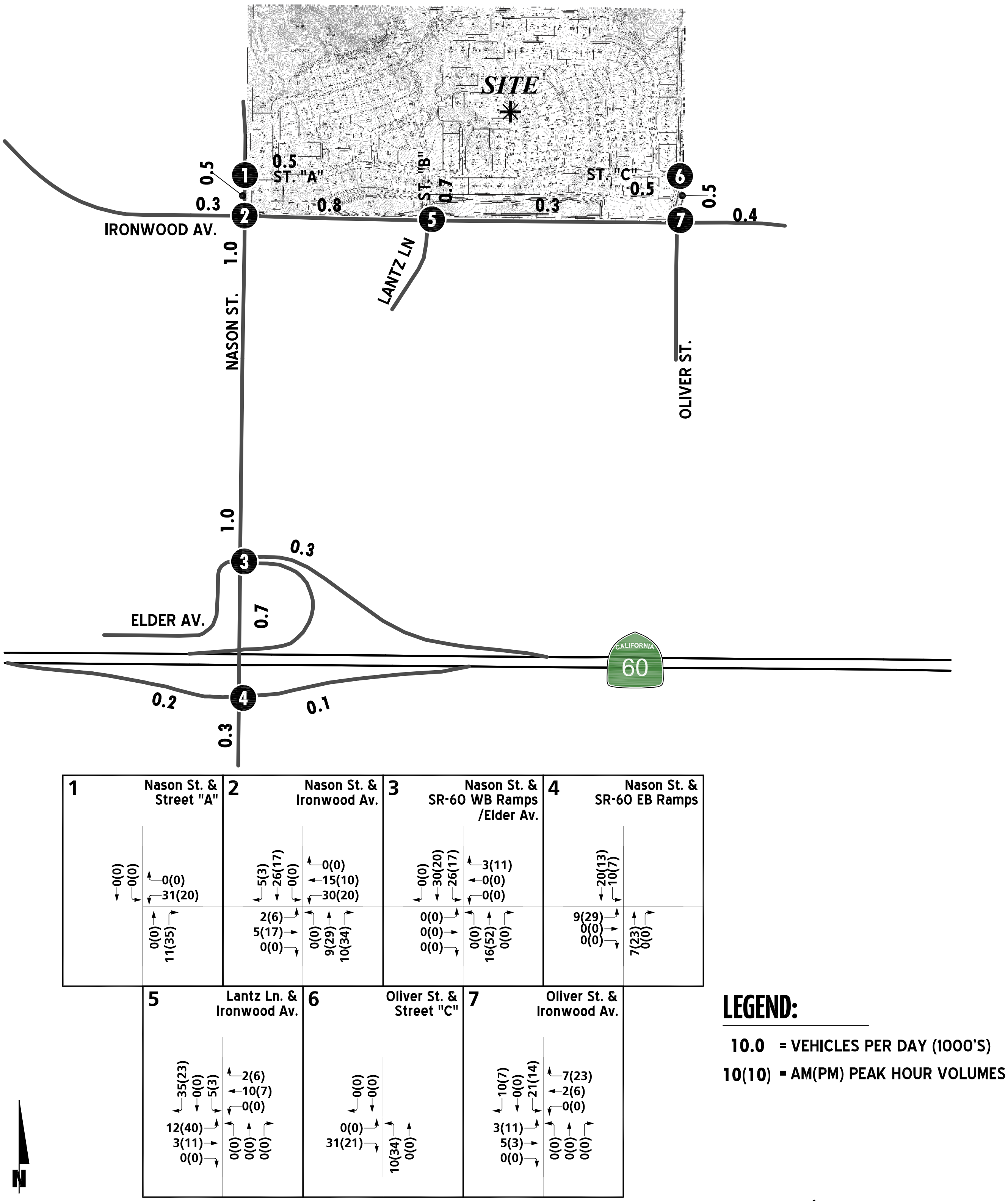


Exhibit 4-3: Cumulative Development Projects Location Map

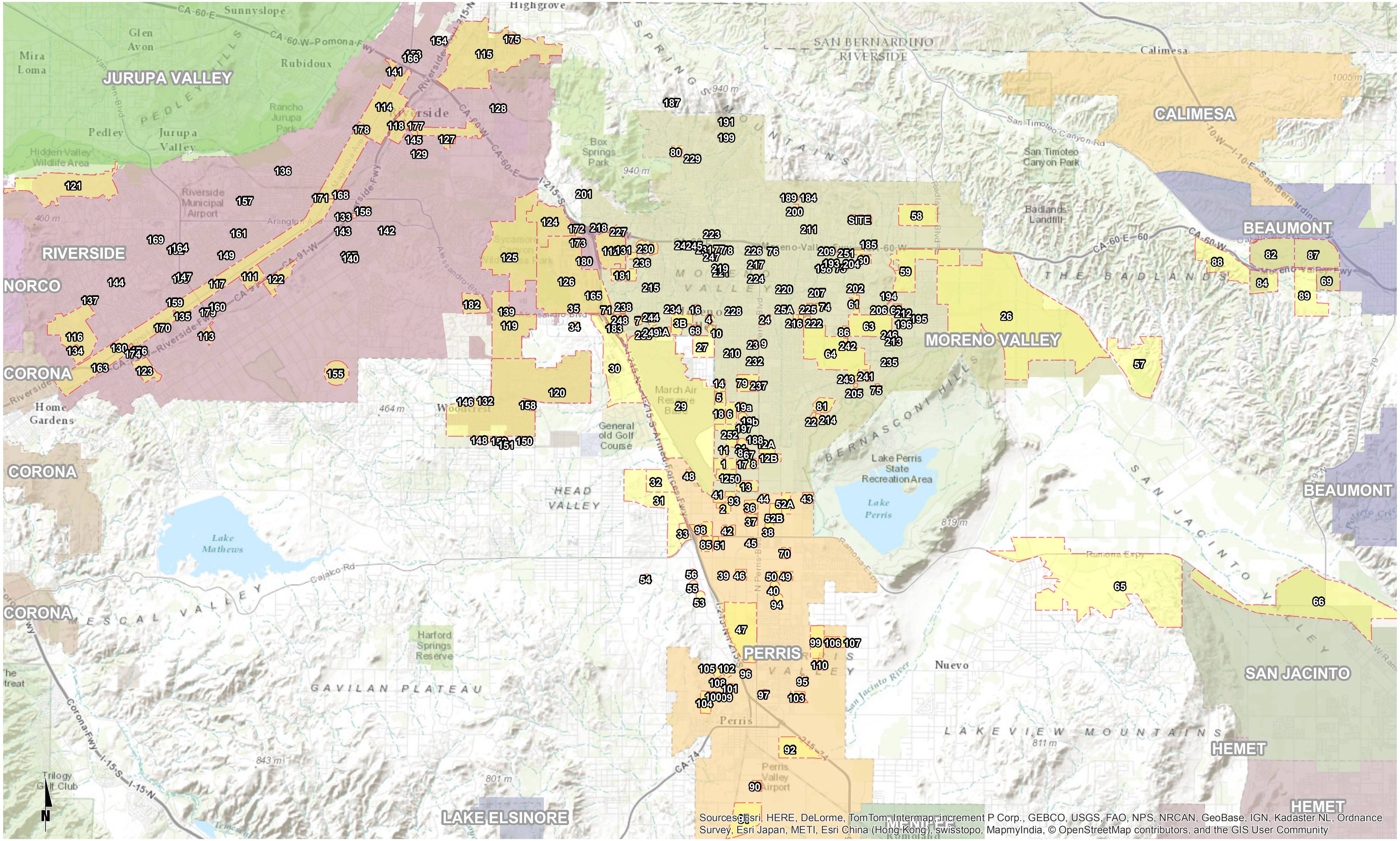


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Table 4-2

Cumulative Development Land Use Summary

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
1	PA 06-0152 & PA 06-0153 (First Park Nandina I & II)	High-Cube Warehouse	1,182.918	TSF
2	Integra Pacific Industrial Facility	High-Cube Warehouse	880.000	TSF
3A	PA 08-0072 (Overton Moore Properties)	High-Cube Warehouse	520.000	TSF
3B	Harbor Freight Expansion	High-Cube Warehouse	1,279.910	TSF
4	PA 04-0063 (Centerpointe Buildings 8 and 9)	General Light Industrial	361.384	TSF
5	PA 07-0035; PA 07-0039 (Moreno Valley Industrial Park)	General Light Industrial	204.657	TSF
		High-Cube Warehouse	409.920	TSF
6	PA 07-0079 (Indian Business Park)	High-Cube Warehouse	1,560.046	TSF
7	PA 08-0047-0052 (Komar Cactus Plaza)[3]	Hotel	110	RMS
		Fast Food w/Drive Thru	8.000	TSF
		Commercial	42.400	TSF
8	First Inland Logistics Center	High-Cube Warehouse	400.130	TSF
9	TM 33607	Condo/Townhomes	52	DU
10	PA 08-0093 (Centerpointe Business Park II)	General Light Industrial	99.988	TSF
11	PA 06-0021; PA 06-0022; PA 06-0048; PA 06-0049 (Komar Investments)	Warehousing	2,057.400	TSF
12A	PA 06-0017 (Ivan Devries)	Industrial Park	569.200	TSF
12B	Modular Logistics (Dorado Property)	High-Cube Warehouse	1,109.378	TSF
13	PA 09-0004 (Vogel)	High-Cube Warehouse	1,616.133	TSF
14	TM 34748	SFDR	135	DU
15	First Nandina Logistics Center	High-Cube Warehouse	1,450.000	TSF
16	PA 09-0031	Gas Station	12	VFP
17	First Park Nandina III	High-Cube Warehouse	691.960	TSF
	Moreno Valley Commerce Park	High-Cube Warehouse	354.321	TSF
18	March Business Center	General Light Industrial	16.732	TSF
		Warehousing	87.429	TSF
		High-Cube Warehouse	1,380.246	TSF
19A	TM 33810	SFDR	16	DU
19B	TM 34151	SFDR	37	DU
20	373K Industrial Facility	High-Cube Warehouse	373.030	TSF
21	TM 32716	SFDR	57	DU
22	TM 32917	Condo/Townhomes	227	DU
23	TM 33417	Condo/Townhomes	60	DU
24	TM 34988	Condo/Townhomes	271	DU
25A	TM 34216	Condo/Townhomes	39	DU
25B	TM 34681	Condo/Townhomes	49	DU
25C	PA 08-0079-0081 (Winco Foods)	Discount Supermarket	95.440	TSF
		Specialty Retail	14.800	TSF
26	Moreno Beach Marketplace (Lowe's)	Commercial Retail	175.000	TSF
	Auto Mall Specific Plan (Planning Area C)	Commercial Retail	304.500	TSF
	Westridge	High-Cube Warehouse	937.260	TSF
	ProLogis	High-Cube Warehouse	1,916.190	TSF
		Warehousing	328.448	TSF
	World Logistics Center	High-Cube Warehouse	41,400.000	TSF
		Warehousing	200.000	TSF
		Gas Station w/ Market	12	VFP
		Existing SFDR	7	DU
27	March Lifecare Campus Specific Plan[4]	Medical Offices	190.000	TSF
		Commercial Retail	210.000	TSF
		Research & Education	200.000	TSF
		Hospital	50	Beds
		Institutional Residential	660	Beds
28	Alessandro Metrolink Station	Light Rail Transit Station	300	SP
29	Airport Master Plan	Airport Use	559.000	TSF
30	Meridian Business Park North	Industrial Park	5,985.000	TSF
31	SP 341; PP 21552 (Majestic Freeway Business Center)	High-Cube Warehouse	6,200.000	TSF
32	PP 20699 (Oleander Business Park)	Warehousing	1,206.710	TSF
33	Ramona Metrolink Station	Light Rail Transit Station	300	SP

Table 4-2
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Cumulative Development Land Use Summary

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
34	PP 22925 (Amstar/Kaliber Development)	Office (258.102 TSF)	258.102	TSF
		Warehousing	409.312	TSF
		General Light Industrial	42.222	TSF
		Retail	10.000	TSF
35	P07-1028 (Alessandro Business Park)	General Light Industrial	662.018	TSF
	Alessandro and Gorgonio	Fast Food w/Drive Thru	4.050	TSF
	2100 Alessandro Boulevard	Vocational School	11.505	TSF
36	P 05-0113 (IDI)	High-Cube Warehouse	1,750.000	TSF
37	P 05-0192 (Oakmont I)	High-Cube Warehouse	697.600	TSF
38	P 05-0477	High-Cube Warehouse	462.692	TSF
39	Rados Distribution Center	High-Cube Warehouse	1,200.000	TSF
40	Investment Development Services (IDS) II	High-Cube Warehouse	350.000	TSF
41	P 07-09-0018	Warehousing	170.000	TSF
42	P 07-07-0029 (Oakmont II)	High-Cube Warehouse	1,600.000	TSF
43	TR 32707	SFDR	137	DU
44	TR 34716	SFDR	318	DU
45	P 05-0493 (Ridge I)	High-Cube Warehouse	700.000	TSF
46	Ridge II	High-Cube Warehouse	2,000.000	TSF
47	Harvest Landing Specific Plan	SFDR	717	DU
		Condo/Townhomes	1,139	DU
		Sports Park	16.700	AC
		Business Park	1,233.401	TSF
		Shopping Center	73.181	TSF
	Perris Marketplace	Shopping Center	450.000	TSF
48	P 06-0411 (Concrete Batch Plant)	Manufacturing	2.000	TSF
49	Jordan Distribution	High-Cube Warehouse	378.000	TSF
50	Aiere	High-Cube Warehouse	642.000	TSF
51	P 08-11-0005; P 08-11-0006 (Starcrest)	High-Cube Warehouse	454.088	TSF
52A	Stratford Ranch Specific Plan	High-Cube Warehouse	1,725.411	TSF
52B	Stratford Ranch Specific Plan	High-Cube Warehouse	480.000	TSF
		General Light Industrial	120.000	TSF
53	PP 18908	General Light Industrial	133.000	TSF
54	Tract 33869	SFDR	39.000	DU
55	PP 16976	General Light Industrial	85.000	TSF
56	PP 21144	Industrial Park	190.802	TSF
57	Quail Ranch Specific Plan	Private School (K-12)	300	STU
		Golf Course	18	Holes
		Hotel	500	ROOMS
		Specialty Retail	66.667	TSF
		General office	66.667	TSF
		Assisted Living	500	Beds
		Senior Living (Detached)	200	DU
		SFDR	600	DU
58	a TR 32460 (Sussex Capital)	SFDR	57	DU
	b TR 32459 (Sussex Capital)	SFDR	11	DU
	c TR 30411 (Pacific Communities)	SFDR	24	DU
	d TR 33962 (Pacific Scene Homes)	SFDR	31	DU
	e TR 30998 (Pacific Communities)	SFDR	47	DU
59	a Westridge Commerce Center	High-Cube Warehouse	937.260	TSF
	b P06-158 (Gascon)	Commercial Retail	116.360	TSF
	c Auto Mall Specific Plan (PAC)	Commercial Retail	304.500	TSF
	d ProLogis	Warehousing	367.000	TSF
		High-Cube Warehouse	1,901.000	TSF
	e TR 35823 (Stowe Passco)	SFDR	261	DU
		Apartments	216	DU

Table 4-2

Cumulative Development Land Use Summary

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
60	TR 36340	SFDR	275	DU
61	a TR 31771 (Sanchez)	SFDR	25	DU
	b TR 34397 (Winchester Associates)	SFDR	52	DU
	c TR 32645 (Winchester Associates)	SFDR	53	DU
62	Lowe's (Moreno Beach Marketplace)	Home Improvement Store	175.000	TSF
63	a Convenience Store/ Fueling Station	Gas Station w/ Market	30.750	TSF
	b Senior Assisted Living	Assisted Living Units	139	DU
	c TR 31590 (Winchester Associates)	SFDR	96	DU
	d TR 32548 (Gabel, Cook & Associates)	SFDR	107	DU
	e 26th Corp. & Granite Capitol	SFDR	32	DU
	f TR 32218 (Whitney)	SFDR	63	DU
	g Moreno Marketplace	Commercial Retail	93.788	TSF
	h Medical Plaza	Medical Offices	311.633	TSF
64	a Moreno Medical Campus	Medical Offices	80.000	TSF
	b Aqua Bella Specific Plan	SFDR	2,922	DU
	c TR 34329 (Granite Capitol)	SFDR	90	DU
	d Cresta Bella	General Office	30.000	TSF
65	a Villages of Lakeview	SFDR	860	DU
		Condo/Townhomes	1,920	DU
		Elementary School	1,200	STU
		Commercial Retail	100.000	TSF
		Soccer Complex	12	Fields
		City Park	8.900	AC
		County Park	8.100	AC
		Regional Park	107.100	AC
	b Motte Lakeview Ranch	SFDR	847	DU
		Condo/Townhomes	686	DU
		Apartments	467	DU
		Elementary School	650	STU
		Middle School	300	STU
		Commercial Retail	120.000	TSF
		Regional Park	177.000	AC
66	Gateway Area Specific Plan	Commercial Retail	255.000	AC
		General Office	510.000	AC
		Business Park	595.000	AC
		Residential	340.000	AC
67	Moreno Valley Industrial Center (Industrial Area SP)	General Light Industrial	354.810	TSF
68	Centerpointe Business Park	General Light Industrial	356.000	TSF
69	ProLogis/Rolling Hills Ranch Industrial	Heavy Industrial	2,565.684	TSF
70	P05-0493	Logistics	597.370	TSF
71	P07-0102; and P09-0416, -0418, -0419	General Light Industrial	652.018	TSF
	Alessandro Bl. (APN 263-091-008; 263-100-019; 263-100-005; P14-0841 to 0848)	Commercial and Industrial Complex	101.580	TSF
72	Moreno Valley Shopping Center	Free Standing Discount Store	189.520	TSF
		Gas Station w/ Market / Car Wash	16	VFP
73	TR 31305 / Richmond American	Residential	87	DU
74	TR 32505 / DR Horton	Residential	72	DU
75	TR 34329 / Granite Capitol	Residential	90	DU
76	TR 31814 / Moreno Valley Investors	Residential	60	DU
77	TR 33771 / Creative Design Associates	Residential	12	DU
78	TR 35663 / Kha	Residential	12	DU
79	TR 22180 / Young Homes	Residential	140	DU
80	TR 32515	Residential	161	DU
81	TR 32142	Residential	81	DU
82	Heartland	Residential	922	DU
83	San Michele Industrial Center (Industrial Area SP)	General Light Industrial	865.960	TSF
84	Hidden Canyon	General Light Industrial	2,890.000	TSF
85	Starcrest, P011-0005; 08-11-0006	General Light Industrial	454.088	TSF

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Cumulative Development Land Use Summary

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
86	Commercial Medical Plaza	Medical Offices	311.633	TSF
87	Mountain Bridge Regional Commercial Community	Commercial	1,853.251	TSF
88	Jack Rabbit Trail	Residential	2,000	DU
89	The Preserve / Legacy Highlands SP	Commercial	595.901	TSF
		Residential	3,412	DU
90	South Perris Industrial Phase 1	Logistics	787.700	TSF
91	South Perris Industrial Phase 2	Logistics	3,448.734	TSF
92	South Perris Industrial Phase 3	Logistics	3,166.857	TSF
93	P 04-0343	Warehousing	41.650	TSF
94	P 06-0228	General Light Industrial	149.738	TSF
95	P 06-0378	Senior Housing	429	DU
96	P 11-09-0011	Retail	80.000	TSF
97	P 12-05-0013	Apartments	75	DU
98	P 12-10-0005	High-Cube Warehouse	1,463.887	TSF
99	TR 30850	Residential	496	DU
100	TR 30973	Residential	35	DU
101	TR 31225	Residential	57	DU
102	TR 31226	Residential	82	DU
103	TR 31240	Residential	114	DU
104	TR 31407	Residential	243	DU
105	TR 31650	SFDR	61	DU
106	TR 31659	SFDR	161	DU
107	TR 32041	Residential	122	DU
108	TR 32406	SFDR	15	DU
109	TR 33193	Townhomes	94	DU
110	TR 33338	Residential	75	DU
111	California Baptist University Specific Plan	University	157	AC
112	Canyon Springs Specific Plan	Hospital	280	BEDS
		Medical-Dental Office	370	TSF
		Senior Adult Housing-Attached	234	DU
		Assisted Living	267	BEDS
113	Citrus Business Park Specific Plan	Industrial Business Park	49	AC
114	Downtown Specific Plan	Residential	5,000	DU
115	Hunter Business Park	Industrial	1,300	AC
116	La Sierra University Specific Plan	Mixed-Use		
117	Magnolia Avenue Specific Plan	Mixed-Use/Very High Residential	1,473	AC
118	Marketplace Specific Plan	Commercial Retail/Office	200	AC
119	Mission Grove Specific Plan	Business/Office Park	56.79	AC
		Commercial Retail	68.12	AC
		High Density Residential	53.77	AC
		Low Density Residential	78.38	AC
		Medium Density Residential	155.31	AC
120	Orangecrest Specific Plan	Rural Residential	2.13	AC
		Business/Office Park	2.70	AC
		Commercial Retail	138.96	AC
		High Density Residential	13.70	AC
		Low Density Residential	540.76	AC
		Medium Density Residential	1,217.80	AC
		Public Facilities/Institutions	121.59	AC
		Public Park	59.51	AC
121	Rancho La Sierra Specific Plan	SFDR	598	DU
122	Riverside Auto Center Specific Plan	Auto Center		
123	Riverwalk Vista Specific Plan	Residential	402	DU
124	Sycamore Canyon Specific Plan	Hillside Residential	41.83	AC
		Low Density Residential	97.28	AC
		Medium Density Residential	14.84	AC
		Very Low Density Residential	884.22	AC
		Public Park	27.85	AC

Table 4-2

Cumulative Development Land Use Summary

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
125	Sycamore Canyon Business Park Specific Plan	Business/Office Park	847.15	AC
		Commercial Retail	10.32	AC
126	Sycamore-Highlands Specific Plan	Commercial Retail	14.63	AC
		High Density Residential	52.18	AC
		Medium Density Residential	99.11	AC
		Public Facilities	1.56	AC
		Public Park	144.17	AC
		Very Low Density Residential	49.09	AC
127	University Avenue Specific Plan	Mixed-Use	Varies	
128	807 Blaine Street (P09-0717; P09-0718)	Apartments	55	DU
129	2340 Fourteenth Street (P09-0808; P08-0809)	Senior Housing	134	BEDS
130	10938 Magnolia Avenue (P10-0083)	Pharmacy	14.064	TSF
131	6287 Day Street (P10-0090; P10-0091)	Gas Station	2	VFP
	2570 Canyon Springs Parkway (P08-0274; P08-0275)	Bank w/ Drive Thru	2.746	TSF
	6211 Valley Springs Parkway (Steak 'N Shake Restaurant; P14-0536)	Fast Food w/Drive Thru	3.750	TSF
132	N. of Van Buren Boulevard; W. of Wood Street (P10-0808; P10-0708)	Fast Food w/Drive Thru	2.361	TSF
133	3439 Arlington Avenue (P12-0234)	Fitness Club	9.600	TSF
134	NWC of Riverwalk Parkway and Flat Rock Drive (P12-0019; P12-0156; P12-0158)	Convenience Store	2.400	TSF
		Coffee Shop	3.946	TSF
135	3875 Dawes Street (P10-0438; Magnolia Garden Condominiums)	Condo/Townhomes	62	DU
136	5938-5944 Grand Avenue (P12-0266; P12-0267; P12-0268)	Senior Housing	37	DU
137	4901 La Sierra Avenue (P11-0627; P11-0628; P11-0777; P11-0778)	Gas Station	4.100	TSF
138	4250 Van Buren Boulevard (P12-0605; P12-0606)	Gas Station	1.776	TSF
139	360 Alessandro Boulevard (P12-0419; P12-0557; P12-0558; P12-0559)	Bank	3.858	TSF
140	2831 Mary Street (P12-0761; P12-0442 P12-0443; P12-0444)	Pharmacy	56.101	TSF
141	2450 Market Street (P13-0087; P13-0262)	Apartments	77	DU
142	6091 Victoria Avenue (P13-0432)	Day Care	1.831	TSF
143	6692 Indiana Avenue (P13-0159; P13-0160)	Gas Station	2.958	TSF
144	4824 Jones Avenue (P13-0181; P13-0182)	Church	23.124	TSF
145	2586 University avenue (P13-0650; P13-0651)	Bed and Breakfast	3.618	TSF
146	18580 Van Buren Boulevard (P08-0402; P13-0822)	Auto Repair Shop	8.142	TSF
147	4247 Van Buren Boulevard (P13-0785; P13-0787)	Church Expansion	12.166	TSF
148	SWC of Lurin Avenue and Wood Road (P06-0900; P08-0269; P08-0270; TTM 32301)	SFDR	20	DU
149	8616 California Avenue (P08-0084; PM 35852)	Condo/Townhomes	21	DU
150	19811 Lurin Avenue (P06-1355; TM 33480)	SFDR	32	DU
151	APN:266140029, 030 (P06-1396; Mariposa Avenue; TM 33481)	SFDR	25	DU
152	APN:266140002, 021, 022 (P06-1404; Lurin Avenue; TM 33482)	SFDR	29	DU
153	3719 Strong Street (P05-0269; P08-0416; TM 33550)	SFDR	9	DU
154	1006 & 1008 Clark Street (P06-0782; TM 34908)	SFDR	15	DU
155	E. of Gratton St., W. of Corsica Av., N. of Van Buren Bl. (P05-1528; P09-0087; TM 34509)	SFDR	50	DU
156	NWC of Dominion Avenue and Division Street (P08-0396; P08-0397; P08-0398; P08-0399; TM 35620)	Condo/Townhomes	36	DU
157	6639 Hillside Avenue (P08-0727; PM 35901)	Industrial	5	LOTS
158	19985 Van Buren Boulevard (P10-0118; Gless Ranch)	Commercial Retail	425.447	TSF
159	3990 Reynolds Road (P12-0021; P12-0022; P12-0074; PM 36442)	Condo/Townhomes	102	DU
160	NEC of Martha Way & Everest Avenue (P13-0389; TM 36579)	SFDR	5	DU
161	4325, 4335, 4345, 4355, 4375 Adams Street (P13-0723; P13-0724; P13-0725; TM 36654)	SFDR	62	DU
162	5200 Van Buren Boulevard (P09-0600; P09-0601; Walmart Expansion)	Free Standing Discount Store	22.272	TSF
163	11500 Magnolia Avenue (P10-0406; P10-0407; P10-0408)	Apartments	168	DU
164	9241 & 9265 Audrey Avenue (P12-0184; P12-0185; P12-0187; Azar Plaza)	Commercial Retail	6.150	TSF
165	2325 Cottonwood Avenue (P12-0507; P12-0508; P12-0509; P12-0510)	High-Cube Warehouse	235.741	TSF
166	1710 Main Street (P12-0717)	Family Dollar Store	8.039	TSF
167	2861 Mary Street (P12-0442; P12-0443; P12-0444)	Shopping Center	56.101	TSF
168	3545 Central Avenue (P12-0741; P12-0743)	Riverside Plaza Renovations	35	AC
169	5731, 5741, 5761 & 5797 Pickler Street (P13-0198; P13-0199; P13-0200; P13-0201)	Apartments	30	DU

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Cumulative Development Land Use Summary

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
170	3705 Tyler Street (P13-0501; P13-0502)	Restaurant	6.000	TSF
171	6570 Magnolia Avenue; 3739 & 3747 Central Avenue (P13-0196; P13-0197)	Fast Food w/Drive Thru	3.795	TSF
172	5940-5980 Sycamore Canyon Boulevard (P13-0553; P13-0554; P13-0583; P14-0065)	Apartments	275	DU
173	SEC Sycamore Canyon Boulevard & Box Springs Road (P13-0607; P13-0608; P0609; P13-0854)	General Light Industrial	171.616	TSF
174	3742 Park Sierra Avenue (P13-0912; P13-0913)	Fitness Club	45.000	TSF
175	474 Palmyrita Avenue (P13-0956; P13-0959; P13-0960; P13-0963; P13-0964; P13-0965; P13-0966)	High-Cube Warehouse	1,461.449	TSF
176	Park Sierra Avenue (P14-0026; P14-0027)	Fast Food w/Drive Thru	3.500	TSF
177	E. of Commerce St., between Mission Inn Av. and Ninth St. (P14-0045; P14-0046; P14-0047; P14-0048; P14-0049)	Apartments	208	DU
178	4445 Magnolia Avenue (P13-0207; P13-0208; P13-0209; P13-0210; P13-0211)	Hospital Expansion	Varies	
179	SR-91/Van Buren Commercial	Commercial Retail	23.565	TSF
180	6465 Sycamore Canyon Boulevard	Health Club	4.000	TSF
181	Edgemont Street, South of Eucalyptus Av.	Apartments	112	DU
182	14601 Dauchy Av. - TM 36370 (P12-0601; P12-0697; P12-0698)	SFDR	10	DU
	TM 32180 (P07-1073)	SFDR	9	DU
	18875 Moss Road	SFDR	8	DU
	South of Clarke St., west of Crystal View Terrace (PM 34583' {09-0141; P09-173)	SFDR	3	DU
183	Freeway Business Center (March JPA)	High-Cube Warehouse	710	TSF
184	28860 Professor's Fun IV, LLC/Winchester Associates, Inc.	SFDR	9	DU
185	20636 Pacific Communities	SFDR	67	DU
186	31297 Randy McFarland	SFDR	7	DU
187	31394 Pigeon Pass, Ltd.	SFDR	78	DU
188	31442 SKG Pacific Enterprises Inc.	SFDR	63	DU
189	31517 Professors Prop Six/Winchester Assoc.	SFDR	83	DU
190	31621 Peter Sanchez	SFDR	25	DU
191	32005 Red Hill Village, LLC	SFDR	214	DU
192	32126 Salvador Torres	SFDR	35	DU
193	32194 Arman Pezeshkifar	SFDR	32	DU
194	32408 Sanstone Inc.	SFDR	80	DU
195	32844 Winchester Associates	SFDR	17	DU
196	32978 Focus Estates	SFDR	19	DU
197	33024 Adam Wislar	SFDR	8	DU
198	33275 Jose Guzman	SFDR	4	DU
199	33388 SCH Development, LLC	SFDR	16	DU
200	33436 Winchester Associates	SFDR	105	DU
201	33626 Kincaid Development, Inc.	SFDR	23	DU
202	33963 Rance Garrett	SFDR	31	DU
203	34043 RM3 Building and Development	SFDR	12	DU
204	31621 Beazer Homes	SFDR	274	DU
205	30268 Pacific Communities	SFDR	83	DU
206	31414 GRF - Majestic Hills	SFDR	31	DU
207	31494 Winchester Associates	SFDR	12	DU
208	32715 GFR - Trinity	SFDR	30	DU
209	33256 Granite Homes	SFDR	79	DU
210	32711 Isaac Genah	SFDR	9	DU
211	35530 Moreno Gilman 650, LLC-Quail Ranch	SFDR	1,105	DU
212	35534 Leedco Engineers	SFDR	12	DU
213	36436 CV Communities	SFDR	159	DU
214	36401 Continental East Fund III, LLC	SFDR	92	DU
215	32215 Winchester Associates "Scottish Village"	MFDR	194	DU
216	32756 Jimmy Lee	MFDR	24	DU
217	35369 Tason Myers Property	MFDR	12	DU
218	35414 Lincoln Property Co. Southwest	MFDR	240	DU
219	35769 Michael Chen	MFDR	16	DU

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Cumulative Development Land Use Summary

TAZ	Project Name	Land Use[1]	Quantity	Units[2]
220	PA08-0013 Palm Desert Development "Rancho Dorado North"	MFDR	80	DU
221	PA09-0006 Jim Nydam	MFDR	15	DU
222	35861 Frederick Homes	MFDR	24	DU
223	36038 Alessandro Village Plaza, LLC	MFDR	96	DU
224	35304 Jimmy Lee	MFDR	12	DU
225	Alessandro & Lasselle	Shopping Center	140	TSF
226	Burger King - Fast-Food - 24800 Sunnymead	Fast Food w/Drive Thru	--	TSF
227	Nightclub	Retail	11	TSF
	Aerosports Trampoline Park	Recreation Community Center	34.5	TSF
228	Food 4 Less - Fueling Station	Gas Station with Convenience Market	16	VFS
229	Lakeshore Village Marketplace	Shopping Center	140	TSF
230	El Paso (food court)	Fast Food no Drive Thru	--	TSF
231	Potato Corner	Fast Food no Drive Thru	--	TSF
232	O'Reilly Automotive	Automobile Parts Sale	7.5	TSF
233	O'Reilly Automotive	Automobile Parts Sale	7.5	TSF
234	Restaurant	Restaurant	9	TSF
235	Rancho Belago Plaza - Retail	Retail	14	TSF
236	24-Hour Fitness	Fitness Club	--	TSF
	Rivals Sports Bar & Grill	Restaurant	--	TSF
237	Walmart	Free Standing Discount Store	193	TSF
238	Yum Yum Donut Shop	Coffee/Donut Shop w/o Drive-Thru	4.35	TSF
239	Hawthorn Inn & Suites	Hotel	79	RMS
240	Sleep Inn Suites	Hotel	66	RMS
241	Fresenius Medical Care Center	Medical Offices	12	TSF
242	Integrated Care Communities	Nursing Home	44	TSF
243	Kaiser Permanente - Emergency Room Expansion	Medical Offices	--	TSF
244	Moreno Valley Professional Center	General Office	84	TSF
245	Olivewood Plaza - Office Building	General Office	23	TSF
246	Renaissance Village of Moreno Valley	Senior Adult Housing-Attached	140	DU
247	Riverside County Office Building	General Office	52	TSF
248	Gateway Business Park	Residential Condo/Townhouse	34	DU
249	Shaw Development	High-Cube Warehouse	367	TSF
250	IDS/Real Estate Group - Nandina Distribution Center	High-Cube Warehouse	697	TSF
251	Stoneridge Town Centre - Vacant Restaurant	Restaurant	5,700	TSF
252	Moreno Valley Logistics Center	High-Cube Warehouse	1,332	TSF
		Warehousing	371	TSF

[1] SFDR = Single Family Detached Residential ; MFDR = Multi-Family Detached Residential

[2] DU = Dwelling Units; TSF = Thousand Square Feet; SP = Spaces; VFP = Vehicle Fueling Positions

[3] Source: Cactus Avenue and Commerce Center Drive Commercial Center TIA, Urban Crossroads, Inc., December 9, 2008 (Revised).

[4] Source: March Lifecare Campus Specific Plan Traffic Impact Analysis, Mountain Pacific, Inc., May 2009 (Revised).

The buildup approach combines existing traffic counts with a background ambient growth factor and cumulative development traffic to forecast the Opening Year Cumulative traffic conditions. An ambient growth factor of 10.41% accounts for background (area-wide) traffic increases that occur over time up to the year 2020 from the year 2015 (compounded two percent per year growth over a minimum five year period). Traffic volumes generated by the Project are then added to assess the Opening Year Cumulative With Project traffic conditions. The Opening Year roadway network is similar to the Existing conditions roadway network, with the exception of future driveways proposed to be developed by the Project.

The near-term traffic analysis includes the following traffic conditions, with the various traffic components:

- Opening Year Cumulative (2020) Without Project
  - Existing 2015 counts
  - Ambient growth traffic (10.41%)
  - Cumulative Development traffic
- Opening Year Cumulative (2020) With Project
  - Existing 2015 counts
  - Ambient growth traffic (10.41%)
  - Cumulative Development traffic
  - Project traffic

4.8 HORIZON YEAR (2035) VOLUME DEVELOPMENT

The Horizon Year (2035) Without Project traffic conditions were derived from the Riverside County Transportation Analysis Model (RivTAM) modified to represent General Plan Buildout conditions for the City of Moreno Valley using accepted procedures for model forecast refinement and smoothing. The traffic forecasts reflect the area-wide growth anticipated between Existing conditions and General Plan Buildout conditions.

In most instances the traffic model zone structure is not designed to provide accurate turning movements along arterial roadways unless refinement and reasonableness checking is performed. Therefore, the Horizon Year Without Project peak hour forecasts were refined using the model derived long-range forecasts, along with existing peak hour traffic count data collected at each analysis location in January 2015. Future estimated peak hour traffic data was used for new intersections and intersections with an anticipated change in travel patterns to further refine the Horizon Year With Project peak hour forecasts.

The refined future peak hour approach and departure volumes obtained from the model output data are then entered into a spreadsheet program consistent with the National Cooperative Highway Research Program (NCHRP Report 255), along with initial estimates of turning movement proportions. A linear programming algorithm is used to calculate individual turning movements which match the known directional roadway segment forecast volumes computed in the previous step. This program computes a likely set of intersection turning movements from intersection approach counts and the initial turning proportions from each approach leg.

Typically, the model growth is prorated and is subsequently added to the existing (base validation) traffic volumes to represent Horizon Year traffic conditions. However, review of the resulting model growth indicates negative growth for several study area intersections. In an effort to conduct a conservative analysis, reductions to traffic forecasts from either Existing or Opening Year Cumulative traffic conditions were not assumed as part of this analysis. As such, in conjunction with the addition of cumulative projects that are not consistent with the General Plan, additional growth has also been applied on a movement-by-movement basis, where applicable, to estimate reasonable Horizon Year forecasts. Horizon Year turning volumes were compared to Opening Year Cumulative volumes in order to ensure a minimum growth as a part of the refinement process. The minimum growth includes any additional growth between Opening Year Cumulative and Horizon Year traffic conditions that is not accounted for by the traffic generated by cumulative development projects and ambient growth rates assumed between Existing (2015) and Opening Year Cumulative traffic conditions. Future estimated peak hour traffic data was used for new intersections and intersections with an anticipated change in travel patterns to further refine the Horizon Year peak hour forecasts.

The future Horizon Year Without Project peak hour turning movements were then reviewed by Urban Crossroads for reasonableness, and in some cases, were adjusted to achieve flow conservation, reasonable growth, and reasonable diversion between parallel routes. Flow conservation checks ensure that traffic flow between two closely spaced intersections, such as two freeway ramp locations, is verified in order to make certain that vehicles leaving one intersection are entering the adjacent intersection and that there are no unexplained loss of vehicles. The result of this traffic forecasting procedure is a series of traffic volumes which are suitable for traffic operations analysis.

Post-processing worksheets for Horizon Year Without Project traffic conditions are provided in Appendix 4.1.

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5 EXISTING PLUS PROJECT TRAFFIC ANALYSIS

In an effort to satisfy the CEQA Guideline section 15125(a), an analysis of existing traffic volumes plus traffic generated by the proposed Project (E+P) has been included in this analysis. This section discusses the traffic forecasts for E+P conditions and the resulting intersection operations, roadway segment analyses, and traffic signal warrants.

5.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for E+P conditions are consistent with those shown previously on Exhibit 3-1, with the exception of Project streets assumed to be constructed by the Project to provide site access. In other words, no other off-site improvements are assumed beyond those that currently exist with the exception of the intersections and roadways that would be improved by the Project for access.

5.2 EXISTING PLUS PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus Project traffic. Exhibit 5-1 shows the ADT, AM and PM peak hour traffic volumes which can be expected for E+P traffic conditions.

5.3 INTERSECTION OPERATIONS ANALYSIS

E+P peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA. The intersection analysis results are summarized in Table 5-1, which indicates all study area intersections are anticipated to continue to operate at acceptable LOS consistent with Existing traffic conditions. As such, the addition of Project traffic is not anticipated to result in any deficiencies.

Consistent with Table 5-1, a summary of the peak hour intersection LOS for E+P conditions are shown on Exhibit 5-2. The intersection operations analysis worksheets for E+P traffic conditions are included in Appendix “5.1” of this TIA.

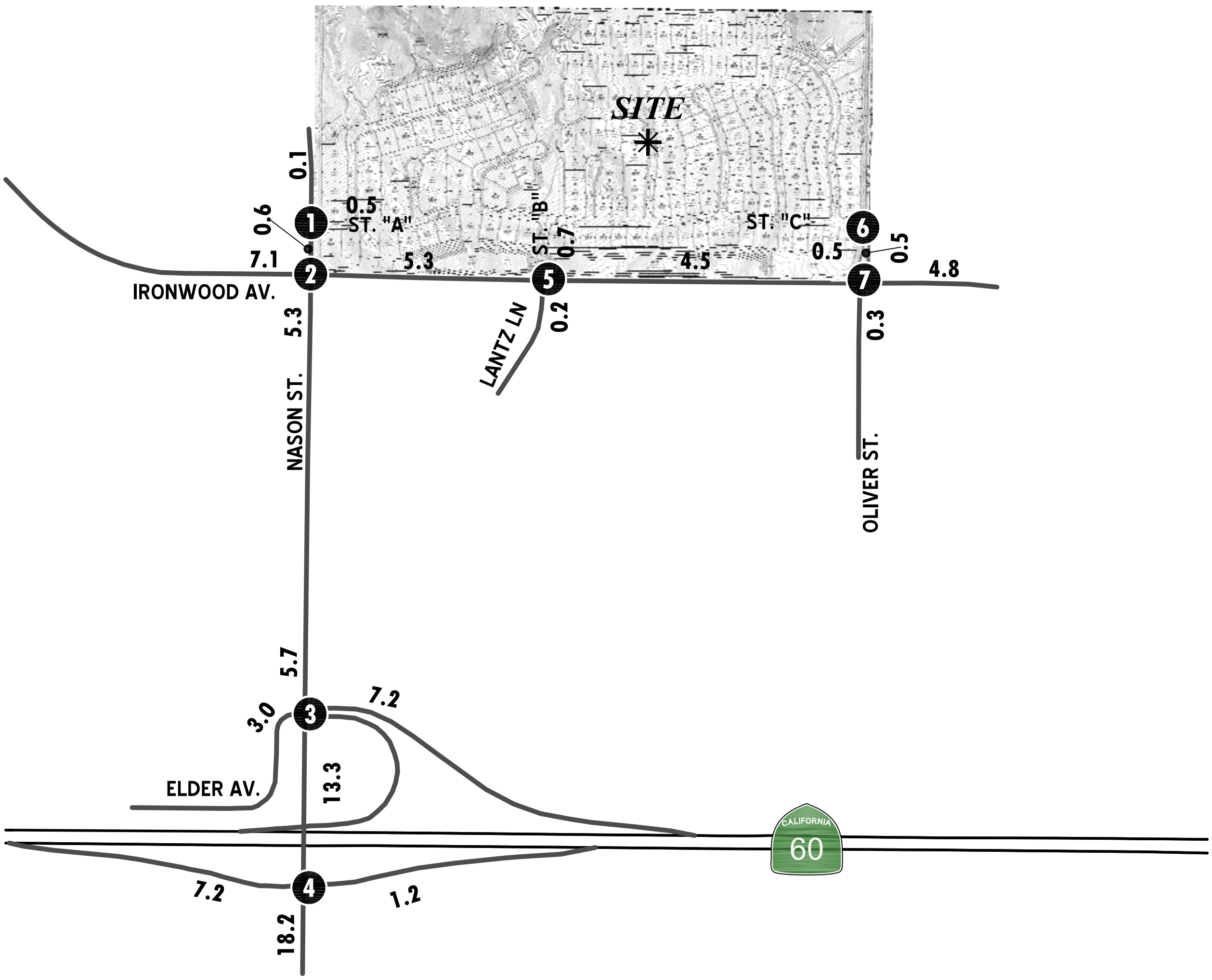
5.4 ROADWAY SEGMENT CAPACITY ANALYSIS

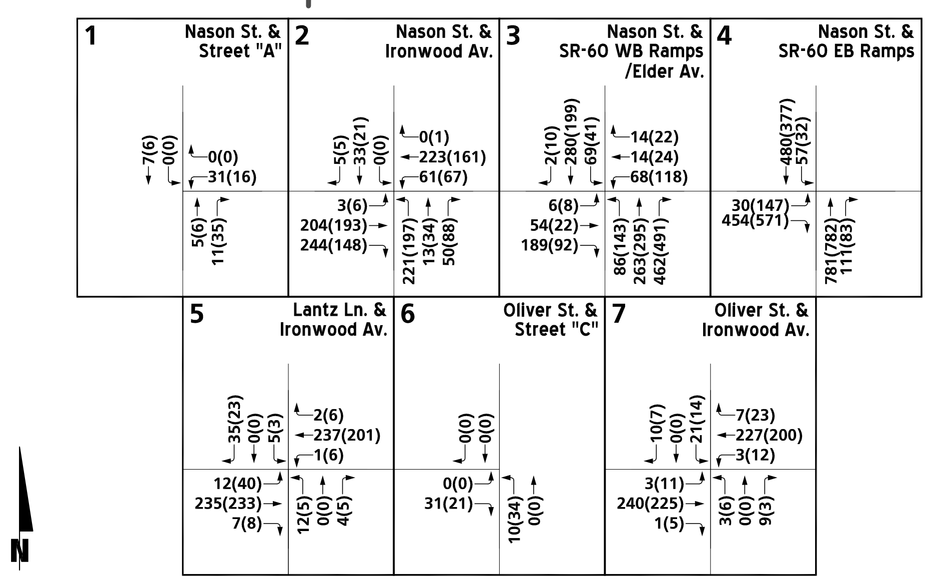
Table 5-2 provides a summary of the E+P conditions roadway segment capacity analysis based on the City of Moreno Valley General Plan Circulation Element Roadway Segment Capacity/(LOS) Thresholds identified previously on Table 2-3. As shown on Table 5-2, all the study roadway segments are anticipated to operate at acceptable LOS consistent with Existing traffic conditions. As such, the addition of Project traffic is not anticipated to result in any deficiencies.

5.5 TRAFFIC SIGNAL WARRANTS ANALYSIS

Traffic signal warrants for E+P traffic conditions are based on both E+P Caltrans planning-level ADT and peak hour volumes. For E+P conditions, there are no traffic signals that appear to be warranted (see Appendix “5.2”).

EXHIBIT 5-1: E+P TRAFFIC VOLUMES





LEGEND:

10.0 = VEHICLES PER DAY (1000'S)

10(10) = AM(PM) PEAK HOUR VOLUMES

EXHIBIT 5-2: SUMMARY OF PEAK HOUR INTERSECTION LOS FOR E+P CONDITIONS

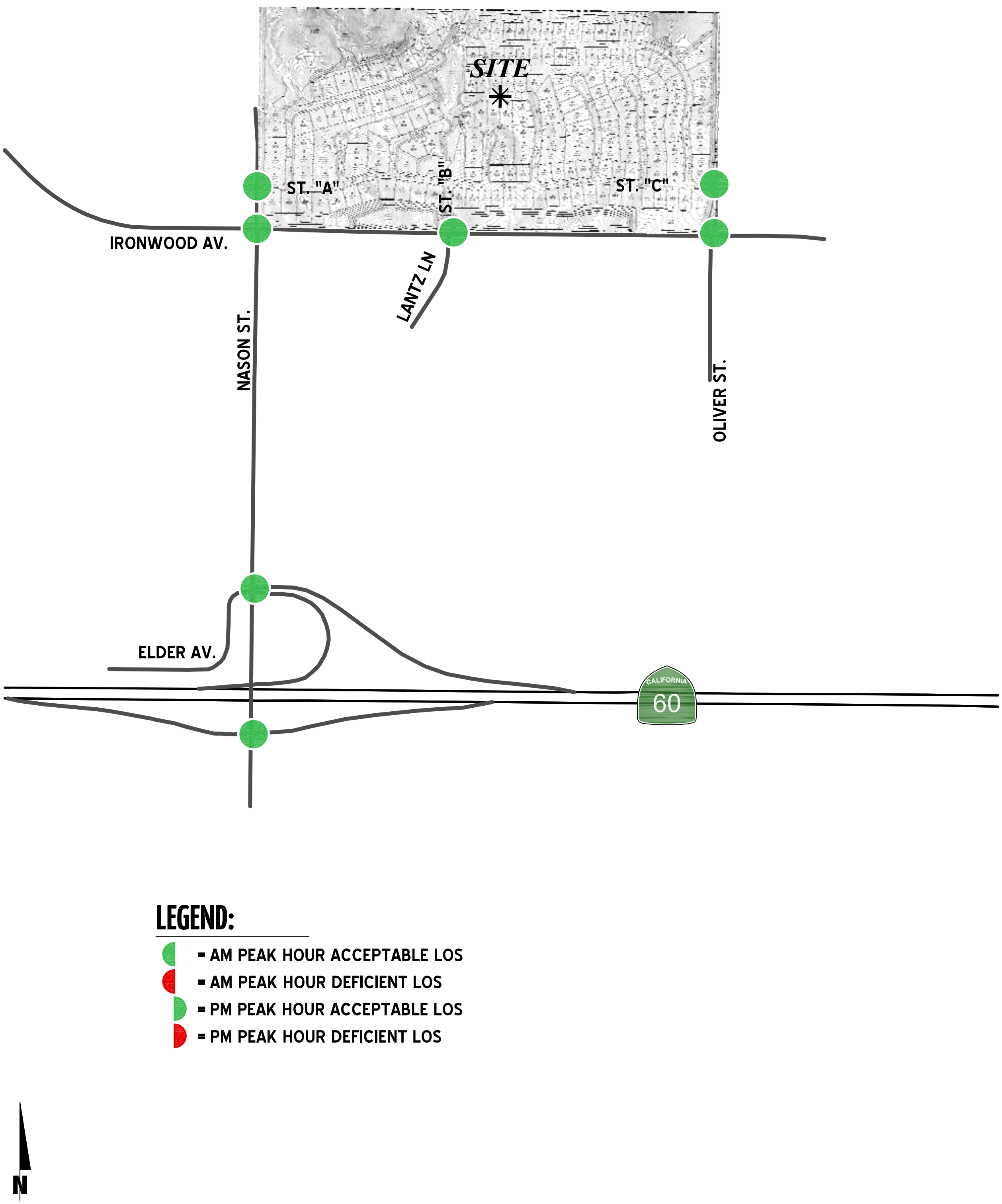


Table 5-1

Intersection Analysis for Existing Plus Project Conditions

#	Intersection	Traffic Control [2]	Existing (2015) Delay [1] (secs.) AM	Existing (2015) Delay [1] (secs.) PM	Existing (2015) Level of Service AM	Existing (2015) Level of Service PM	Existing Plus Project Delay [1] (secs.) AM	Existing Plus Project Delay [1] (secs.) PM	Existing Plus Project Level of Service AM	Existing Plus Project Level of Service PM
1	Nason St. / Street "A"	**CSS**	Future Intersection				8.9	8.9	A	A
2	Nason St. / Ironwood Av.	TS	18.1	16.7	B	B	20.0	18.7	B	B
3	Nason St. / SR-60 WB Ramps	TS	19.1	20.3	B	C	19.9	20.5	B	C
4	Nason St. / SR-60 EB Ramps	TS	11.9	14.1	B	B	12.3	14.6	B	B
5	Lantz Ln. / Ironwood Av.	CCS	11.6	11.0	B	B	12.2	12.0	B	B
6	Oliver St. / Street "C"	**CSS**	Future Intersection				8.9	9.2	A	A
7	Oliver St. / Ironwood Av.	CCS	11.5	11.2	B	B	12.0	11.6	B	B

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; TS = Traffic Signal

Attachment: Traffic Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Table 5-2

Roadway Volume/Capacity Analysis for Existing Plus Project Conditions

#	Roadway	Segment Limits	Roadway Section	LOS Capacity[1]	Existing (2015)	V/C	LOS	E+P	V/C	LOS	Acceptable LOS
1	Nason Street	Street "A" to Ironwood Avenue	**2U**	2,000	N/A			637	0.32	A	C
2		South of Ironwood Avenue	2U	12,500	4,306	0.34	A	5,253	0.42	A	D
3		North of SR-60 WB Ramps	4D	37,500	4,760	0.38	A	5,707	0.46	A	D
4		SR-60 WB Ramps to SR-60 EB Ramps	4D	37,500	12,687	0.34	A	13,332	0.36	A	D
5		South of SR-60 EB Ramps	4D	37,500	17,807	0.47	A	18,151	0.48	A	D
6	Ironwood Avenue	West of Nason Street	2U	12,500	6,754	0.54	A	7,098	0.57	A	C
7		Nason Street to Lantz Lane	2U	12,500	4,568	0.37	A	5,342	0.43	A	C
8		Lantz Lane to Oliver Street	2U	12,500	4,279	0.34	A	4,537	0.36	A	C
9		East of Oliver Street	2U	12,500	4,319	0.35	A	4,750	0.38	A	C
10	Oliver Street	Between Street "C" and Ironwood Avenue	**2U**	2,000	N/A			517	0.26	A	C

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

N/A = Not Applicable; Segment does not exist.

[1] These maximum roadway capacities have been extracted from the City of Moreno Valley's Transportation Division's Traffic Impact Analysis Transportation Division's Traffic Impact Analysis Preparation Guidelines (August 2007). These roadway capacities are "rule of thumb" estimates for planning purposes. The LOS "E" service volumes are estimated maximum daily capacity for respective classifications. Capacity is affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian and bicycle traffic.

5.6 OFF-RAMP QUEUING ANALYSIS

Queuing analysis findings are presented in Table 5-3. As shown on Table 5-3, there are no queuing issues during the peak 95th percentile traffic flows under Existing Plus Project traffic conditions consistent with Existing traffic conditions. As such, the addition of Project traffic is not anticipated to result in any potential off-ramp queues at the SR-60 Freeway and Nason Street. Worksheets for Existing Plus Project traffic conditions off-ramp queuing analysis are provided in Appendix "5.3".

Table 5-3

Peak Hour Freeway Off-Ramp Queuing Summary for Existing Plus Project Conditions

Intersection	Movement	Available Stacking Distance (Feet)	95th Percentile Queue (Feet) [2]		Acceptable? [1]	
			AM Peak Hour	PM Peak Hour	AM	PM
Existing (2015) Conditions						
Nason St. / SR-60 WB Ramps	WBL	1,370	83	132	Yes	Yes
	WBT	2,140	21	31	Yes	Yes
	WBR	190	0	0	Yes	Yes
Nason St. / SR-60 EB Ramps	EBL	805	27	96	Yes	Yes
	EBT	1,300	46	66	Yes	Yes
	EBR	225	45	63	Yes	Yes
Existing Plus Project Conditions						
Nason St. / SR-60 WB Ramps	WBL	1,370	83	132	Yes	Yes
	WBT	2,140	21	31	Yes	Yes
	WBR	190	0	0	Yes	Yes
Nason St. / SR-60 EB Ramps	EBL	805	35	113	Yes	Yes
	EBT	1,300	46	64	Yes	Yes
	EBR	225	45	62	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.
[2] Maximum queue length for the approach reported.

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6 OPENING YEAR CUMULATIVE (2020) TRAFFIC ANALYSIS

This section discusses the methods used to develop Opening Year Cumulative Without and With Project traffic forecasts, and the resulting intersection operations, roadway segment analyses, and traffic signal warrants.

6.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Opening Year Cumulative conditions are consistent with those shown previously on Exhibit 3-1, with the exception of Project driveways assumed to be constructed by the Project to provide site access. In other words, no other off-site improvements are assumed beyond those that currently exist with the exception of the intersections and roadways that would be improved by the Project for access.

6.2 OPENING YEAR CUMULATIVE WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

The weekday ADT, AM and PM peak hour volumes which can be expected for Opening Year Without Project traffic conditions are shown on Exhibit 6-1.

6.3 OPENING YEAR CUMULATIVE WITH PROJECT TRAFFIC VOLUME FORECASTS

The weekday ADT, AM and PM peak hour volumes which can be expected for Opening Year With Project traffic conditions are shown on Exhibit 6-2.

6.4 INTERSECTION OPERATIONS ANALYSIS

As shown in Table 6-1, all the study area intersections are anticipated to operate at acceptable LOS under both Opening Year Cumulative Without and With Project traffic conditions.

A summary of the peak hour intersection LOS for Opening Year Cumulative Without and With Project conditions are shown on Exhibits 6-3 and 6-4. The intersection operations analysis worksheets for Opening Year Cumulative Without and With Project traffic conditions are included in Appendix "6.1" and Appendix "6.2" of this TIA, respectively.

6.5 ROADWAY SEGMENT CAPACITY ANALYSIS

Table 6-2 provides a summary of the Opening Year Cumulative conditions roadway segment capacity analysis based on the City of Moreno Valley General Plan Circulation Element Roadway Segment Capacity/LOS Thresholds identified previously on Table 2-3. As shown on Table 6-2, all the study roadway segments are anticipated to operate at acceptable LOS with the exception of the segment of Ironwood Avenue, west of Nason Street.

EXHIBIT 6-1: OPENING YEAR CUMULATIVE (2020) WITHOUT PROJECT TRAFFIC VOLUMES

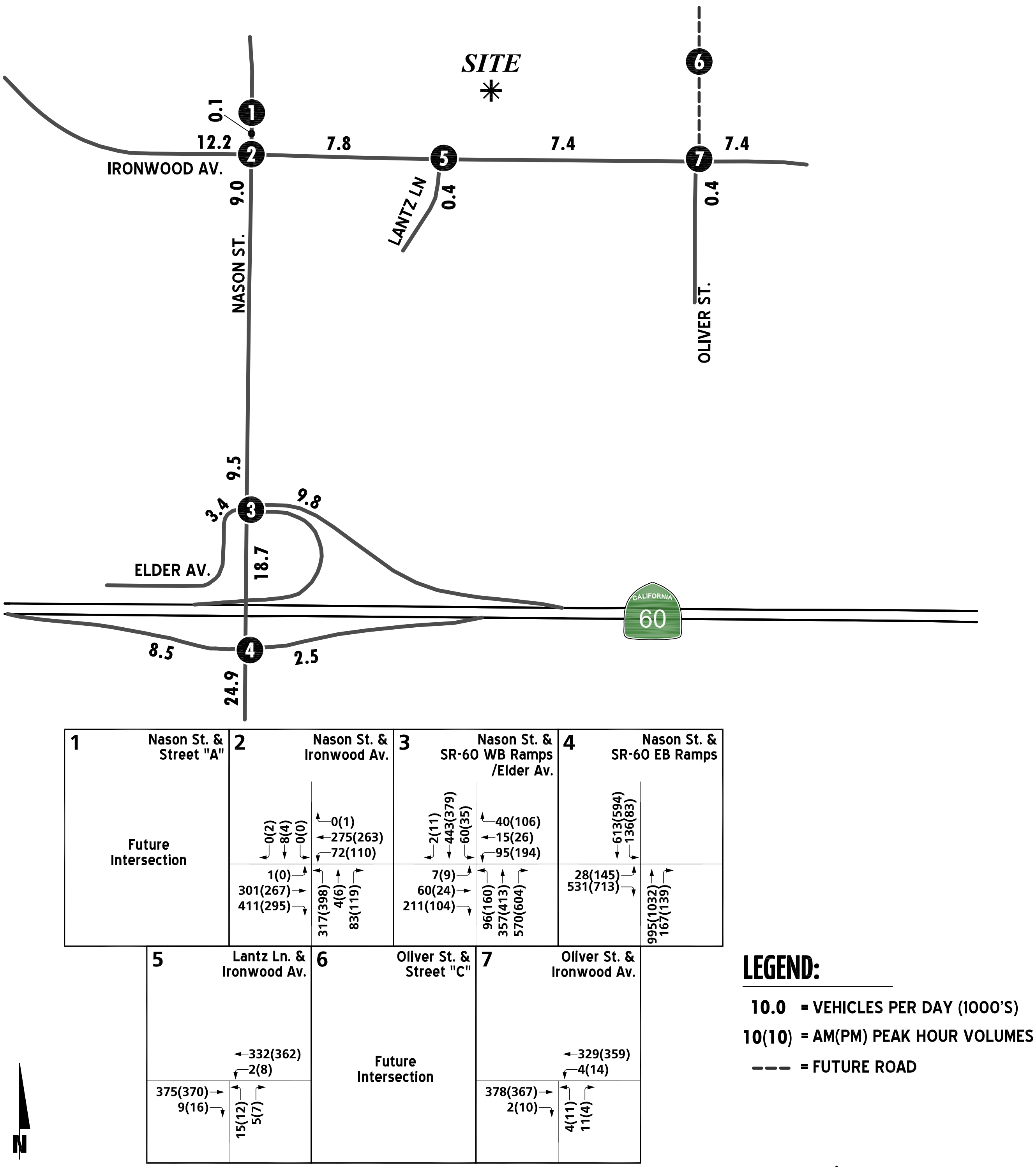

EXHIBIT 6-2: OPENING YEAR CUMULATIVE (2020) WITH PROJECT TRAFFIC VOLUMES

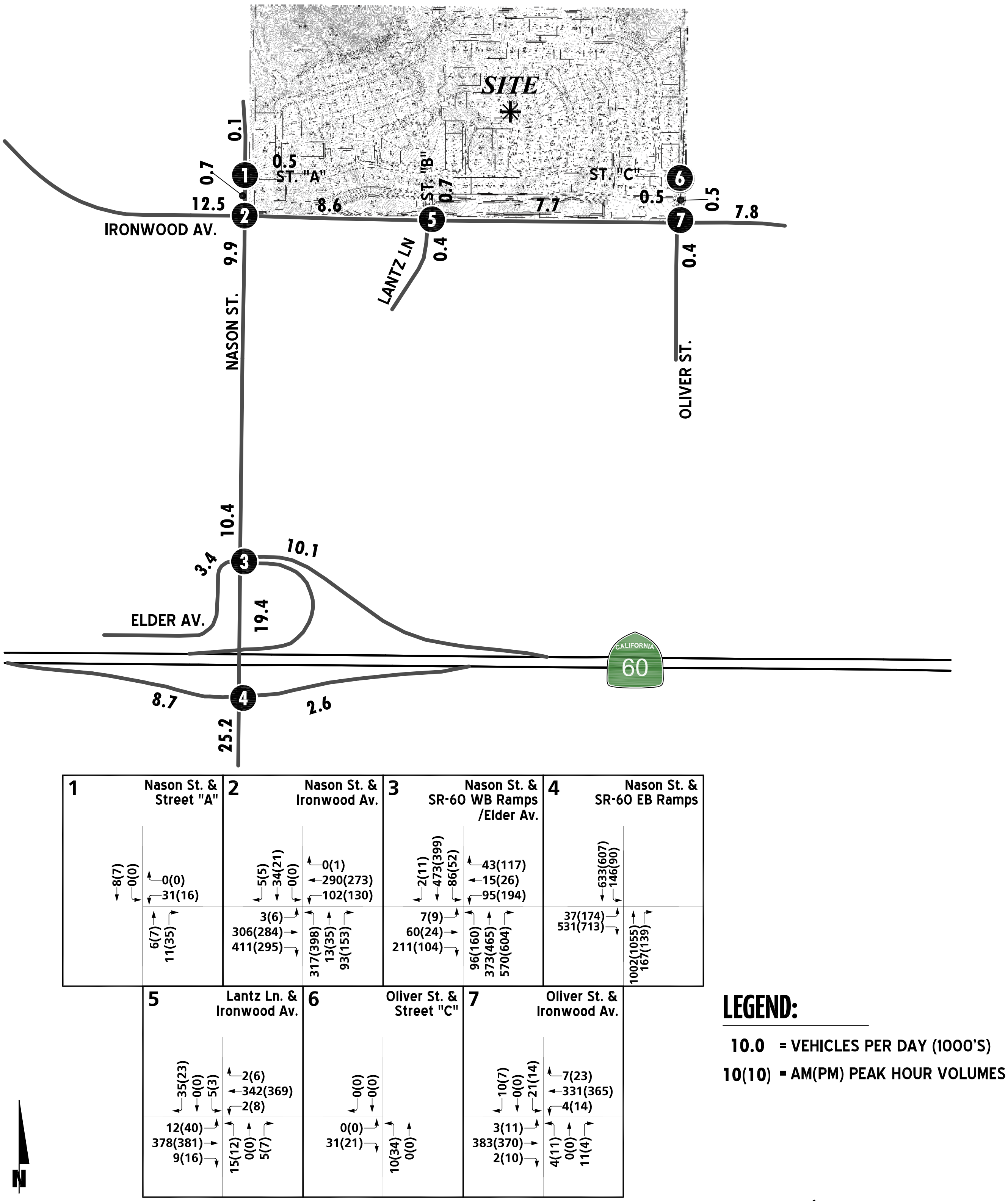

EXHIBIT 6-3: SUMMARY OF PEAK HOUR INTERSECTION LOS FOR OPENING YEAR CUMULATIVE (2020) WITHOUT PROJECT CONDITIONS

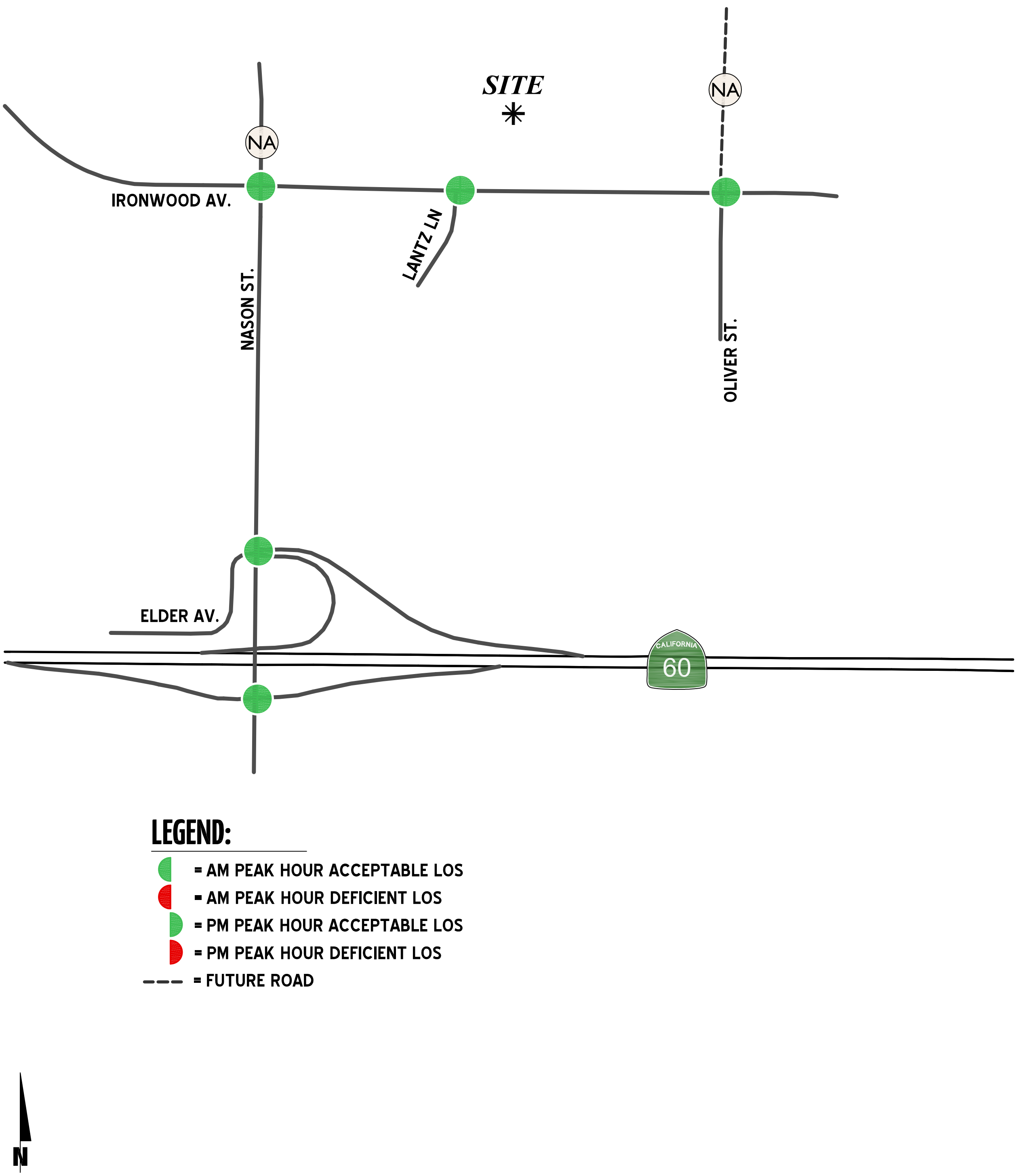

EXHIBIT 6-4: SUMMARY OF PEAK HOUR INTERSECTION LOS FOR OPENING YEAR CUMULATIVE (2020) WITH PROJECT CONDITIONS

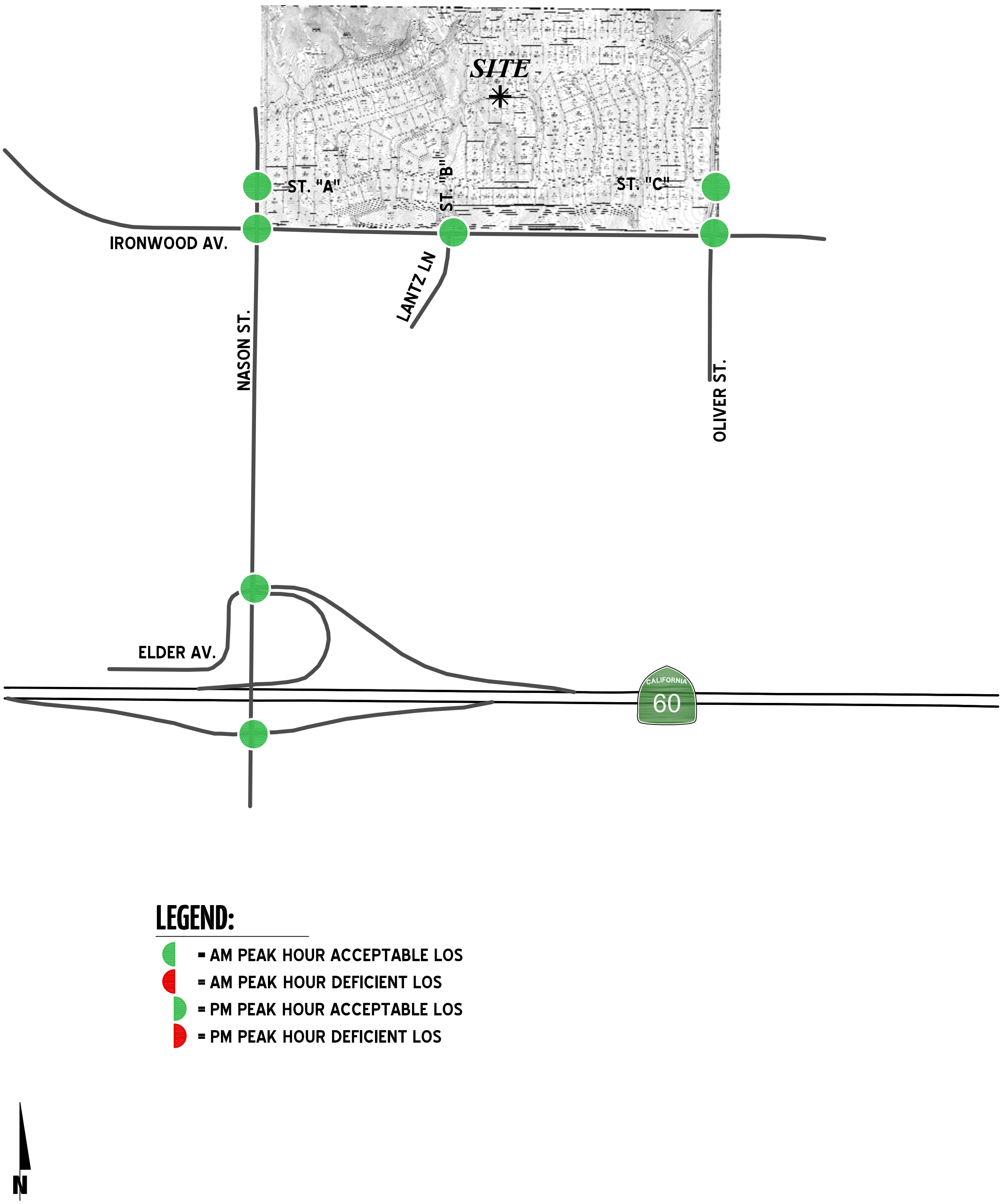

Table 6-1

Intersection Analysis for Opening Year Cumulative (2020) Conditions

#	Intersection	Traffic Control [2]	2020 Without Project Delay [1] (secs.) AM	2020 Without Project Delay [1] (secs.) PM	2020 Without Project Level of Service AM	2020 Without Project Level of Service PM	2020 With Project Delay [1] (secs.) AM	2020 With Project Delay [1] (secs.) PM	2020 With Project Level of Service AM	2020 With Project Level of Service PM
1	Nason St. / Street "A"	**CSS**	Future Intersection				8.9	8.9	A	A
2	Nason St. / Ironwood Av.	TS	47.0	28.6	D	C	54.7	32.7	D	C
3	Nason St. / SR-60 WB Ramps	TS	20.2	23.7	C	C	23.6	24.1	C	C
4	Nason St. / SR-60 EB Ramps	TS	22.7	18.7	C	B	26.1	19.4	C	B
5	Lantz Ln. / Ironwood Av.	CCS	13.3	12.8	B	B	14.5	14.5	B	B
6	Oliver St. / Street "C"	**CSS**	Future Intersection				8.9	9.2	A	A
7	Oliver St. / Ironwood Av.	CCS	13.2	13.0	B	B	13.9	13.6	B	B

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; TS = Traffic Signal

Attachment: Traffic Impact Analysis (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

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Table 6-2

Roadway Volume/Capacity Analysis for Opening Year Cumulative (2020) Conditions

#	Roadway	Segment Limits	Roadway Section	LOS Capacity[1]	2020 Without Project	V/C	LOS	2020 With Project	V/C	LOS	Acceptable LOS
1	Nason Street	Street "A" to Ironwood Avenue	**2U**	2,000	N/A			649	0.32	A	C
2		South of Ironwood Avenue	2U	12,500	8,951	0.72	C	9,898	0.79	C	D
3		North of SR-60 WB Ramps	4D	37,500	9,452	0.25	A	10,399	0.28	A	D
4		SR-60 WB Ramps to SR-60 EB Ramps	4D	37,500	18,743	0.50	A	19,388	0.52	A	D
5		South of SR-60 EB Ramps	4D	37,500	24,886	0.66	B	25,230	0.67	B	D
6	Ironwood Avenue	West of Nason Street	2U	12,500	**12,164**	**0.97**	**E**	**12,508**	**1.00**	**E**	C
7		Nason Street to Lantz Lane	2U	12,500	7,829	0.63	B	8,603	0.69	B	C
8		Lantz Lane to Oliver Street	2U	12,500	7,394	0.59	A	7,652	0.61	B	C
9		East of Oliver Street	2U	12,500	7,371	0.59	A	7,802	0.62	B	C
10	Oliver Street	Between Street "C" and Ironwood Avenue	**2U**	2,000	N/A			517	0.26	A	C

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

N/A = Not Applicable; Segment does not exist.

[1] These maximum roadway capacities have been extracted from the City of Moreno Valley's Transportation Division's Traffic Impact Analysis Transportation Division's Traffic Impact Analysis Preparation Guidelines (August 2007). These roadway capacities are "rule of thumb" estimates for planning purposes. The LOS "E" service volumes are estimated maximum daily capacity for respective classifications. Capacity is affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian and bicycle traffic.

As noted previously in Section 2.3, where the ADT-based roadway segment analysis indicates a deficiency (unacceptable LOS), a review of the more detailed peak hour intersection analysis and progression analysis are undertaken. The more detailed peak hour intersection analysis explicitly accounts for factors that affect roadway capacity. Therefore, roadway segment widening is typically only recommended if the peak hour intersection analysis indicates the need for additional through lanes. The adjacent intersection of Nason Street at Ironwood Avenue is anticipated to operate at acceptable LOS under Opening Year Cumulative traffic conditions without roadway widening. As such, roadway widening or additional improvements to the eastbound approach at the intersection have not been recommended and are considered less-than-significant.

6.6 TRAFFIC SIGNAL WARRANTS ANALYSIS

Traffic signal warrants for Opening Year Cumulative traffic conditions are based on both Opening Year Cumulative Caltrans planning-level ADT and peak hour volumes. For Opening Year Cumulative Without and With Project conditions, there are no study intersections anticipated to meet traffic signal warrants (see Appendix “6.3” and Appendix “6.4”).

6.7 OFF-RAMP QUEUING ANALYSIS

Queuing analysis findings are presented in Table 6-3. As shown on Table 6-3, there are no queuing issues during the peak 95th percentile traffic flows under Opening Year Cumulative (2020) With and Without Project traffic conditions. Worksheets for Opening Year Cumulative (2020) With and Without Project traffic conditions off-ramp queuing analysis are provided in Appendix “6.5” and Appendix “6.6”, respectively.

Table 6-3

Peak Hour Freeway Off-Ramp Queuing Summary for Opening Year Cumulative (2020) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	95th Percentile Queue (Feet) [2]		Acceptable? [1]	
			AM Peak Hour	PM Peak Hour	AM	PM
Opening Year Cumulative (2020) Without Project						
Nason St. / SR-60 WB Ramps	WBL	1,370	103	254 [3]	Yes	Yes
	WBT	2,140	22	33	Yes	Yes
	WBR	190	2	19	Yes	Yes
Nason St. / SR-60 EB Ramps	EBL	805	30	67	Yes	Yes
	EBT	1,300	98	45	Yes	Yes
	EBR	225	97	43	Yes	Yes
Opening Year Cumulative (2020) With Project						
Nason St. / SR-60 WB Ramps	WBL	1,370	106	254 [3]	Yes	Yes
	WBT	2,140	22	33	Yes	Yes
	WBR	190	4	25	Yes	Yes
Nason St. / SR-60 EB Ramps	EBL	805	37	129	Yes	Yes
	EBT	1,300	120	137	Yes	Yes
	EBR	225	118	134	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] Maximum queue length for the approach reported.

[3] 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

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7 HORIZON YEAR (2035) TRAFFIC ANALYSIS

This section discusses the methods used to develop Horizon Year Without and With Project traffic forecasts, and the resulting intersection operations, roadway segment analyses, and traffic signal warrants.

7.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Horizon Year conditions are consistent with those shown previously on Exhibit 3-1, with the exception of Project driveways assumed to be constructed by the Project to provide site access. In other words, no other off-site improvements are assumed beyond those that currently exist with the exception of the intersections and roadways that would be improved by the Project for access.

7.2 HORIZON YEAR WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

The weekday ADT, AM and PM peak hour volumes which can be expected for Horizon Year Without Project traffic conditions are shown on Exhibit 7-1.

7.3 OPENING YEAR CUMULATIVE WITH PROJECT TRAFFIC VOLUME FORECASTS

The weekday ADT, AM and PM peak hour volumes which can be expected for Horizon Year With Project traffic conditions are shown on Exhibit 7-2.

7.4 INTERSECTION OPERATIONS ANALYSIS

As shown in Table 7-1, all the study area intersections are anticipated to operate at acceptable LOS under both Horizon Year Without and With Project traffic conditions, with the exception of the intersection of Nason Street at Ironwood Avenue.

A summary of the peak hour intersection LOS for Horizon Year Without and With Project conditions are shown on Exhibits 7-3 and 7-4, respectively. The intersection operations analysis worksheets for Horizon Year Without and With Project traffic conditions are included in Appendix “7.1” and Appendix “7.2” of this TIA, respectively.

7.5 ROADWAY SEGMENT CAPACITY ANALYSIS

Table 7-2 provides a summary of the Horizon Year conditions roadway segment capacity analysis based on the City of Moreno Valley General Plan Circulation Element Roadway Segment Capacity/LOS Thresholds identified previously on Table 2-3. As shown on Table 7-2, all the study roadway segments are anticipated to operate at acceptable LOS with the exception of the segment of Ironwood Avenue, west of Nason Street.

EXHIBIT 7-1: HORIZON YEAR (2035) WITHOUT PROJECT TRAFFIC VOLUMES

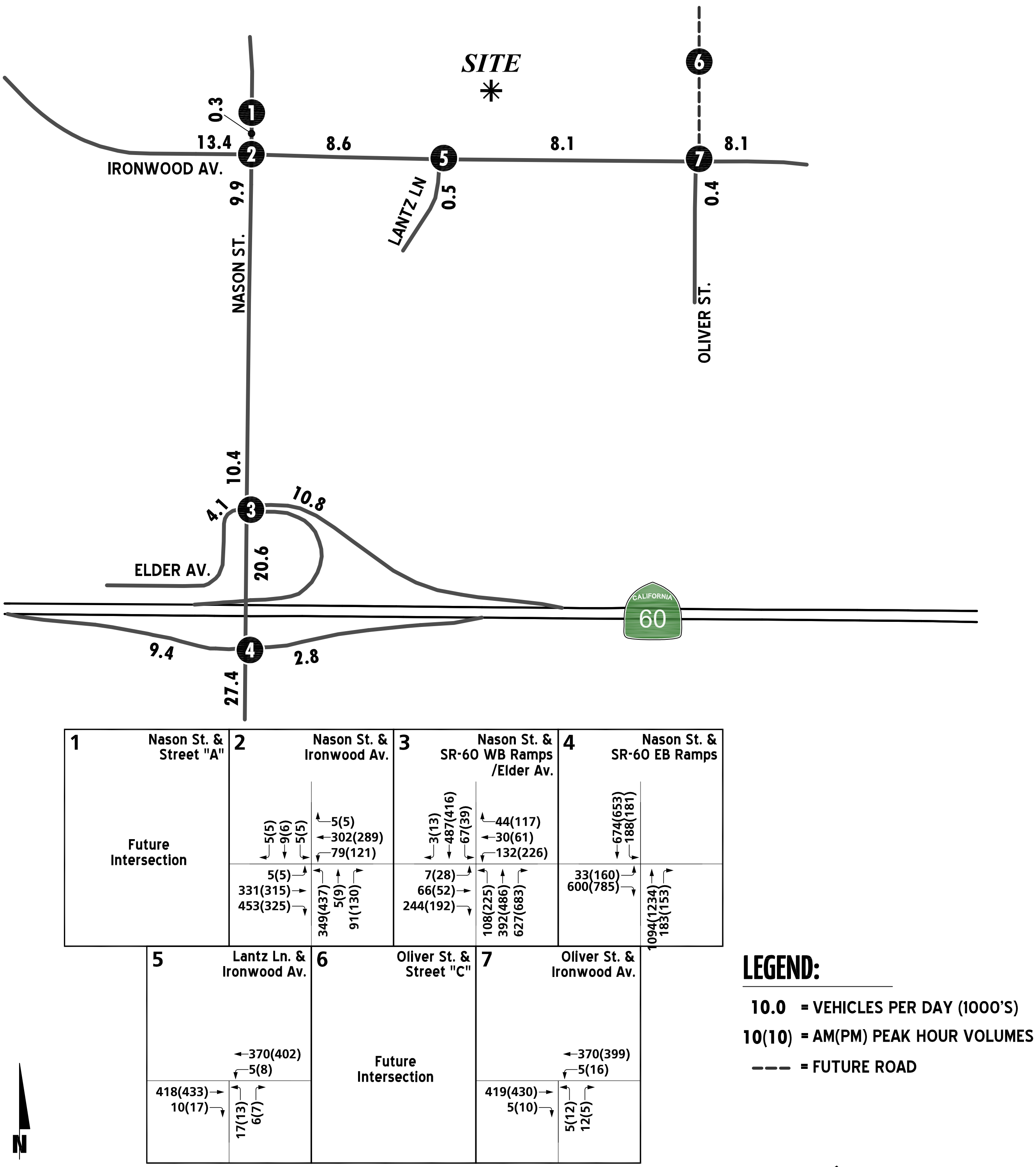

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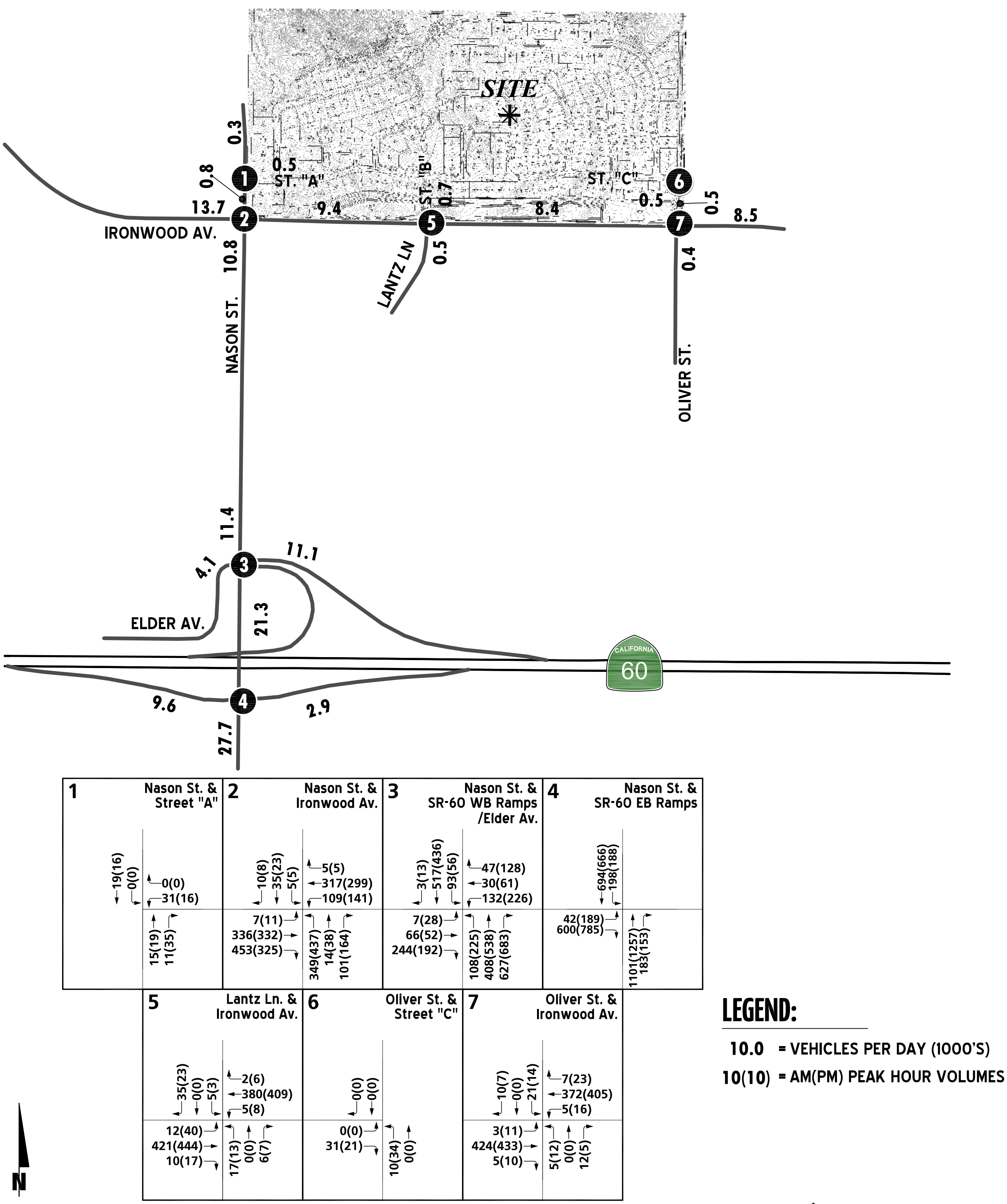
Exhibit 7-2: Horizon Year (2035) With Project Traffic Volumes



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URBAN CROSSROADS

EXHIBIT 7-3: SUMMARY OF PEAK HOUR INTERSECTION LOS FOR HORIZON YEAR (2035) WITHOUT PROJECT CONDITIONS

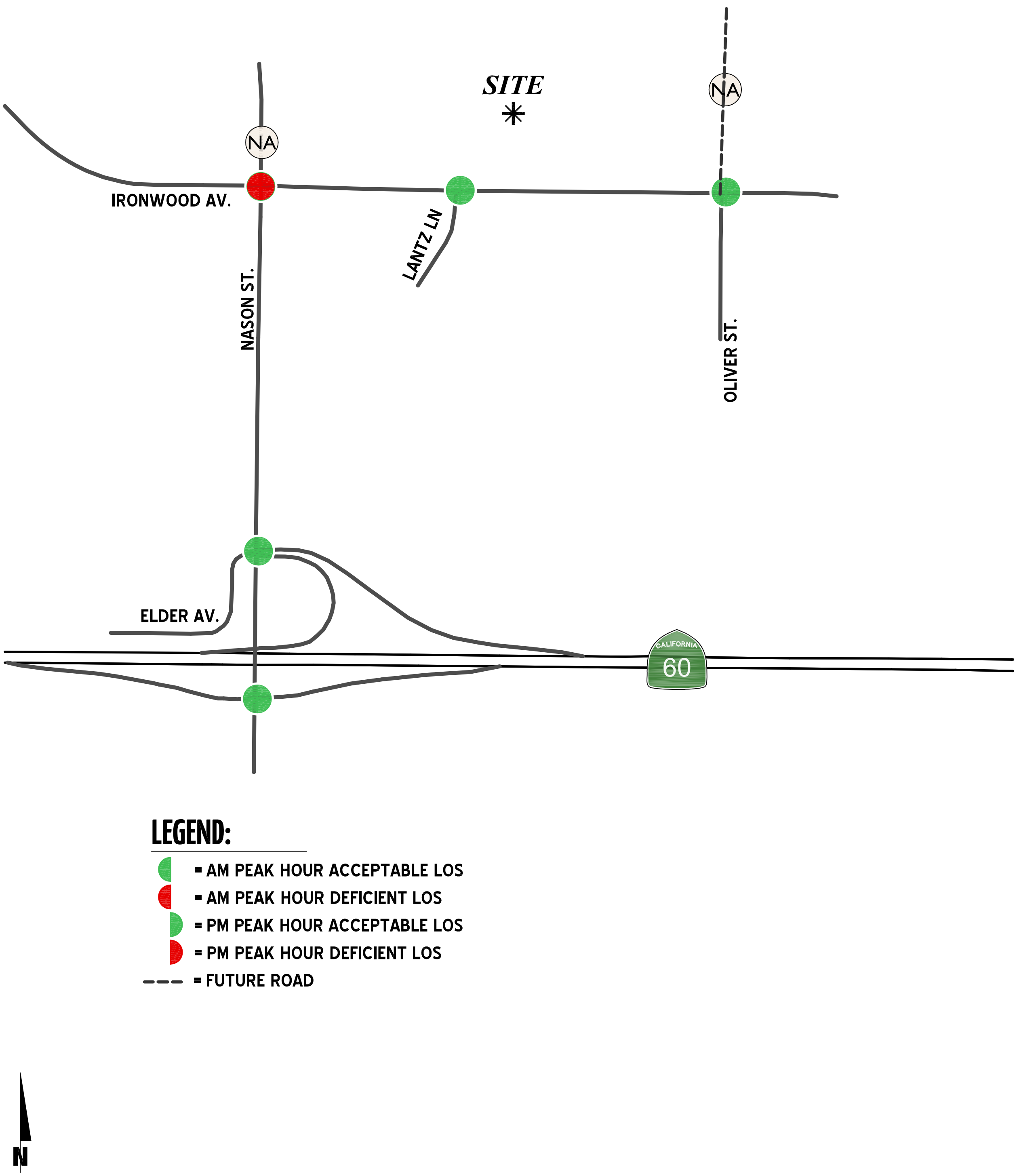

EXHIBIT 7-4: SUMMARY OF PEAK HOUR INTERSECTION LOS FOR HORIZON YEAR (2035) WITH PROJECT CONDITIONS

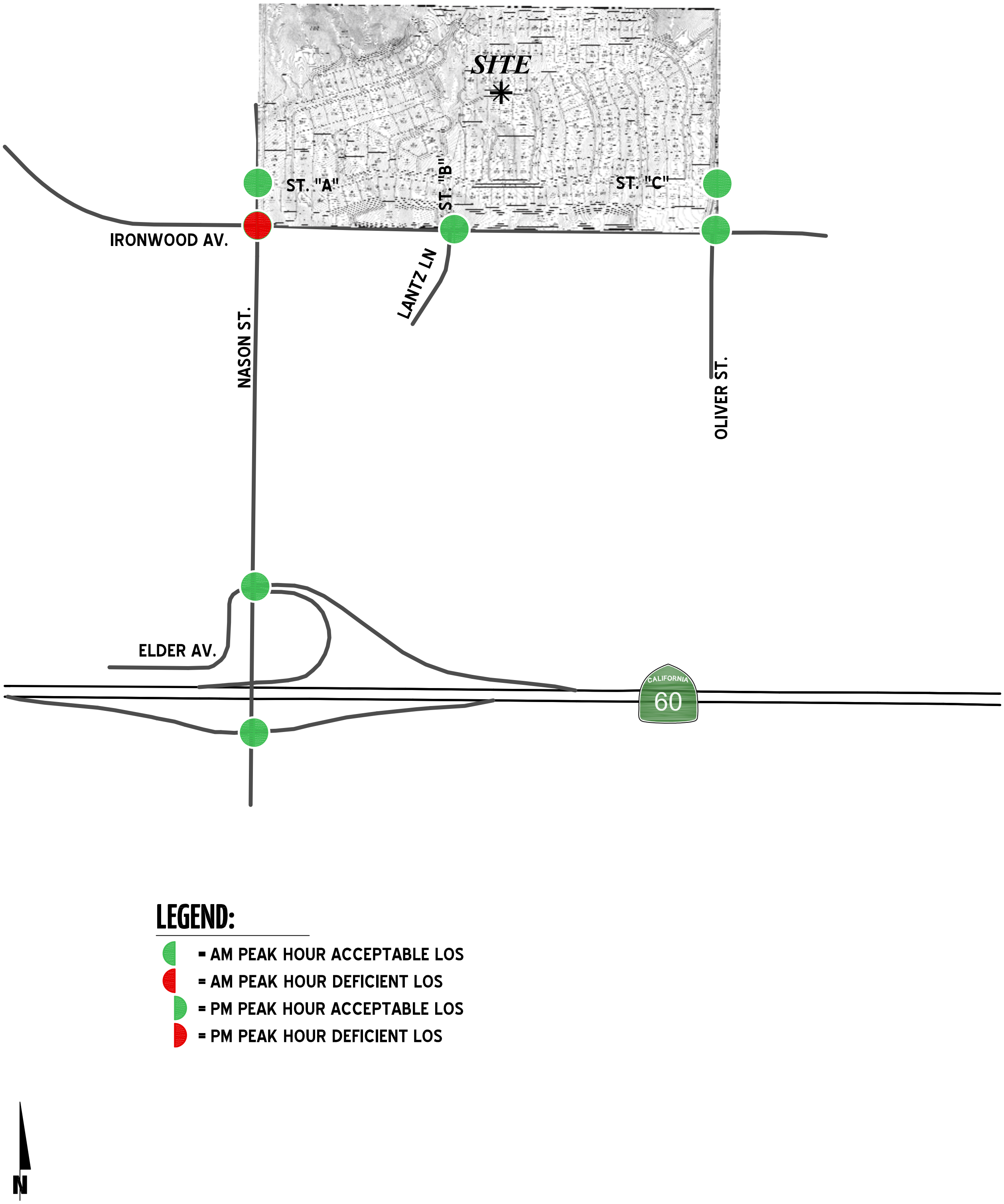

Table 7-1

Intersection Analysis for Horizon Year (2035) Conditions

#	Intersection	Traffic Control [2]	2035 Without Project Delay [1] (secs.) AM	2035 Without Project Delay [1] (secs.) PM	2035 Without Project Level of Service AM	2035 Without Project Level of Service PM	2035 With Project Delay [1] (secs.) AM	2035 With Project Delay [1] (secs.) PM	2035 With Project Level of Service AM	2035 With Project Level of Service PM
1	Nason St. / Street "A"	**<u>CSS</u>**	Future Intersection				9.0	9.0	A	A
2	Nason St. / Ironwood Av.	TS	**>200.0**	**141.2**	**F**	**F**	**>200.0**	**>200.0**	**F**	**F**
3	Nason St. / SR-60 WB Ramps	TS	23.9	31.3	C	C	27.5	31.5	C	C
4	Nason St. / SR-60 EB Ramps	TS	27.2	31.0	C	C	28.1	32.1	C	C
5	Lantz Ln. / Ironwood Av.	CCS	14.1	13.5	B	B	14.2	13.6	B	B
6	Oliver St. / Street "C"	**<u>CSS</u>**	Future Intersection				8.8	9.1	A	A
7	Oliver St. / Ironwood Av.	CCS	13.9	13.8	B	B	14.6	13.8	B	B

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; TS = Traffic Signal

Table 7-2

Roadway Volume/Capacity Analysis for Horizon Year (2035) Conditions

#	Roadway	Segment Limits	Roadway Section	LOS Capacity[1]	2035 Without Project	V/C	LOS	2035 With Project	V/C	LOS	Acceptable LOS
1	Nason Street	Street "A" to Ironwood Avenue	**2U**	2,000	N/A			817	0.41	A	C
2	Nason Street	South of Ironwood Avenue	2U	12,500	9,846	0.79	C	10,793	0.86	D	D
3	Nason Street	North of SR-60 WB Ramps	4D	37,500	10,398	0.28	A	11,345	0.30	A	D
4	Nason Street	SR-60 WB Ramps to SR-60 EB Ramps	4D	37,500	20,617	0.55	A	21,262	0.57	A	D
5	Nason Street	South of SR-60 EB Ramps	4D	37,500	27,375	0.73	C	27,719	0.74	C	D
6	Ironwood Avenue	West of Nason Street	2U	12,500	**13,381**	**1.07**	**F**	**13,725**	**1.10**	**F**	C
7	Ironwood Avenue	Nason Street to Lantz Lane	2U	12,500	8,612	0.69	B	9,386	0.75	C	C
8	Ironwood Avenue	Lantz Lane to Oliver Street	2U	12,500	8,134	0.65	B	8,392	0.67	B	C
9	Ironwood Avenue	East of Oliver Street	2U	12,500	8,101	0.65	B	8,532	0.68	B	C
10	Oliver Street	Between Street "C" and Ironwood Avenue	**2U**	2,000	N/A			517	0.26	A	C

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

N/A = Not Applicable; Segment does not exist.

[1] These maximum roadway capacities have been extracted from the City of Moreno Valley's Transportation Division's Traffic Impact Analysis Transportation Division's Traffic Impact Analysis Preparation Guidelines (August 2007). These roadway capacities are "rule of thumb" estimates for planning purposes. The LOS "E" service volumes are estimated maximum daily capacity for respective classifications. Capacity is affected by such factors as intersections (spacing, configuration and control features), degree of access control, roadway grades, design geometrics (horizontal and vertical alignment standards), sight distance, vehicle mix (truck and bus traffic) and pedestrian and bicycle traffic.

As noted previously in Section 2.3, where the ADT-based roadway segment analysis indicates a deficiency (unacceptable LOS), a review of the more detailed peak hour intersection analysis and progression analysis are undertaken. The more detailed peak hour intersection analysis explicitly accounts for factors that affect roadway capacity. Therefore, roadway segment widening is typically only recommended if the peak hour intersection analysis indicates the need for additional through lanes. The adjacent intersection of Nason Street at Ironwood Avenue is anticipated to operate at acceptable LOS under Horizon Year traffic conditions with turn lane improvements as identified on Table 6-4, but without additional through lanes. As such, roadway widening or additional improvements to the eastbound approach at the intersection have not been recommended beyond those needed to address peak hour intersection operational deficiencies and are considered less-than-significant.

7.6 TRAFFIC SIGNAL WARRANTS ANALYSIS

Traffic signal warrants for Horizon Year traffic conditions are based on both Horizon Year Caltrans planning-level ADT and peak hour volumes. For Horizon Year Without and With Project conditions, there are no study intersections anticipated to meet traffic signal warrants (see Appendix "7.3" and Appendix "7.4").

7.7 OFF-RAMP QUEUING ANALYSIS

Queuing analysis findings are presented in Table 7-3. As shown on Table 7-3, there are no queuing issues during the peak 95th percentile traffic flows under Horizon Year (2035) Without and With Project traffic conditions. Worksheets for Horizon Year (2035) Without and With Project traffic conditions off-ramp queuing analysis are provided in Appendix "7.5" and Appendix "7.6", respectively.

7.8 RECOMMENDED IMPROVEMENTS

Improvement strategies have been recommended at intersections that have been identified as deficient in an effort to reduce each location's peak hour delay and improve the associated LOS grade to an acceptable LOS (LOS D or better). The effectiveness of the recommended improvement strategies discussed below to address Horizon Year traffic deficiencies is presented in Table 7-4.

The applicant shall participate in the funding of off-site improvements, including traffic signals that are needed to serve cumulative traffic conditions through the payment of TUMF and City of Moreno Valley DIF fees (if the improvements are included in the TUMF or DIF programs) or on a fair share basis (if the improvements are not included in the TUMF or DIF programs). These fees shall be collected by the City of Moreno Valley, with the proceeds solely used as part of a funding mechanism aimed at ensuring that regional highways and arterial expansions keep pace with the projected population increases. There are no other applicable pre-existing funding programs for the study area aside from TUMF and DIF.

Worksheets for Horizon Year Without and With Project conditions, with improvements, HCM calculation worksheets are provided in Appendix "7.7" and Appendix "7.8," respectively.

Table 7-3

Peak Hour Freeway Off-Ramp Queuing Summary for Horizon Year (2035) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	95th Percentile Queue (Feet) [2]		Acceptable? [1]	
			AM Peak Hour	PM Peak Hour	AM	PM
Horizon Year (2035) Without Project						
Nason St. / SR-60 WB Ramps	WBL	1,370	94	308 [3]	Yes	Yes
	WBT	2,140	16	62	Yes	Yes
	WBR	190	0	25	Yes	Yes
Nason St. / SR-60 EB Ramps	EBL	805	42	129	Yes	Yes
	EBT	1,300	180 [3]	226 [3]	Yes	Yes
	EBR	225	171 [3]	220 [3]	Yes	Yes
Horizon Year (2035) With Project						
Nason St. / SR-60 WB Ramps	WBL	1,370	140	308 [3]	Yes	Yes
	WBT	2,140	36	62	Yes	Yes
	WBR	190	6	31	Yes	Yes
Nason St. / SR-60 EB Ramps	EBL	805	50	152	Yes	Yes
	EBT	1,300	202 [3]	232 [3]	Yes	Yes
	EBR	225	187 [3]	226 [3]	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] Maximum queue length for the approach reported.

[3] 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

Table 7-4

Intersection Analysis for Horizon Year (2035) Conditions With Improvements

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Delay[2] (secs.)		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
2	Nason St. / Ironwood Av.																	
	- Without Project	TS	**<u>1</u>**	1	1	**<u>1</u>**	1	0	1	1	**<u>1></u>**	1	1	0	30.0	34.3	C	C
	- With Project	TS	**<u>1</u>**	1	1	**<u>1</u>**	1	0	1	1	**<u>1></u>**	1	1	0	34.2	36.4	C	D

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; > = Right-Turn Overlap Phasing; >> = Free-Right Turn Lane; d= Defacto Right Turn Lane; **<u>1</u>** = Improvement

[2] Per the 2010 HCM, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control.
For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] TS = Traffic Signal

8 REFERENCES

1. **City of Moreno Valley Traffic Division.** *Transportation Impact Analysis Preparation Guide.* City of Moreno Valley : s.n., August 2007.

2. **Institute of Transportation Engineers.** *Trip Generation.* 9th Edition. 2012.

3. **Southern California Association of Governments.** *2012 Regional Transportation Plan.* April 2012.

4. **City of Moreno Valley.** *City of Moreno Valley General Plan.* Moreno Valley : s.n., July 11, 2006.

5. **Burden, Dan.** *Streets and Sidewalks, People and Cars: The Citizens' Guide to Traffic Calming.* Sacramento, California : Center for Livable Communities, April 2000.

6. **Transportation Research Board.** *Highway Capacity Manual (HCM).* Washington, D.C. : National Academy of Sciences, 2010. 978-0-309-16077-3.

7. **Federal Highway Administration.** Manual on Uniform Traffic Control Devices (MUTCD). [book auth.] California Department of Transportation. *California Manual on Uniform Traffic Control Devices (CAMUTCD).* 2012.

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APPENDIX 1.1:

APPROVED SCOPING AGREEMENT

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URBAN CROSSROADS

41 Corporate Park | Suite 300 | Irvine, CA 92606 | (949) 660-1994
www.urbanXroads.com

Date: January 20, 2015
February 5, 2015 (Revised)

This letter acknowledges the City of Moreno Valley Transportation Engineering Division requirements for the traffic impact analysis of the following project:

Case No.	P14-130	
Project Name:	Ironwood Residential	
Project Address:	North of Ironwood Avenue, between Nason Street and Oliver Street	
Project Description:	144 single family residential dwelling units	
Related Cases:		
	Consultant	Developer Representative
Name:	URBAN CROSSROADS, INC. Attn: Aric Evatt	GLOBAL INVESTMENT & DEVELOPMENT, LLC Attn: Mr. Joseph Rivani
Address:	41 Corporate Park, Suite 300 Irvine, CA 92606	3470 Wilshire Blvd., Suite 1020 Los Angeles, CA 90010
Telephone:	949-660-1994 x. 204	213-369-9600

I. Background

The proposed Ironwood Residential development (referred to as "Project") is located north of Ironwood Avenue, east of Nason Street, and west of Oliver Street. The Project is proposed to consist of 144 single family, detached residential dwelling units. The Project is anticipated to be built in a single phase with an anticipated opening year of 2020 (minimum five-year opening year per Moreno Valley traffic study guidelines). See preliminary tentative tract map on **Exhibit 1**. **Exhibit 2** illustrates the study area and proposed existing and opening year intersection analysis locations.

II. Trip Geographic Distribution and Assignment

The project trip distribution patterns were developed based on an understanding of existing travel patterns in the area, the geographical location of the site, and the site's proximity to the regional arterial and state highway system (see **Exhibit 3**).

III. Site Trip Generation Forecast

A. Source for trip generation rates: Institute of Transportation Engineers (ITE) *Trip Generation Manual* 9th Edition (2012) for ITE Land Use Code 210 (Single Family Detached Residential).

B. Weekday AM Peak: 7:00-9:00 AM
C. Weekday PM Peak: 4:00-6:00 PM
D. Intersection and link acceptable Level of Service "D" for some intersections and links and Level of Service "C" for others based upon the current City policy. (Use Highway Capacity Manual 2010 operations procedures; parameters per County of Riverside Traffic Impact Analysis Guidelines)

Proposed Use Rates [(1)]

Single Family Residential

(per DU) Daily: 9.52 AM: 0.75 PM: 1.00

(See attached **Table 1**)

Internal Trip Allowance: Yes: ______ No: X Percentage: ______

Pass-by Trip Allowance: Yes: ______ No: X Percentage: ______

(1) Institute of Transportation Engineers 9th Edition *Trip Generation Manual* (2012).

IV. Specific Project Issues to be Analyzed

A. The traffic study will address the adequacy of site access and identify specific near-term circulation improvements required at study area intersections and roadways to maintain acceptable peak hour and daily levels of service (LOS).
B. The traffic study shall address the project traffic impacts at all study intersections listed in Section VI and provide appropriate mitigation measures if applicable. Peak-hour traffic signal warrants shall be evaluated for all intersections that are not currently signalized.
C. Qualitative assessment of existing and planned non-motorized facilities (e.g., pedestrians, bike routes, trails, etc.) within the study area.
D. The turn pocket lengths will be determined through peak hour traffic simulations developed using SimTraffic software in an effort to identify the required storage capacity for turn lanes at each Project driveway.
E. Provide a conceptual striping plan for the intersection of Nason Street and Ironwood Avenue for the traffic signal modification.
F. Recommend potential traffic calming measures for internal tract streets.

V. Study Horizon Year

A. Existing (2015)
B. Existing (2015) Plus Project
C. Opening Year Cumulative (2020) Without Project (existing to opening year-2020, assuming a growth rate of 2% per year and includes the traffic from other cumulative development projects in the vicinity)
D. Opening Year Cumulative (2020) With Project

VI. Facilities to be Studied

A. Analysis Locations: (See **Exhibit 2**)
1. Nason Street / Street "A" – Future Intersection
2. Nason Street / Ironwood Avenue
3. Nason Street / Elder Avenue/SR-60 Westbound Ramps
4. Nason Street / SR-60 Eastbound Ramps

5. Street "B"/Lantz Lane / Ironwood Avenue
6. Oliver Street / Street "C" – Future Intersection
7. Oliver Street / Ironwood Avenue

B. Roadway Segments:
All roadway segments adjacent to intersection analysis locations will be analyzed (e.g. all legs of intersections listed above).

VII. **Open Items**

A. **Cumulative Development Projects:** It is requested that the list of cumulative development projects be provided by the City for inclusion in the traffic study.

VIII. **Deliverables**

a. Draft traffic impact studies (2 copies each)
b. Final traffic impact studies (4 copies each)

All draft and final traffic impact studies shall be delivered with the appropriate review fee to the Permit Technician, Land Development Division - Moreno Valley City Hall, 14177 Frederick Street, Moreno Valley, CA 92552. Please contact the Land Development Division at 951-413-3110 prior to the delivery of the traffic study.

A review fee will be required upon submittal of the traffic study. **A signed copy of this *Scoping Agreement* must be included in the submitted draft and final traffic impact studies.**

If you have any questions regarding this *Scoping Agreement*, please contact Eric Lewis at 951-413-3140.

Recommended By:

Aric Evatt, PTP
Principal
Urban Crossroads, Inc.

Approved By:

Eric Lewis, City of Moreno Valley
MICHAEL LLOYD FOR

Attachments

Table 1

Project Trip Generation

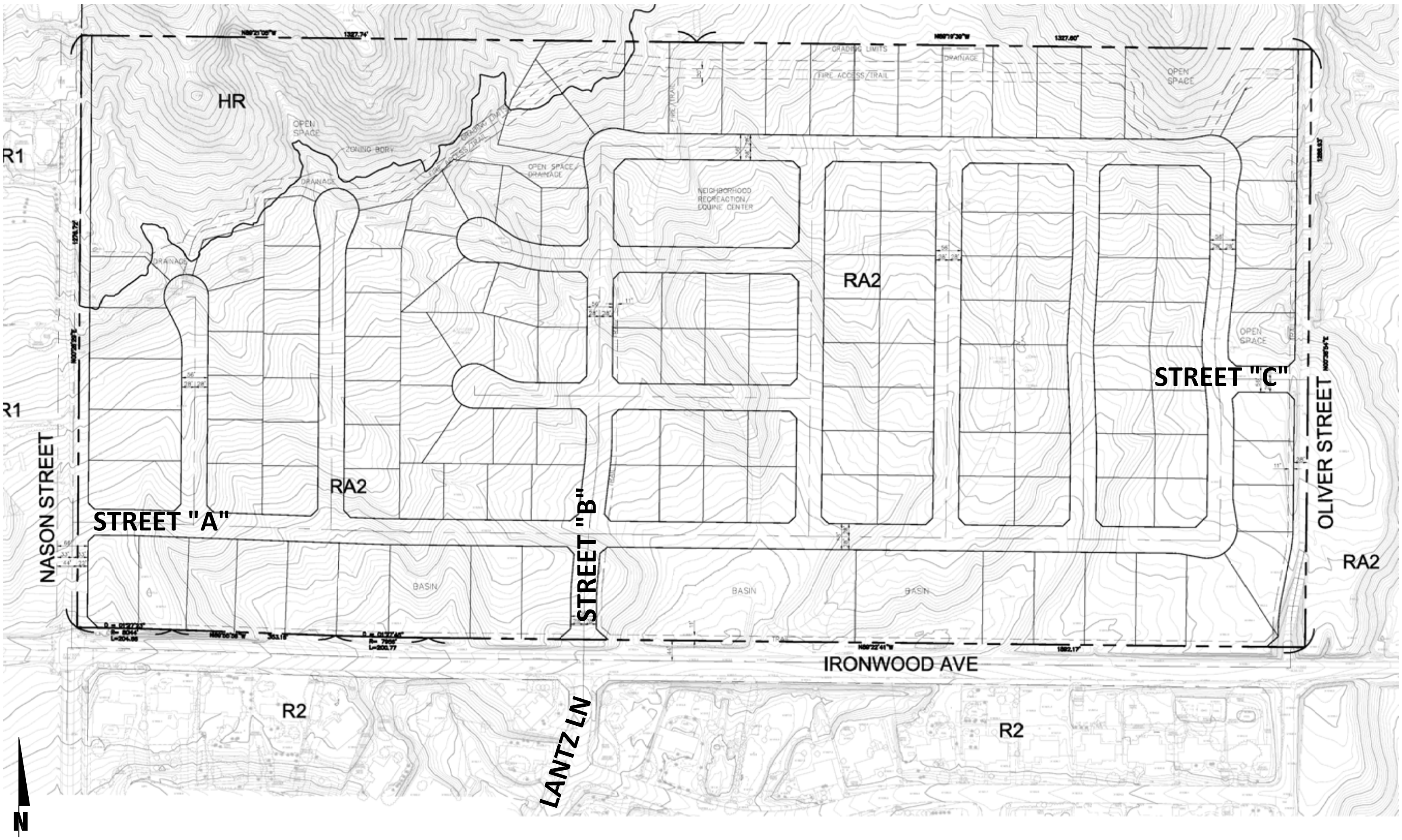
Land Use	ITE Code	Units[2]	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Project Trip Generation Rates[1]									
Single Family Detached Residential	210	DU	0.19	0.56	0.75	0.63	0.37	1.00	9.52

Land Use	Quantity	Units[2]	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Project Trip Generation Summary									
Ironwood Residential	144	DU	27	81	108	91	53	144	1,371

[1] Source: Institute of Transportation Engineers (ITE) Trip Generation, 9th Edition, 2012.

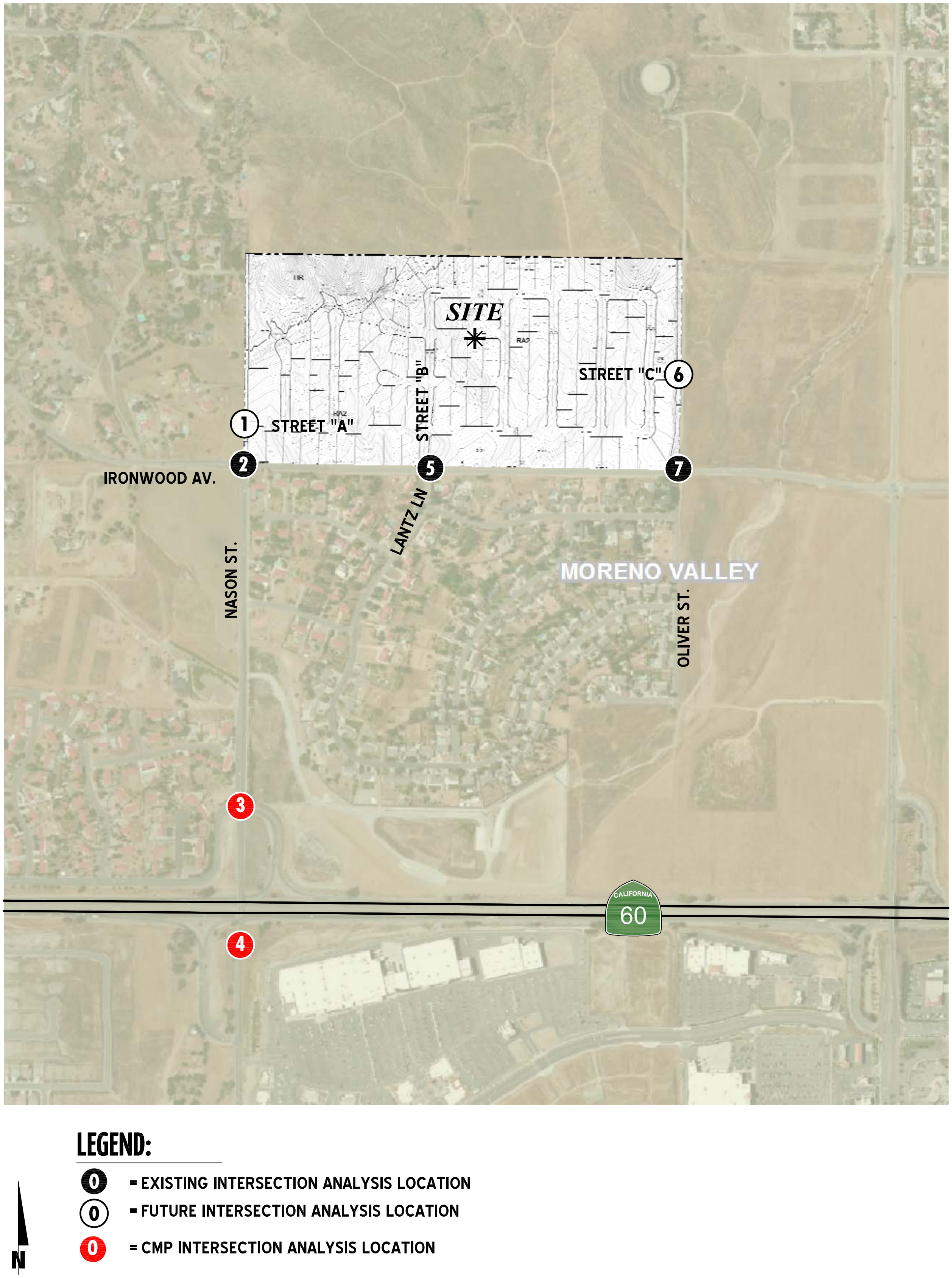
[2] DU = Dwelling Units

EXHIBIT 1: PRELIMINARY TENTATIVE TRACT MAP



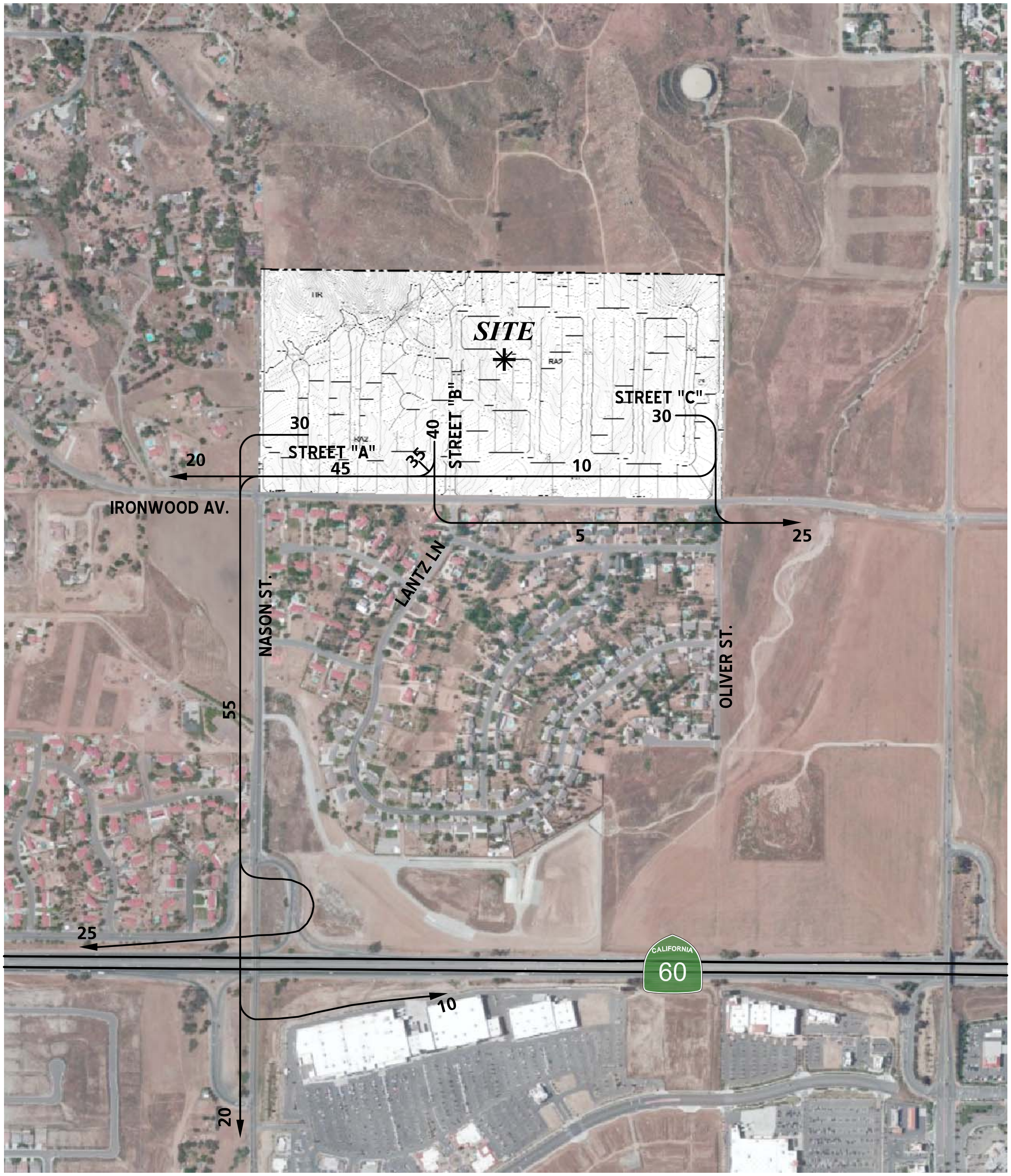
09386 - site plan.dwg

Exhibit 2: Location Map



09386 - locmap.dwg

EXHIBIT 3: PROJECT TRIP DISTRIBUTION



LEGEND:

10 = PERCENT TO/FROM PROJECT

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APPENDIX 1.2:

SITE ADJACENT QUEUES

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Intersection Level Of Service Report
#1: Nason Street / Street "A"

Control Type:	Two-way stop	Delay (sec / veh):	9.0
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.036

Intersection Setup

Name	Nason Street		Nason Street		Street "A"	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Nason Street		Nason Street		Street "A"	
Base Volume Input [veh/h]	15	0	0	19	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	11	0	0	31	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	15	11	0	19	31	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	3	0	5	8	0
Total Analysis Volume [veh/h]	16	12	0	21	34	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.04	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.27	0.00	8.98	8.56
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.11	0.11
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	2.81	2.81
d_A, Approach Delay [s/veh]	0.00		0.00		8.98	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.68					
Intersection LOS	A					

Option 2: AM Improvement

Number	2											
Intersection	Nason Street / Ironwood Avenue											
Control Type	Signalized											
Analysis Method	HCM 2010											
Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	349	5	91	5	9	5	5	331	453	79	302	5
Total Analysis Volume [veh/h]	435	17	103	6	44	12	9	419	517	136	395	6

Intersection Settings

Cycle Length [s]	110											
Coordination Type	Time of Day Pattern Coordinated											
Actuation Type	Fully actuated											
Lost time [s]	0.00											
Control Type	Protecte	Permissi	Permissi	Protecte	Permissi	Permissi	Protecte	Permissi	Overlap	Protecte	Permissi	Permissi
Signal Group	3	8	0	7	4	0	5	2	3	1	6	0
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	0	5	5	0	5	5	5	5	5	0
Maximum Green [s]	0	0	0	0	0	0	0	0	0	0	0	0
Amber [s]	3.0	5.0	0.0	3.0	5.0	0.0	4.0	5.0	3.0	4.0	5.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0
Split [s]	38	11	0	55	28	0	10	28	38	16	34	0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	2.0	0.0
Minimum Recall	no	no		no	no		no	no	no	no	no	
Maximum Recall	no	no		no	no		no	yes	no	no	yes	
Pedestrian Recall	no	no		no	no		no	no	no	no	no	

Lane Group Calculations

g / C, Green / Cycle	0.29	0.33	0.33	0.01	0.04	0.01	0.38	0.72	0.10	0.46
(v / s)_i Volume / Saturation Flow Rate	0.27	0.01	0.07	0.00	0.03	0.01	0.25	0.36	0.09	0.24
so, Base Saturation Flow per Lane [ve	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Arrival type	3			3		3			3	
s, saturation flow rate [veh/h]	1597	1676	1425	1597	1615	1597	1676	1425	1597	1671
c, Capacity [veh/h]	463	546	464	12	70	17	630	1027	160	777
X, volume / capacity	0.94	0.03	0.22	0.49	0.80	0.52	0.66	0.50	0.85	0.52
d, Delay for Lane Group [s/veh]	61.95	25.28	27.06	82.23	59.83	62.62	34.01	8.51	68.38	23.15
Lane Group LOS	E	C	C	F	E	E	C	A	E	C
Critical Lane Group	yes	no	no	no	yes	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	13.90	0.29	1.90	0.26	1.69	0.28	9.62	4.54	4.36	7.03
50th-Percentile Queue Length [ft]	347.48	7.35	47.56	6.52	42.27	7.06	240.54	113.56	109.07	175.87
95th-Percentile Queue Length [veh]	20.01	0.53	3.42	0.47	3.04	0.51	14.71	8.04	7.79	11.38
95th-Percentile Queue Length [ft]	500.34	13.22	85.61	11.73	76.08	12.71	367.71	200.94	194.70	284.62

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	61.95	25.28	27.06	82.23	59.83	59.83	62.62	34.01	8.51	68.38	23.15	23.15
Movement LOS	E	C	C	F	E	E	E	C	A	E	C	C
Critical Movement	no	no	no	yes	no	no	no	no	no	no	no	no
d_A, Approach Delay [s/veh]	54.35			62.00			20.33			34.60		
Approach LOS	D			E			C			C		
d_I, Intersection Delay [s/veh]	34.21											
Intersection LOS	C											
Intersection V/C	0.643											

Intersection Level Of Service Report
#5: Street "B"/Lantz Lane / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	14.2
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	17	0	6	0	0	0	0	418	10	5	370	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	5	0	35	12	3	0	0	10	2
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	17	0	6	5	0	35	12	421	10	5	380	2
Peak Hour Factor	0.8100	0.8100	0.8100	1.0000	1.0000	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	0	2	1	0	9	3	130	3	2	117	1
Total Analysis Volume [veh/h]	21	0	7	5	0	35	12	520	12	6	469	2
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes			
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	14.18	14.18	12.02	0.00	0.00	0.00	0.00	0.00	0.00	8.50	0.00	0.00
Movement LOS	B	B	B					A	A	A	A	
95th-Percentile Queue Length [veh]	0.20	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	2.46	2.46	0.00
95th-Percentile Queue Length [ft]	5.02	5.02	5.02	0.00	0.00	0.00	0.00	0.00	0.00	61.41	61.41	0.00
d_A, Approach Delay [s/veh]	13.64			0.00			0.00			0.11		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.42											
Intersection LOS	B											

Intersection Level Of Service Report
#6: Oliver Street / Street "C"

Control Type:	Two-way stop	Delay (sec / veh):	8.8
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street		Oliver Street		Street "C"	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Oliver Street		Oliver Street		Street "C"	
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	10	0	0	0	0	31
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	10	0	0	0	0	31
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	0	0	0	8
Total Analysis Volume [veh/h]	11	0	0	0	0	31
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	7.23	0.00	0.00	0.00	8.82	0.00
Movement LOS	A	A	A	A	A	
95th-Percentile Queue Length [veh]	0.02	0.02	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.51	0.51	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	7.23		0.00		8.82	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	7.23					
Intersection LOS	A					

Intersection Level Of Service Report
#7: Oliver Street / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	14.6
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.052

Intersection Setup

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	5	0	12	0	0	0	0	419	5	5	370	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	21	0	10	3	5	0	0	2	7
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	0	12	21	0	10	3	424	5	5	372	7
Peak Hour Factor	0.8100	0.8100	0.8100	1.0000	1.0000	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	0	4	5	0	3	1	131	2	2	115	2
Total Analysis Volume [veh/h]	6	0	15	21	0	10	3	523	6	6	459	7
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes	yes		
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.03	0.05	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	14.08	13.91	11.81	14.56	14.28	11.57	0.00	0.00	0.00	8.49	0.00	0.00
Movement LOS	B	B	B	B	B	B		A	A	A	A	
95th-Percentile Queue Length [veh]	0.13	0.13	0.13	0.22	0.22	0.22	0.00	0.00	0.00	2.36	2.36	0.00
95th-Percentile Queue Length [ft]	3.26	3.26	3.26	5.53	5.53	5.53	0.00	0.00	0.00	58.91	58.91	0.00
d_A, Approach Delay [s/veh]	12.46			13.59			0.00			0.11		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	0.70											
Intersection LOS	B											

Intersection Level Of Service Report
#1: Nason Street / Street "A"

Control Type:	Two-way stop	Delay (sec / veh):	9.0
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.024

Intersection Setup

Name	Nason Street		Nason Street		Street "A"	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Nason Street		Nason Street		Street "A"	
Base Volume Input [veh/h]	19	0	0	16	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	35	0	0	20	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	19	35	0	16	20	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	10	0	4	5	0
Total Analysis Volume [veh/h]	21	38	0	17	22	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.33	0.00	8.98	8.59
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.07	0.07
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	1.82	1.82
d_A, Approach Delay [s/veh]	0.00		0.00		8.98	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.02					
Intersection LOS	A					

Option 2: PM Improvement

Number	2											
Intersection	Nason Street / Ironwood Avenue											
Control Type	Signalized											
Analysis Method	HCM 2010											
Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	437	9	130	5	6	5	5	315	325	121	289	5
Total Analysis Volume [veh/h]	446	39	136	5	23	6	11	339	311	144	305	5

Intersection Settings

Cycle Length [s]	115											
Coordination Type	Time of Day Pattern Coordinated											
Actuation Type	Fully actuated											
Lost time [s]	0.00											
Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss
Signal Group	3	8	0	7	4	0	5	2	3	1	6	0
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	0	5	5	0	5	5	5	5	5	0
Maximum Green [s]	0	0	0	0	0	0	0	0	0	0	0	0
Amber [s]	3.0	5.0	0.0	3.0	5.0	0.0	4.0	5.0	3.0	4.0	5.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0
Split [s]	42	11	0	59	28	0	10	28	42	17	35	0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	2.0	0.0
Minimum Recall	no	no		no	no		no	no	no	no	no	
Maximum Recall	no	no		no	no		no	yes	no	no	yes	
Pedestrian Recall	no	no		no	no		no	no	no	no	no	

Lane Group Calculations

g / C, Green / Cycle	0.30	0.32	0.32	0.01	0.03	0.01	0.39	0.74	0.10	0.48
(v / s)_i Volume / Saturation Flow Rate	0.28	0.02	0.10	0.00	0.02	0.01	0.20	0.22	0.09	0.19
so, Base Saturation Flow per Lane [veh/h/ln]	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Arrival type	3			3		3			3	
s, saturation flow rate [veh/h]	1597	1676	1425	1597	1617	1597	1676	1425	1597	1672
c, Capacity [veh/h]	474	530	451	10	42	21	654	1053	167	805
X, volume / capacity	0.94	0.07	0.30	0.49	0.68	0.54	0.52	0.30	0.86	0.38
d, Delay for Lane Group [s/veh]	62.23	27.53	29.84	88.77	62.50	64.21	29.72	5.72	72.65	20.36
Lane Group LOS	E	C	C	F	E	E	C	A	E	C
Critical Lane Group	yes	no	no	no	yes	no	yes	no	yes	no
50th-Percentile Queue Length [veh]	14.69	0.73	2.76	0.24	0.92	0.35	7.30	2.11	4.91	5.09
50th-Percentile Queue Length [ft]	367.14	18.31	69.07	5.91	23.06	8.86	182.43	52.70	122.69	127.17
95th-Percentile Queue Length [veh]	20.97	1.32	4.97	0.43	1.66	0.64	11.73	3.79	8.54	8.79
95th-Percentile Queue Length [ft]	524.26	32.95	124.32	10.64	41.51	15.94	293.19	94.85	213.51	219.64

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	62.23	27.53	29.84	88.77	62.50	62.50	64.21	29.72	5.72	72.65	20.36	20.36
Movement LOS	E	C	C	F	E	E	E	C	A	E	C	C
Critical Movement	no	no	no	yes	no	no	no	no	no	no	no	no
d_A, Approach Delay [s/veh]		52.96			66.36			19.00			36.94	
Approach LOS		D			E			B			D	
d_I, Intersection Delay [s/veh]						36.43						
Intersection LOS						D						
Intersection V/C						0.590						

Intersection Level Of Service Report
#5: Street "B"/Lantz Lane / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	13.6
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	13	0	7	0	0	0	0	433	17	8	402	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	3	0	23	40	11	0	0	7	6
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	13	0	7	3	0	23	40	444	17	8	409	6
Peak Hour Factor	0.9300	0.9300	0.9300	1.0000	1.0000	1.0000	1.0000	0.9300	0.9300	0.9300	0.9300	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	2	1	0	6	10	119	5	2	110	2
Total Analysis Volume [veh/h]	14	0	8	3	0	23	40	477	18	9	440	6
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes			
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	13.57	13.65	11.48	0.00	0.00	0.00	0.00	0.00	0.00	8.40	0.00	0.00
Movement LOS	B	B	B					A	A	A	A	
95th-Percentile Queue Length [veh]	0.14	0.14	0.14	0.00	0.00	0.00	0.00	0.00	0.00	2.12	2.12	0.00
95th-Percentile Queue Length [ft]	3.57	3.57	3.57	0.00	0.00	0.00	0.00	0.00	0.00	52.90	52.90	0.00
d_A, Approach Delay [s/veh]	12.81			0.00			0.00			0.17		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.37											
Intersection LOS	B											

Intersection Level Of Service Report
#6: Oliver Street / Street "C"

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street		Oliver Street		Street "C"	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Oliver Street		Oliver Street		Street "C"	
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.10	1.00	1.00	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	34	0	0	0	0	21
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	34	0	0	0	0	21
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	0	0	0	0	6
Total Analysis Volume [veh/h]	37	0	0	0	0	23
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	7.27	0.00	0.00	0.00	9.09	0.00
Movement LOS	A	A		A	A	
95th-Percentile Queue Length [veh]	0.07	0.07	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	1.75	1.75	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	7.27		0.00		9.09	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	7.27					
Intersection LOS	A					

Intersection Level Of Service Report
#7: Oliver Street / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	13.8
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	12	0	5	0	0	0	0	430	10	16	399	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.10	1.10	1.10	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	14	0	7	11	3	0	0	6	23
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	0	5	14	0	7	11	433	10	16	405	23
Peak Hour Factor	0.9100	0.9100	0.9100	1.0000	1.0000	1.0000	1.0000	0.9100	0.9100	0.9100	0.9100	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	1	4	0	2	3	119	3	4	111	6
Total Analysis Volume [veh/h]	13	0	5	14	0	7	11	476	11	18	445	23
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes			
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
d_M, Delay for Movement [s/veh]	13.75	13.83	11.43	0.00	0.00	0.00	0.00	0.00	0.00	8.40	0.00	0.00
Movement LOS	B	B	B					A	A	A	A	
95th-Percentile Queue Length [veh]	0.12	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	2.20	2.20	0.00
95th-Percentile Queue Length [ft]	3.03	3.03	3.03	0.00	0.00	0.00	0.00	0.00	0.00	55.06	55.06	0.00
d_A, Approach Delay [s/veh]	13.10			0.00			0.00			0.33		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.40											
Intersection LOS	B											

APPENDIX 3.1:

EXISTING TRAFFIC COUNTS – JANUARY 2015

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Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Moreno Valley
N/S: Nason Street
E/W: Ironwood Avenue
Weather: Clear

File Name : MRVNAIRAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- Total Volume

	Nason Street Southbound					Ironwood Avenue Westbound					Nason Street Northbound					Ironwood Avenue Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
07:00 AM	0	3	0	0	3	8	25	0	0	33	38	0	16	10	64	0	31	27	7	65	165
07:15 AM	0	4	0	0	4	6	42	0	0	48	44	1	8	4	57	0	38	42	11	91	200
07:30 AM	0	1	0	0	1	9	70	0	0	79	59	0	10	6	75	0	43	77	5	125	280
07:45 AM	0	2	0	0	2	9	58	0	0	67	67	1	13	4	85	1	72	74	13	160	314
Total	0	10	0	0	10	32	195	0	0	227	208	2	47	24	281	1	184	220	36	441	959
08:00 AM	0	0	0	0	0	7	38	0	0	45	51	2	9	4	66	0	44	51	9	104	215
08:15 AM	0	1	0	0	1	1	30	0	0	31	25	0	7	0	32	0	30	17	0	47	111
08:30 AM	0	0	1	1	2	3	18	0	0	21	18	1	4	4	27	0	23	28	4	55	105
08:45 AM	1	1	0	0	2	2	12	0	0	14	16	0	6	4	26	0	34	19	3	56	98
Total	1	2	1	1	5	13	98	0	0	111	110	3	26	12	151	0	131	115	16	262	529
Grand Total	1	12	1	1	15	45	293	0	0	338	318	5	73	36	432	1	315	335	52	703	1488
Apprch %	6.7	80	6.7	6.7		13.3	86.7	0	0		73.6	1.2	16.9	8.3		0.1	44.8	47.7	7.4		
Total %	0.1	0.8	0.1	0.1	1	3	19.7	0	0	22.7	21.4	0.3	4.9	2.4	29	0.1	21.2	22.5	3.5	47.2	

	Nason Street Southbound				Ironwood Avenue Westbound				Nason Street Northbound				Ironwood Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	4	0	4	6	42	0	48	44	1	8	53	0	38	42	80	185
07:30 AM	0	1	0	1	9	70	0	79	59	0	10	69	0	43	77	120	269
07:45 AM	0	2	0	2	9	58	0	67	67	1	13	81	1	72	74	147	297
08:00 AM	0	0	0	0	7	38	0	45	51	2	9	62	0	44	51	95	202
Total Volume	0	7	0	7	31	208	0	239	221	4	40	265	1	197	244	442	953
% App. Total	0	100	0		13	87	0		83.4	1.5	15.1		0.2	44.6	55.2		
PHF	.000	.438	.000	.438	.861	.743	.000	.756	.825	.500	.769	.818	.250	.684	.792	.752	.802

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City of Moreno Valley
N/S: Nason Street
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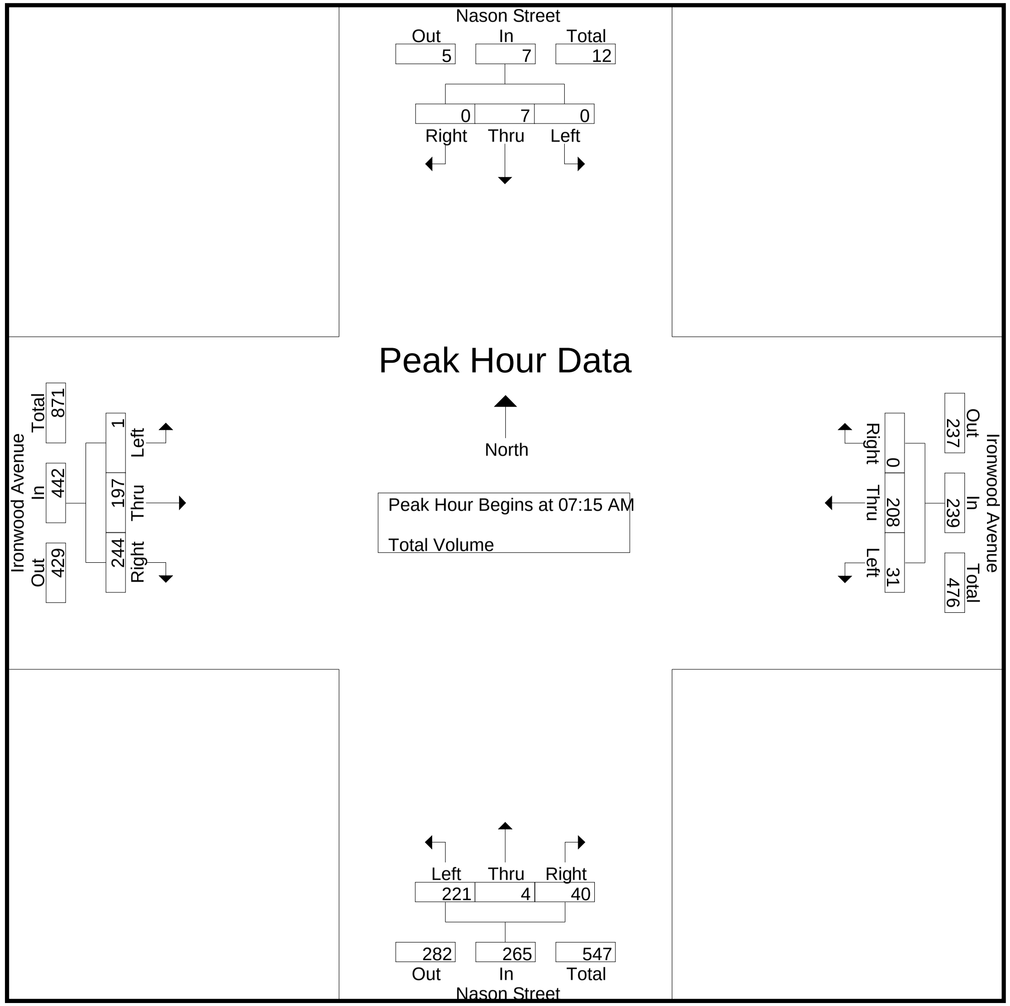
Weather: Clear

File Name : MRVNAIRAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



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City of Moreno Valley
N/S: Nason Street
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Start Date : 1/29/2015
Page No : 3

	Nason Street Southbound				Ironwood Avenue Westbound				Nason Street Northbound				Ironwood Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	07:00 AM				07:15 AM				07:15 AM				07:15 AM				
+0 mins.	0	3	0	3	6	42	0	48	44	1	8	53	0	38	42	80	
+15 mins.	0	4	0	4	9	70	0	79	59	0	10	69	0	43	77	120	
+30 mins.	0	1	0	1	9	58	0	67	67	1	13	81	1	72	74	147	
+45 mins.	0	2	0	2	7	38	0	45	51	2	9	62	0	44	51	95	
Total Volume	0	10	0	10	31	208	0	239	221	4	40	265	1	197	244	442	
% App. Total	0	100	0		13	87	0		83.4	1.5	15.1		0.2	44.6	55.2		
PHF	.000	.625	.000	.625	.861	.743	.000	.756	.825	.500	.769	.818	.250	.684	.792	.752	

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City of Moreno Valley
N/S: Nason Street
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File Name : MRVNAIRPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- Total Volume

	Nason Street Southbound					Ironwood Avenue Westbound					Nason Street Northbound					Ironwood Avenue Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
04:00 PM	0	0	0	0	0	10	31	0	0	41	27	1	8	5	41	0	35	30	3	68	150
04:15 PM	0	0	0	0	0	6	41	1	0	48	41	0	12	7	60	0	37	28	6	71	179
04:30 PM	0	2	1	1	4	10	29	1	0	40	54	1	11	8	74	0	39	38	6	83	201
04:45 PM	0	0	0	0	0	11	42	0	0	53	35	1	18	9	63	0	44	32	3	79	195
Total	0	2	1	1	4	37	143	2	0	182	157	3	49	29	238	0	155	128	18	301	725
05:00 PM	0	1	1	1	3	9	39	0	0	48	47	2	7	5	61	0	36	38	10	84	196
05:15 PM	0	1	0	0	1	13	30	0	0	43	31	1	18	9	59	0	53	40	1	94	197
05:30 PM	0	1	0	0	1	10	43	0	0	53	35	2	8	2	47	0	49	32	4	85	186
05:45 PM	0	1	1	1	3	6	27	0	0	33	38	1	11	7	57	0	42	27	2	71	164
Total	0	4	2	2	8	38	139	0	0	177	151	6	44	23	224	0	180	137	17	334	743
Grand Total	0	6	3	3	12	75	282	2	0	359	308	9	93	52	462	0	335	265	35	635	1468
Apprch %	0	50	25	25		20.9	78.6	0.6	0		66.7	1.9	20.1	11.3		0	52.8	41.7	5.5		
Total %	0	0.4	0.2	0.2	0.8	5.1	19.2	0.1	0	24.5	21	0.6	6.3	3.5	31.5	0	22.8	18.1	2.4	43.3	

	Nason Street Southbound				Ironwood Avenue Westbound				Nason Street Northbound				Ironwood Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	2	1	3	10	29	1	40	54	1	11	66	0	39	38	77	186
04:45 PM	0	0	0	0	11	42	0	53	35	1	18	54	0	44	32	76	183
05:00 PM	0	1	1	2	9	39	0	48	47	2	7	56	0	36	38	74	180
05:15 PM	0	1	0	1	13	30	0	43	31	1	18	50	0	53	40	93	187
Total Volume	0	4	2	6	43	140	1	184	167	5	54	226	0	172	148	320	736
% App. Total	0	66.7	33.3		23.4	76.1	0.5		73.9	2.2	23.9		0	53.8	46.2		
PHF	.000	.500	.500	.500	.827	.833	.250	.868	.773	.625	.750	.856	.000	.811	.925	.860	.984

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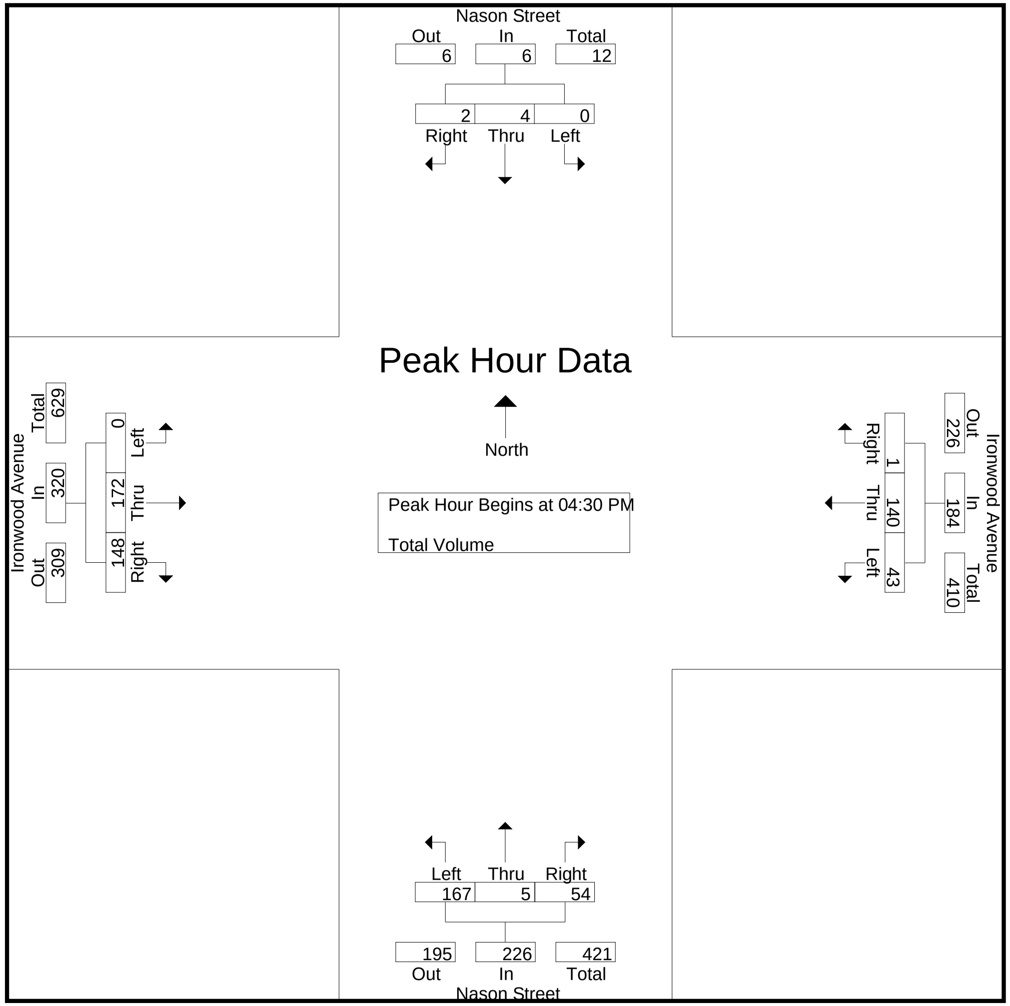
File Name : MRVNAIRPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



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Page No : 3

	Nason Street Southbound				Ironwood Avenue Westbound				Nason Street Northbound				Ironwood Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	04:30 PM				04:45 PM				04:15 PM				04:45 PM				
+0 mins.	0	2	1	3	11	42	0	53	41	0	12	53	0	44	32	76	
+15 mins.	0	0	0	0	9	39	0	48	54	1	11	66	0	36	38	74	
+30 mins.	0	1	1	2	13	30	0	43	35	1	18	54	0	53	40	93	
+45 mins.	0	1	0	1	10	43	0	53	47	2	7	56	0	49	32	81	
Total Volume	0	4	2	6	43	154	0	197	177	4	48	229	0	182	142	324	
% App. Total	0	66.7	33.3		21.8	78.2	0		77.3	1.7	21		0	56.2	43.8		
PHF	.000	.500	.500	.500	.827	.895	.000	.929	.819	.500	.667	.867	.000	.858	.888	.871	

Location: Moreno Valley
N/S: Nason Street
E/W: Ironwood Avenue

Date: 1/29/2015
Weather: Clear

Pedestrians

	North Leg Nason Street	East Leg Ironwood Avenue	South Leg Nason Street	West Leg Ironwood Avenue	
	Pedestrians	**Pedestrians**	**Pedestrians**	**Pedestrians**	TOTAL
7:00 AM	0	0	0	0	0
7:15 AM	1	0	0	0	1
7:30 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0
8:00 AM	0	0	0	0	0
8:15 AM	0	0	0	0	0
8:30 AM	0	0	0	0	0
8:45 AM	0	0	0	0	0
TOTAL VOLUMES:	1	0	0	0	1

	North Leg Nason Street	East Leg Ironwood Avenue	South Leg Nason Street	West Leg Ironwood Avenue	
	Pedestrians	**Pedestrians**	**Pedestrians**	**Pedestrians**	TOTAL
4:00 PM	0	0	0	0	0
4:15 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0

Location: Moreno Valley
N/S: Nason Street
E/W: Ironwood Avenue

Date: 1/29/2015
Weather: Clear

Bicycles

	North Leg Nason Street	East Leg Ironwood Avenue	South Leg Nason Street	West Leg Ironwood Avenue	
	Bicycles	**Bicycles**	**Bicycles**	**Bicycles**	TOTAL
7:00 AM	0	0	0	0	0
7:15 AM	1	0	0	0	1
7:30 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0
8:00 AM	0	0	0	0	0
8:15 AM	0	0	0	0	0
8:30 AM	0	0	0	0	0
8:45 AM	0	0	0	0	0
TOTAL VOLUMES:	1	0	0	0	1

	North Leg Nason Street	East Leg Ironwood Avenue	South Leg Nason Street	West Leg Ironwood Avenue	
	Bicycles	**Bicycles**	**Bicycles**	**Bicycles**	TOTAL
4:00 PM	0	0	0	0	0
4:15 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0

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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

	Nason Street Southbound					SR-60 Westbound Ramps Westbound					Nason Street Northbound					Elder Avenue Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
07:00 AM	13	32	0	0	45	9	3	2	2	16	18	55	138	25	236	0	19	29	20	68	365
07:15 AM	10	46	0	0	56	15	3	2	2	22	12	45	110	9	176	1	13	35	24	73	327
07:30 AM	11	78	1	0	90	27	4	4	2	37	20	67	103	33	223	2	16	53	34	105	455
07:45 AM	9	92	1	0	102	17	4	3	2	26	36	80	111	7	234	3	6	72	51	132	494
Total	43	248	2	0	293	68	14	11	8	101	86	247	462	74	869	6	54	189	129	378	1641
08:00 AM	10	51	5	1	67	19	5	3	1	28	39	55	99	21	214	0	11	14	12	37	346
08:15 AM	8	26	0	0	34	11	3	3	3	20	9	32	111	27	179	4	8	15	12	39	272
08:30 AM	9	26	1	0	36	9	1	1	0	11	9	23	68	11	111	1	7	17	12	37	195
08:45 AM	6	21	0	0	27	18	1	1	0	20	11	22	73	20	126	3	9	7	6	25	198
Total	33	124	6	1	164	57	10	8	4	79	68	132	351	79	630	8	35	53	42	138	1011
Grand Total	76	372	8	1	457	125	24	19	12	180	154	379	813	153	1499	14	89	242	171	516	2652
Apprch %	16.6	81.4	1.8	0.2		69.4	13.3	10.6	6.7		10.3	25.3	54.2	10.2		2.7	17.2	46.9	33.1		
Total %	2.9	14	0.3	0	17.2	4.7	0.9	0.7	0.5	6.8	5.8	14.3	30.7	5.8	56.5	0.5	3.4	9.1	6.4	19.5	
Passenger Vehicles																					
% Passenger Vehicles	96.1	99.2	100	100	98.7	98.4	91.7	100	100	97.8	96.8	99.5	98.8	100	98.9	100	96.6	98.3	98.2	98.1	98.6
Large 2 Axle Vehicles	2	3	0	0	5	2	2	0	0	4	5	2	8	0	15	0	2	4	3	9	33
% Large 2 Axle Vehicles	2.6	0.8	0	0	1.1	1.6	8.3	0	0	2.2	3.2	0.5	1	0	1	0	2.2	1.7	1.8	1.7	1.2
3 Axle Vehicles	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
% 3 Axle Vehicles	1.3	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	1.1	0	0	0.2	0.1
4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	2
% 4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0.1	0	0	0	0	0	0.1

	Nason Street Southbound				SR-60 Westbound Ramps Westbound				Nason Street Northbound				Elder Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	13	32	0	45	9	3	2	14	18	55	138	211	0	19	29	48	318
07:15 AM	10	46	0	56	15	3	2	20	12	45	110	167	1	13	35	49	292
07:30 AM	11	78	1	90	27	4	4	35	20	67	103	190	2	16	53	71	386
07:45 AM	9	92	1	102	17	4	3	24	36	80	111	227	3	6	72	81	434
Total Volume	43	248	2	293	68	14	11	93	86	247	462	795	6	54	189	249	1430
% App. Total	14.7	84.6	0.7		73.1	15.1	11.8		10.8	31.1	58.1		2.4	21.7	75.9		
PHF	.827	.674	.500	.718	.630	.875	.688	.664	.597	.772	.837	.876	.500	.711	.656	.769	.824

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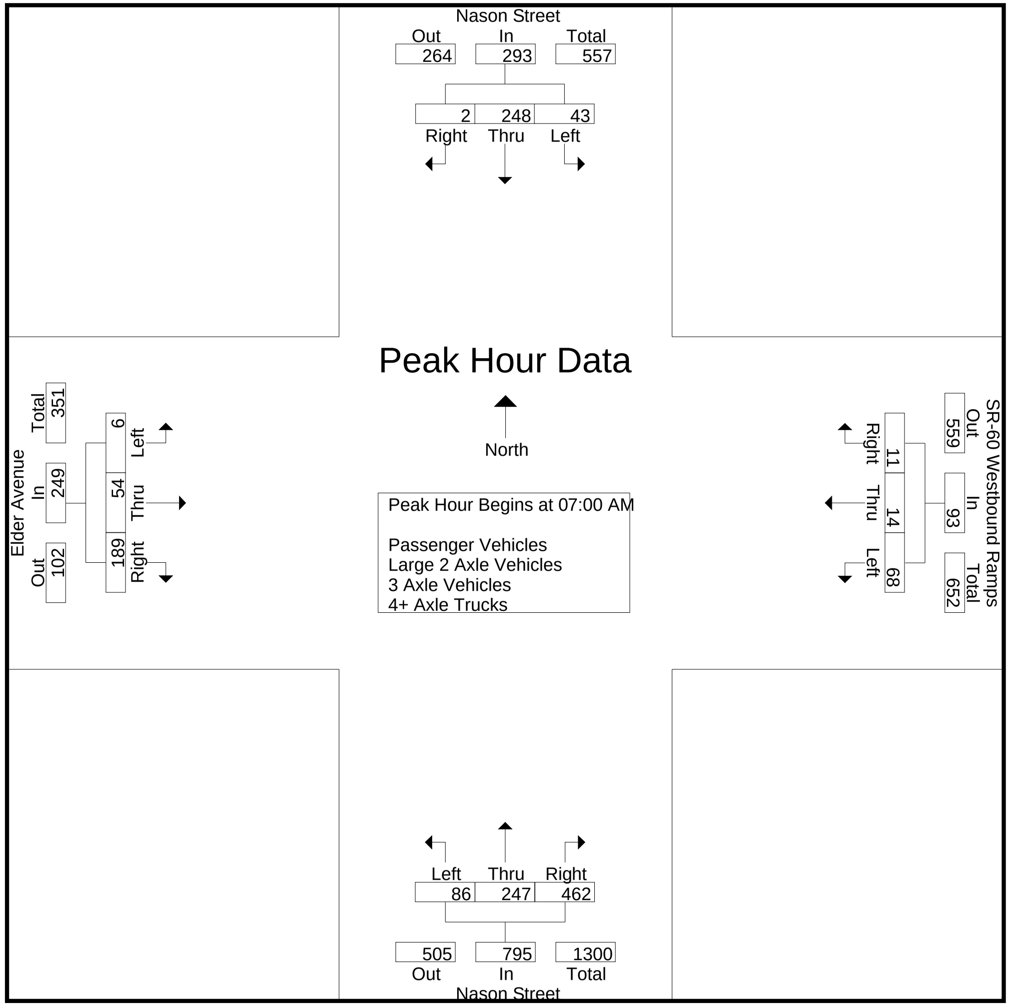
City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



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N/S: Nason Street
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File Name : MRVNA60WAM
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	Nason Street Southbound				SR-60 Westbound Ramps Westbound				Nason Street Northbound				Elder Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	07:15 AM				07:15 AM				07:00 AM				07:00 AM				
+0 mins.	10	46	0	56	15	3	2	20	18	55	138	211	0	19	29	48	
+15 mins.	11	78	1	90	27	4	4	35	12	45	110	167	1	13	35	49	
+30 mins.	9	92	1	102	17	4	3	24	20	67	103	190	2	16	53	71	
+45 mins.	10	51	5	66	19	5	3	27	36	80	111	227	3	6	72	81	
Total Volume	40	267	7	314	78	16	12	106	86	247	462	795	6	54	189	249	
% App. Total	12.7	85	2.2		73.6	15.1	11.3		10.8	31.1	58.1		2.4	21.7	75.9		
PHF	.909	.726	.350	.770	.722	.800	.750	.757	.597	.772	.837	.876	.500	.711	.656	.769	

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- Large 2 Axle Vehicles

	Nason Street Southbound					SR-60 Westbound Ramps Westbound					Nason Street Northbound					Elder Avenue Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
07:00 AM	1	1	0	0	2	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	4
07:15 AM	0	0	0	0	0	0	0	0	0	0	1	0	3	0	4	0	0	1	0	1	5
07:30 AM	1	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	2	2	4	7
07:45 AM	0	0	0	0	0	0	0	0	0	0	2	1	1	0	4	0	0	0	0	0	4
Total	2	3	0	0	5	0	0	0	0	0	3	1	5	0	9	0	1	3	2	6	20
08:00 AM	0	0	0	0	0	0	2	0	0	2	2	1	2	0	5	0	0	0	0	0	7
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2
08:45 AM	0	0	0	0	0	2	0	0	0	2	0	0	1	0	1	0	0	0	0	0	3
Total	0	0	0	0	0	2	2	0	0	4	2	1	3	0	6	0	1	1	1	3	13
Grand Total	2	3	0	0	5	2	2	0	0	4	5	2	8	0	15	0	2	4	3	9	33
Apprch %	40	60	0	0		50	50	0	0		33.3	13.3	53.3	0		0	22.2	44.4	33.3		
Total %	6.1	9.1	0	0	15.2	6.1	6.1	0	0	12.1	15.2	6.1	24.2	0	45.5	0	6.1	12.1	9.1	27.3	

	Nason Street Southbound				SR-60 Westbound Ramps Westbound				Nason Street Northbound				Elder Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	1	1	0	2	0	0	0	0	0	0	1	1	0	1	0	1	4
07:15 AM	0	0	0	0	0	0	0	0	1	0	3	4	0	0	1	1	5
07:30 AM	1	2	0	3	0	0	0	0	0	0	0	0	0	0	2	2	5
07:45 AM	0	0	0	0	0	0	0	0	2	1	1	4	0	0	0	0	4
Total Volume	2	3	0	5	0	0	0	0	3	1	5	9	0	1	3	4	18
% App. Total	40	60	0		0	0	0		33.3	11.1	55.6		0	25	75		
PHF	.500	.375	.000	.417	.000	.000	.000	.000	.375	.250	.417	.563	.000	.250	.375	.500	.900

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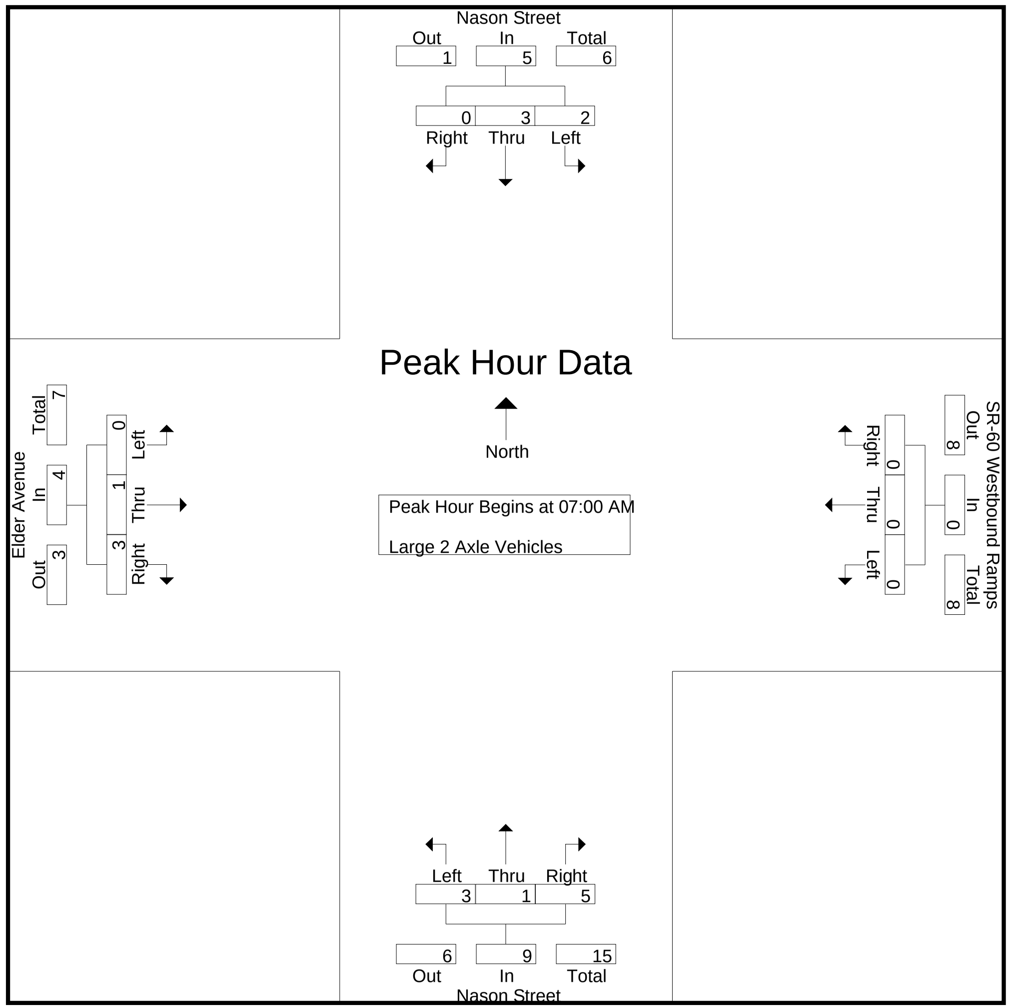
(951) 268-6268

City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 3

	Nason Street Southbound				SR-60 Westbound Ramps Westbound				Nason Street Northbound				Elder Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	07:00 AM				07:00 AM				07:00 AM				07:00 AM				
+0 mins.	1	1	0	2	0	0	0	0	0	0	1	1	0	1	0	1	
+15 mins.	0	0	0	0	0	0	0	0	1	0	3	4	0	0	1	1	
+30 mins.	1	2	0	3	0	0	0	0	0	0	0	0	0	0	2	2	
+45 mins.	0	0	0	0	0	0	0	0	2	1	1	4	0	0	0	0	
Total Volume	2	3	0	5	0	0	0	0	3	1	5	9	0	1	3	4	
% App. Total	40	60	0		0	0	0		33.3	11.1	55.6		0	25	75		
PHF	.500	.375	.000	.417	.000	.000	.000	.000	.375	.250	.417	.563	.000	.250	.375	.500	

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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- 3 Axle Vehicles

	Nason Street Southbound					SR-60 Westbound Ramps Westbound					Nason Street Northbound					Elder Avenue Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
07:15 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2
Apprch %	100	0	0	0		0	0	0	0		0	0	0	0		0	100	0	0		
Total %	50	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	50	0	0	50	

	Nason Street Southbound				SR-60 Westbound Ramps Westbound				Nason Street Northbound				Elder Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
07:15 AM	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	2
% App. Total	100	0	0		0	0	0		0	0	0		0	100	0		
PHF	.250	.000	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.250	.500

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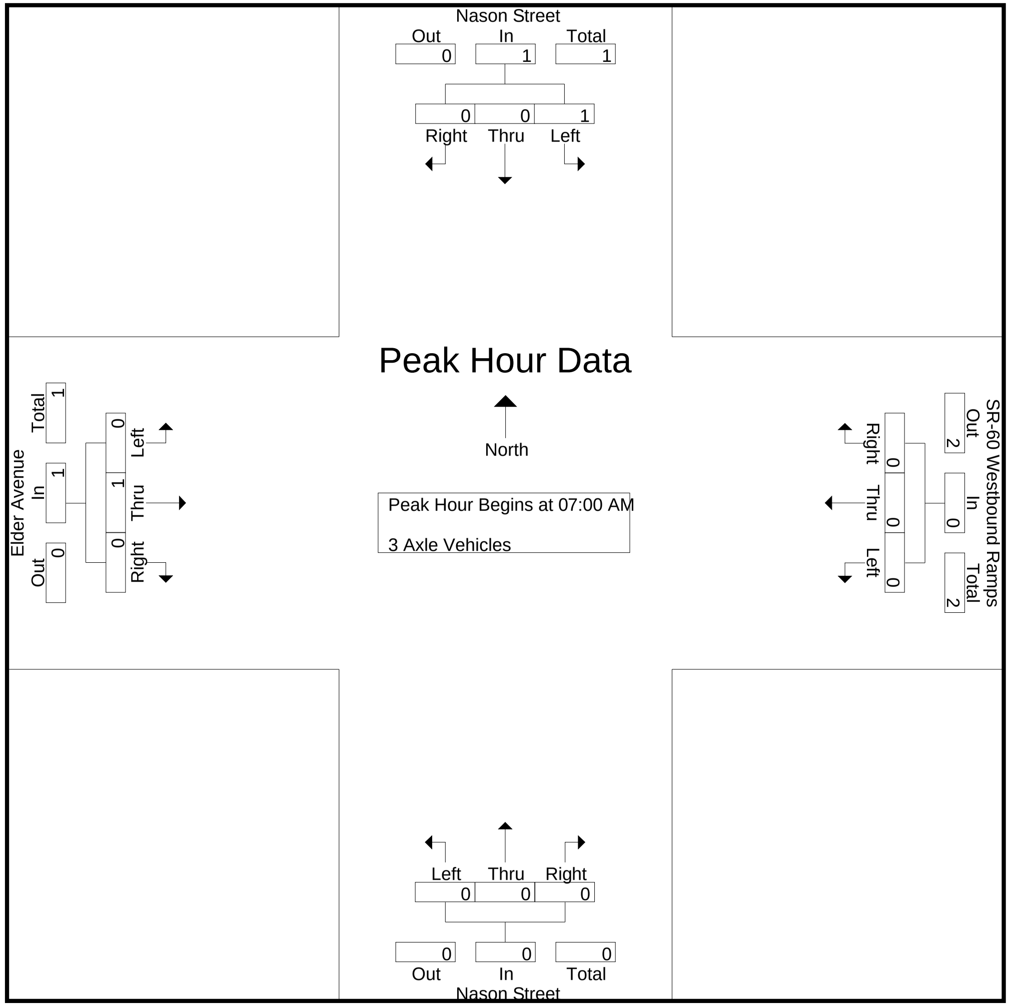
City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 3

	Nason Street Southbound				SR-60 Westbound Ramps Westbound				Nason Street Northbound				Elder Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	07:00 AM				07:00 AM				07:00 AM				07:00 AM				
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	
+15 mins.	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Volume	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	
% App. Total	100	0	0		0	0	0		0	0	0		0	100	0		
PHF	.250	.000	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.250	

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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- 4+ Axle Trucks

	Nason Street Southbound					SR-60 Westbound Ramps Westbound					Nason Street Northbound					Elder Avenue Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	2
Apprch %	0	0	0	0		0	0	0	0		0	0	100	0		0	0	0	0		
Total %	0	0	0	0	0	0	0	0	0	0	0	0	100	0	100	0	0	0	0	0	

	Nason Street Southbound				SR-60 Westbound Ramps Westbound				Nason Street Northbound				Elder Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
% App. Total	0	0	0		0	0	0		0	0	100		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.000	.000	.000	.000	.250

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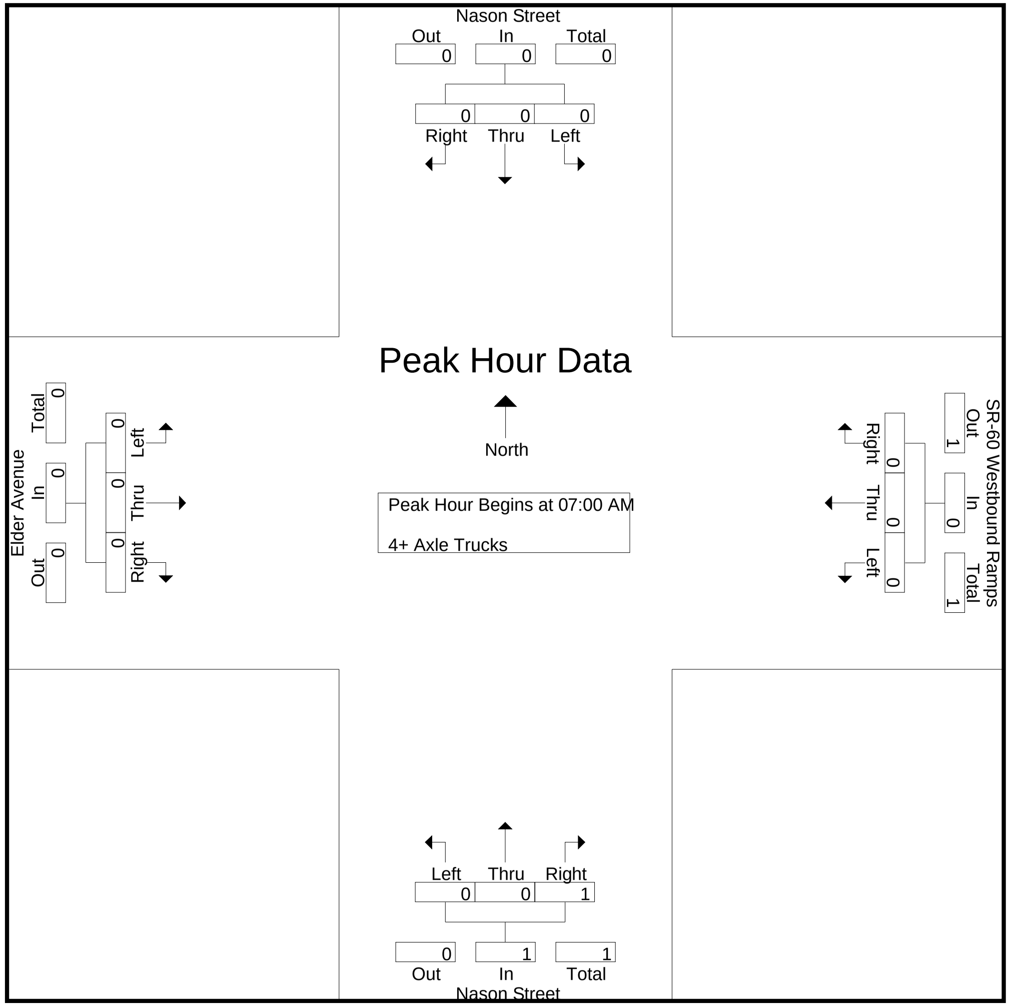
City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WAM
Site Code : 05115059
Start Date : 1/29/2015
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	Nason Street Southbound				SR-60 Westbound Ramps Westbound				Nason Street Northbound				Elder Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	07:00 AM				07:00 AM				07:00 AM				07:00 AM				
+0 mins.	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Volume	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	
% App. Total	0	0	0		0	0	0		0	0	100		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.000	.000	.000	.000	

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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

	Nason Street Southbound					SR-60 Westbound Ramps Westbound					Nason Street Northbound					Elder Avenue Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
04:00 PM	7	41	1	1	50	16	9	2	2	29	25	47	104	15	191	1	5	28	20	54	324
04:15 PM	5	30	1	1	37	22	5	6	2	35	41	49	99	17	206	1	4	26	20	51	329
04:30 PM	13	42	3	2	60	30	1	4	4	39	36	70	140	36	282	1	6	24	20	51	432
04:45 PM	1	41	3	2	47	32	8	2	1	43	32	61	139	24	256	0	5	18	8	31	377
Total	26	154	8	6	194	100	23	14	9	146	134	227	482	92	935	3	20	96	68	187	1462
05:00 PM	5	46	2	0	53	25	11	5	4	45	32	55	120	21	228	3	8	24	17	52	378
05:15 PM	5	50	2	0	57	31	4	0	0	35	43	57	92	14	206	4	3	26	20	53	351
05:30 PM	2	44	0	0	46	32	5	8	5	50	30	46	86	22	184	0	8	29	22	59	339
05:45 PM	3	38	1	0	42	15	4	6	4	29	28	49	109	20	206	3	5	18	17	43	320
Total	15	178	5	0	198	103	24	19	13	159	133	207	407	77	824	10	24	97	76	207	1388
Grand Total	41	332	13	6	392	203	47	33	22	305	267	434	889	169	1759	13	44	193	144	394	2850
Apprch %	10.5	84.7	3.3	1.5		66.6	15.4	10.8	7.2		15.2	24.7	50.5	9.6		3.3	11.2	49	36.5		
Total %	1.4	11.6	0.5	0.2	13.8	7.1	1.6	1.2	0.8	10.7	9.4	15.2	31.2	5.9	61.7	0.5	1.5	6.8	5.1	13.8	
Passenger Vehicles																					
% Passenger Vehicles	100	99.7	100	100	99.7	97.5	100	100	100	98.4	99.6	98.8	99.7	100	99.5	100	100	100	100	100	99.5
Large 2 Axle Vehicles	0	1	0	0	1	5	0	0	0	5	1	4	2	0	7	0	0	0	0	0	13
% Large 2 Axle Vehicles	0	0.3	0	0	0.3	2.5	0	0	0	1.6	0.4	0.9	0.2	0	0.4	0	0	0	0	0	0.5
3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	2
% 3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0.2	0.1	0	0.1	0	0	0	0	0	0.1
4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% 4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Nason Street Southbound				SR-60 Westbound Ramps Westbound				Nason Street Northbound				Elder Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	13	42	3	58	30	1	4	35	36	70	140	246	1	6	24	31	370
04:45 PM	1	41	3	45	32	8	2	42	32	61	139	232	0	5	18	23	342
05:00 PM	5	46	2	53	25	11	5	41	32	55	120	207	3	8	24	35	336
05:15 PM	5	50	2	57	31	4	0	35	43	57	92	192	4	3	26	33	317
Total Volume	24	179	10	213	118	24	11	153	143	243	491	877	8	22	92	122	1365
% App. Total	11.3	84	4.7		77.1	15.7	7.2		16.3	27.7	56		6.6	18	75.4		
PHF	.462	.895	.833	.918	.922	.545	.550	.911	.831	.868	.877	.891	.500	.688	.885	.871	.922

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-

Counts Unlimited, Inc.
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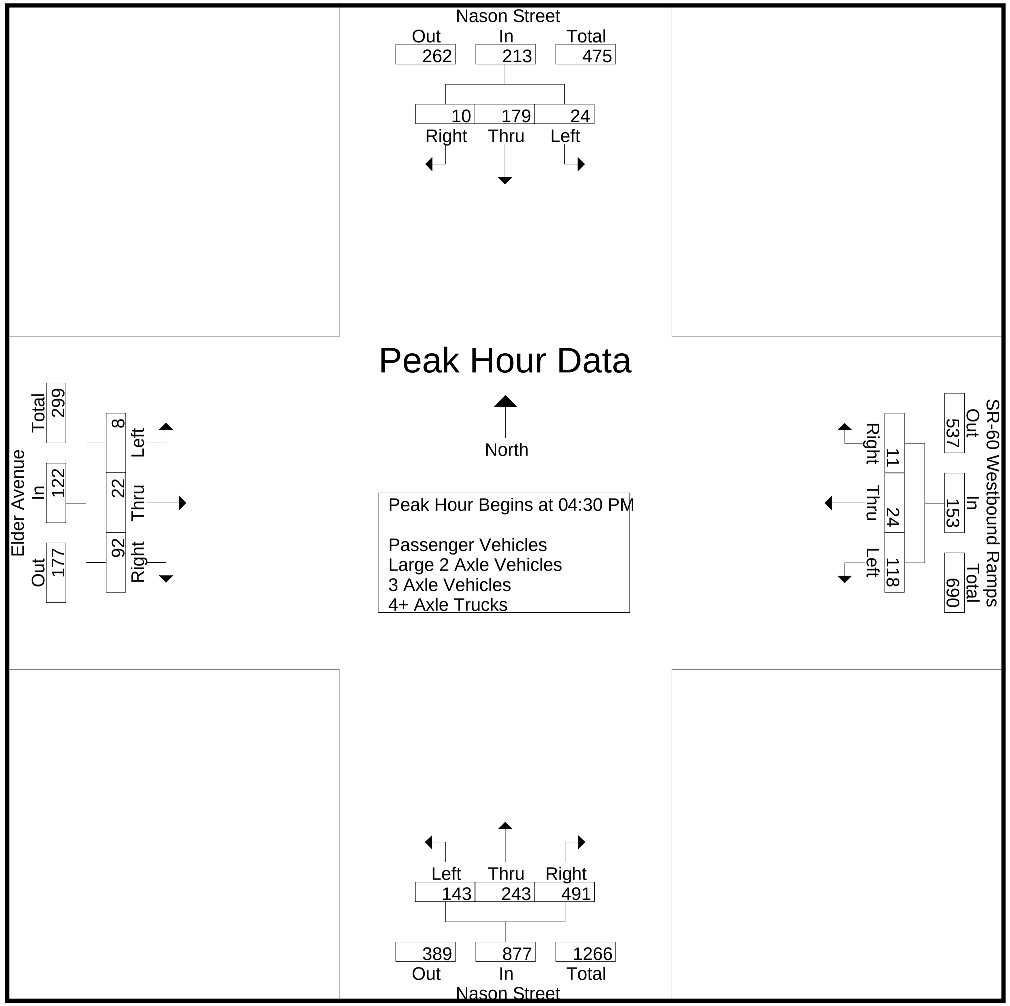
City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



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(951) 268-6268

City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 3

	Nason Street Southbound				SR-60 Westbound Ramps Westbound				Nason Street Northbound				Elder Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	04:30 PM				04:45 PM				04:30 PM				05:00 PM				
+0 mins.	13	42	3	58	32	8	2	42	36	70	140	246	3	8	24	35	
+15 mins.	1	41	3	45	25	11	5	41	32	61	139	232	4	3	26	33	
+30 mins.	5	46	2	53	31	4	0	35	32	55	120	207	0	8	29	37	
+45 mins.	5	50	2	57	32	5	8	45	43	57	92	192	3	5	18	26	
Total Volume	24	179	10	213	120	28	15	163	143	243	491	877	10	24	97	131	
% App. Total	11.3	84	4.7		73.6	17.2	9.2		16.3	27.7	56		7.6	18.3	74		
PHF	.462	.895	.833	.918	.938	.636	.469	.906	.831	.868	.877	.891	.625	.750	.836	.885	

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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- Large 2 Axle Vehicles

	Nason Street Southbound					SR-60 Westbound Ramps Westbound					Nason Street Northbound					Elder Avenue Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	2
04:15 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	2
04:30 PM	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
04:45 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	3	0	0	0	3	1	2	1	0	4	0	0	0	0	0	7
05:00 PM	0	1	0	0	1	1	0	0	0	1	0	0	1	0	1	0	0	0	0	0	3
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
05:30 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total	0	1	0	0	1	2	0	0	0	2	0	2	1	0	3	0	0	0	0	0	6
Grand Total	0	1	0	0	1	5	0	0	0	5	1	4	2	0	7	0	0	0	0	0	13
Apprch %	0	100	0	0		100	0	0	0		14.3	57.1	28.6	0		0	0	0	0		
Total %	0	7.7	0	0	7.7	38.5	0	0	0	38.5	7.7	30.8	15.4	0	53.8	0	0	0	0	0	

	Nason Street Southbound				SR-60 Westbound Ramps Westbound				Nason Street Northbound				Elder Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	2
04:45 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
05:00 PM	0	1	0	1	1	0	0	1	0	0	1	1	0	0	0	0	3
05:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
Total Volume	0	1	0	1	4	0	0	4	0	1	1	2	0	0	0	0	7
% App. Total	0	100	0		100	0	0		0	50	50		0	0	0		
PHF	.000	.250	.000	.250	.500	.000	.000	.500	.000	.250	.250	.500	.000	.000	.000	.000	.583

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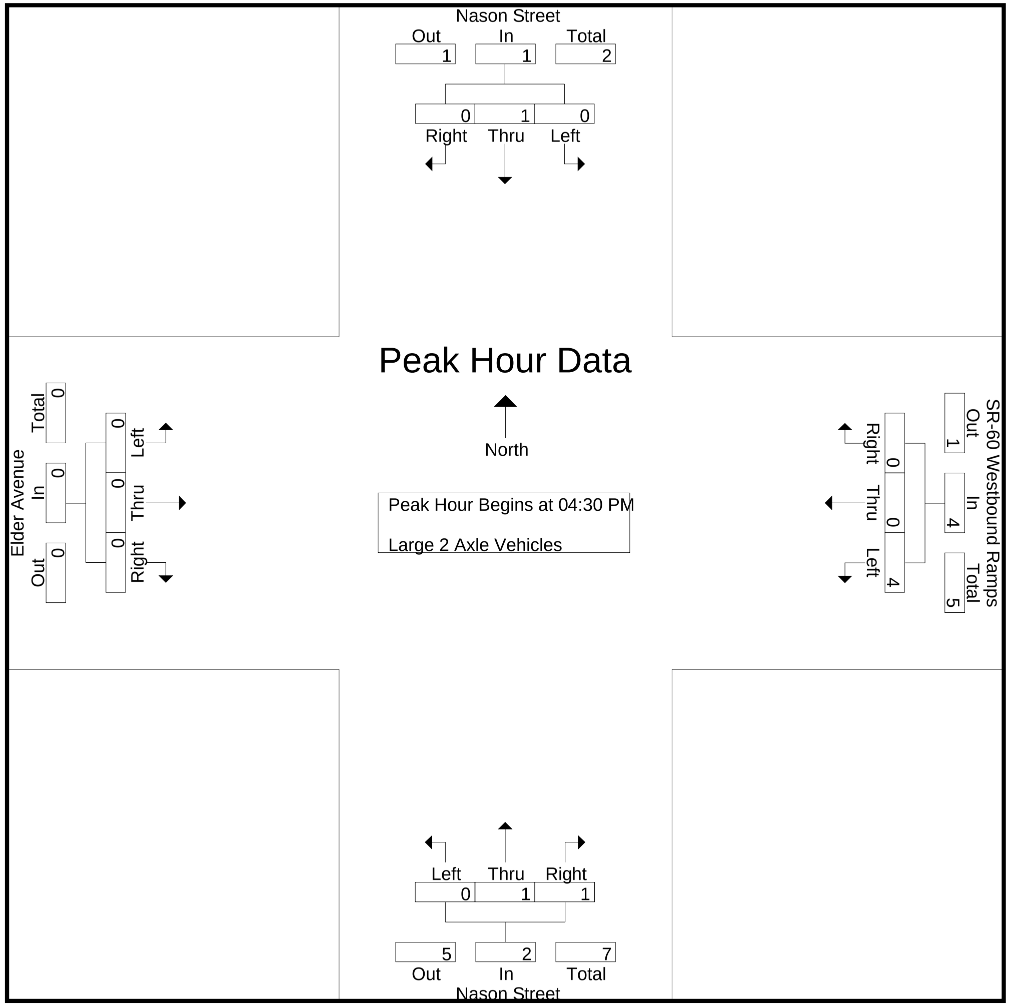
City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 3

	Nason Street Southbound				SR-60 Westbound Ramps Westbound				Nason Street Northbound				Elder Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	04:30 PM				04:30 PM				04:30 PM				04:30 PM				
+0 mins.	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	
+15 mins.	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	
+30 mins.	0	1	0	1	1	0	0	1	0	0	1	1	0	0	0	0	
+45 mins.	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	
Total Volume	0	1	0	1	4	0	0	4	0	1	1	2	0	0	0	0	
% App. Total	0	100	0		100	0	0		0	50	50		0	0	0		
PHF	.000	.250	.000	.250	.500	.000	.000	.500	.000	.250	.250	.500	.000	.000	.000	.000	

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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- 3 Axle Vehicles

	Nason Street Southbound					SR-60 Westbound Ramps Westbound					Nason Street Northbound					Elder Avenue Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Grand Total	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	2
Apprch %	0	0	0	0		0	0	0	0		0	50	50	0		0	0	0	0		
Total %	0	0	0	0	0	0	0	0	0	0	0	50	50	0	100	0	0	0	0	0	

	Nason Street Southbound				SR-60 Westbound Ramps Westbound				Nason Street Northbound				Elder Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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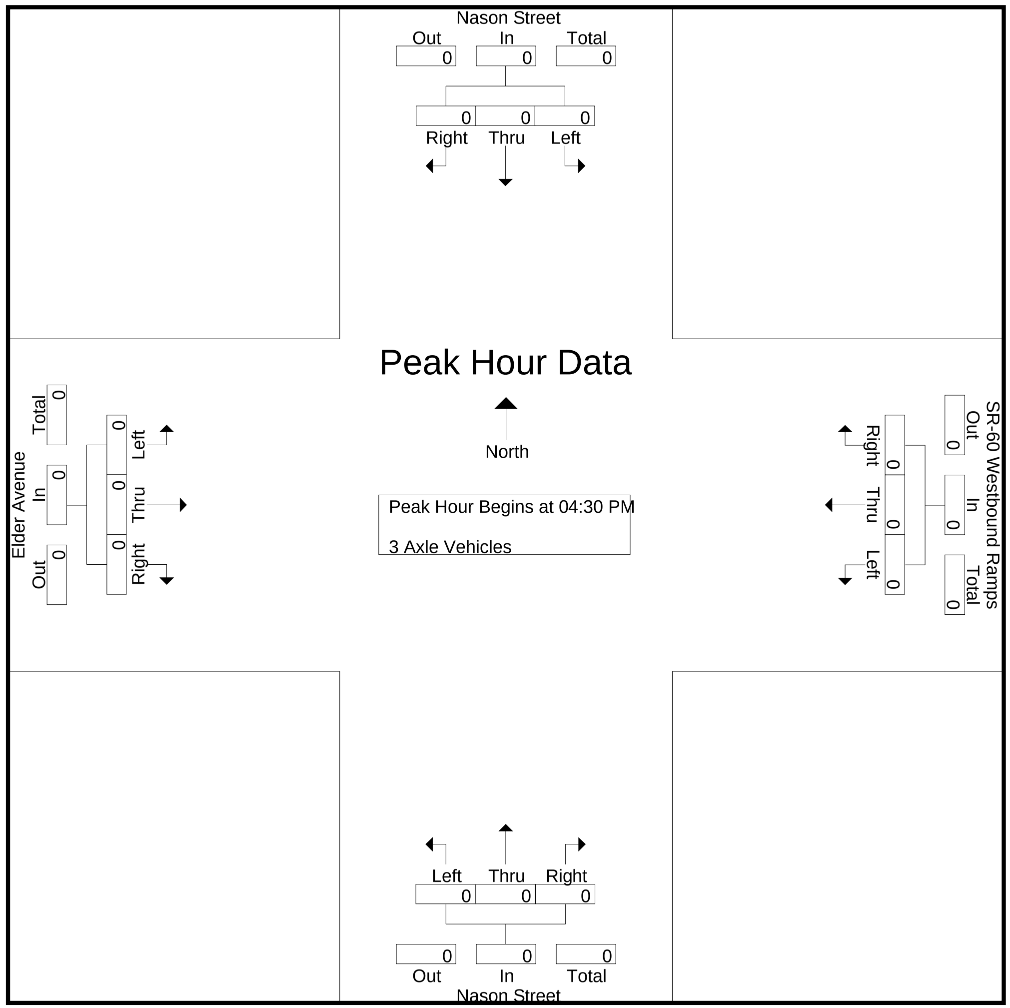
City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 3

	Nason Street Southbound				SR-60 Westbound Ramps Westbound				Nason Street Northbound				Elder Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	04:30 PM				04:30 PM				04:30 PM				04:30 PM				
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	

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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- 4+ Axle Trucks

	Nason Street Southbound					SR-60 Westbound Ramps Westbound					Nason Street Northbound					Elder Avenue Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
Total %																					

	Nason Street Southbound				SR-60 Westbound Ramps Westbound				Nason Street Northbound				Elder Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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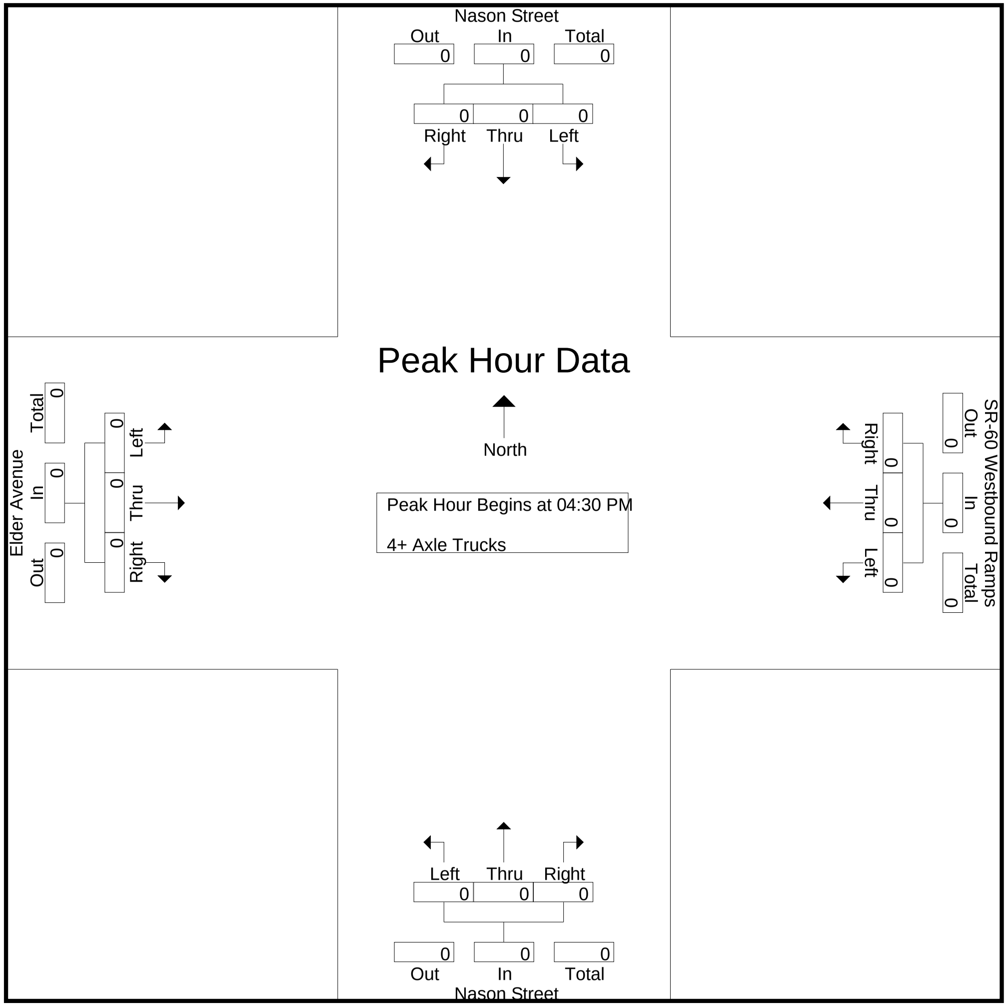
City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound Ramps
Weather: Clear

File Name : MRVNA60WPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 3

	Nason Street Southbound				SR-60 Westbound Ramps Westbound				Nason Street Northbound				Elder Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	04:30 PM				04:30 PM				04:30 PM				04:30 PM				
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	

Location: Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound

Date: 1/29/2015
Weather: Clear

Pedestrians

	North Leg Nason Street	East Leg SR-60 Westbound	South Leg Nason Street	West Leg SR-60 Westbound	
	Pedestrians	**Pedestrians**	**Pedestrians**	**Pedestrians**	TOTAL
7:00 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0
7:30 AM	0	0	0	2	2
7:45 AM	0	0	0	1	1
8:00 AM	0	0	0	0	0
8:15 AM	0	0	0	1	1
8:30 AM	0	0	0	0	0
8:45 AM	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	4	4

	North Leg Nason Street	East Leg SR-60 Westbound	South Leg Nason Street	West Leg SR-60 Westbound	
	Pedestrians	**Pedestrians**	**Pedestrians**	**Pedestrians**	TOTAL
4:00 PM	0	0	0	0	0
4:15 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0
4:45 PM	0	0	0	2	2
5:00 PM	0	0	0	2	2
5:15 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	4	4

Location: Moreno Valley
N/S: Nason Street
E/W: SR-60 Westbound

Date: 1/29/2015
Weather: Clear

Bicycles

	North Leg Nason Street	East Leg SR-60 Westbound	South Leg Nason Street	West Leg SR-60 Westbound	
	Bicycles	**Bicycles**	**Bicycles**	**Bicycles**	TOTAL
7:00 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0
7:30 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0
8:00 AM	0	0	0	2	2
8:15 AM	0	0	0	0	0
8:30 AM	0	0	0	0	0
8:45 AM	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	2	2

	North Leg Nason Street	East Leg SR-60 Westbound	South Leg Nason Street	West Leg SR-60 Westbound	
	Bicycles	**Bicycles**	**Bicycles**	**Bicycles**	TOTAL
4:00 PM	0	0	0	0	0
4:15 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0

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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Eastbound Ramps
Weather: Clear

File Name : MRVNA60EAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

	Nason Street Southbound					SR-60 Eastbound On Ramp Westbound					Nason Street Northbound					SR-60 Eastbound Off Ramp Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
07:00 AM	9	56	0	0	65	0	0	0	0	0	0	207	32	8	247	5	2	95	54	156	468
07:15 AM	17	86	0	0	103	0	0	0	0	0	0	151	26	9	186	5	0	111	68	184	473
07:30 AM	6	146	0	0	152	0	0	0	0	0	0	186	26	5	217	6	0	124	53	183	552
07:45 AM	15	172	0	0	187	0	0	0	0	0	0	224	27	5	256	5	0	124	68	197	640
Total	47	460	0	0	507	0	0	0	0	0	0	768	111	27	906	21	2	454	243	720	2133
08:00 AM	7	79	0	0	86	0	0	0	0	0	0	171	20	0	191	6	1	91	56	154	431
08:15 AM	11	41	0	0	52	0	0	0	0	0	0	148	30	1	179	6	1	83	54	144	375
08:30 AM	8	44	0	0	52	0	0	0	0	0	0	85	29	5	119	13	0	78	35	126	297
08:45 AM	5	41	0	0	46	0	0	0	0	0	0	97	11	0	108	12	0	79	36	127	281
Total	31	205	0	0	236	0	0	0	0	0	0	501	90	6	597	37	2	331	181	551	1384
Grand Total	78	665	0	0	743	0	0	0	0	0	0	1269	201	33	1503	58	4	785	424	1271	3517
Apprch %	10.5	89.5	0	0		0	0	0	0		0	84.4	13.4	2.2		4.6	0.3	61.8	33.4		
Total %	2.2	18.9	0	0	21.1	0	0	0	0	0	0	36.1	5.7	0.9	42.7	1.6	0.1	22.3	12.1	36.1	
Passenger Vehicles																					
% Passenger Vehicles	100	98.6	0	0	98.8	0	0	0	0	0	0	98.7	97	100	98.5	96.6	50	96.9	96.5	96.6	97.9
Large 2 Axle Vehicles	0	9	0	0	9	0	0	0	0	0	0	15	5	0	20	2	2	18	11	33	62
% Large 2 Axle Vehicles	0	1.4	0	0	1.2	0	0	0	0	0	0	1.2	2.5	0	1.3	3.4	50	2.3	2.6	2.6	1.8
3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	6	6
% 3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.7	0.5	0.2
4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	0	0	3	1	4	7
% 4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0.2	0.5	0	0.2	0	0	0.4	0.2	0.3	0.2

	Nason Street Southbound				SR-60 Eastbound On Ramp Westbound				Nason Street Northbound				SR-60 Eastbound Off Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	9	56	0	65	0	0	0	0	0	207	32	239	5	2	95	102	406
07:15 AM	17	86	0	103	0	0	0	0	0	151	26	177	5	0	111	116	396
07:30 AM	6	146	0	152	0	0	0	0	0	186	26	212	6	0	124	130	494
07:45 AM	15	172	0	187	0	0	0	0	0	224	27	251	5	0	124	129	567
Total Volume	47	460	0	507	0	0	0	0	0	768	111	879	21	2	454	477	1863
% App. Total	9.3	90.7	0		0	0	0		0	87.4	12.6		4.4	0.4	95.2		
PHF	.691	.669	.000	.678	.000	.000	.000	.000	.000	.857	.867	.875	.875	.250	.915	.917	.821

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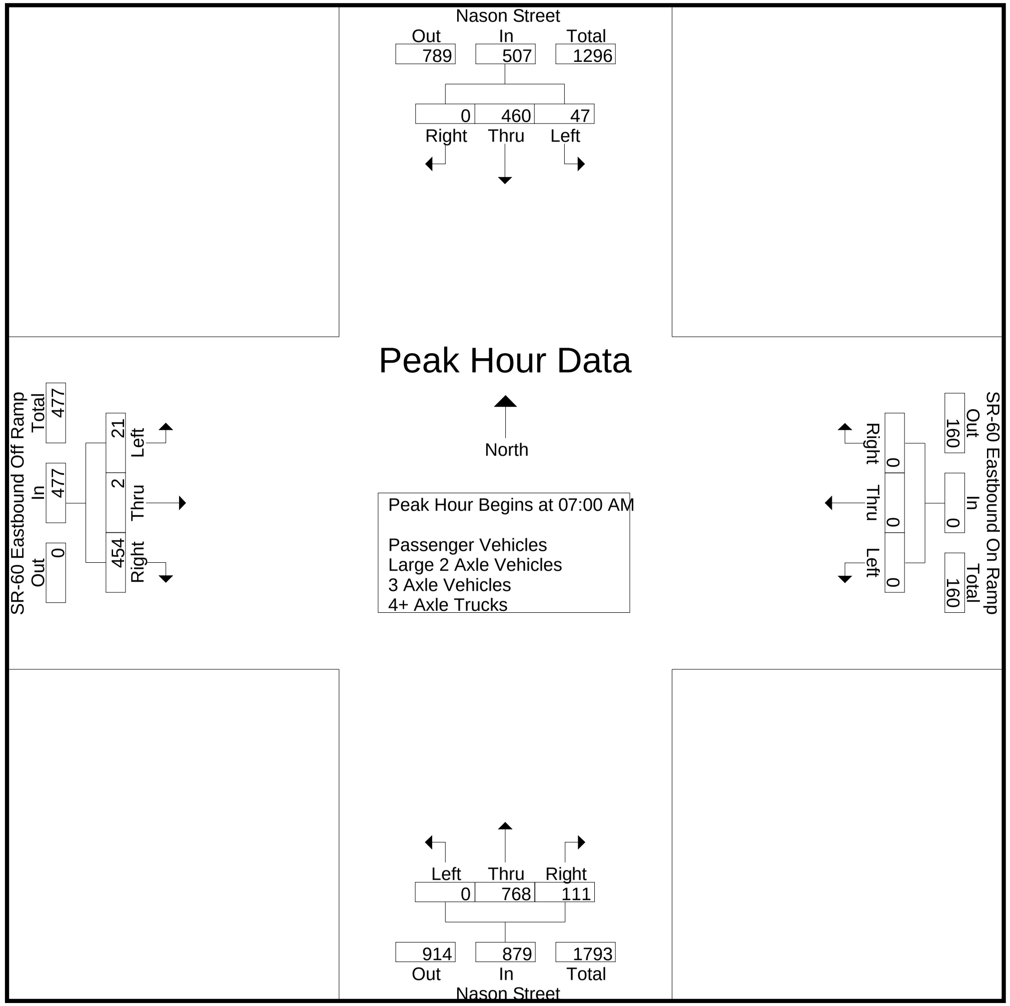
City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Eastbound Ramps
Weather: Clear

File Name : MRVNA60EAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



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City of Moreno Valley
N/S: Nason Street
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File Name : MRVNA60EAM
Site Code : 05115059
Start Date : 1/29/2015
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	Nason Street Southbound				SR-60 Eastbound On Ramp Westbound				Nason Street Northbound				SR-60 Eastbound Off Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	07:15 AM				07:00 AM				07:00 AM				07:00 AM				
+0 mins.	17	86	0	103	0	0	0	0	0	207	32	239	5	2	95	102	
+15 mins.	6	146	0	152	0	0	0	0	0	151	26	177	5	0	111	116	
+30 mins.	15	172	0	187	0	0	0	0	0	186	26	212	6	0	124	130	
+45 mins.	7	79	0	86	0	0	0	0	0	224	27	251	5	0	124	129	
Total Volume	45	483	0	528	0	0	0	0	0	768	111	879	21	2	454	477	
% App. Total	8.5	91.5	0		0	0	0		0	87.4	12.6		4.4	0.4	95.2		
PHF	.662	.702	.000	.706	.000	.000	.000	.000	.000	.857	.867	.875	.875	.250	.915	.917	

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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Eastbound Ramps
Weather: Clear

File Name : MRVNA60EAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- Large 2 Axle Vehicles

	Nason Street Southbound					SR-60 Eastbound On Ramp Westbound					Nason Street Northbound					SR-60 Eastbound Off Ramp Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
07:00 AM	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	1	2	1	4	7
07:15 AM	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	1	0	5	4	10	14
07:30 AM	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	6
07:45 AM	0	1	0	0	1	0	0	0	0	0	0	5	1	0	6	0	0	3	2	5	12
Total	0	6	0	0	6	0	0	0	0	0	0	10	1	0	11	1	1	13	7	22	39
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	4	3	0	7	0	1	2	2	5	12
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	1	2
08:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	3
08:45 AM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	2	1	3	6
Total	0	3	0	0	3	0	0	0	0	0	0	5	4	0	9	1	1	5	4	11	23
Grand Total	0	9	0	0	9	0	0	0	0	0	0	15	5	0	20	2	2	18	11	33	62
Apprch %	0	100	0	0		0	0	0	0		0	75	25	0		6.1	6.1	54.5	33.3		
Total %	0	14.5	0	0	14.5	0	0	0	0	0	0	24.2	8.1	0	32.3	3.2	3.2	29	17.7	53.2	

	Nason Street Southbound				SR-60 Eastbound On Ramp Westbound				Nason Street Northbound				SR-60 Eastbound Off Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	1	0	1	0	0	0	0	0	2	0	2	0	1	2	3	6
07:15 AM	0	1	0	1	0	0	0	0	0	3	0	3	1	0	5	6	10
07:30 AM	0	3	0	3	0	0	0	0	0	0	0	0	0	0	3	3	6
07:45 AM	0	1	0	1	0	0	0	0	0	5	1	6	0	0	3	3	10
Total Volume	0	6	0	6	0	0	0	0	0	10	1	11	1	1	13	15	32
% App. Total	0	100	0		0	0	0		0	90.9	9.1		6.7	6.7	86.7		
PHF	.000	.500	.000	.500	.000	.000	.000	.000	.000	.500	.250	.458	.250	.250	.650	.625	.800

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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Eastbound Ramps
Weather: Clear

File Name : MRVNA60EAM
Site Code : 05115059
Start Date : 1/29/2015
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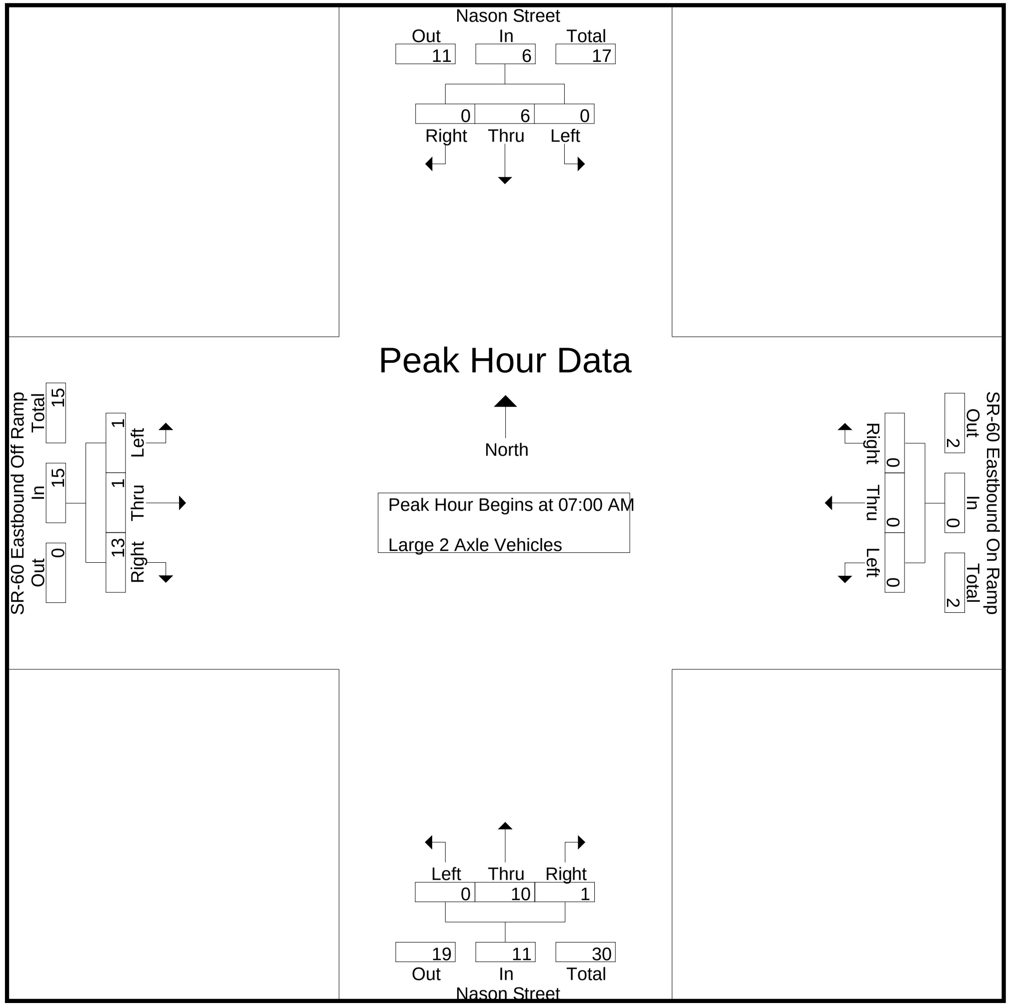

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City of Moreno Valley
N/S: Nason Street
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Weather: Clear

File Name : MRVNA60EAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 3

	Nason Street Southbound				SR-60 Eastbound On Ramp Westbound				Nason Street Northbound				SR-60 Eastbound Off Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	07:00 AM				07:00 AM				07:00 AM				07:00 AM				
+0 mins.	0	1	0	1	0	0	0	0	0	2	0	2	0	1	2	3	
+15 mins.	0	1	0	1	0	0	0	0	0	3	0	3	1	0	5	6	
+30 mins.	0	3	0	3	0	0	0	0	0	0	0	0	0	0	3	3	
+45 mins.	0	1	0	1	0	0	0	0	0	5	1	6	0	0	3	3	
Total Volume	0	6	0	6	0	0	0	0	0	10	1	11	1	1	13	15	
% App. Total	0	100	0		0	0	0		0	90.9	9.1		6.7	6.7	86.7		
PHF	.000	.500	.000	.500	.000	.000	.000	.000	.000	.500	.250	.458	.250	.250	.650	.625	

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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Eastbound Ramps
Weather: Clear

File Name : MRVNA60EAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- 3 Axle Vehicles

	Nason Street Southbound					SR-60 Eastbound On Ramp Westbound					Nason Street Northbound					SR-60 Eastbound Off Ramp Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	4	4
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	4	4
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	6	6
Apprch %	0	0	0	0		0	0	0	0		0	0	0	0		0	0	50	50		
Total %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	50	100	

	Nason Street Southbound				SR-60 Eastbound On Ramp Westbound				Nason Street Northbound				SR-60 Eastbound Off Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
% App. Total	0	0	0		0	0	0		0	0	0		0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.250

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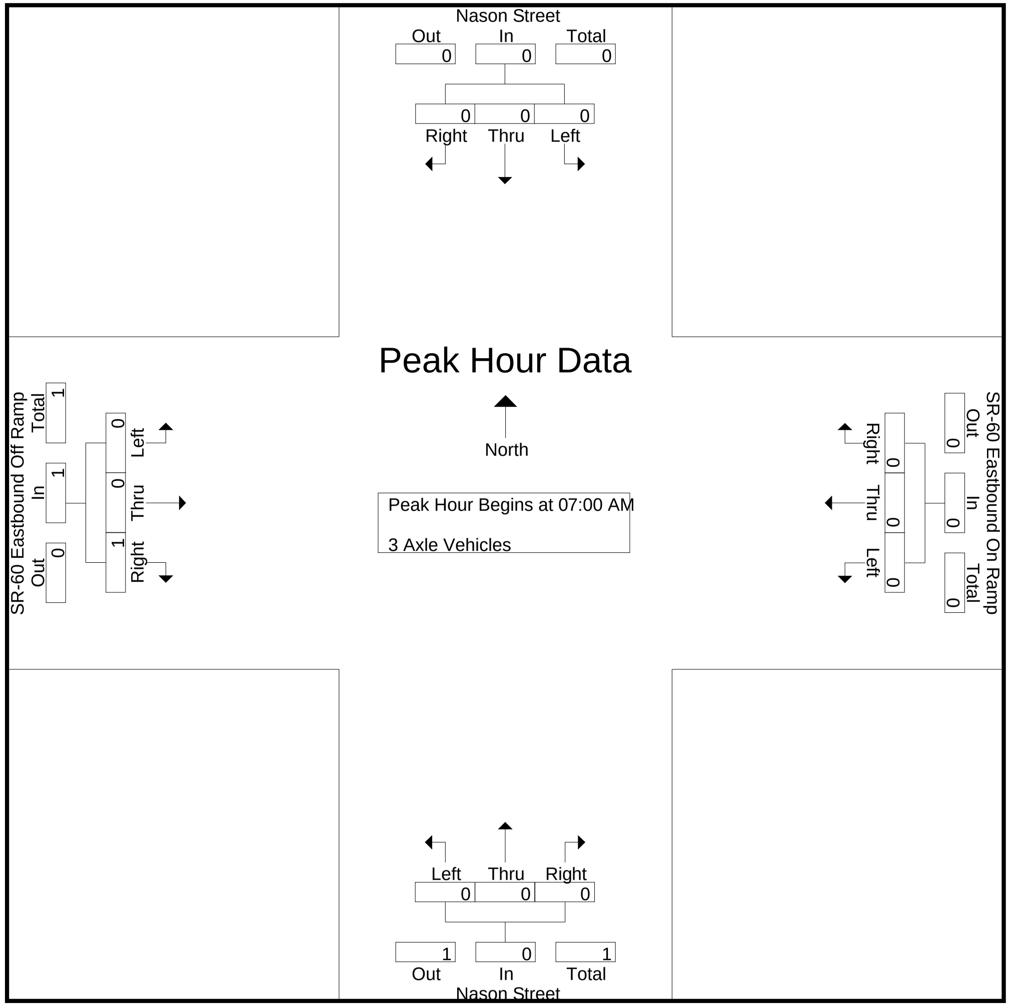
City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Eastbound Ramps
Weather: Clear

File Name : MRVNA60EAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



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City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Eastbound Ramps
Weather: Clear

File Name : MRVNA60EAM
Site Code : 05115059
Start Date : 1/29/2015
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	Nason Street Southbound				SR-60 Eastbound On Ramp Westbound				Nason Street Northbound				SR-60 Eastbound Off Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	07:00 AM				07:00 AM				07:00 AM				07:00 AM				
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
% App. Total	0	0	0		0	0	0		0	0	0		0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	

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City of Moreno Valley
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File Name : MRVNA60EAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- 4+ Axle Trucks

	Nason Street Southbound					SR-60 Eastbound On Ramp Westbound					Nason Street Northbound					SR-60 Eastbound Off Ramp Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	2	3
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	2
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	2	0	2	4
Grand Total	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	0	0	3	1	4	7
Apprch %	0	0	0	0		0	0	0	0		0	66.7	33.3	0		0	0	75	25		
Total %	0	0	0	0	0	0	0	0	0	0	0	28.6	14.3	0	42.9	0	0	42.9	14.3	57.1	

	Nason Street Southbound				SR-60 Eastbound On Ramp Westbound				Nason Street Northbound				SR-60 Eastbound Off Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Total Volume	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	1	2
% App. Total	0	0	0		0	0	0		0	100	0		0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.250	.250	.500

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N/S: Nason Street
E/W: SR-60 Eastbound Ramps
Weather: Clear

File Name : MRVNA60EAM
Site Code : 05115059
Start Date : 1/29/2015
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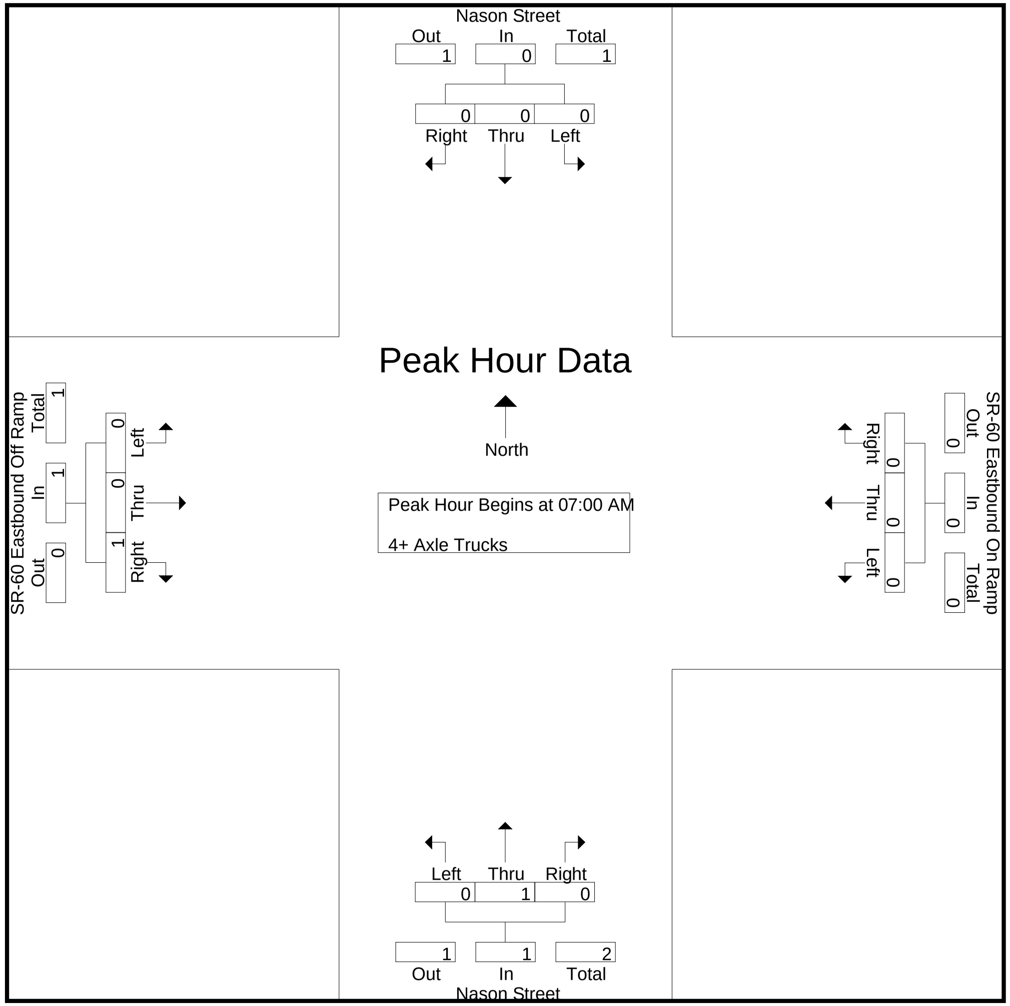

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File Name : MRVNA60EAM
Site Code : 05115059
Start Date : 1/29/2015
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	Nason Street Southbound				SR-60 Eastbound On Ramp Westbound				Nason Street Northbound				SR-60 Eastbound Off Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	07:00 AM				07:00 AM				07:00 AM				07:00 AM				
+0 mins.	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
Total Volume	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	1	
% App. Total	0	0	0		0	0	0		0	100	0		0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.250	.250	

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File Name : MRVNA60EPM
Site Code : 05115059
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Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

	Nason Street Southbound					SR-60 Eastbound On Ramp Westbound					Nason Street Northbound					SR-60 Eastbound Off Ramp Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
04:00 PM	9	78	0	0	87	0	0	0	0	0	0	170	22	3	195	20	3	119	57	199	481
04:15 PM	11	67	0	0	78	0	0	0	0	0	0	147	29	7	183	34	1	99	44	178	439
04:30 PM	3	96	0	0	99	0	0	0	0	0	0	221	18	2	241	27	1	135	56	219	559
04:45 PM	3	85	0	0	88	0	0	0	0	0	0	195	14	1	210	29	0	139	69	237	535
Total	26	326	0	0	352	0	0	0	0	0	0	733	83	13	829	110	5	492	226	833	2014
05:00 PM	11	84	0	0	95	0	0	0	0	0	0	188	30	3	221	22	1	152	78	253	569
05:15 PM	8	95	0	0	103	0	0	0	0	0	0	148	21	4	173	40	1	145	54	240	516
05:30 PM	10	95	0	0	105	0	0	0	0	0	0	150	21	2	173	25	1	150	65	241	519
05:45 PM	10	62	0	0	72	0	0	0	0	0	0	148	16	5	169	26	1	157	56	240	481
Total	39	336	0	0	375	0	0	0	0	0	0	634	88	14	736	113	4	604	253	974	2085
Grand Total	65	662	0	0	727	0	0	0	0	0	0	1367	171	27	1565	223	9	1096	479	1807	4099
Apprch %	8.9	91.1	0	0		0	0	0	0		0	87.3	10.9	1.7		12.3	0.5	60.7	26.5		
Total %	1.6	16.2	0	0	17.7	0	0	0	0	0	0	33.3	4.2	0.7	38.2	5.4	0.2	26.7	11.7	44.1	
Passenger Vehicles																					
% Passenger Vehicles	100	99.2	0	0	99.3	0	0	0	0	0	0	99.6	99.4	100	99.6	98.2	66.7	99	98.7	98.7	99.1
Large 2 Axle Vehicles	0	5	0	0	5	0	0	0	0	0	0	5	1	0	6	3	3	11	6	23	34
% Large 2 Axle Vehicles	0	0.8	0	0	0.7	0	0	0	0	0	0	0.4	0.6	0	0.4	1.3	33.3	1	1.3	1.3	0.8
3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	2
% 3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0.4	0	0	0	0.1	0
4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% 4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Nason Street Southbound				SR-60 Eastbound On Ramp Westbound				Nason Street Northbound				SR-60 Eastbound Off Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	3	96	0	99	0	0	0	0	0	221	18	239	27	1	135	163	501
04:45 PM	3	85	0	88	0	0	0	0	0	195	14	209	29	0	139	168	465
05:00 PM	11	84	0	95	0	0	0	0	0	188	30	218	22	1	152	175	488
05:15 PM	8	95	0	103	0	0	0	0	0	148	21	169	40	1	145	186	458
Total Volume	25	360	0	385	0	0	0	0	0	752	83	835	118	3	571	692	1912
% App. Total	6.5	93.5	0		0	0	0		0	90.1	9.9		17.1	0.4	82.5		
PHF	.568	.938	.000	.934	.000	.000	.000	.000	.000	.851	.692	.873	.738	.750	.939	.930	.954

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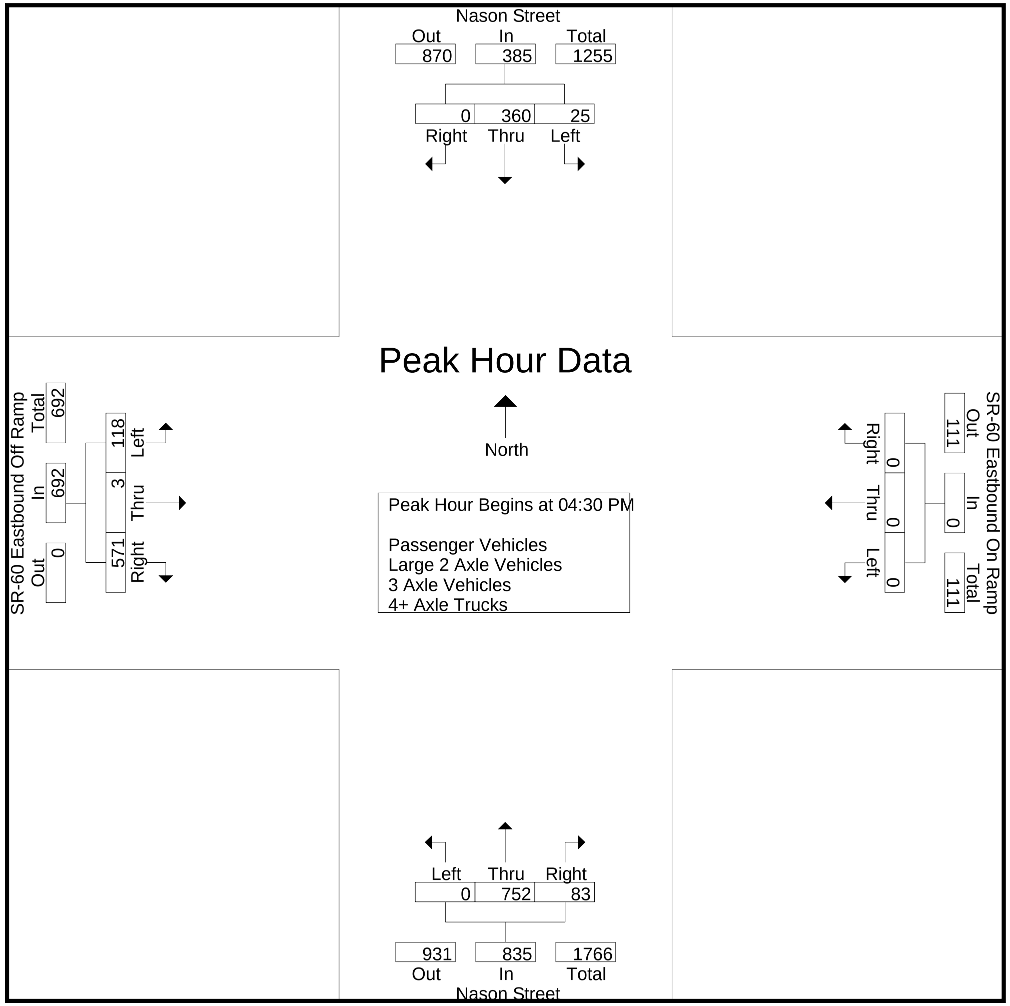
City of Moreno Valley
N/S: Nason Street
E/W: SR-60 Eastbound Ramps
Weather: Clear

File Name : MRVNA60EPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



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	Nason Street Southbound				SR-60 Eastbound On Ramp Westbound				Nason Street Northbound				SR-60 Eastbound Off Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	04:45 PM				04:00 PM				04:15 PM				05:00 PM				
+0 mins.	3	85	0	88	0	0	0	0	0	147	29	176	22	1	152	175	
+15 mins.	11	84	0	95	0	0	0	0	0	221	18	239	40	1	145	186	
+30 mins.	8	95	0	103	0	0	0	0	0	195	14	209	25	1	150	176	
+45 mins.	10	95	0	105	0	0	0	0	0	188	30	218	26	1	157	184	
Total Volume	32	359	0	391	0	0	0	0	0	751	91	842	113	4	604	721	
% App. Total	8.2	91.8	0		0	0	0		0	89.2	10.8		15.7	0.6	83.8		
PHF	.727	.945	.000	.931	.000	.000	.000	.000	.000	.850	.758	.881	.706	1.000	.962	.969	

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Site Code : 05115059
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Page No : 1

Groups Printed- Large 2 Axle Vehicles

	Nason Street Southbound					SR-60 Eastbound On Ramp Westbound					Nason Street Northbound					SR-60 Eastbound Off Ramp Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	2
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	1	1	0	2	4
04:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	2	1	3	5
04:45 PM	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	0	0	2	1	3	6
Total	0	2	0	0	2	0	0	0	0	0	0	5	1	0	6	1	1	5	2	9	17
05:00 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	2	1	4	6
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2	5	5
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	2
05:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	1	3	4
Total	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	2	2	6	4	14	17
Grand Total	0	5	0	0	5	0	0	0	0	0	0	5	1	0	6	3	3	11	6	23	34
Apprch %	0	100	0	0		0	0	0	0		0	83.3	16.7	0		13	13	47.8	26.1		
Total %	0	14.7	0	0	14.7	0	0	0	0	0	0	14.7	2.9	0	17.6	8.8	8.8	32.4	17.6	67.6	

	Nason Street Southbound				SR-60 Eastbound On Ramp Westbound				Nason Street Northbound				SR-60 Eastbound Off Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	1	0	1	0	0	0	0	0	0	1	1	0	0	2	2	4
04:45 PM	0	1	0	1	0	0	0	0	0	2	0	2	0	0	2	2	5
05:00 PM	0	2	0	2	0	0	0	0	0	0	0	0	0	1	2	3	5
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	3	3
Total Volume	0	4	0	4	0	0	0	0	0	2	1	3	1	1	8	10	17
% App. Total	0	100	0		0	0	0		0	66.7	33.3		10	10	80		
PHF	.000	.500	.000	.500	.000	.000	.000	.000	.000	.250	.250	.375	.250	.250	1.00	.833	.850

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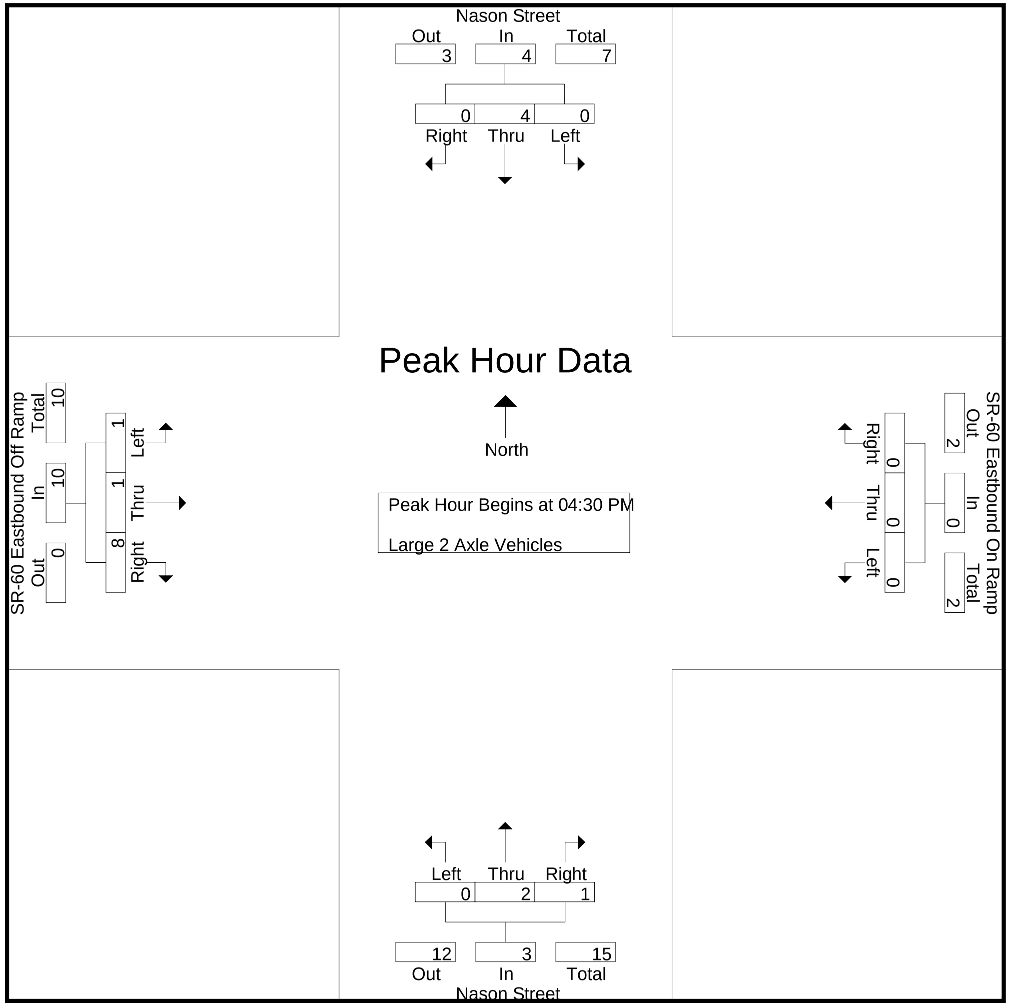

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	Nason Street Southbound				SR-60 Eastbound On Ramp Westbound				Nason Street Northbound				SR-60 Eastbound Off Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	04:30 PM				04:30 PM				04:30 PM				04:30 PM				
+0 mins.	0	1	0	1	0	0	0	0	0	0	1	1	0	0	2	2	
+15 mins.	0	1	0	1	0	0	0	0	0	2	0	2	0	0	2	2	
+30 mins.	0	2	0	2	0	0	0	0	0	0	0	0	0	1	2	3	
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	3	
Total Volume	0	4	0	4	0	0	0	0	0	2	1	3	1	1	8	10	
% App. Total	0	100	0		0	0	0		0	66.7	33.3		10	10	80		
PHF	.000	.500	.000	.500	.000	.000	.000	.000	.000	.250	.250	.375	.250	.250	1.000	.833	

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Groups Printed- 3 Axle Vehicles

	Nason Street Southbound					SR-60 Eastbound On Ramp Westbound					Nason Street Northbound					SR-60 Eastbound Off Ramp Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Grand Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	2
Apprch %	0	0	0	0		0	0	0	0		0	100	0	0		100	0	0	0		
Total %	0	0	0	0	0	0	0	0	0	0	0	50	0	0	50	50	0	0	0	50	

	Nason Street Southbound				SR-60 Eastbound On Ramp Westbound				Nason Street Northbound				SR-60 Eastbound Off Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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Weather: Clear

File Name : MRVNA60EPM
Site Code : 05115059
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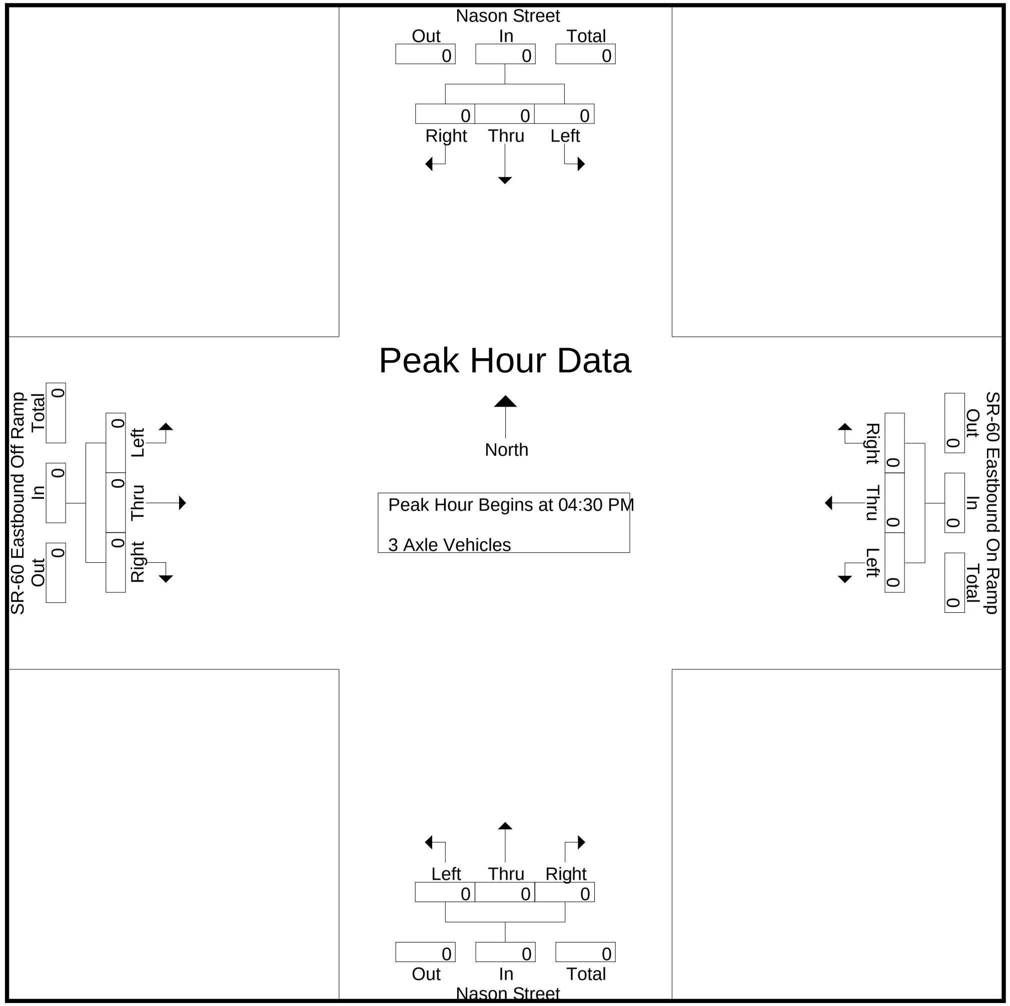

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	Nason Street Southbound				SR-60 Eastbound On Ramp Westbound				Nason Street Northbound				SR-60 Eastbound Off Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	04:30 PM				04:30 PM				04:30 PM				04:30 PM				
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	

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Groups Printed- 4+ Axle Trucks

	Nason Street Southbound					SR-60 Eastbound On Ramp Westbound					Nason Street Northbound					SR-60 Eastbound Off Ramp Eastbound					
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
Total %																					

	Nason Street Southbound				SR-60 Eastbound On Ramp Westbound				Nason Street Northbound				SR-60 Eastbound Off Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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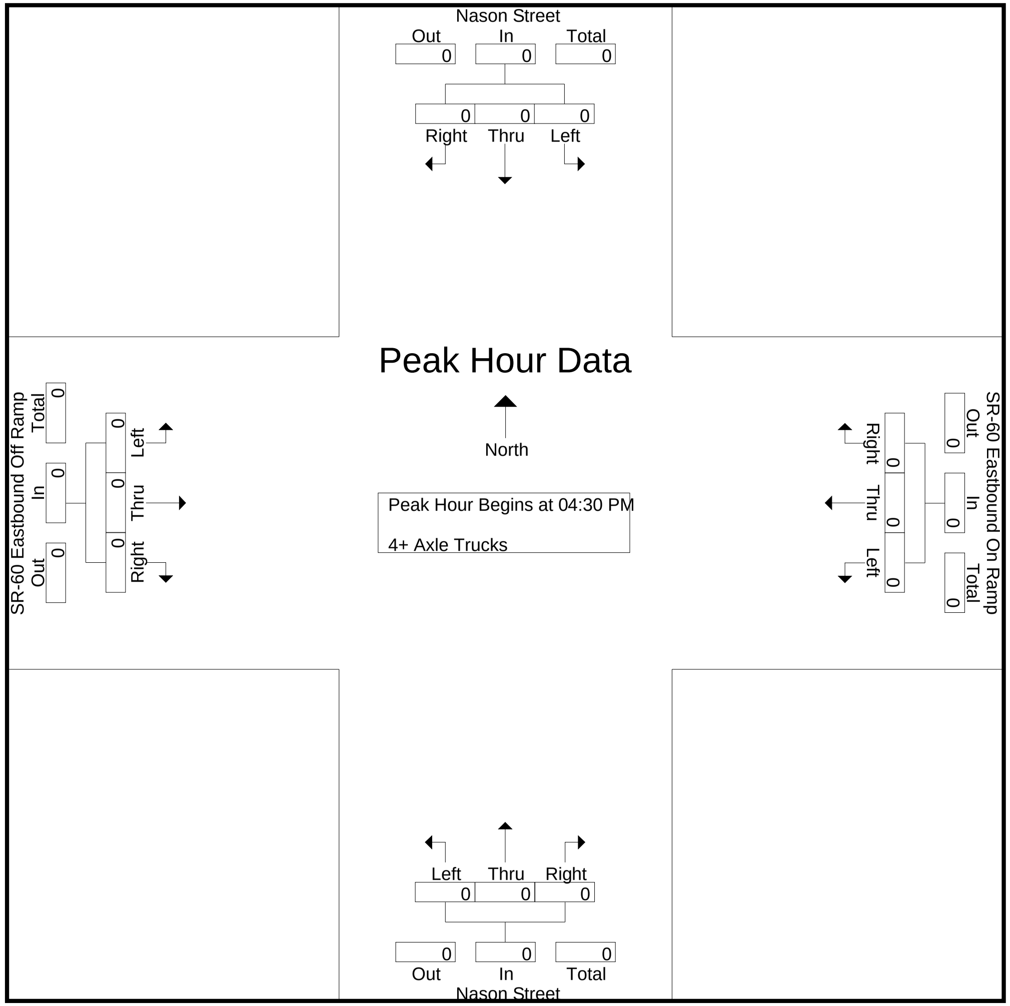

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	Nason Street Southbound				SR-60 Eastbound On Ramp Westbound				Nason Street Northbound				SR-60 Eastbound Off Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	04:30 PM				04:30 PM				04:30 PM				04:30 PM				
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	

Location: Moreno Valley
N/S: Nason Street
E/W: SR-60 Eastbound

Date: 1/29/2015
Weather: Clear

Pedestrians

	North Leg Nason Street	East Leg SR-60 Eastbound	South Leg Nason Street	West Leg SR-60 Eastbound	
	Pedestrians	**Pedestrians**	**Pedestrians**	**Pedestrians**	TOTAL
7:00 AM	0	0	0	0	0
7:15 AM	0	0	0	3	3
7:30 AM	0	0	0	9	9
7:45 AM	0	0	0	6	6
8:00 AM	0	0	0	1	1
8:15 AM	0	0	0	0	0
8:30 AM	0	0	0	0	0
8:45 AM	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	19	19

	North Leg Nason Street	East Leg SR-60 Eastbound	South Leg Nason Street	West Leg SR-60 Eastbound	
	Pedestrians	**Pedestrians**	**Pedestrians**	**Pedestrians**	TOTAL
4:00 PM	0	0	0	2	2
4:15 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0
5:00 PM	0	0	0	1	1
5:15 PM	0	0	0	1	1
5:30 PM	0	0	0	1	1
5:45 PM	0	0	0	1	1
TOTAL VOLUMES:	0	0	0	6	6

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Location:	Moreno Valley	Date:	1/29/2015
N/S:	Nason Street	Weather:	Clear
E/W:	SR-60 Eastbound		

Bicycles

	North Leg Nason Street **Bicycles**	East Leg SR-60 Eastbound **Bicycles**	South Leg Nason Street **Bicycles**	West Leg SR-60 Eastbound **Bicycles**	TOTAL
7:00 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0
7:30 AM	0	0	0	1	1
7:45 AM	0	0	0	1	1
8:00 AM	0	0	0	0	0
8:15 AM	0	0	0	0	0
8:30 AM	0	0	0	0	0
8:45 AM	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	2	2

	North Leg Nason Street **Bicycles**	East Leg SR-60 Eastbound **Bicycles**	South Leg Nason Street **Bicycles**	West Leg SR-60 Eastbound **Bicycles**	TOTAL
4:00 PM	0	0	0	0	0
4:15 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

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City of Moreno Valley
N/S: Lantz Lane
E/W: Ironwood Avenue
Weather: Clear

File Name : MRVLAIRAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- Total Volume

	Ironwood Avenue Westbound			Lantz Lane Northbound			Ironwood Avenue Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
07:00 AM	1	34	35	0	1	1	41	1	42	78
07:15 AM	0	44	44	3	1	4	43	2	45	93
07:30 AM	0	77	77	3	0	3	50	2	52	132
07:45 AM	0	61	61	3	2	5	81	2	83	149
Total	1	216	217	9	4	13	215	7	222	452
08:00 AM	1	44	45	3	1	4	57	1	58	107
08:15 AM	1	29	30	1	1	2	32	3	35	67
08:30 AM	1	18	19	2	0	2	24	2	26	47
08:45 AM	0	15	15	0	4	4	44	0	44	63
Total	3	106	109	6	6	12	157	6	163	284
Grand Total	4	322	326	15	10	25	372	13	385	736
Apprch %	1.2	98.8		60	40		96.6	3.4		
Total %	0.5	43.8	44.3	2	1.4	3.4	50.5	1.8	52.3	

	Ironwood Avenue Westbound			Lantz Lane Northbound			Ironwood Avenue Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	0	44	44	3	1	4	43	2	45	93
07:30 AM	0	77	77	3	0	3	50	2	52	132
07:45 AM	0	61	61	3	2	5	81	2	83	149
08:00 AM	1	44	45	3	1	4	57	1	58	107
Total Volume	1	226	227	12	4	16	231	7	238	481
% App. Total	0.4	99.6		75	25		97.1	2.9		
PHF	.250	.734	.737	1.00	.500	.800	.713	.875	.717	.807

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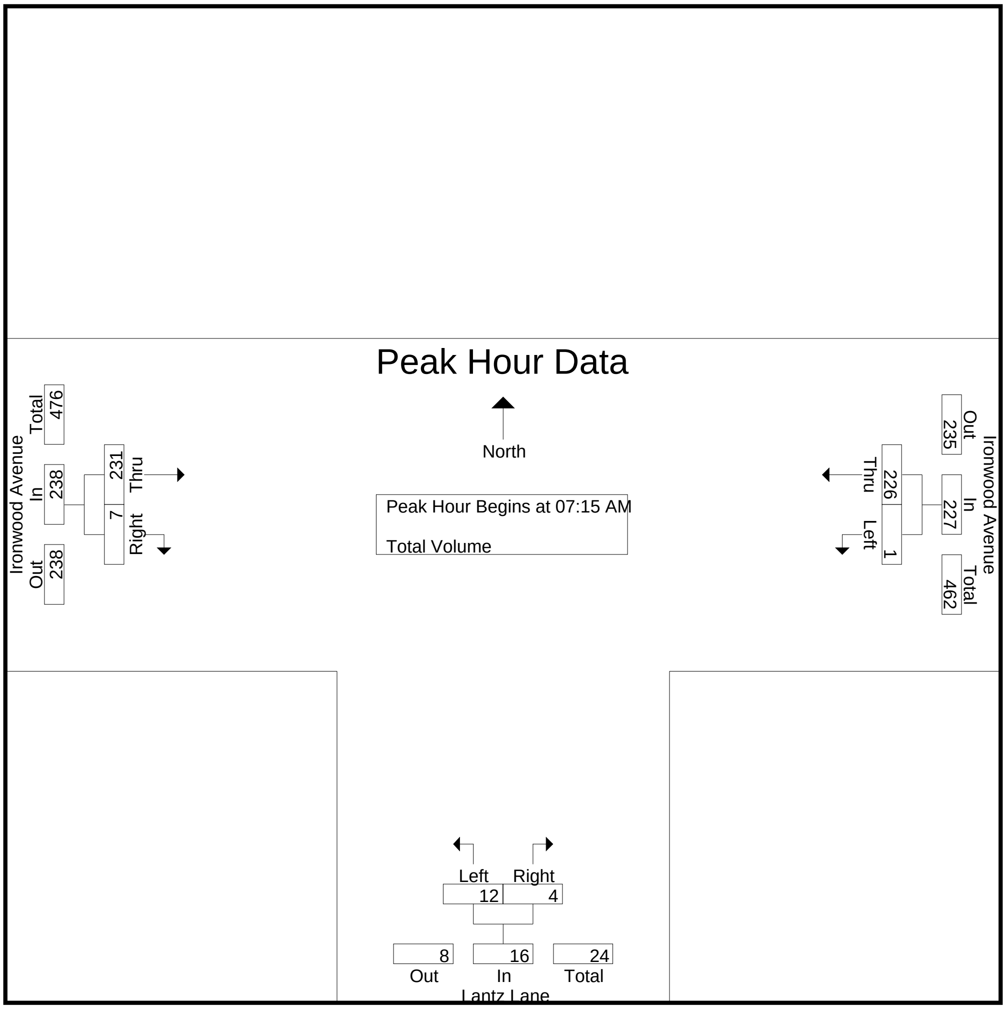
City of Moreno Valley
N/S: Lantz Lane
E/W: Ironwood Avenue
Weather: Clear

File Name : MRVLAIRAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM			07:15 AM			07:15 AM		
+0 mins.	0	44	44	3	1	4	43	2	45
+15 mins.	0	77	77	3	0	3	50	2	52
+30 mins.	0	61	61	3	2	5	81	2	83
+45 mins.	1	44	45	3	1	4	57	1	58
Total Volume	1	226	227	12	4	16	231	7	238
% App. Total	0.4	99.6		75	25		97.1	2.9	
PHF	.250	.734	.737	1.000	.500	.800	.713	.875	.717

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City of Moreno Valley
N/S: Lantz Lane
E/W: Ironwood Avenue
Weather: Clear

File Name : MRVLAIRPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- Total Volume

	Ironwood Avenue Westbound			Lantz Lane Northbound			Ironwood Avenue Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
04:00 PM	1	44	45	0	1	1	43	1	44	90
04:15 PM	1	49	50	0	1	1	43	4	47	98
04:30 PM	2	39	41	2	1	3	49	0	49	93
04:45 PM	0	53	53	1	2	3	60	2	62	118
Total	4	185	189	3	5	8	195	7	202	399
05:00 PM	2	46	48	1	0	1	43	2	45	94
05:15 PM	2	39	41	3	1	4	68	3	71	116
05:30 PM	2	53	55	0	2	2	51	1	52	109
05:45 PM	0	31	31	2	1	3	50	3	53	87
Total	6	169	175	6	4	10	212	9	221	406
Grand Total	10	354	364	9	9	18	407	16	423	805
Apprch %	2.7	97.3		50	50		96.2	3.8		
Total %	1.2	44	45.2	1.1	1.1	2.2	50.6	2	52.5	

	Ironwood Avenue Westbound			Lantz Lane Northbound			Ironwood Avenue Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	0	53	53	1	2	3	60	2	62	118
05:00 PM	2	46	48	1	0	1	43	2	45	94
05:15 PM	2	39	41	3	1	4	68	3	71	116
05:30 PM	2	53	55	0	2	2	51	1	52	109
Total Volume	6	191	197	5	5	10	222	8	230	437
% App. Total	3	97		50	50		96.5	3.5		
PHF	.750	.901	.895	.417	.625	.625	.816	.667	.810	.926

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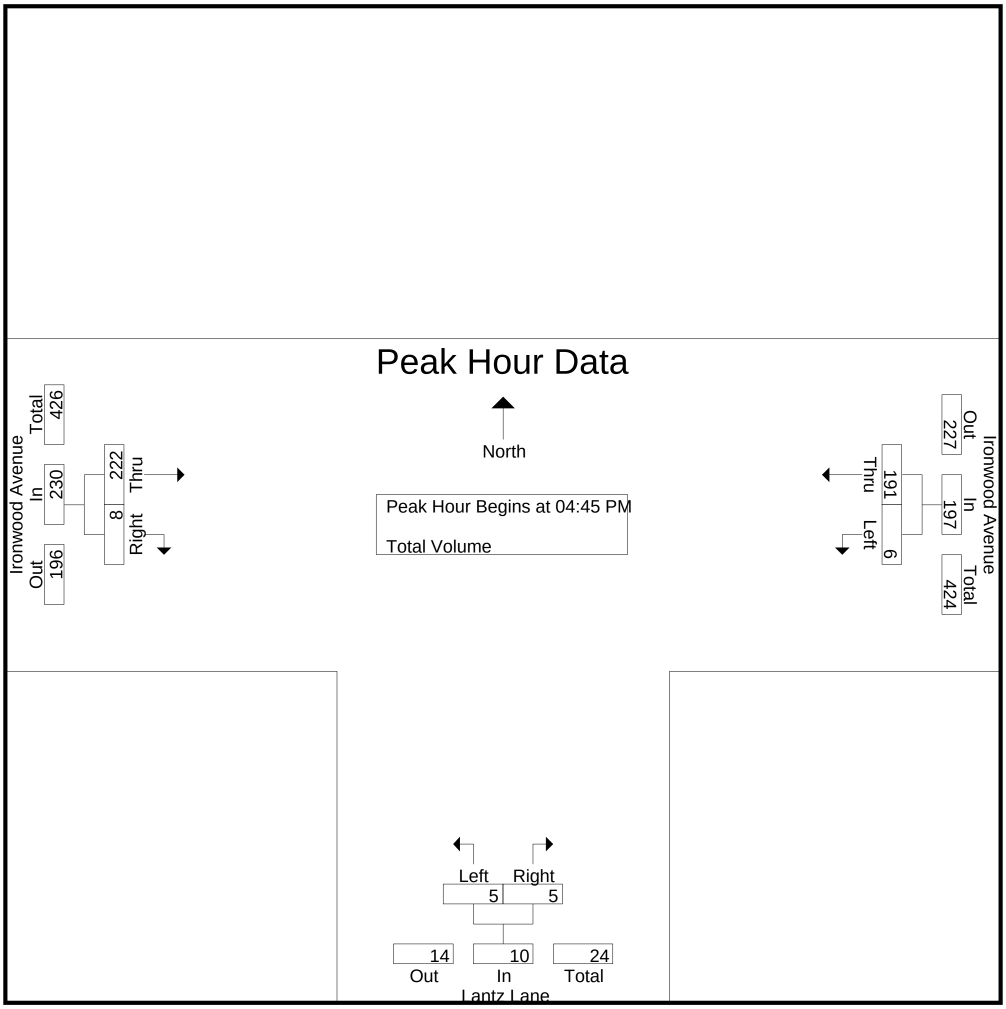
City of Moreno Valley
N/S: Lantz Lane
E/W: Ironwood Avenue
Weather: Clear

File Name : MRVLAIRPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM			04:30 PM			04:45 PM		
+0 mins.	0	53	53	2	1	3	60	2	62
+15 mins.	2	46	48	1	2	3	43	2	45
+30 mins.	2	39	41	1	0	1	68	3	71
+45 mins.	2	53	55	3	1	4	51	1	52
Total Volume	6	191	197	7	4	11	222	8	230
% App. Total	3	97		63.6	36.4		96.5	3.5	
PHF	.750	.901	.895	.583	.500	.688	.816	.667	.810

Location:	Moreno Valley
N/S:	Lantz Lane
E/W:	Ironwood Avenue

Date: 1/29/2015
Weather: Clear

Pedestrians

	North Leg Lantz Lane	East Leg Ironwood Avenue	South Leg Lantz Lane	West Leg Ironwood Avenue	
	Pedestrians	**Pedestrians**	**Pedestrians**	**Pedestrians**	TOTAL
7:00 AM		0	0	0	0
7:15 AM		0	0	0	0
7:30 AM		0	0	0	0
7:45 AM		0	0	0	0
8:00 AM		0	0	0	0
8:15 AM		0	0	0	0
8:30 AM		0	0	0	0
8:45 AM		0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0

	North Leg Lantz Lane	East Leg Ironwood Avenue	South Leg Lantz Lane	West Leg Ironwood Avenue	
	Pedestrians	**Pedestrians**	**Pedestrians**	**Pedestrians**	TOTAL
4:00 PM		0	0	0	0
4:15 PM		0	0	0	0
4:30 PM		0	0	0	0
4:45 PM		0	0	0	0
5:00 PM		0	0	0	0
5:15 PM		0	0	0	0
5:30 PM		0	0	0	0
5:45 PM		0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0

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Location: Moreno Valley
N/S: Lantz Lane
E/W: Ironwood Avenue

Date: 1/29/2015
Weather: Clear

Bicycles

	North Leg Lantz Lane	East Leg Ironwood Avenue	South Leg Lantz Lane	West Leg Ironwood Avenue	
	Bicycles	**Bicycles**	**Bicycles**	**Bicycles**	TOTAL
7:00 AM		0	0	0	0
7:15 AM		0	0	0	0
7:30 AM		0	0	0	0
7:45 AM		0	0	0	0
8:00 AM		0	1	0	1
8:15 AM		0	0	0	0
8:30 AM		0	0	0	0
8:45 AM		0	0	0	0
TOTAL VOLUMES:	0	0	1	0	1

	North Leg Lantz Lane	East Leg Ironwood Avenue	South Leg Lantz Lane	West Leg Ironwood Avenue	
	Bicycles	**Bicycles**	**Bicycles**	**Bicycles**	TOTAL
4:00 PM		0	1	0	1
4:15 PM		0	0	0	0
4:30 PM		0	0	0	0
4:45 PM		0	0	0	0
5:00 PM		0	0	0	0
5:15 PM		0	0	0	0
5:30 PM		0	0	0	0
5:45 PM		0	0	0	0
TOTAL VOLUMES:	0	0	1	0	1

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City of Moreno Valley
N/S: Oliver Street
E/W: Ironwood Avenue
Weather: Clear

File Name : MRVOLIRAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- Total Volume

	Ironwood Avenue Westbound			Oliver Street Northbound			Ironwood Avenue Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
07:00 AM	0	34	34	1	4	5	39	1	40	79
07:15 AM	0	43	43	1	2	3	45	0	45	91
07:30 AM	2	77	79	1	2	3	49	0	49	131
07:45 AM	1	59	60	1	2	3	83	1	84	147
Total	3	213	216	4	10	14	216	2	218	448
08:00 AM	0	46	46	0	3	3	58	0	58	107
08:15 AM	0	29	29	1	2	3	33	0	33	65
08:30 AM	0	20	20	0	4	4	25	0	25	49
08:45 AM	1	13	14	0	0	0	43	0	43	57
Total	1	108	109	1	9	10	159	0	159	278
Grand Total	4	321	325	5	19	24	375	2	377	726
Apprch %	1.2	98.8		20.8	79.2		99.5	0.5		
Total %	0.6	44.2	44.8	0.7	2.6	3.3	51.7	0.3	51.9	

	Ironwood Avenue Westbound			Oliver Street Northbound			Ironwood Avenue Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	0	43	43	1	2	3	45	0	45	91
07:30 AM	2	77	79	1	2	3	49	0	49	131
07:45 AM	1	59	60	1	2	3	83	1	84	147
08:00 AM	0	46	46	0	3	3	58	0	58	107
Total Volume	3	225	228	3	9	12	235	1	236	476
% App. Total	1.3	98.7		25	75		99.6	0.4		
PHF	.375	.731	.722	.750	.750	1.00	.708	.250	.702	.810

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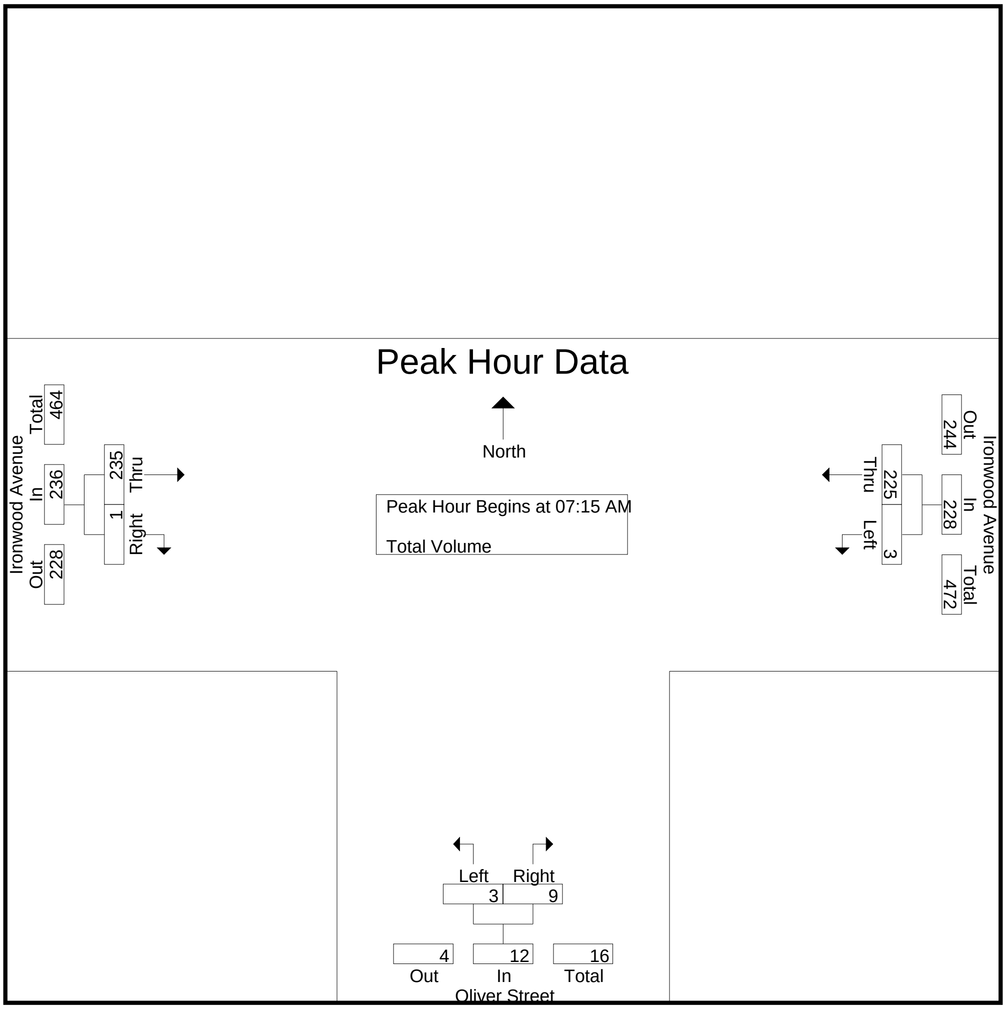
City of Moreno Valley
N/S: Oliver Street
E/W: Ironwood Avenue
Weather: Clear

File Name : MRVOLIRAM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM			07:00 AM			07:15 AM		
+0 mins.	0	43	43	1	4	5	45	0	45
+15 mins.	2	77	79	1	2	3	49	0	49
+30 mins.	1	59	60	1	2	3	83	1	84
+45 mins.	0	46	46	1	2	3	58	0	58
Total Volume	3	225	228	4	10	14	235	1	236
% App. Total	1.3	98.7		28.6	71.4		99.6	0.4	
PHF	.375	.731	.722	1.000	.625	.700	.708	.250	.702

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City of Moreno Valley
N/S: Oliver Street
E/W: Ironwood Avenue
Weather: Clear

File Name : MRVOLIRPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 1

Groups Printed- Total Volume

	Ironwood Avenue Westbound			Oliver Street Northbound			Ironwood Avenue Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
04:00 PM	3	45	48	0	2	2	43	0	43	93
04:15 PM	2	49	51	0	0	0	39	0	39	90
04:30 PM	2	40	42	1	3	4	52	1	53	99
04:45 PM	5	54	59	0	0	0	59	3	62	121
Total	12	188	200	1	5	6	193	4	197	403
05:00 PM	1	47	48	3	1	4	43	0	43	95
05:15 PM	3	41	44	1	1	2	66	2	68	114
05:30 PM	3	52	55	2	1	3	52	0	52	110
05:45 PM	2	33	35	0	1	1	53	2	55	91
Total	9	173	182	6	4	10	214	4	218	410
Grand Total	21	361	382	7	9	16	407	8	415	813
Apprch %	5.5	94.5		43.8	56.2		98.1	1.9		
Total %	2.6	44.4	47	0.9	1.1	2	50.1	1	51	

	Ironwood Avenue Westbound			Oliver Street Northbound			Ironwood Avenue Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	5	54	59	0	0	0	59	3	62	121
05:00 PM	1	47	48	3	1	4	43	0	43	95
05:15 PM	3	41	44	1	1	2	66	2	68	114
05:30 PM	3	52	55	2	1	3	52	0	52	110
Total Volume	12	194	206	6	3	9	220	5	225	440
% App. Total	5.8	94.2		66.7	33.3		97.8	2.2		
PHF	.600	.898	.873	.500	.750	.563	.833	.417	.827	.909

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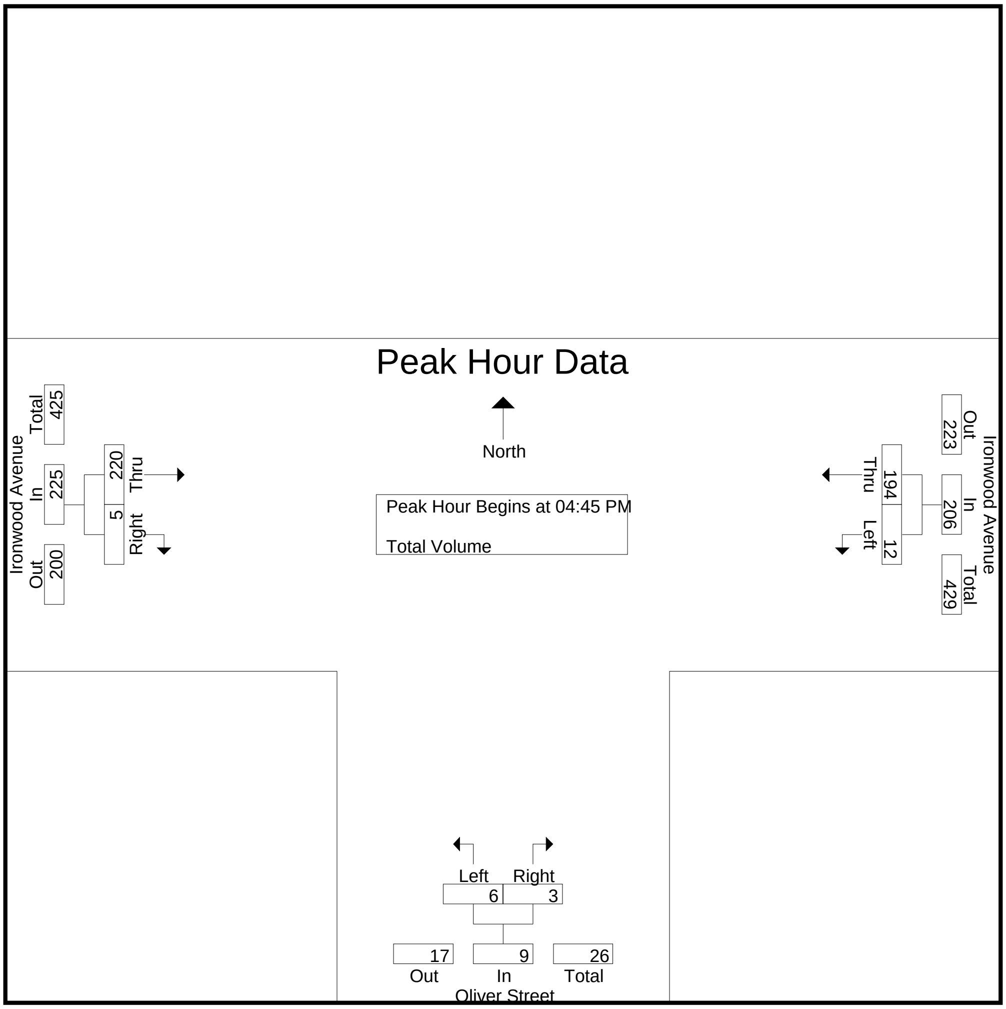
City of Moreno Valley
N/S: Oliver Street
E/W: Ironwood Avenue
Weather: Clear

File Name : MRVOLIRPM
Site Code : 05115059
Start Date : 1/29/2015
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM			04:30 PM			04:30 PM		
+0 mins.	5	54	59	1	3	4	52	1	53
+15 mins.	1	47	48	0	0	0	59	3	62
+30 mins.	3	41	44	3	1	4	43	0	43
+45 mins.	3	52	55	1	1	2	66	2	68
Total Volume	12	194	206	5	5	10	220	6	226
% App. Total	5.8	94.2		50	50		97.3	2.7	
PHF	.600	.898	.873	.417	.417	.625	.833	.500	.831

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Location:	Moreno Valley
N/S:	Oliver Street
E/W:	Ironwood Avenue

Date: 1/29/2015
Weather: Clear

Pedestrians

	North Leg Oliver Street	East Leg Ironwood Avenue	South Leg Oliver Street	West Leg Ironwood Avenue	
	Pedestrians	**Pedestrians**	**Pedestrians**	**Pedestrians**	TOTAL
7:00 AM		0	0	0	0
7:15 AM		2	0	0	2
7:30 AM		0	0	0	0
7:45 AM		0	0	0	0
8:00 AM		0	0	0	0
8:15 AM		0	0	0	0
8:30 AM		0	0	0	0
8:45 AM		0	0	0	0
TOTAL VOLUMES:	0	2	0	0	2

	North Leg Oliver Street	East Leg Ironwood Avenue	South Leg Oliver Street	West Leg Ironwood Avenue	
	Pedestrians	**Pedestrians**	**Pedestrians**	**Pedestrians**	TOTAL
4:00 PM		0	0	0	0
4:15 PM		0	0	0	0
4:30 PM		0	0	0	0
4:45 PM		0	0	0	0
5:00 PM		0	0	1	1
5:15 PM		0	0	0	0
5:30 PM		0	0	0	0
5:45 PM		0	0	0	0
TOTAL VOLUMES:	0	0	0	1	1

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Location: Moreno Valley
N/S: Oliver Street
E/W: Ironwood Avenue

Date: 1/29/2015
Weather: Clear

Bicycles

	North Leg Oliver Street	East Leg Ironwood Avenue	South Leg Oliver Street	West Leg Ironwood Avenue	
	Bicycles	**Bicycles**	**Bicycles**	**Bicycles**	TOTAL
7:00 AM		0	0	0	0
7:15 AM		0	0	0	0
7:30 AM		0	0	0	0
7:45 AM		0	0	0	0
8:00 AM		0	1	0	1
8:15 AM		0	0	0	0
8:30 AM		0	0	0	0
8:45 AM		0	0	0	0
TOTAL VOLUMES:	0	0	1	0	1

	North Leg Oliver Street	East Leg Ironwood Avenue	South Leg Oliver Street	West Leg Ironwood Avenue	
	Bicycles	**Bicycles**	**Bicycles**	**Bicycles**	TOTAL
4:00 PM		0	1	0	1
4:15 PM		0	0	0	0
4:30 PM		0	0	0	0
4:45 PM		0	0	0	0
5:00 PM		0	0	0	0
5:15 PM		0	0	0	0
5:30 PM		0	0	0	0
5:45 PM		0	0	0	0
TOTAL VOLUMES:	0	0	1	0	1

Counts Unlimited, Inc

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City of Moreno Valley
Nason Street
S/ Ironwood Avenue
24 Hour Directional Volume Count

MRV001
Site Code: 051-15059

Start Time	29-Jan-15 Thu	Northbound Morning	Northbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Southbound Morning	Southbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		8	24			7	11				
12:15		7	25			4	15				
12:30		2	33			3	25				
12:45		4	20	21	102	3	25	17	76	38	178
01:00		1	27			1	15				
01:15		1	23			4	23				
01:30		5	28			1	18				
01:45		1	37	8	115	3	32	9	88	17	203
02:00		4	34			1	25				
02:15		2	37			1	30				
02:30		1	36			3	**56**				
02:45		3	31	10	138	2	**42**	7	153	17	291
03:00		2	**84**			1	**56**				
03:15		3	**71**			2	**45**				
03:30		1	**63**			0	48				
03:45		0	**47**	6	265	0	40	3	189	9	454
04:00		0	36			0	42				
04:15		1	58			3	36				
04:30		2	59			4	48				
04:45		2	61	5	214	2	43	9	169	14	383
05:00		4	48			5	47				
05:15		5	52			5	53				
05:30		7	49			13	45				
05:45		14	50	30	199	13	33	36	178	66	377
06:00		5	43			12	36				
06:15		15	40			14	30				
06:30		31	28			27	33				
06:45		30	44	81	155	39	22	92	121	173	276
07:00		53	30			39	19				
07:15		**53**	29			**50**	22				
07:30		**63**	17			**82**	18				
07:45		**86**	20	255	96	**88**	12	259	71	514	167
08:00		**59**	23			**62**	9				
08:15		36	25			23	13				
08:30		22	23			30	9				
08:45		25	21	142	92	23	17	138	48	280	140
09:00		11	19			18	19				
09:15		10	16			15	11				
09:30		15	15			24	14				
09:45		16	14	52	64	15	11	72	55	124	119
10:00		15	11			14	11				
10:15		16	8			14	12				
10:30		20	18			13	8				
10:45		28	11	79	48	13	6	54	37	133	85
11:00		22	9			25	5				
11:15		25	6			22	6				
11:30		17	7			34	5				
11:45		29	7	93	29	22	7	103	23	196	52
Total		782	1517	782	1517	799	1208	799	1208	1581	2725
Combined Total		2299		2299		2007		2007		4306	
AM Peak	-	07:15	-	-	-	07:15	-	-	-	-	-
Vol.	-	261	-	-	-	282	-	-	-	-	-
P.H.F.		0.759				0.801					
PM Peak	-	-	03:00	-	-	-	02:30	-	-	-	-
Vol.	-	-	265	-	-	-	199	-	-	-	-
P.H.F.			0.789				0.888				
Percentage		34.0%	66.0%			39.8%	60.2%				
ADT/AADT		ADT 4,306		AADT 4,306							

Counts Unlimited, Inc
PO Box 1178
Corona, CA 92878
Phone: 951-268-6268
email: counts@countsunlimited.com

City of Moreno Valley
Ironwood Avenue
E/ Nason Street
24 Hour Directional Volume Count

MRV002
Site Code: 051-15059

Start Time	29-Jan-15 Thu	Eastbound Morning	Eastbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Westbound Morning	Westbound Afternoon	Hour Totals Morning	Hour Totals Afternoon	Combined Totals Morning	Combined Totals Afternoon
12:00		4	27			4	30				
12:15		5	38			3	20				
12:30		1	36			4	33				
12:45		2	32	12	133	3	32	14	115	26	248
01:00		4	25			1	25				
01:15		0	34			2	24				
01:30		3	29			1	26				
01:45		3	29	10	117	1	42	5	117	15	234
02:00		2	39			1	44				
02:15		5	48			1	51				
02:30		0	65			2	**44**				
02:45		2	47	9	199	1	**48**	5	187	14	386
03:00		1	38			2	**61**				
03:15		2	38			3	**58**				
03:30		0	60			0	42				
03:45		1	47	4	183	2	29	7	190	11	373
04:00		0	42			1	44				
04:15		4	46			1	47				
04:30		4	**53**			5	40				
04:45		4	**62**	12	203	6	53	13	184	25	387
05:00		7	**44**			1	50				
05:15		4	**71**			2	43				
05:30		18	52			8	51				
05:45		15	55	44	222	13	33	24	177	68	399
06:00		16	46			7	40				
06:15		14	46			8	44				
06:30		33	50			14	30				
06:45		29	30	92	172	20	28	49	142	141	314
07:00		41	16			33	32				
07:15		**46**	26			**44**	33				
07:30		**53**	21			**81**	15				
07:45		**82**	12	222	75	**68**	13	226	93	448	168
08:00		**59**	17			**48**	17				
08:15		34	21			29	20				
08:30		27	25			22	19				
08:45		41	18	161	81	14	33	113	89	274	170
09:00		27	18			18	23				
09:15		28	16			22	23				
09:30		24	10			22	15				
09:45		20	11	99	55	24	23	86	84	185	139
10:00		16	9			14	9				
10:15		17	8			26	15				
10:30		31	10			22	16				
10:45		25	7	89	34	26	10	88	50	177	84
11:00		22	7			37	7				
11:15		28	5			24	6				
11:30		40	8			25	9				
11:45		31	5	121	25	21	7	107	29	228	54
Total		875	1499	875	1499	737	1457	737	1457	1612	2956
Combined Total		2374		2374		2194		2194		4568	
AM Peak	-	07:15	-	-	-	07:15	-	-	-	-	-
Vol.	-	240	-	-	-	241	-	-	-	-	-
P.H.F.		0.732				0.744					
PM Peak	-	-	04:30	-	-	-	02:30	-	-	-	-
Vol.	-	-	230	-	-	-	211	-	-	-	-
P.H.F.			0.810				0.865				
Percentage		36.9%	63.1%			33.6%	66.4%				
ADT/AADT		ADT 4,568		AADT 4,568							

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

APPENDIX 3.2:

EXISTING (2015) CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS

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Intersection Level Of Service Report
#2: Nason Street / Ironwood Avenue

Control Type:	Signalized	Delay (sec / veh):	18.1
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.522

Intersection Setup

Name					Nason Street			Ironwood Avenue			Ironwood Avenue	
Approach		Northbound			Southbound			Eastbound			Westbound	
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]		45.00			25.00			45.00			55.00	
Grade [%]		0.00			0.00			0.00			0.00	
Crosswalk		yes			no			yes			no	

Volumes

Name					Nason Street			Ironwood Avenue			Ironwood Avenue	
Base Volume Input [veh/h]	221	4	40	0	7	0	1	199	244	31	208	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	18	0	0	0	0	0	38	0	0	0
Total Hourly Volume [veh/h]	221	4	22	0	7	0	1	199	206	31	208	0
Peak Hour Factor	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	69	1	7	0	2	0	0	62	64	10	65	0
Total Analysis Volume [veh/h]	276	5	27	0	9	0	1	248	257	39	259	0
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]		0			0			0			0	
Bicycle Volume [bicycles/h]		0			0			0			1	

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LagFO
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	8	0	0	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	5.0	0.0	0.0	5.0	0.0	4.0	5.0	0.0	4.0	5.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	28	0	0	28	0	31	32	0	10	11	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
Minimum Recall		no			no		no	no		no	no	
Maximum Recall		no			no		no	yes		no	yes	
Pedestrian Recall		no			no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	C	R	C	L	C	L	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	5.00	6.00	5.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	3.00	4.00	3.00	4.00
g_i, Effective Green Time [s]	14	14	14	0	37	3	39
g / C, Green / Cycle	0.19	0.19	0.19	0.00	0.53	0.04	0.56
(v / s)_i Volume / Saturation Flow Rate	0.17	0.02	0.01	0.00	0.33	0.02	0.15
s, saturation flow rate [veh/h]	1661	1425	1491	1597	1538	1597	1676
c, Capacity [veh/h]	425	277	342	3	806	61	940
d1, Uniform Delay [s]	27.28	23.15	22.85	34.91	11.80	33.19	7.99
k, delay calibration	0.04	0.04	0.04	0.04	0.50	0.04	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.66	0.06	0.01	24.80	3.66	4.00	0.73
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

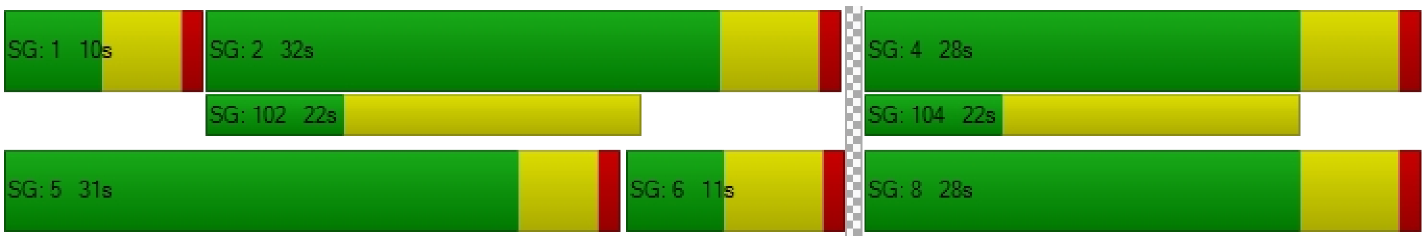
X, volume / capacity	0.66	0.10	0.03	0.35	0.63	0.64	0.28
d, Delay for Lane Group [s/veh]	27.94	23.21	22.86	59.71	15.47	37.19	8.72
Lane Group LOS	C	C	C	E	B	D	A
Critical Lane Group	yes	no	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	4.17	0.34	0.12	0.04	5.08	0.66	1.57
50th-Percentile Queue Length [ft]	104.24	8.45	2.97	0.89	126.96	16.38	39.17
95th-Percentile Queue Length [veh]	7.51	0.61	0.21	0.06	8.77	1.18	2.82
95th-Percentile Queue Length [ft]	187.63	15.21	5.35	1.60	219.36	29.49	70.51

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	27.94	27.94	23.21	22.86	22.86	22.86	59.71	15.47	15.47	37.19	8.72	8.72
Movement LOS	C	C	C	C	C	C	E	B	B	D	A	A
d_A, Approach Delay [s/veh]	27.53			22.86			15.55			12.44		
Approach LOS	C			C			B			B		
d_I, Intersection Delay [s/veh]	18.08											
Intersection LOS	B											
Intersection V/C	0.522											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↑	↱	↰	↑↱	
Volume (veh/h)	6	54	189	68	14	11	86	247	462	43	250	2
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1863	1900	1900	1900	1810	1900	1863	1776	1881	1900
Adj Flow Rate, veh/h	7	66	73	83	17	3	105	301	473	52	305	2
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	0	4	2	0	0	0	5	0	2	7	1	1
Cap, veh/h	16	118	223	107	219	249	131	2185	1052	66	2069	14
Arrive On Green	0.01	0.06	0.06	0.06	0.12	0.12	0.08	0.61	0.61	0.04	0.57	0.57
Sat Flow, veh/h	1810	1827	1583	1810	1900	1615	1723	3610	1583	1691	3640	24
Grp Volume(v), veh/h	7	66	73	83	17	3	105	301	473	52	150	157
Grp Sat Flow(s),veh/h/ln	1810	1827	1583	1810	1900	1615	1723	1805	1583	1691	1787	1877
Q Serve(g_s), s	0.4	3.3	3.9	4.3	0.8	0.1	5.7	3.4	13.6	2.9	3.7	3.8
Cycle Q Clear(g_c), s	0.4	3.3	3.9	4.3	0.8	0.1	5.7	3.4	13.6	2.9	3.7	3.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.01
Lane Grp Cap(c), veh/h	16	118	223	107	219	249	131	2185	1052	66	1016	1067
V/C Ratio(X)	0.44	0.56	0.33	0.77	0.08	0.01	0.80	0.14	0.45	0.78	0.15	0.15
Avail Cap(c_a), veh/h	95	327	404	286	540	522	200	2185	1052	107	1016	1067
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.87	0.87	0.87	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.8	43.1	36.8	44.1	37.5	34.0	43.2	8.1	7.6	45.2	9.7	9.7
Incr Delay (d2), s/veh	6.8	1.5	0.3	4.4	0.1	0.0	5.8	0.1	1.2	7.3	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.7	1.7	2.3	0.4	0.1	2.9	1.7	6.3	1.5	1.9	2.0
LnGrp Delay(d),s/veh	53.6	44.7	37.1	48.5	37.6	34.0	48.9	8.2	8.8	52.5	10.0	10.0
LnGrp LOS	D	D	D	D	D	C	D	A	A	D	A	A
Approach Vol, veh/h		146			103			879			359	
Approach Delay, s/veh		41.3			46.2			13.4			16.1	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.7	63.5	10.6	12.1	12.2	60.0	5.8	16.9
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	6.0	35.0	15.0	17.0	11.0	30.0	5.0	27.0
Max Q Clear Time (g_c+I1), s	4.9	15.6	6.3	5.9	7.7	5.8	2.4	2.8
Green Ext Time (p_c), s	0.0	2.9	0.0	0.3	0.0	3.0	0.0	0.4

Intersection Summary		
HCM 2010 Ctrl Delay		19.1
HCM 2010 LOS		B

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱					↑↑↱		↰	↑↑	
Volume (veh/h)	21	2	454	0	0	0	0	774	111	47	460	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1839	1845				0	1881	1900	1900	1881	0
Adj Flow Rate, veh/h	26	0	259				0	944	102	57	561	0
Adj No. of Lanes	1	0	2				0	2	0	1	2	0
Peak Hour Factor	0.82	0.82	0.82				0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	5	50	3				0	1	1	0	1	0
Cap, veh/h	193	0	351				0	2002	216	84	2602	0
Arrive On Green	0.11	0.00	0.11				0.00	0.62	0.62	0.05	0.73	0.00
Sat Flow, veh/h	1723	0	3136				0	3349	352	1810	3668	0
Grp Volume(v), veh/h	26	0	259				0	518	528	57	561	0
Grp Sat Flow(s),veh/h/ln	1723	0	1568				0	1787	1819	1810	1787	0
Q Serve(g_s), s	1.0	0.0	6.0				0.0	11.8	11.8	2.3	3.8	0.0
Cycle Q Clear(g_c), s	1.0	0.0	6.0				0.0	11.8	11.8	2.3	3.8	0.0
Prop In Lane	1.00		1.00				0.00		0.19	1.00		0.00
Lane Grp Cap(c), veh/h	193	0	351				0	1099	1119	84	2602	0
V/C Ratio(X)	0.13	0.00	0.74				0.00	0.47	0.47	0.68	0.22	0.00
Avail Cap(c_a), veh/h	414	0	753				0	1099	1119	145	2602	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.96	0.96	0.00
Uniform Delay (d), s/veh	30.0	0.0	32.2				0.0	7.8	7.8	35.2	3.3	0.0
Incr Delay (d2), s/veh	0.1	0.0	1.1				0.0	1.5	1.4	3.4	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	2.6				0.0	6.2	6.3	1.2	1.9	0.0
LnGrp Delay(d),s/veh	30.1	0.0	33.4				0.0	9.3	9.3	38.7	3.5	0.0
LnGrp LOS	C		C					A	A	D	A	
Approach Vol, veh/h		285						1046			618	
Approach Delay, s/veh		33.1						9.3			6.7	
Approach LOS		C						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	8.5	52.1		14.4		60.6		
Change Period (Y+Rc), s	5.0	6.0		6.0		6.0		
Max Green Setting (Gmax), s	6.0	34.0		18.0		45.0		
Max Q Clear Time (g_c+I1), s	4.3	13.8		8.0		5.8		
Green Ext Time (p_c), s	0.0	6.5		0.4		7.4		

Intersection Summary	
HCM 2010 Ctrl Delay	11.9
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Intersection Level Of Service Report
#5: Street "B"/Lantz Lane / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	11.6
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	12	0	4	0	0	0	0	232	7	1	227	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	0	4	0	0	0	0	232	7	1	227	0
Peak Hour Factor	0.8100	0.8100	0.8100	1.0000	1.0000	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	0	1	0	0	0	0	72	2	0	70	0
Total Analysis Volume [veh/h]	15	0	5	0	0	0	0	286	9	1	280	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes			
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.25	11.57	9.97	0.00	0.00	0.00	0.00	0.00	0.00	7.84	0.00	0.00
Movement LOS	B	B	A					A	A	A	A	
95th-Percentile Queue Length [veh]	0.10	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.85	0.85	0.00
95th-Percentile Queue Length [ft]	2.47	2.47	2.47	0.00	0.00	0.00	0.00	0.00	0.00	21.24	21.24	0.00
d_A, Approach Delay [s/veh]	10.93			0.00			0.00			0.03		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.38											
Intersection LOS	B											

Intersection Level Of Service Report
#7: Oliver Street / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	11.5
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	3	0	9	0	0	0	0	235	1	3	225	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	0	9	0	0	0	0	235	1	3	225	0
Peak Hour Factor	0.8100	0.8100	0.8100	1.0000	1.0000	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	0	3	0	0	0	0	73	0	1	69	0
Total Analysis Volume [veh/h]	4	0	11	0	0	0	0	290	1	4	278	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes			
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.22	11.55	9.92	0.00	0.00	0.00	0.00	0.00	0.00	7.84	0.00	0.00
Movement LOS	B	B	A					A	A	A	A	
95th-Percentile Queue Length [veh]	0.07	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.85	0.85	0.00
95th-Percentile Queue Length [ft]	1.64	1.64	1.64	0.00	0.00	0.00	0.00	0.00	0.00	21.24	21.24	0.00
d_A, Approach Delay [s/veh]	10.27			0.00			0.00			0.11		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.32											
Intersection LOS	B											

Intersection Level Of Service Report
#2: Nason Street / Ironwood Avenue

Control Type:	Signalized	Delay (sec / veh):	16.7
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.353

Intersection Setup

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			25.00			45.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			no			yes			no		

Volumes

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	197	5	54	0	4	2	0	176	148	47	151	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	31	0	0	2	0	0	20	0	0	0
Total Hourly Volume [veh/h]	197	5	23	0	4	0	0	176	128	47	151	1
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	50	1	6	0	1	0	0	45	33	12	39	0
Total Analysis Volume [veh/h]	201	5	23	0	4	0	0	180	131	48	154	1
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LagFO
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	8	0	0	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	5.0	0.0	0.0	5.0	0.0	4.0	5.0	0.0	4.0	5.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	28	0	0	28	0	10	28	0	14	32	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
Minimum Recall		no			no		no	no		no	no	
Maximum Recall		no			no		no	yes		no	yes	
Pedestrian Recall		no			no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	C	R	C	L	C	L	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	5.00	6.00	5.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	3.00	4.00	3.00	4.00
g_i, Effective Green Time [s]	10	10	10	0	40	3	43
g / C, Green / Cycle	0.15	0.15	0.15	0.00	0.56	0.04	0.61
(v / s)_i Volume / Saturation Flow Rate	0.12	0.02	0.00	0.00	0.20	0.03	0.09
s, saturation flow rate [veh/h]	1661	1425	1420	1597	1560	1597	1675
c, Capacity [veh/h]	350	213	264	1	880	70	1017
d1, Uniform Delay [s]	28.86	25.73	25.40	0.00	8.32	33.01	5.96
k, delay calibration	0.04	0.04	0.04	0.04	0.50	0.04	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.59	0.08	0.01	0.00	1.11	4.38	0.32
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

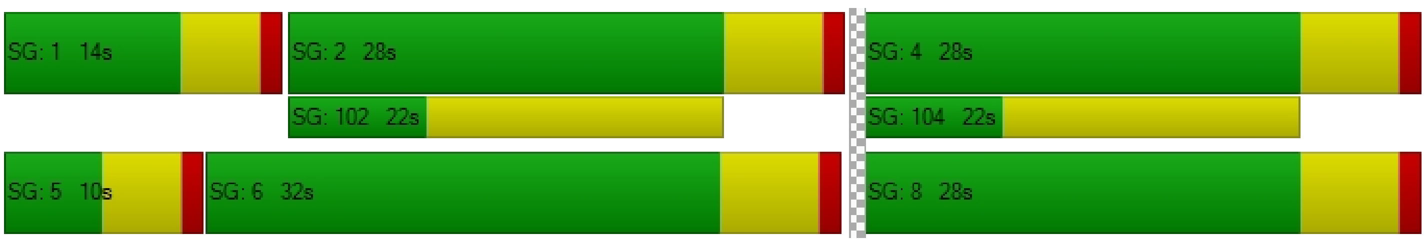
X, volume / capacity	0.59	0.11	0.02	0.00	0.35	0.69	0.15
d, Delay for Lane Group [s/veh]	29.45	25.81	25.40	0.00	9.44	37.39	6.27
Lane Group LOS	C	C	C	A	A	D	A
Critical Lane Group	yes	no	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	3.11	0.31	0.06	0.00	2.17	0.81	0.70
50th-Percentile Queue Length [ft]	77.72	7.71	1.41	0.00	54.35	20.17	17.61
95th-Percentile Queue Length [veh]	5.60	0.56	0.10	0.00	3.91	1.45	1.27
95th-Percentile Queue Length [ft]	139.89	13.89	2.54	0.00	97.83	36.30	31.69

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	29.45	29.45	25.81	25.40	25.40	25.40	0.00	9.44	9.44	37.39	6.27	6.27
Movement LOS	C	C	C	C	C	C	A	A	A	D	A	A
d_A, Approach Delay [s/veh]	29.09			25.40			9.44			13.63		
Approach LOS	C			C			A			B		
d_I, Intersection Delay [s/veh]	16.69											
Intersection LOS	B											
Intersection V/C	0.353											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	8	22	92	118	24	11	143	243	491	24	179	10
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1845	1900	1900	1900	1900	1900	1900	1882	1900
Adj Flow Rate, veh/h	9	24	29	128	26	2	155	264	431	26	195	7
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	3	0	0	0	0	0	0	1	1
Cap, veh/h	20	91	245	158	240	247	188	2183	1122	47	1855	66
Arrive On Green	0.01	0.05	0.05	0.09	0.13	0.13	0.10	0.60	0.60	0.03	0.53	0.53
Sat Flow, veh/h	1810	1900	1615	1757	1900	1615	1810	3610	1615	1810	3522	126
Grp Volume(v), veh/h	9	24	29	128	26	2	155	264	431	26	99	103
Grp Sat Flow(s),veh/h/ln	1810	1900	1615	1757	1900	1615	1810	1805	1615	1810	1788	1859
Q Serve(g_s), s	0.5	1.2	1.5	6.8	1.2	0.1	8.0	3.0	10.6	1.3	2.6	2.6
Cycle Q Clear(g_c), s	0.5	1.2	1.5	6.8	1.2	0.1	8.0	3.0	10.6	1.3	2.6	2.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.07
Lane Grp Cap(c), veh/h	20	91	245	158	240	247	188	2183	1122	47	942	980
V/C Ratio(X)	0.45	0.26	0.12	0.81	0.11	0.01	0.82	0.12	0.38	0.55	0.10	0.11
Avail Cap(c_a), veh/h	95	380	491	240	540	501	267	2183	1122	95	942	980
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.92	0.92	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.7	43.6	34.8	42.4	36.7	34.1	41.7	8.0	6.0	45.7	11.3	11.3
Incr Delay (d2), s/veh	5.7	0.6	0.1	6.3	0.1	0.0	8.6	0.1	0.9	3.7	0.2	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.6	0.7	3.6	0.6	0.0	4.5	1.5	5.0	0.7	1.3	1.4
LnGrp Delay(d),s/veh	52.4	44.2	34.9	48.8	36.8	34.1	50.3	8.1	7.0	49.4	11.5	11.5
LnGrp LOS	D	D	C	D	D	C	D	A	A	D	B	B
Approach Vol, veh/h		62			156			850			228	
Approach Delay, s/veh		41.0			46.6			15.2			15.8	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.5	63.4	13.5	10.5	14.9	56.0	6.1	18.0
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	5.0	36.0	13.0	19.0	14.0	27.0	5.0	27.0
Max Q Clear Time (g_c+I1), s	3.3	12.6	8.8	3.5	10.0	4.6	2.5	3.2
Green Ext Time (p_c), s	0.0	2.3	0.1	0.1	0.1	2.3	0.0	0.2

Intersection Summary	
HCM 2010 Ctrl Delay	20.3
HCM 2010 LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	118	3	571	0	0	0	0	759	83	25	364	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1875	1881				0	1898	1900	1900	1881	0
Adj Flow Rate, veh/h	124	0	332				0	799	76	26	383	0
Adj No. of Lanes	1	0	2				0	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	33	1				0	0	0	0	1	0
Cap, veh/h	242	0	433				0	2031	193	50	2519	0
Arrive On Green	0.14	0.00	0.14				0.00	0.61	0.61	0.03	0.70	0.00
Sat Flow, veh/h	1792	0	3198				0	3424	317	1810	3668	0
Grp Volume(v), veh/h	124	0	332				0	433	442	26	383	0
Grp Sat Flow(s),veh/h/ln	1792	0	1599				0	1803	1842	1810	1787	0
Q Serve(g_s), s	4.8	0.0	7.5				0.0	9.2	9.2	1.1	2.7	0.0
Cycle Q Clear(g_c), s	4.8	0.0	7.5				0.0	9.2	9.2	1.1	2.7	0.0
Prop In Lane	1.00		1.00				0.00		0.17	1.00		0.00
Lane Grp Cap(c), veh/h	242	0	433				0	1100	1124	50	2519	0
V/C Ratio(X)	0.51	0.00	0.77				0.00	0.39	0.39	0.52	0.15	0.00
Avail Cap(c_a), veh/h	430	0	768				0	1100	1124	121	2519	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.96	0.96	0.00
Uniform Delay (d), s/veh	30.1	0.0	31.3				0.0	7.5	7.5	36.0	3.7	0.0
Incr Delay (d2), s/veh	0.6	0.0	1.1				0.0	1.1	1.0	2.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	3.4				0.0	4.9	5.0	0.6	1.3	0.0
LnGrp Delay(d),s/veh	30.7	0.0	32.4				0.0	8.6	8.5	38.9	3.8	0.0
LnGrp LOS	C		C					A	A	D	A	
Approach Vol, veh/h		456						875			409	
Approach Delay, s/veh		31.9						8.5			6.0	
Approach LOS		C						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	7.1	51.8		16.1		58.9		
Change Period (Y+Rc), s	5.0	6.0		6.0		6.0		
Max Green Setting (Gmax), s	5.0	35.0		18.0		45.0		
Max Q Clear Time (g_c+I1), s	3.1	11.2		9.5		4.7		
Green Ext Time (p_c), s	0.0	4.9		0.6		5.2		

Intersection Summary	
HCM 2010 Ctrl Delay	14.1
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Intersection Level Of Service Report
#5: Street "B"/Lantz Lane / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	11.0
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	5	0	5	0	0	0	0	222	8	6	194	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	0	5	0	0	0	0	222	8	6	194	0
Peak Hour Factor	0.9300	0.9300	0.9300	1.0000	1.0000	1.0000	1.0000	0.9300	0.9300	0.9300	0.9300	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	0	1	0	0	0	0	60	2	2	52	0
Total Analysis Volume [veh/h]	5	0	5	0	0	0	0	239	9	6	209	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes			
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.63	11.01	9.57	0.00	0.00	0.00	0.00	0.00	0.00	7.74	0.00	0.00
Movement LOS	B	B	A					A	A	A	A	
95th-Percentile Queue Length [veh]	0.04	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.58	0.00
95th-Percentile Queue Length [ft]	1.06	1.06	1.06	0.00	0.00	0.00	0.00	0.00	0.00	14.56	14.56	0.00
d_A, Approach Delay [s/veh]	10.10			0.00			0.00			0.22		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.31											
Intersection LOS	B											

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Intersection Level Of Service Report
#7: Oliver Street / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	11.2
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	6	0	3	0	0	0	0	222	5	12	194	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	0	3	0	0	0	0	222	5	12	194	0
Peak Hour Factor	0.9100	0.9100	0.9100	1.0000	1.0000	1.0000	1.0000	0.9100	0.9100	0.9100	0.9100	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	0	1	0	0	0	0	61	1	3	53	0
Total Analysis Volume [veh/h]	7	0	3	0	0	0	0	244	5	13	213	0
Pedestrian Volume [ped/h]	0			0			0			0		

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes			
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	10.77	11.15	9.61	0.00	0.00	0.00	0.00	0.00	0.00	7.76	0.00	0.00
Movement LOS	B	B	A					A	A	A	A	
95th-Percentile Queue Length [veh]	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.62	0.00
95th-Percentile Queue Length [ft]	1.13	1.13	1.13	0.00	0.00	0.00	0.00	0.00	0.00	15.47	15.47	0.00
d_A, Approach Delay [s/veh]	10.42			0.00			0.00			0.45		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.42											
Intersection LOS	B											

APPENDIX 3.3:

EXISTING (2015) TRAFFIC SIGNAL WARRANT ANALYSIS

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Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

Traffic Conditions = **Existing (2015) Conditions - Weekday AM Peak Hour**

Major Street Name = **Ironwood Avenue**

Total of Both Approaches (VPH) = **467**

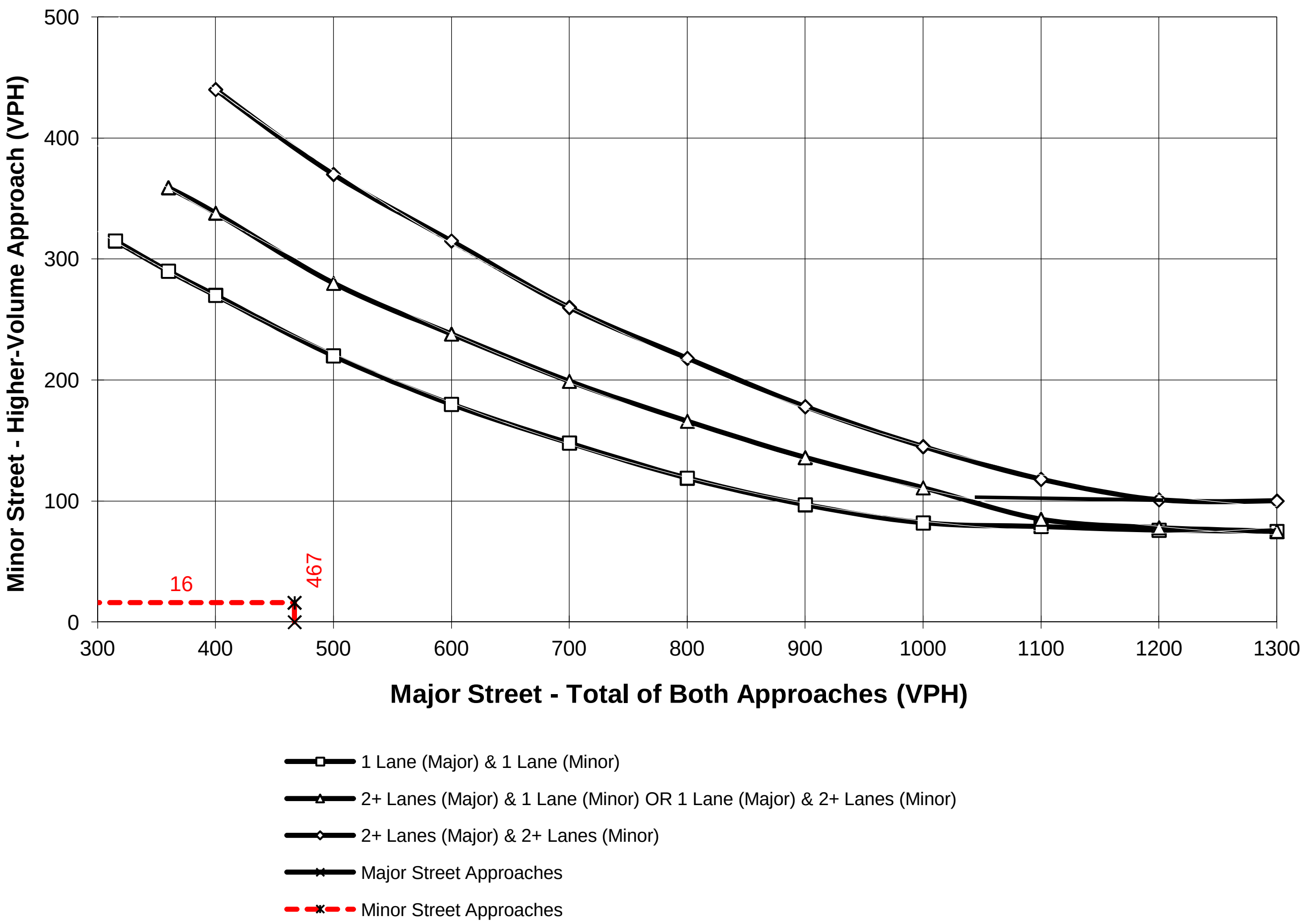
Number of Approach Lanes Major Street = **1**

Minor Street Name = **Lantz Lane**

High Volume Approach (VPH) = **16**

Number of Approach Lanes Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 100 vph applies as the lower threshold for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold for a minor-street approach with one lane

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

Traffic Conditions = **Existing (2015) Conditions - Weekday AM Peak Hour**

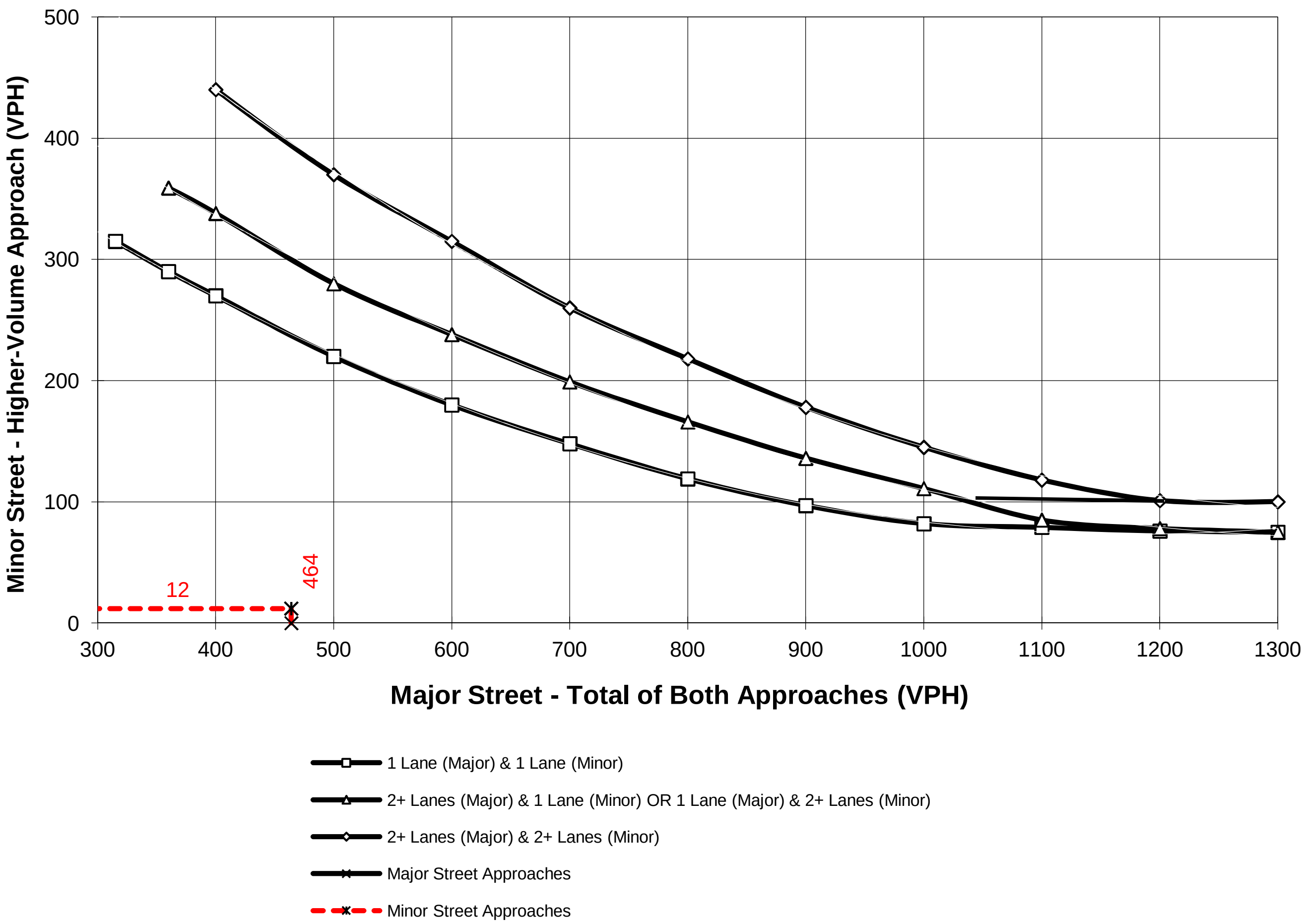
Major Street Name = **Ironwood Avenue**

Total of Both Approaches (VPH) = **464**
Number of Approach Lanes Major Street = **1**

Minor Street Name = **Oliver Street**

High Volume Approach (VPH) = **12**
Number of Approach Lanes Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 100 vph applies as the lower threshold for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold for a minor-street approach with one lane

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

URBAN CROSSROADS

APPENDIX 3.4:

EXISTING (2015) OFF-RAMP QUEUING ANALYSIS WORKSHEETS

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3: Nason Street & Elder Avenue/SR-60 Westbound Ramps

2/19/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	7	66	230	83	17	13	105	301	563	52	307
v/c Ratio	0.07	0.36	0.42	0.49	0.04	0.02	0.62	0.15	0.44	0.44	0.17
Control Delay	44.7	43.1	5.4	50.1	26.5	0.1	56.5	14.1	2.0	54.7	16.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.7	43.1	5.4	50.1	26.5	0.1	56.5	14.1	2.0	54.7	16.4
Queue Length 50th (ft)	4	39	0	49	8	0	61	47	0	30	52
Queue Length 95th (ft)	17	63	33	83	21	0	103	86	25	63	96
Internal Link Dist (ft)		689			1331			796			788
Turn Bay Length (ft)	120		120	1000		200	360		150	100	
Base Capacity (vph)	95	336	579	285	540	607	202	1978	1338	121	1776
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.20	0.40	0.29	0.03	0.02	0.52	0.15	0.42	0.43	0.17

Intersection Summary

Lane Group	EBL	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	26	279	277	1079	57	561
v/c Ratio	0.14	0.69	0.69	0.49	0.34	0.21
Control Delay	30.0	13.8	13.5	10.2	36.9	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.0	13.8	13.5	10.2	36.9	3.8
Queue Length 50th (ft)	12	1	0	129	25	28
Queue Length 95th (ft)	27	46	45	224	52	63
Internal Link Dist (ft)		1293		1072		796
Turn Bay Length (ft)	805		225		250	
Base Capacity (vph)	412	567	568	2222	173	2627
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.49	0.49	0.49	0.33	0.21

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	9	24	100	128	26	12	155	264	534	26	206
v/c Ratio	0.09	0.15	0.22	0.66	0.09	0.02	0.70	0.12	0.38	0.25	0.11
Control Delay	45.1	39.1	2.2	56.0	29.6	0.1	56.0	11.2	1.6	48.9	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.1	39.1	2.2	56.0	29.6	0.1	56.0	11.2	1.6	48.9	15.6
Queue Length 50th (ft)	5	14	0	74	14	0	90	28	0	15	26
Queue Length 95th (ft)	21	34	11	132	31	0	153	83	41	43	76
Internal Link Dist (ft)		689			1331			796			788
Turn Bay Length (ft)	120		120	1000		200	360		150	100	
Base Capacity (vph)	95	380	482	239	540	559	268	2258	1423	104	1835
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.06	0.21	0.54	0.05	0.02	0.58	0.12	0.38	0.25	0.11

Intersection Summary

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Lane Group	EBL	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	124	304	300	886	26	383
v/c Ratio	0.50	0.65	0.64	0.39	0.19	0.15
Control Delay	36.0	10.9	10.5	8.8	35.0	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.0	10.9	10.5	8.8	35.0	4.4
Queue Length 50th (ft)	54	1	0	68	12	25
Queue Length 95th (ft)	96	66	63	194	34	51
Internal Link Dist (ft)		1293		1072		796
Turn Bay Length (ft)	805		225		250	
Base Capacity (vph)	428	592	592	2277	140	2508
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.51	0.51	0.39	0.19	0.15

Intersection Summary

APPENDIX 5.1:

EXISTING PLUS PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS

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Project:	=======================>	Ironwood Residential	<===	Job #: 09386
Scenario:	=======================>	GP Buildout Post 2035 Without Project	<===	Analyst: CHS
Existing Conditions Model Run ID:	==>	RivTAM for MV-Existing Base Model	<===	Date: 8/24/15
Future Conditions Model Run ID:	==>	RivTAM-Moreno Valley GP	<===	

LOCATION: **Nason Street / Ironwood Avenue**

AM PEAK HOUR	**PM PEAK HOUR**
EXISTING TURNING MOVEMENT VOLUMES:	EXISTING TURNING MOVEMENT VOLUMES:
2015	2015
Southbound: **0** < **7** v **0** >	Southbound: **2** < **4** v **0** >
Eastbound: **1** ^ **199** > **244** v	Eastbound: **0** ^ **176** > **148** v
Total = 955	Total = 785
Westbound: ^ **0** < **208** v **31**	Westbound: ^ < **15** v **4**
Northbound: < **221** ^ **4** > **40**	Northbound: < **197** ^ **5** > **54**
EXISTING MODEL YEAR:	EXISTING MODEL YEAR:
2008	2008
North: v **50** ^ **50**	North: v **50** ^ **50**
West: **88** < **168** >	West: **163** < **154** >
IN = 525 < **130** ; OUT = 524 > **284**	IN = 649 < **27** ; OUT = 646 > **25**
South: v **102** ^ **177**	South: v **183** ^ **173**
FUTURE MODEL YEAR:	FUTURE MODEL YEAR:
2035	2035
North: v **50** ^ **50**	North: v **50** ^ **50**
West: **220** < **351** >	West: **455** < **375** >
IN = 667 < **156** ; OUT = 666 > **222**	IN = 1170 < **23** ; OUT = 1171 > **53**
South: v **174** ^ **110**	South: v **131** ^ **510**
EXISTING (COUNTED) ADTs BY LEG:	EXISTING (COUNTED) ADTs BY LEG:
2015	2015
N **120**	N 120
6,754 W **LEG** E **4,568**	6,754 W + E 4,568
S **4,306**	S 4,306
REFINED FUTURE ADT'S BY LEG:	REFINED FUTURE ADT'S BY LEG:
2035	2035
N **300**	N 300
7,389 W **LEG** E **5,592**	7,389 W + E 5,592
S **4,520**	S 4,520

U:\UcJobs_09100-09500_09300\09386\Post Processing\[02 Nason_Ironwood.xls]Input (1)

Project: Ironwood Residential
Scenario: GP Buildout Post 2035 Without Project

Job #: 09386
Analyst: CHS
Date: 8/24/15

LOCATION: Nason Street / Ironwood Avenue

EXISTING COUNTED INBOUND AND OUTBOUND VOLUME CALCULATION

AM

EXISTING COUNT YEAR:
2015

	7		5	
	v		^	
429 <	IN =		955 <	239
444 >	OUT =		955 >	239
	v		^	
	282		265	

PM

EXISTING COUNT YEAR:
2015

	6		6	
	v		^	
350 <	IN =		785 <	199
324 >	OUT =		785 >	230
	v		^	
	199		256	

GROWTH CALCULATION DECISION RULE

MIN = Minimum Count Growth Approach
ADD = Additive (Growth Increment) Approach
MUL = Multiplicative (Ratio) Approach

AM:

	MUL	MUL	
	v	^	
ADD <			< ADD
ADD >			> MIN
	v	^	
	ADD	MIN	

MIN = Minimum Count Growth Approach
ADD = Additive (Growth Increment) Approach
MUL = Multiplicative (Ratio) Approach

PM:

	MUL	MUL	
	v	^	
ADD <			< MIN
ADD >			> MUL
	v	^	
	MIN	ADD	

MINIMUM GROWTH %s 2008 TO 2035

AM:

	0%	0%	
	v	^	
0% <		<	0%
0% >		>	0%
	v	^	
	0%	0%	

PM:

	0%	0%	
	v	^	
0% <		<	0%
0% >		>	0%
	v	^	
	0%	0%	

REFINED GROWTH: 2008 TO 2035

	3	5	
	v	^	
130 <		<	30
180 >		>	0
	v	^	
	70	0	

ADJUSTED GROWTH: 2008 TO 2035

	4	4	
	v	^	
290 <		<	0
220 >		>	260
	v	^	
	0	340	

PRORATED GROWTH: 2015 TO 2035
20 YEARS

	0	0	
	v	^	
100 <		<	20
130 >		>	0
	v	^	
	50	0	

PRORATED GROWTH: 2015 TO 2035
20 YEARS

	0	0	
	v	^	
210 <		<	0
160 >		>	190
	v	^	
	0	250	

NEW PROJECTED VOLUMES: 2035

	10		10	
	v		^	
530 <	IN =		1110 <	260
570 >	OUT =		1110 >	240
	v		^ *	
	330		270	

NEW PROJECTED VOLUMES: 2035

	10		10	
	v		^	
565 <	IN =		1200 <	200
480 >	OUT =		1200 >	424
	v		^ *	
	202		510	

* NOTE: Outbound future volume may be factored (increased) to match inbound if inbound is greater than outbound.

U:\UcJobs_09100-09500_09300\09386\Post Processing\[02 Nason_Ironwood.xls] Growth Summary (2)

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Project:	Ironwood Residential	Job #:	09386
Scenario:	GP Buildout Post 2035 Without Project	Analyst:	CHS
		Date:	8/24/15

LOCATION: Nason Street / Ironwood Avenue
FORECAST YEAR: 2035

INDIVIDUAL TURN VOLUME GROWTH REVIEW									
		AM PEAK HOUR INPUT DATA				PM PEAK HOUR INPUT DATA			
APPROACH	TURNING MOVEMENT	EXISTING COUNT	FUTURE VOLUME	DIFF-ERENCE	% CHANGE	EXISTING COUNT	FUTURE VOLUME	DIFF-ERENCE	% CHANGE
NORTH BOUND	Left	221	267	46	21%	197	393	196	99%
	Through	4	5	1	25%	5	9	4	80%
	Right	40	13	-27	-68%	54	108	54	100%
	NB Total	265	285	20	8%	256	510	254	99%
SOUTH BOUND	Left	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	Through	7	9	2	29%	4	6	2	50%
	Right	0	0	0	#DIV/0!	2	4	2	100%
	SB Total	7	9	2	29%	6	10	4	67%
EAST BOUND	Left	1	5	4	400%	0	0	0	#DIV/0!
	Through	199	227	28	14%	176	315	139	79%
	Right	244	309	65	27%	148	164	16	11%
	EB Total	444	541	97	22%	324	479	155	48%
WEST BOUND	Left	31	12	-19	-61%	47	32	-15	-32%
	Through	208	263	55	26%	151	167	16	11%
	Right	0	0	0	#DIV/0!	1	1	0	0%
	WB Total	239	275	36	15%	199	200	1	1%
TOTAL ENTERING VOLUME		955	1,110	155	16%	785	1,199	414	53%

FORECAST PEAK HOUR TO ADT COMPARISON						
		VOLUMES		PERCENT OF ADT		
		AM	PM	AM	PM	ADT
North Leg	Inbound	9	10			
North Leg	Outbound	10	10			
North Leg	**TOTAL**	**19**	**20**	**6%**	**7%**	**300**
South Leg	Inbound	285	510			
South Leg	Outbound	330	202			
South Leg	**TOTAL**	**615**	**712**	**14%**	**16%**	**4,520**
East Leg	Inbound	275	200			
East Leg	Outbound	240	423			
East Leg	**TOTAL**	**515**	**623**	**9%**	**11%**	**5,592**
West Leg	Inbound	541	479			
West Leg	Outbound	530	564			
West Leg	**TOTAL**	**1,071**	**1,043**	**14%**	**14%**	**7,389**
OVERALL TOTAL		***2,220***	***2,398***	**12%**	***13%***	***17,801***

U:\UcJobs_09100-09500_09300\09386\Post Processing\[02 Nason_Ironwood.xls]Output (3)

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

INPUT DATA

Project:	=======================>	Ironwood Residential	<===	Job #: 09386
Scenario:	=======================>	GP Buildout Post 2035 Without Project	<===	Analyst: CHS
Existing Conditions Model Run ID:	==>	RivTAM for MV-Existing Base Model	<===	Date: 8/24/15
Future Conditions Model Run ID:	==>	RivTAM-Moreno Valley GP	<===	

LOCATION: **Nason Street / SR-60 Westbound Ramps**

AM PEAK HOUR

EXISTING TURNING MOVEMENT VOLUMES:

2015

		2 <	**250** v	**43** >	
6 ^				^	**11**
54 >		Total =	1,432	<	**14**
189 v				v	**68**
		86 <	**247** ^	**462** >	

EXISTING MODEL YEAR:

2008

			156 v	**207** ^	
49	<	IN =	837	<	**80**
79	>	OUT =	837	>	**347**
			234 v	**522** ^	

FUTURE MODEL YEAR:

2035

			265 v	**203** ^	
110	<	IN =	1096	<	**201**
156	>	OUT =	1095	>	**298**
			484 v	**474** ^	

EXISTING (COUNTED) ADTs BY LEG:

2015

		4,760 N		
2,996	W	**LEG**	E	**6,914**
		S **12,657**		

REFINED FUTURE ADT'S BY LEG:

2035

		7,030 N		
4,097	W	**LEG**	E	**8,066**
		S **14,764**		

PM PEAK HOUR

EXISTING TURNING MOVEMENT VOLUMES:

2015

		10 <	**179** v	**24** >	
8 ^				^	1
22 >		Total =	1,364	<	2
92 v				v	11
		143 <	**242** ^	**491** >	

EXISTING MODEL YEAR:

2008

			234 v	**234** ^	
94	<	IN =	855	<	17
61	>	OUT =	855	>	15
			377 v	**389** ^	

FUTURE MODEL YEAR:

2035

			254 v	**622** ^	
258	<	IN =	1956	<	41
262	>	OUT =	1956	>	42
			654 v	**1021** ^	

EXISTING (COUNTED) ADTs BY LEG:

2015

		4,760 N		
2,996	W	+	E	6,914
		S 12,657		

REFINED FUTURE ADT'S BY LEG:

2035

		7,030 N		
4,097	W	+	E	8,066
		S 14,764		

U:\UcJobs_09100-09500_09300\09386\Post Processing\[03 Nason_SR60 WB Ramps.xls]Input (1)

Project: Ironwood Residential
Scenario: GP Buildout Post 2035 Without Project

Job #: 09386
Analyst: CHS
Date: 8/24/15

LOCATION: Nason Street / SR-60 Westbound Ramps

EXISTING COUNTED INBOUND AND OUTBOUND VOLUME CALCULATION

		AM					**PM**		
EXISTING COUNT YEAR:					EXISTING COUNT YEAR:				
2015		295	264		2015		213	261	
		v	^				v	^	
	102 <	IN =	1432 <	93		177 <	IN =	1364 <	153
	249 >	OUT =	1432 >	559		122 >	OUT =	1364 >	537
		v	^				v	^	
		507	795				389	876	

GROWTH CALCULATION DECISION RULE									
MIN = Minimum Count Growth Approach					MIN = Minimum Count Growth Approach				
ADD = Additive (Growth Increment) Approach		ADD	ADD		ADD = Additive (Growth Increment) Approach		MUL	ADD	
MUL = Multiplicative (Ratio) Approach		v	^		MUL = Multiplicative (Ratio) Approach		v	^	
	ADD <			< ADD		ADD <			< MUL
	ADD >			> MIN		ADD >			> ADD
		v	^				v	^	
		ADD	MIN				ADD	ADD	

MINIMUM GROWTH %s 2008 TO 2035									
		0%	0%				0%	0%	
		v	^				v	^	
	0% <		<	0%		0% <		<	0%
	0% >		>	0%		0% >		>	0%
		v	^				v	^	
		0%	0%				0%	0%	

REFINED GROWTH: 2008 TO 2035					ADJUSTED GROWTH: 2008 TO 2035				
		110	0				17	390	
		v	^				v	^	
	60 <		<	120		160 <		<	227
	80 >		>	0		200 >		>	270
		v	^				v	^	
		250	0				280	630	

PRORATED GROWTH: 2015 TO 2035					PRORATED GROWTH: 2015 TO 2035				
20 YEARS		80	0		20 YEARS		10	290	
		v	^				v	^	
	40 <		<	90		120 <		<	170
	60 >		>	0		150 >		>	200
		v	^				v	^	
		190	0				210	470	

NEW PROJECTED VOLUMES: 2035					NEW PROJECTED VOLUMES: 2035				
		380	262				220	550	
		v	^				v	^	
	141 <	IN =	1670 <	180		300 <	IN =	2160 <	320
	310 >	OUT =	1670 >	563		270 >	OUT =	2190 >	740
		v	^ *				v	^ *	
		704	800				600	1350	

* NOTE: Outbound future volume may be factored (increased) to match inbound if inbound is greater than outbound.

U:\UcJobs_09100-09500_09300\09386\Post Processing\[03 Nason_SR60 WB Ramps.xls] Growth Summary (2)

Project:	Ironwood Residential	Job #:	09386
Scenario:	GP Buildout Post 2035 Without Project	Analyst:	CHS
		Date:	8/24/15

LOCATION: Nason Street / SR-60 Westbound Ramps
FORECAST YEAR: 2035

INDIVIDUAL TURN VOLUME GROWTH REVIEW

APPROACH	TURNING MOVEMENT	AM EXISTING COUNT	AM FUTURE VOLUME	AM DIFF-ERENCE	AM % CHANGE	PM EXISTING COUNT	PM FUTURE VOLUME	PM DIFF-ERENCE	PM % CHANGE
NORTH BOUND	Left	86	108	22	26%	143	225	82	57%
	Through	247	237	-10	-4%	242	486	244	101%
	Right	462	454	-8	-2%	491	660	169	34%
	NB Total	795	799	4	1%	876	1,371	495	57%
SOUTH BOUND	Left	43	49	6	14%	24	28	4	17%
	Through	250	329	79	32%	179	181	2	1%
	Right	2	3	1	50%	10	13	3	30%
	SB Total	295	381	86	29%	213	222	9	4%
EAST BOUND	Left	6	7	1	17%	8	28	20	250%
	Through	54	60	6	11%	22	52	30	136%
	Right	189	244	55	29%	92	192	100	109%
	EB Total	249	311	62	25%	122	272	150	123%
WEST BOUND	Left	68	132	64	94%	118	226	108	92%
	Through	14	30	16	114%	24	61	37	154%
	Right	11	18	7	64%	11	36	25	227%
	WB Total	93	180	87	94%	153	323	170	111%
TOTAL ENTERING VOLUME		1,432	1,671	239	17%	1,364	2,188	824	60%

FORECAST PEAK HOUR TO ADT COMPARISON

		VOLUMES AM	VOLUMES PM	PERCENT OF ADT AM	PERCENT OF ADT PM	ADT
North Leg	Inbound	381	222			
North Leg	Outbound	262	550			
North Leg	**TOTAL**	**643**	**772**	**9%**	**11%**	**7,030**
South Leg	Inbound	799	1,371			
South Leg	Outbound	705	599			
South Leg	**TOTAL**	**1,504**	**1,970**	**10%**	**13%**	**14,764**
East Leg	Inbound	180	323			
East Leg	Outbound	563	740			
East Leg	**TOTAL**	**743**	**1,063**	**9%**	**13%**	**8,066**
West Leg	Inbound	311	272			
West Leg	Outbound	141	299			
West Leg	**TOTAL**	**452**	**571**	**11%**	**14%**	**4,097**
OVERALL TOTAL		***3,342***	***4,376***	**10%**	***13%***	***33,957***

U:\UcJobs_09100-09500_09300\09386\Post Processing\[03 Nason_SR60 WB Ramps.xls]Output (3)

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Project: ======================>	Ironwood Residential	<===	Job #: 09386
Scenario: ======================>	GP Buildout Post 2035 Without Project	<===	Analyst: CHS
Existing Conditions Model Run ID: ==>	RivTAM for MV-Existing Base Model	<===	Date: 8/24/15
Future Conditions Model Run ID: ==>	RivTAM-Moreno Valley GP	<===	

LOCATION: **Nason Street / SR-60 Eastbound Ramps**

AM PEAK HOUR	**PM PEAK HOUR**
EXISTING TURNING MOVEMENT VOLUMES: **2015** **0** **460** **47** < v > **21** ^ ^ **0** **2** > Total = 1,869 < **0** **454** v v **0** < ^ > **0** **774** **111**	EXISTING TURNING MOVEMENT VOLUMES: 2015 **0** **364** **25** < v > **118** ^ ^ **3** > Total = 1,923 < **571** v v < ^ > **0** **759** **83**
EXISTING MODEL YEAR: **2008** **234** **522** v ^ **0** < IN = 1023 < **0** **199** > OUT = 1023 > **109** v ^ **392** **590**	EXISTING MODEL YEAR: 2008 **377** **389** v ^ **0** < IN = 1264 < **481** > OUT = 1264 > **8** v ^ **786** **406**
FUTURE MODEL YEAR: **2035** **484** **474** v ^ **0** < IN = 1383 < **0** **415** > OUT = 1384 > **142** v ^ **768** **484**	FUTURE MODEL YEAR: 2035 **654** **1021** v ^ **0** < IN = 2181 < **449** > OUT = 2182 > **13** v ^ **1028** **1078**
EXISTING (COUNTED) ADTs BY LEG: 2015 **12,687** N **6,935** W **LEG** E **1,112** S **17,807**	EXISTING (COUNTED) ADTs BY LEG: 2015 12,687 N 6,935 W + E 1,112 S 17,807
REFINED FUTURE ADT'S BY LEG: 2035 **14,764** N **6,034** W **LEG** E **1,513** S **19,932**	REFINED FUTURE ADT'S BY LEG: 2035 14,764 N 6,034 W + E 1,513 S 19,932

U:\UcJobs_09100-09500_09300\09386\Post Processing\[04 Nason_SR60 EB Ramps.xls]Input (1)

Project: Ironwood Residential
Scenario: GP Buildout Post 2035 Without Project

Job #: 09386
Analyst: CHS
Date: 8/24/15

LOCATION: Nason Street / SR-60 Eastbound Ramps

EXISTING COUNTED INBOUND AND OUTBOUND VOLUME CALCULATION

AM

EXISTING COUNT YEAR:
2015

		507	795	
		v	^	
0 <	IN =	1869 <		0
477 >	OUT =	1869 >		160
		v	^	
		914	885	

PM

EXISTING COUNT YEAR:
2015

		389	877	
		v	^	
0 <	IN =	1923 <		0
692 >	OUT =	1923 >		111
		v	^	
		935	842	

GROWTH CALCULATION DECISION RULE

MIN = Minimum Count Growth Approach
ADD = Additive (Growth Increment) Approach
MUL = Multiplicative (Ratio) Approach

AM:

	ADD	MIN		
	v	^		
MUL <			< MUL	
ADD >			> ADD	
	v	^		
	ADD	MIN		

PM:

MIN = Minimum Count Growth Approach
ADD = Additive (Growth Increment) Approach
MUL = Multiplicative (Ratio) Approach

	ADD	ADD		
	v	^		
MUL <			< MUL	
ADD >			> ADD	
	v	^		
	ADD	ADD		

MINIMUM GROWTH %s 2008 TO 2035

AM:

	0%	0%	
	v	^	
-13% <		<	0%
-13% >		>	0%
	v	^	
	0%	0%	

PM:

	0%	0%	
	v	^	
-13% <		<	0%
-13% >		>	0%
	v	^	
	0%	0%	

REFINED GROWTH: 2008 TO 2035 (AM)

	250	0	
	v	^	
0 <		<	0
220 >		>	30
	v	^	
	380	0	

ADJUSTED GROWTH: 2008 TO 2035 (PM)

	280	630	
	v	^	
0 <		<	0
-30 >		>	40
	v	^	
	240	670	

PRORATED GROWTH: 2015 TO 2035

20 YEARS

AM:

	190	0	
	v	^	
0 <		<	0
160 >		>	20
	v	^	
	280	0	

PM:

	210	470	
	v	^	
0 <		<	0
-20 >		>	30
	v	^	
	180	500	

NEW PROJECTED VOLUMES: 2035

AM:

		700	822	
		v	^	
0 <	IN =	2230 <		0
640 >	OUT =	2230 >		185
		v	^ *	
		1223	890	

PM:

		600	1350	
		v	^	
0 <	IN =	2610 <		0
670 >	OUT =	2610 >		140
		v	^ *	
		1120	1340	

* NOTE: Outbound future volume may be factored (increased) to match inbound if inbound is greater than outbound.

U:\UcJobs_09100-09500_09300\09386\Post Processing\[04 Nason_SR60 EB Ramps.xls] Growth Summary (2)

Project: Ironwood Residential
Scenario: GP Buildout Post 2035 Without Project
Job #: 09386
Analyst: CHS
Date: 8/24/15

LOCATION: Nason Street / SR-60 Eastbound Ramps
FORECAST YEAR: 2035

INDIVIDUAL TURN VOLUME GROWTH REVIEW									
		AM PEAK HOUR INPUT DATA				PM PEAK HOUR INPUT DATA			
APPROACH	TURNING MOVEMENT	EXISTING COUNT	FUTURE VOLUME	DIFF-ERENCE	% CHANGE	EXISTING COUNT	FUTURE VOLUME	DIFF-ERENCE	% CHANGE
NORTH BOUND	Left	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	Through	774	789	15	2%	759	1,234	475	63%
	Right	111	109	-2	-2%	83	106	23	28%
	NB Total	885	898	13	1%	842	1,340	498	59%
SOUTH BOUND	Left	47	73	26	55%	25	31	6	24%
	Through	460	623	163	35%	364	569	205	56%
	Right	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	SB Total	507	696	189	37%	389	600	211	54%
EAST BOUND	Left	21	33	12	57%	118	116	-2	-2%
	Through	2	3	1	50%	3	2	-1	-33%
	Right	454	600	146	32%	571	551	-20	-4%
	EB Total	477	636	159	33%	692	669	-23	-3%
WEST BOUND	Left	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	Through	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	Right	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	WB Total	0	0	0	#DIV/0!	0	0	0	#DIV/0!
TOTAL ENTERING VOLUME		1,869	2,230	361	19%	1,923	2,609	686	36%

FORECAST PEAK HOUR TO ADT COMPARISON						
		VOLUMES		PERCENT OF ADT		
		AM	PM	AM	PM	ADT
North Leg	Inbound	696	600			
North Leg	Outbound	822	1,350			
North Leg	**TOTAL**	**1,518**	**1,950**	**10%**	**13%**	**14,764**
South Leg	Inbound	898	1,340			
South Leg	Outbound	1,223	1,120			
South Leg	**TOTAL**	**2,121**	**2,460**	**11%**	**12%**	**19,932**
East Leg	Inbound	0	0			
East Leg	Outbound	185	139			
East Leg	**TOTAL**	**185**	**139**	**12%**	**9%**	**1,513**
West Leg	Inbound	636	669			
West Leg	Outbound	0	0			
West Leg	**TOTAL**	**636**	**669**	**11%**	**11%**	**6,034**
OVERALL TOTAL		***4,460***	***5,218***	**11%**	***12%***	***42,243***

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APPENDIX 5.1:

EXISTING PLUS PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS

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Intersection Level Of Service Report
#1: Nason Street / Street "A"

Control Type:	Two-way stop	Delay (sec / veh):	8.9
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.036

Intersection Setup

Name	Nason Street		Nason Street		Street "A"	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Nason Street		Nason Street		Street "A"	
Base Volume Input [veh/h]	5	0	0	7	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	11	0	0	31	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	11	0	7	31	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	3	0	2	8	0
Total Analysis Volume [veh/h]	5	12	0	8	34	0
Pedestrian Volume [ped/h]	0		0		0	

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.04	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.25	0.00	8.90	8.50
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.11	0.11
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	2.76	2.76
d_A, Approach Delay [s/veh]	0.00		0.00		8.90	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	5.13					
Intersection LOS	A					

Intersection Level Of Service Report
#2: Nason Street / Ironwood Avenue

Control Type:	Signalized	Delay (sec / veh):	20.0
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.555

Intersection Setup

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			25.00			45.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			no			yes			no		

Volumes

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	221	4	40	0	7	0	1	199	244	31	208	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	9	10	0	26	5	2	5	0	30	15	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	18	0	0	0	0	0	38	0	0	0
Total Hourly Volume [veh/h]	221	13	32	0	33	5	3	204	206	61	223	0
Peak Hour Factor	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	69	4	10	0	10	2	1	64	64	19	70	0
Total Analysis Volume [veh/h]	276	16	40	0	41	6	4	254	257	76	278	0
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			1		

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LagFO
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	8	0	0	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	5.0	0.0	0.0	5.0	0.0	4.0	5.0	0.0	4.0	5.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	28	0	0	28	0	31	28	0	14	11	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
Minimum Recall		no			no		no	no		no	no	
Maximum Recall		no			no		no	yes		no	yes	
Pedestrian Recall		no			no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	C	R	C	L	C	L	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	5.00	6.00	5.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	3.00	4.00	3.00	4.00
g_i, Effective Green Time [s]	14	14	14	0	35	4	39
g / C, Green / Cycle	0.20	0.20	0.20	0.01	0.50	0.06	0.55
(v / s)_i Volume / Saturation Flow Rate	0.18	0.03	0.03	0.00	0.33	0.05	0.17
s, saturation flow rate [veh/h]	1661	1425	1465	1597	1540	1597	1676
c, Capacity [veh/h]	434	287	346	9	765	94	922
d1, Uniform Delay [s]	27.05	22.99	23.02	34.70	13.26	32.56	8.49
k, delay calibration	0.04	0.04	0.04	0.04	0.50	0.04	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.68	0.08	0.07	11.46	4.59	5.98	0.84
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.67	0.14	0.14	0.43	0.67	0.81	0.30
d, Delay for Lane Group [s/veh]	27.73	23.07	23.08	46.16	17.85	38.54	9.33
Lane Group LOS	C	C	C	D	B	D	A
Critical Lane Group	yes	no	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	4.32	0.50	0.63	0.09	5.71	1.30	1.78
50th-Percentile Queue Length [ft]	108.05	12.50	15.76	2.32	142.79	32.41	44.56
95th-Percentile Queue Length [veh]	7.73	0.90	1.13	0.17	9.63	2.33	3.21
95th-Percentile Queue Length [ft]	193.29	22.50	28.37	4.17	240.77	58.34	80.20

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	27.73	27.73	23.07	23.08	23.08	23.08	46.16	17.85	17.85	38.54	9.33	9.33
Movement LOS	C	C	C	C	C	C	D	B	B	D	A	A
d_A, Approach Delay [s/veh]	27.17			23.08			18.06			15.60		
Approach LOS	C			C			B			B		
d_I, Intersection Delay [s/veh]	19.98											
Intersection LOS	B											
Intersection V/C	0.555											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	54	189	68	14	14	86	263	462	69	280	2
Future Volume (veh/h)	6	54	189	68	14	14	86	263	462	69	280	2
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1863	1900	1900	1900	1810	1900	1863	1827	1881	1900
Adj Flow Rate, veh/h	7	66	73	83	17	7	105	321	473	84	341	2
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	0	4	2	0	0	0	5	0	2	4	1	1
Cap, veh/h	16	118	223	107	219	285	131	2105	1017	107	2070	12
Arrive On Green	0.01	0.06	0.06	0.06	0.12	0.12	0.08	0.58	0.58	0.06	0.57	0.57
Sat Flow, veh/h	1810	1827	1583	1810	1900	1615	1723	3610	1583	1740	3643	21
Grp Volume(v), veh/h	7	66	73	83	17	7	105	321	473	84	167	176
Grp Sat Flow(s),veh/h/ln	1810	1827	1583	1810	1900	1615	1723	1805	1583	1740	1787	1877
Q Serve(g_s), s	0.4	3.3	3.9	4.3	0.8	0.3	5.7	3.9	14.5	4.5	4.2	4.2
Cycle Q Clear(g_c), s	0.4	3.3	3.9	4.3	0.8	0.3	5.7	3.9	14.5	4.5	4.2	4.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.01
Lane Grp Cap(c), veh/h	16	118	223	107	219	285	131	2105	1017	107	1015	1067
V/C Ratio(X)	0.44	0.56	0.33	0.77	0.08	0.02	0.80	0.15	0.47	0.79	0.16	0.16
Avail Cap(c_a), veh/h	95	327	404	286	540	558	200	2105	1017	165	1015	1067
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.85	0.85	0.85	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.8	43.1	36.7	44.1	37.5	32.3	43.2	9.1	8.7	44.0	9.8	9.8
Incr Delay (d2), s/veh	6.8	1.5	0.3	4.4	0.1	0.0	5.6	0.1	1.3	5.8	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.7	1.7	2.3	0.4	0.2	2.9	2.0	6.7	2.3	2.2	2.3
LnGrp Delay(d),s/veh	53.6	44.6	37.1	48.5	37.6	32.4	48.8	9.2	10.0	49.7	10.1	10.1
LnGrp LOS	D	D	D	D	D	C	D	A	A	D	B	B
Approach Vol, veh/h		146			107			899			427	
Approach Delay, s/veh		41.3			45.7			14.2			17.9	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.8	61.4	10.6	12.2	12.2	60.0	5.8	16.9
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	9.0	32.0	15.0	17.0	11.0	30.0	5.0	27.0
Max Q Clear Time (g_c+I1), s	6.5	16.5	6.3	5.9	7.7	6.2	2.4	2.8
Green Ext Time (p_c), s	0.0	3.0	0.0	0.3	0.0	3.2	0.0	0.4

Intersection Summary	
HCM 2010 Ctrl Delay	19.9
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	30	2	454	0	0	0	0	781	111	57	480	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1839	1845				0	1881	1900	1900	1881	0
Adj Flow Rate, veh/h	37	0	259				0	952	102	70	585	0
Adj No. of Lanes	1	0	2				0	2	0	1	2	0
Peak Hour Factor	0.82	0.82	0.82				0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	3	50	3				0	1	1	0	1	0
Cap, veh/h	197	0	352				0	1987	213	93	2602	0
Arrive On Green	0.11	0.00	0.11				0.00	0.61	0.61	0.05	0.73	0.00
Sat Flow, veh/h	1757	0	3136				0	3352	349	1810	3668	0
Grp Volume(v), veh/h	37	0	259				0	522	532	70	585	0
Grp Sat Flow(s),veh/h/ln	1757	0	1568				0	1787	1820	1810	1787	0
Q Serve(g_s), s	1.4	0.0	6.0				0.0	12.1	12.1	2.9	4.0	0.0
Cycle Q Clear(g_c), s	1.4	0.0	6.0				0.0	12.1	12.1	2.9	4.0	0.0
Prop In Lane	1.00		1.00				0.00		0.19	1.00		0.00
Lane Grp Cap(c), veh/h	197	0	352				0	1090	1110	93	2602	0
V/C Ratio(X)	0.19	0.00	0.74				0.00	0.48	0.48	0.76	0.22	0.00
Avail Cap(c_a), veh/h	422	0	753				0	1090	1110	145	2602	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.96	0.96	0.00
Uniform Delay (d), s/veh	30.2	0.0	32.2				0.0	8.1	8.1	35.1	3.3	0.0
Incr Delay (d2), s/veh	0.2	0.0	1.1				0.0	1.5	1.5	4.5	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	2.6				0.0	6.3	6.4	1.6	2.0	0.0
LnGrp Delay(d),s/veh	30.4	0.0	33.4				0.0	9.6	9.5	39.6	3.5	0.0
LnGrp LOS	C		C					A	A	D	A	
Approach Vol, veh/h		296						1054			655	
Approach Delay, s/veh		33.0						9.6			7.4	
Approach LOS		C						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	8.8	51.8		14.4		60.6		
Change Period (Y+Rc), s	5.0	6.0		6.0		6.0		
Max Green Setting (Gmax), s	6.0	34.0		18.0		45.0		
Max Q Clear Time (g_c+I1), s	4.9	14.1		8.0		6.0		
Green Ext Time (p_c), s	0.0	6.6		0.4		7.6		

Intersection Summary	
HCM 2010 Ctrl Delay	12.3
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Intersection Level Of Service Report
#5: Street "B"/Lantz Lane / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	12.2
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.029

Intersection Setup

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	12	0	4	0	0	0	0	232	7	1	227	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	5	0	35	12	3	0	0	10	2
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	0	4	5	0	35	12	235	7	1	237	2
Peak Hour Factor	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	0	1	2	0	11	4	73	2	0	73	1
Total Analysis Volume [veh/h]	15	0	5	6	0	43	15	290	9	1	293	2
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes	yes		
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.01	0.01	0.00	0.06	0.01	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	12.18	11.99	10.04	11.82	12.11	10.20	7.88	0.00	0.00	7.85	0.00	0.00
Movement LOS	B	B	B	B	B	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.11	0.11	0.11	0.22	0.22	0.22	0.94	0.94	0.00	0.91	0.91	0.91
95th-Percentile Queue Length [ft]	2.77	2.77	2.77	5.50	5.50	5.50	23.61	23.61	0.00	22.81	22.81	22.81
d_A, Approach Delay [s/veh]	11.65			10.40			0.38			0.03		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	1.28											
Intersection LOS	B											

Intersection Level Of Service Report
#6: Oliver Street / Street "C"

Control Type:	Two-way stop	Delay (sec / veh):	8.9
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street		Oliver Street		Street "C"	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Oliver Street		Oliver Street		Street "C"	
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	10	0	0	0	0	31
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	10	0	0	0	0	31
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	0	0	0	8
Total Analysis Volume [veh/h]	11	0	0	0	0	34
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.00	0.03
d_M, Delay for Movement [s/veh]	7.23	0.00	0.00	0.00	8.92	8.43
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.02	0.02	0.00	0.00	0.10	0.10
95th-Percentile Queue Length [ft]	0.51	0.51	0.00	0.00	2.42	2.42
d_A, Approach Delay [s/veh]	7.23		0.00		8.43	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	8.13					
Intersection LOS	A					

Intersection Level Of Service Report
#7: Oliver Street / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	12.0
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	3	0	9	0	0	0	0	235	1	3	225	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	21	0	10	3	5	0	0	2	7
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	3	0	9	21	0	10	3	240	1	3	227	7
Peak Hour Factor	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	0	3	6	0	3	1	74	0	1	70	2
Total Analysis Volume [veh/h]	4	0	11	26	0	12	4	296	1	4	280	9
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes	yes		
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.01	0.05	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.50	11.71	9.96	11.76	11.96	10.16	7.84	0.00	0.00	7.86	0.00	0.00
Movement LOS	B	B	A	B	B	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.07	0.07	0.07	0.20	0.20	0.20	0.92	0.92	0.00	0.90	0.90	0.90
95th-Percentile Queue Length [ft]	1.68	1.68	1.68	4.94	4.94	4.94	22.95	22.95	0.00	22.46	22.46	22.46
d_A, Approach Delay [s/veh]	10.37			11.26			0.10			0.11		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	1.00											
Intersection LOS	B											

Intersection Level Of Service Report
#1: Nason Street / Street "A"

Control Type:	Two-way stop	Delay (sec / veh):	8.9
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.023

Intersection Setup

Name	Nason Street		Nason Street		Street "A"	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Nason Street		Nason Street		Street "A"	
Base Volume Input [veh/h]	6	0	0	6	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	35	0	0	20	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	35	0	6	20	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	10	0	2	5	0
Total Analysis Volume [veh/h]	7	38	0	7	22	0
Pedestrian Volume [ped/h]	0		0		0	

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.30	0.00	8.90	8.52
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.07	0.07
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	1.79	1.79
d_A, Approach Delay [s/veh]	0.00		0.00		8.90	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.65					
Intersection LOS	A					

Intersection Level Of Service Report
#2: Nason Street / Ironwood Avenue

Control Type:	Signalized	Delay (sec / veh):	18.7
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.394

Intersection Setup

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			25.00			45.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			no			yes			no		

Volumes

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	197	5	54	0	4	2	0	176	148	47	151	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	29	34	0	17	3	6	17	0	20	10	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	31	0	0	2	0	0	20	0	0	0
Total Hourly Volume [veh/h]	197	34	57	0	21	3	6	193	128	67	161	1
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	50	9	15	0	5	1	2	49	33	17	41	0
Total Analysis Volume [veh/h]	201	35	58	0	21	3	6	197	131	68	164	1
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LagFO
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	8	0	0	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	5.0	0.0	0.0	5.0	0.0	4.0	5.0	0.0	4.0	5.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	28	0	0	28	0	31	28	0	14	11	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
Minimum Recall		no			no		no	no		no	no	
Maximum Recall		no			no		no	yes		no	yes	
Pedestrian Recall		no			no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	C	R	C	L	C	L	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	5.00	6.00	5.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	3.00	4.00	3.00	4.00
g_i, Effective Green Time [s]	12	12	12	1	38	4	41
g / C, Green / Cycle	0.17	0.17	0.17	0.01	0.54	0.05	0.58
(v / s)_i Volume / Saturation Flow Rate	0.14	0.04	0.02	0.00	0.21	0.04	0.10
s, saturation flow rate [veh/h]	1663	1425	1433	1597	1566	1597	1675
c, Capacity [veh/h]	376	240	293	13	839	84	972
d1, Uniform Delay [s]	28.17	25.23	24.58	34.57	9.54	32.81	6.84
k, delay calibration	0.04	0.04	0.04	0.04	0.50	0.04	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	0.65	0.19	0.04	8.69	1.37	6.60	0.38
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.63	0.24	0.08	0.45	0.39	0.81	0.17
d, Delay for Lane Group [s/veh]	28.82	25.42	24.63	43.26	10.91	39.42	7.22
Lane Group LOS	C	C	C	D	B	D	A
Critical Lane Group	yes	no	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	3.54	0.78	0.33	0.13	2.58	1.18	0.86
50th-Percentile Queue Length [ft]	88.38	19.40	8.33	3.17	64.41	29.45	21.40
95th-Percentile Queue Length [veh]	6.36	1.40	0.60	0.23	4.64	2.12	1.54
95th-Percentile Queue Length [ft]	159.08	34.92	14.99	5.70	115.94	53.01	38.52

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	28.82	28.82	25.42	24.63	24.63	24.63	43.26	10.91	10.91	39.42	7.22	7.22
Movement LOS	C	C	C	C	C	C	D	B	B	D	A	A
d_A, Approach Delay [s/veh]		28.15			24.63			11.49			16.62	
Approach LOS		C			C			B			B	
d_I, Intersection Delay [s/veh]						18.73						
Intersection LOS						B						
Intersection V/C						0.394						

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	8	22	92	118	24	22	143	295	491	41	199	10
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1845	1900	1900	1900	1900	1900	1900	1882	1900
Adj Flow Rate, veh/h	9	24	29	128	26	14	155	321	431	45	216	7
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	3	0	0	0	0	0	0	1	1
Cap, veh/h	20	93	247	158	243	266	188	2140	1103	66	1858	60
Arrive On Green	0.01	0.05	0.05	0.09	0.13	0.13	0.10	0.59	0.59	0.04	0.53	0.53
Sat Flow, veh/h	1810	1900	1615	1757	1900	1615	1810	3610	1615	1810	3535	114
Grp Volume(v), veh/h	9	24	29	128	26	14	155	321	431	45	109	114
Grp Sat Flow(s),veh/h/ln	1810	1900	1615	1757	1900	1615	1810	1805	1615	1810	1788	1861
Q Serve(g_s), s	0.5	1.2	1.5	6.8	1.1	0.7	8.0	3.8	11.0	2.3	2.9	2.9
Cycle Q Clear(g_c), s	0.5	1.2	1.5	6.8	1.1	0.7	8.0	3.8	11.0	2.3	2.9	2.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.06
Lane Grp Cap(c), veh/h	20	93	247	158	243	266	188	2140	1103	66	940	978
V/C Ratio(X)	0.45	0.26	0.12	0.81	0.11	0.05	0.82	0.15	0.39	0.68	0.12	0.12
Avail Cap(c_a), veh/h	95	380	491	240	540	518	267	2140	1103	95	940	978
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.7	43.5	34.7	42.4	36.6	33.5	41.7	8.6	6.5	45.2	11.4	11.4
Incr Delay (d2), s/veh	5.7	0.5	0.1	6.3	0.1	0.0	8.4	0.1	0.9	4.5	0.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.6	0.7	3.6	0.6	0.3	4.4	1.9	5.1	1.2	1.5	1.6
LnGrp Delay(d),s/veh	52.4	44.0	34.8	48.8	36.7	33.5	50.1	8.8	7.5	49.7	11.6	11.6
LnGrp LOS	D	D	C	D	D	C	D	A	A	D	B	B
Approach Vol, veh/h		62			168			907			268	
Approach Delay, s/veh		40.9			45.6			15.2			18.0	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.5	62.3	13.5	10.7	14.9	55.9	6.1	18.1
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	5.0	36.0	13.0	19.0	14.0	27.0	5.0	27.0
Max Q Clear Time (g_c+I1), s	4.3	13.0	8.8	3.5	10.0	4.9	2.5	3.1
Green Ext Time (p_c), s	0.0	2.7	0.1	0.2	0.1	2.6	0.0	0.2

Intersection Summary	
HCM 2010 Ctrl Delay	20.5
HCM 2010 LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	147	3	571	0	0	0	0	782	83	32	377	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1875	1881				0	1898	1900	1900	1881	0
Adj Flow Rate, veh/h	155	0	332				0	823	76	34	397	0
Adj No. of Lanes	1	0	2				0	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	33	1				0	0	0	0	1	0
Cap, veh/h	243	0	434				0	2016	186	61	2517	0
Arrive On Green	0.14	0.00	0.14				0.00	0.60	0.60	0.03	0.70	0.00
Sat Flow, veh/h	1792	0	3198				0	3434	308	1810	3668	0
Grp Volume(v), veh/h	155	0	332				0	444	455	34	397	0
Grp Sat Flow(s),veh/h/ln	1792	0	1599				0	1803	1844	1810	1787	0
Q Serve(g_s), s	6.1	0.0	7.5				0.0	9.7	9.7	1.4	2.8	0.0
Cycle Q Clear(g_c), s	6.1	0.0	7.5				0.0	9.7	9.7	1.4	2.8	0.0
Prop In Lane	1.00		1.00				0.00		0.17	1.00		0.00
Lane Grp Cap(c), veh/h	243	0	434				0	1089	1113	61	2517	0
V/C Ratio(X)	0.64	0.00	0.76				0.00	0.41	0.41	0.56	0.16	0.00
Avail Cap(c_a), veh/h	430	0	768				0	1089	1113	121	2517	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.97	0.97	0.00
Uniform Delay (d), s/veh	30.7	0.0	31.3				0.0	7.8	7.8	35.7	3.7	0.0
Incr Delay (d2), s/veh	1.0	0.0	1.1				0.0	1.1	1.1	2.8	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.1	0.0	3.4				0.0	5.2	5.3	0.7	1.4	0.0
LnGrp Delay(d),s/veh	31.7	0.0	32.3				0.0	8.9	8.9	38.5	3.8	0.0
LnGrp LOS	C		C					A	A	D	A	
Approach Vol, veh/h		487						899			431	
Approach Delay, s/veh		32.1						8.9			6.6	
Approach LOS		C						A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	7.5	51.3		16.2		58.8		
Change Period (Y+Rc), s	5.0	6.0		6.0		6.0		
Max Green Setting (Gmax), s	5.0	35.0		18.0		45.0		
Max Q Clear Time (g_c+I1), s	3.4	11.7		9.5		4.8		
Green Ext Time (p_c), s	0.0	5.0		0.7		5.4		

Intersection Summary	
HCM 2010 Ctrl Delay	14.6
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Intersection Level Of Service Report
#5: Street "B"/Lantz Lane / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	12.0
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	5	0	5	0	0	0	0	222	8	6	194	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	3	0	23	40	11	0	0	7	6
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	0	5	3	0	23	40	233	8	6	201	6
Peak Hour Factor	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	0	1	1	0	6	11	63	2	2	54	2
Total Analysis Volume [veh/h]	5	0	5	3	0	25	43	251	9	6	216	6
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes	yes		
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.01	0.01	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.78	11.93	9.66	11.59	11.96	9.56	7.76	0.00	0.00	7.77	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.05	0.05	0.05	0.11	0.11	0.11	0.83	0.83	0.00	0.63	0.63	0.63
95th-Percentile Queue Length [ft]	1.19	1.19	1.19	2.78	2.78	2.78	20.81	20.81	0.00	15.81	15.81	15.81
d_A, Approach Delay [s/veh]	10.72			9.77			1.10			0.20		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	1.34											
Intersection LOS	B											

Intersection Level Of Service Report
#6: Oliver Street / Street "C"

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street		Oliver Street		Street "C"	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Oliver Street		Oliver Street		Street "C"	
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	34	0	0	0	0	21
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	34	0	0	0	0	21
Peak Hour Factor	0.9200	0.9200	1.0000	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	0	0	0	0	6
Total Analysis Volume [veh/h]	37	0	0	0	0	23
Pedestrian Volume [ped/h]	0		0		0	

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.02
d_M, Delay for Movement [s/veh]	7.27	0.00	0.00	0.00	9.17	8.39
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.07	0.07	0.00	0.00	0.06	0.06
95th-Percentile Queue Length [ft]	1.75	1.75	0.00	0.00	1.62	1.62
d_A, Approach Delay [s/veh]	7.27		0.00		8.39	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	7.70					
Intersection LOS	A					

Intersection Level Of Service Report
#7: Oliver Street / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	11.6
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	6	0	3	0	0	0	0	222	5	12	194	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	14	0	7	11	3	0	0	6	23
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	0	3	14	0	7	11	225	5	12	200	23
Peak Hour Factor	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	0	1	4	0	2	3	62	1	3	55	6
Total Analysis Volume [veh/h]	7	0	3	15	0	8	12	247	5	13	220	25
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes	yes		
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.03	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	11.17	11.53	9.64	11.25	11.62	9.66	7.75	0.00	0.00	7.77	0.00	0.00
Movement LOS	B	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.05	0.05	0.05	0.11	0.11	0.11	0.73	0.73	0.00	0.73	0.73	0.73
95th-Percentile Queue Length [ft]	1.19	1.19	1.19	2.73	2.73	2.73	18.19	18.19	0.00	18.23	18.23	18.23
d_A, Approach Delay [s/veh]	10.71			10.70			0.35			0.39		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	0.99											
Intersection LOS	B											

APPENDIX 5.2:

EXISTING PLUS PROJECT CONDITIONS TRAFFIC SIGNAL WARRANT ANALYSIS

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Figure 4C-103 (CA). Traffic Signal Warrants Worksheet
(Average Traffic Estimate Form)

TRAFFIC CONDITIONS **E+P**

DIST ___ CO ___ RTE ___ PM ___

CALC CHS DATE 08/25/15

CHK CHS DATE 08/25/15

Jurisdiction: **City of Moreno Valley**

Major Street: **Nason Street**

Minor Street: **Street "A"**

Critical Approach Speed (Major) 25 mph

Critical Approach Speed (Minor) 25 mph

Major Street Approach Lanes = **1** lane

Minor Street Approach Lanes **1** lane

Major Street Future ADT = **379** vpd

Minor Street Future ADT = **259** vpd

Speed limit or critical speed on major street traffic > 64 km/h (40 mph); ……….. ☐

or **URBAN (U)**

In built up area of isolated community of < 10,000 population …………………… ☐

(Based on Estimated Average Daily Traffic - See Note)

URBAN XX	RURAL	Minimum Requirements EADT			
CONDITION A - Minimum Vehicular Volume		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied	Not Satisfied XX				
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1 **379**	1 **259**	8,000	5,600	2,400	1,680
2 +	1	9,600	6,720	2,400	1,680
2 +	2 +	9,600	6,720	3,200	2,240
1	2 +	8,000	5,600	3,200	2,240
CONDITION B - Interruption of Continuous Traffic		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied	Not Satisfied XX				
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1 **379**	1 **259**	12,000	8,400	1,200	850
2 +	1	14,400	10,080	1,200	850
2 +	2 +	14,400	10,080	1,600	1,120
1	2 +	12,000	8,400	1,600	1,120
Combination of CONDITIONS A + B		2 CONDITIONS 80%		2 CONDITIONS 80%	
Satisfied	Not Satisfied XX				
No one condition satisfied, but following conditions fulfilled 80% of more …..	A **5%** / B **3%**				

Note: To be used only for NEW INTERSECTIONS or other locations where it is not reasonable to count actual traffic volumes.

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

URBAN CROSSROADS

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

Traffic Conditions = **E+P Conditions - Weekday AM Peak Hour**

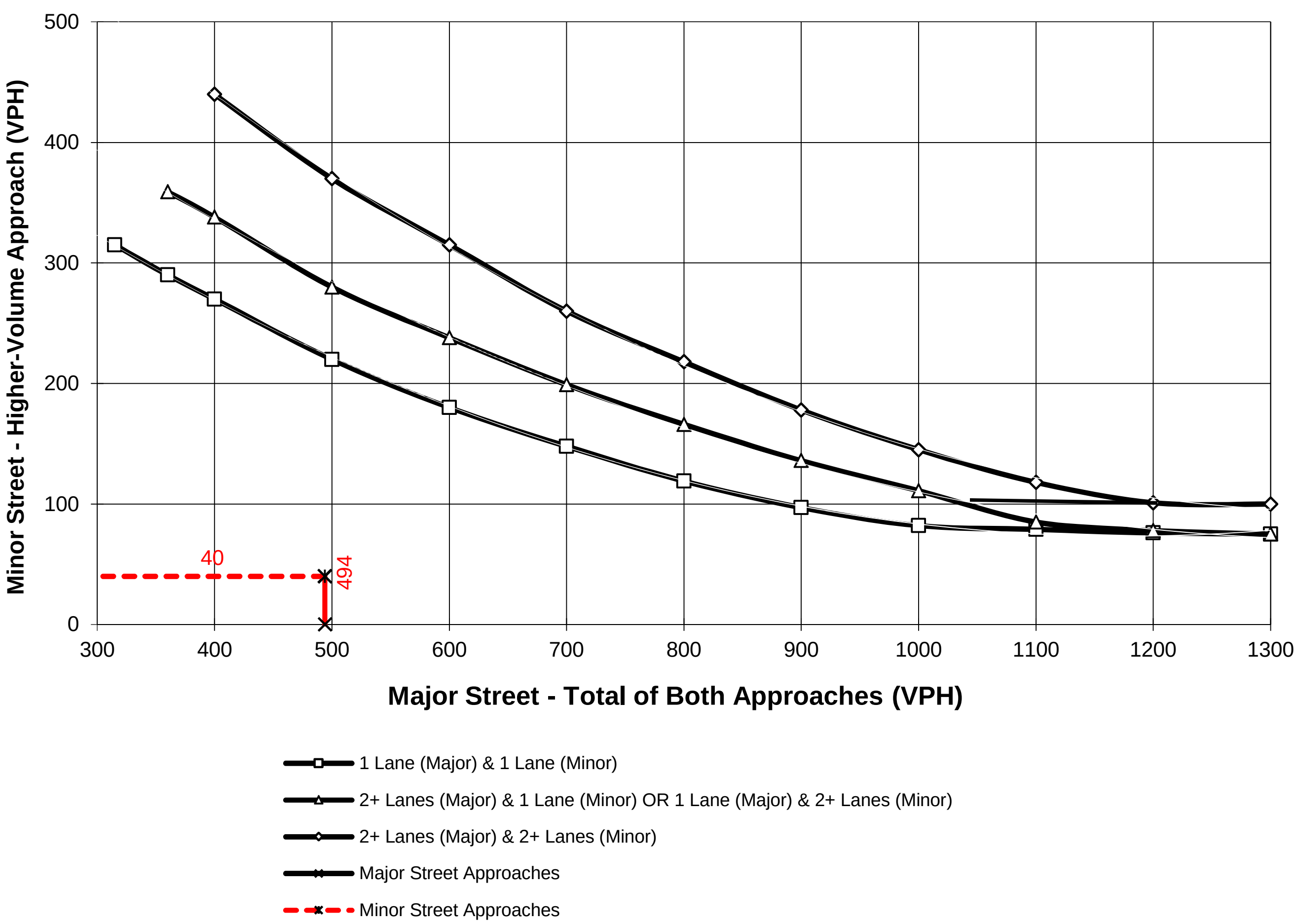
Major Street Name = **Ironwood Avenue**

Total of Both Approaches (VPH) = **494**
Number of Approach Lanes Major Street = **1**

Minor Street Name = **Lantz Lane**

High Volume Approach (VPH) = **40**
Number of Approach Lanes Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 100 vph applies as the lower threshold for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold for a minor-street approach with one lane

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet
(Average Traffic Estimate Form)

DIST	CO	RTE	PM	TRAFFIC CONDITIONS	E+P
				CALC CHS	DATE 08/25/15
				CHK CHS	DATE 08/25/15

Jurisdiction: **City of Moreno Valley**
Major Street: **Oliver Street**
Minor Street: **Street "C"**

Critical Approach Speed (Major) 25 mph
Critical Approach Speed (Minor) 25 mph

Major Street Approach Lanes = **1** lane
Minor Street Approach Lanes **1** lane

Major Street Future ADT = **259** vpd
Minor Street Future ADT = **259** vpd

Speed limit or critical speed on major street traffic > 64 km/h (40 mph); ……….. ☐

or **URBAN (U)**

In built up area of isolated community of < 10,000 population …………………… ☐

(Based on Estimated Average Daily Traffic - See Note)

URBAN	RURAL	Minimum Requirements EADT			
XX					
CONDITION A - Minimum Vehicular Volume		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied	Not Satisfied				
	XX				
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1 **259**	1 **259**	8,000	5,600	2,400	1,680
2 +	1	9,600	6,720	2,400	1,680
2 +	2 +	9,600	6,720	3,200	2,240
1	2 +	8,000	5,600	3,200	2,240
CONDITION B - Interruption of Continuous Traffic		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied	Not Satisfied				
	XX				
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1 **259**	1 **259**	12,000	8,400	1,200	850
2 +	1	14,400	10,080	1,200	850
2 +	2 +	14,400	10,080	1,600	1,120
1	2 +	12,000	8,400	1,600	1,120
Combination of CONDITIONS A + B		2 CONDITIONS 80%		2 CONDITIONS 80%	
Satisfied	Not Satisfied				
	XX				
No one condition satisfied, but following conditions fulfilled 80% of more …..					
A **3%**	B **2%**				

Note: To be used only for NEW INTERSECTIONS or other locations where it is not reasonable to count actual traffic volumes.

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

Traffic Conditions = **E+P Conditions - Weekday AM Peak Hour**

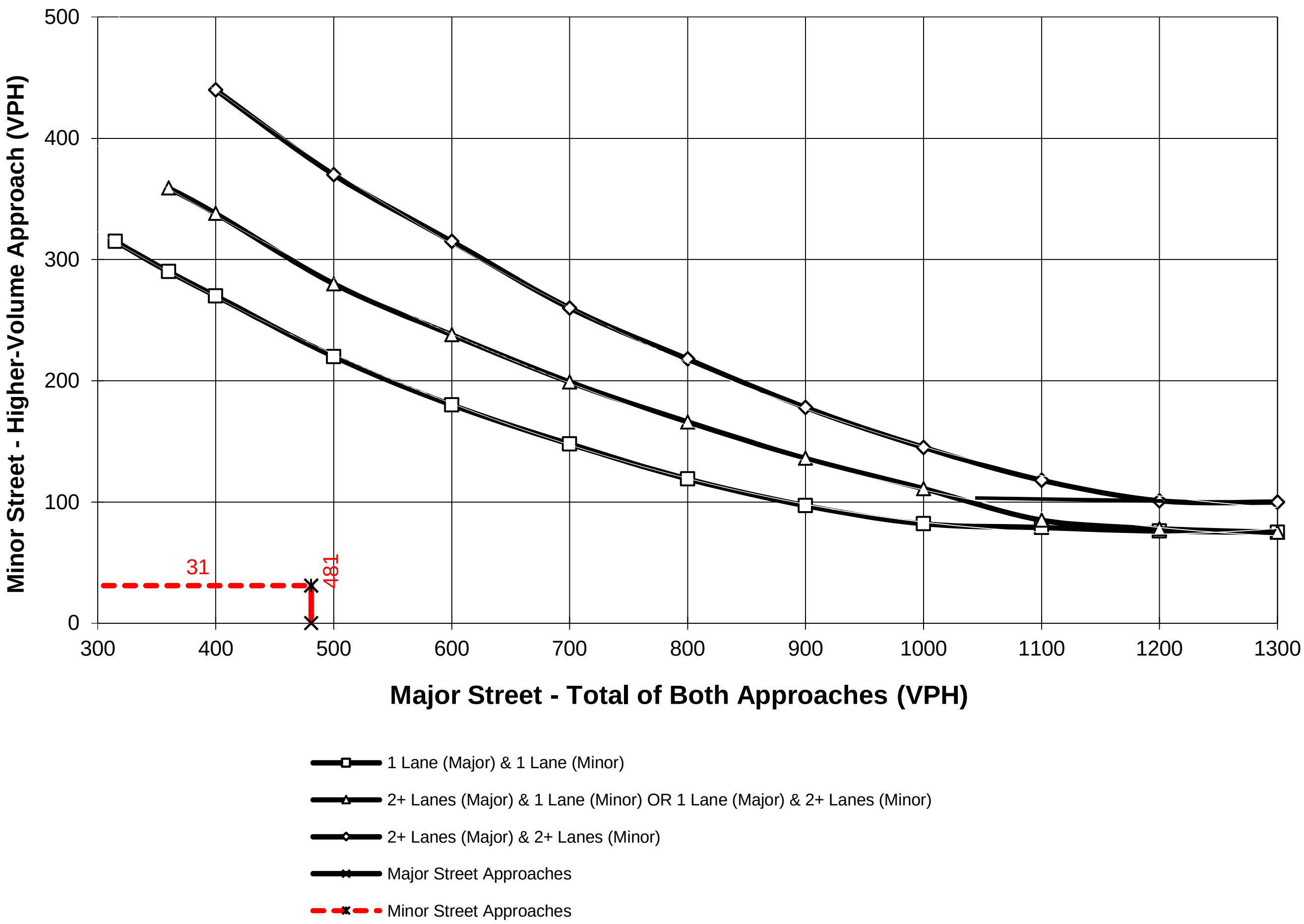
Major Street Name = **Ironwood Avenue**

Total of Both Approaches (VPH) = **481**
Number of Approach Lanes Major Street = **1**

Minor Street Name = **Oliver Street**

High Volume Approach (VPH) = **31**
Number of Approach Lanes Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 100 vph applies as the lower threshold for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold for a minor-street approach with one lane

APPENDIX 5.3:

EXISTING PLUS PROJECT OFF-RAMP QUEUING ANALYSIS WORKSHEETS

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3: Nason Street & Elder Avenue/SR-60 Westbound Ramps

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	7	66	230	83	17	17	105	321	563	84	343
v/c Ratio	0.07	0.36	0.42	0.49	0.04	0.03	0.62	0.17	0.44	0.56	0.19
Control Delay	44.7	43.1	5.4	50.1	26.5	0.1	56.5	15.3	2.2	55.9	16.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.7	43.1	5.4	50.1	26.5	0.1	56.5	15.3	2.2	55.9	16.6
Queue Length 50th (ft)	4	39	0	49	8	0	61	53	0	49	58
Queue Length 95th (ft)	17	63	33	83	21	0	103	96	27	88	106
Internal Link Dist (ft)		689			1331			796			788
Turn Bay Length (ft)	120		120	1000		200	360		150	100	
Base Capacity (vph)	95	336	579	285	540	647	202	1919	1322	170	1776
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.20	0.40	0.29	0.03	0.03	0.52	0.17	0.43	0.49	0.19

Intersection Summary

Lane Group	EBL	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	37	279	277	1087	70	585
v/c Ratio	0.20	0.69	0.68	0.52	0.40	0.22
Control Delay	31.1	13.7	13.3	11.4	38.1	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.1	13.7	13.3	11.4	38.1	3.9
Queue Length 50th (ft)	17	1	0	135	31	30
Queue Length 95th (ft)	35	46	45	227	60	65
Internal Link Dist (ft)		1293		1072		796
Turn Bay Length (ft)	805		225		250	
Base Capacity (vph)	420	567	568	2103	179	2622
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.49	0.49	0.52	0.39	0.22

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	9	24	100	128	26	24	155	321	534	45	227
v/c Ratio	0.09	0.15	0.22	0.66	0.09	0.04	0.70	0.15	0.39	0.39	0.12
Control Delay	45.1	39.1	2.2	56.0	29.6	0.1	56.0	12.0	1.7	53.0	15.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.1	39.1	2.2	56.0	29.6	0.1	56.0	12.0	1.7	53.0	15.7
Queue Length 50th (ft)	5	14	0	74	14	0	90	36	0	26	29
Queue Length 95th (ft)	21	34	11	132	31	0	153	100	41	#69	84
Internal Link Dist (ft)		689			1331			796			788
Turn Bay Length (ft)	120		120	1000		200	360		150	100	
Base Capacity (vph)	95	380	482	239	540	568	268	2159	1393	115	1836
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.06	0.21	0.54	0.05	0.04	0.58	0.15	0.38	0.39	0.12

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	155	304	300	910	34	397
v/c Ratio	0.56	0.62	0.62	0.41	0.25	0.16
Control Delay	36.5	9.8	9.5	9.4	37.1	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.5	9.8	9.5	9.4	37.1	4.9
Queue Length 50th (ft)	67	1	0	77	15	28
Queue Length 95th (ft)	113	64	62	201	41	56
Internal Link Dist (ft)		1293		1072		796
Turn Bay Length (ft)	805		225		250	
Base Capacity (vph)	428	592	592	2232	137	2452
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.51	0.51	0.41	0.25	0.16

Intersection Summary

APPENDIX 6.1:

OPENING YEAR CUMULATIVE (2020) WITHOUT PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS

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Intersection Level Of Service Report
#2: Nason Street / Ironwood Avenue

Control Type:	Signalized	Delay (sec / veh):	47.0
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.843

Intersection Setup

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			25.00			45.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			no			yes			no		

Volumes

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	221	4	40	0	7	0	1	199	244	31	208	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	73	0	39	0	0	0	0	81	142	38	45	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	18	0	0	0	0	0	38	0	0	0
Total Hourly Volume [veh/h]	316	4	65	0	8	0	1	300	372	72	274	0
Peak Hour Factor	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	99	1	20	0	2	0	0	94	116	22	85	0
Total Analysis Volume [veh/h]	394	5	81	0	10	0	1	374	464	90	342	0
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	120
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LagFO
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	8	0	0	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	5.0	0.0	0.0	5.0	0.0	4.0	5.0	0.0	4.0	5.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	33	0	0	33	0	76	71	0	16	11	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
Minimum Recall		no			no		no	no		no	no	
Maximum Recall		no			no		no	yes		no	yes	
Pedestrian Recall		no			no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	C	R	C	L	C	L	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	5.00	6.00	5.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	3.00	4.00	3.00	4.00
g_i, Effective Green Time [s]	27	27	27	0	68	8	76
g / C, Green / Cycle	0.23	0.23	0.23	0.00	0.56	0.07	0.63
(v / s)_i Volume / Saturation Flow Rate	0.24	0.06	0.01	0.00	0.55	0.06	0.20
s, saturation flow rate [veh/h]	1675	1425	1552	1597	1527	1597	1676
c, Capacity [veh/h]	437	321	380	4	861	110	1057
d1, Uniform Delay [s]	47.20	38.17	36.24	59.73	25.27	55.07	10.27
k, delay calibration	0.43	0.04	0.04	0.04	0.50	0.04	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	23.28	0.15	0.01	13.65	24.77	5.43	0.81
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.91	0.25	0.03	0.27	0.97	0.82	0.32
d, Delay for Lane Group [s/veh]	70.48	38.33	36.25	73.38	50.04	60.50	11.08
Lane Group LOS	E	D	D	E	D	E	B
Critical Lane Group	yes	no	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	14.48	1.93	0.23	0.04	26.27	2.74	3.79
50th-Percentile Queue Length [ft]	362.01	48.13	5.85	1.10	656.76	68.56	94.73
95th-Percentile Queue Length [veh]	20.72	3.47	0.42	0.08	34.68	4.94	6.82
95th-Percentile Queue Length [ft]	518.03	86.64	10.54	1.97	866.90	123.40	170.52

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	70.48	70.48	38.33	36.25	36.25	36.25	73.38	50.04	50.04	60.50	11.08	11.08
Movement LOS	E	E	D	D	D	D	E	D	D	E	B	B
d_A, Approach Delay [s/veh]	65.05			36.25			50.07			21.38		
Approach LOS	E			D			D			C		
d_I, Intersection Delay [s/veh]	47.03											
Intersection LOS	D											
Intersection V/C	0.843											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	57	203	92	15	40	92	346	550	59	432	2
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1863	1900	1900	1900	1810	1900	1881	1810	1881	1900
Adj Flow Rate, veh/h	7	70	91	112	18	39	112	422	581	72	527	2
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	0	4	2	0	0	0	5	0	1	5	1	1
Cap, veh/h	16	139	248	142	276	320	139	2026	1022	91	1948	7
Arrive On Green	0.01	0.08	0.08	0.08	0.15	0.15	0.08	0.56	0.56	0.05	0.53	0.53
Sat Flow, veh/h	1810	1827	1583	1810	1900	1615	1723	3610	1599	1723	3652	14
Grp Volume(v), veh/h	7	70	91	112	18	39	112	422	581	72	258	271
Grp Sat Flow(s),veh/h/ln	1810	1827	1583	1810	1900	1615	1723	1805	1599	1723	1787	1879
Q Serve(g_s), s	0.4	3.5	4.9	5.8	0.8	1.9	6.1	5.5	19.6	3.9	7.5	7.5
Cycle Q Clear(g_c), s	0.4	3.5	4.9	5.8	0.8	1.9	6.1	5.5	19.6	3.9	7.5	7.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.01
Lane Grp Cap(c), veh/h	16	139	248	142	276	320	139	2026	1022	91	953	1002
V/C Ratio(X)	0.44	0.50	0.37	0.79	0.07	0.12	0.80	0.21	0.57	0.79	0.27	0.27
Avail Cap(c_a), veh/h	95	327	411	286	540	545	200	2026	1022	109	953	1002
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.50	0.50	0.50	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.8	42.2	35.8	43.0	35.0	31.3	42.9	10.4	9.7	44.5	12.1	12.1
Incr Delay (d2), s/veh	6.8	1.1	0.3	3.7	0.0	0.1	4.8	0.1	1.2	22.4	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.8	2.1	3.0	0.4	0.8	3.1	2.8	8.8	2.4	3.8	4.0
LnGrp Delay(d),s/veh	53.6	43.2	36.2	46.7	35.1	31.3	47.8	10.5	10.9	66.8	12.8	12.8
LnGrp LOS	D	D	D	D	D	C	D	B	B	E	B	B
Approach Vol, veh/h		168			169			1115			601	
Approach Delay, s/veh		39.8			41.9			14.4			19.2	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	59.3	12.4	13.2	12.7	56.7	5.8	19.8
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	6.0	35.0	15.0	17.0	11.0	30.0	5.0	27.0
Max Q Clear Time (g_c+I1), s	5.9	21.6	7.8	6.9	8.1	9.5	2.4	3.9
Green Ext Time (p_c), s	0.0	4.1	0.1	0.4	0.0	4.6	0.0	0.5

Intersection Summary	
HCM 2010 Ctrl Delay	20.2
HCM 2010 LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	27	2	512	0	0	0	0	961	162	134	593	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1839	1845				0	1881	1900	1900	1881	0
Adj Flow Rate, veh/h	33	0	329				0	1172	165	163	723	0
Adj No. of Lanes	1	0	2				0	2	0	1	2	0
Peak Hour Factor	0.82	0.82	0.82				0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	4	50	3				0	1	1	0	1	0
Cap, veh/h	235	0	423				0	1758	247	145	2520	0
Arrive On Green	0.13	0.00	0.13				0.00	0.56	0.56	0.08	0.71	0.00
Sat Flow, veh/h	1740	0	3136				0	3243	442	1810	3668	0
Grp Volume(v), veh/h	33	0	329				0	664	673	163	723	0
Grp Sat Flow(s),veh/h/ln	1740	0	1568				0	1787	1803	1810	1787	0
Q Serve(g_s), s	1.3	0.0	7.6				0.0	19.6	19.7	6.0	5.6	0.0
Cycle Q Clear(g_c), s	1.3	0.0	7.6				0.0	19.6	19.7	6.0	5.6	0.0
Prop In Lane	1.00		1.00				0.00		0.25	1.00		0.00
Lane Grp Cap(c), veh/h	235	0	423				0	998	1007	145	2520	0
V/C Ratio(X)	0.14	0.00	0.78				0.00	0.66	0.67	1.13	0.29	0.00
Avail Cap(c_a), veh/h	418	0	753				0	998	1007	145	2520	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.93	0.93	0.00
Uniform Delay (d), s/veh	28.6	0.0	31.4				0.0	11.6	11.7	34.5	4.1	0.0
Incr Delay (d2), s/veh	0.1	0.0	1.2				0.0	3.5	3.5	109.9	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	3.4				0.0	10.6	10.7	7.4	2.8	0.0
LnGrp Delay(d),s/veh	28.7	0.0	32.5				0.0	15.1	15.2	144.4	4.4	0.0
LnGrp LOS	C		C					B	B	F	A	
Approach Vol, veh/h		362						1337			886	
Approach Delay, s/veh		32.2						15.2			30.1	
Approach LOS		C						B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	11.0	47.9		16.1		58.9		
Change Period (Y+Rc), s	5.0	6.0		6.0		6.0		
Max Green Setting (Gmax), s	6.0	34.0		18.0		45.0		
Max Q Clear Time (g_c+I1), s	8.0	21.7		9.6		7.6		
Green Ext Time (p_c), s	0.0	6.9		0.5		11.1		

Intersection Summary			
HCM 2010 Ctrl Delay			22.7
HCM 2010 LOS			C

Notes

User approved volume balancing among the lanes for turning movement.

Intersection Level Of Service Report
#5: Street "B"/Lantz Lane / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	13.3
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	+						‖r			⊣		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	12	0	4	0	0	0	0	232	7	1	227	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.00	1.00	1.00	1.00	1.10	1.10	1.10	1.10	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	1	0	0	0	0	119	1	1	81	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	15	0	5	0	0	0	0	374	9	2	331	0
Peak Hour Factor	0.8100	0.8100	0.8100	1.0000	1.0000	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	0	2	0	0	0	0	115	3	1	102	0
Total Analysis Volume [veh/h]	19	0	6	0	0	0	0	462	11	2	409	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes			
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.19	13.29	11.40	0.00	0.00	0.00	0.00	0.00	0.00	8.31	0.00	0.00
Movement LOS	B	B	B					A	A	A	A	
95th-Percentile Queue Length [veh]	0.16	0.16	0.16	0.00	0.00	0.00	0.00	0.00	0.00	1.78	1.78	0.00
95th-Percentile Queue Length [ft]	4.03	4.03	4.03	0.00	0.00	0.00	0.00	0.00	0.00	44.53	44.53	0.00
d_A, Approach Delay [s/veh]	12.76			0.00			0.00			0.04		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.37											
Intersection LOS	B											

Intersection Level Of Service Report
#7: Oliver Street / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	13.2
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	3	0	9	0	0	0	0	235	1	3	225	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10	1.00	1.10	1.10	1.10	1.10	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	1	0	1	0	0	0	0	119	1	1	81	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	0	11	0	0	0	0	378	2	4	329	0
Peak Hour Factor	0.8100	0.8100	0.8100	1.0000	1.0000	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	0	3	0	0	0	0	117	1	1	102	0
Total Analysis Volume [veh/h]	5	0	14	0	0	0	0	467	2	5	406	0
Pedestrian Volume [ped/h]	0			0			0			0		

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes	yes		
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.10	13.20	11.27	13.14	13.01	10.58	0.00	0.00	0.00	8.31	0.00	0.00
Movement LOS	B	B	B	B	B	B		A	A	A	A	
95th-Percentile Queue Length [veh]	0.11	0.11	0.11	0.00	0.00	0.00	0.00	0.00	0.00	1.77	1.77	0.00
95th-Percentile Queue Length [ft]	2.67	2.67	2.67	0.00	0.00	0.00	0.00	0.00	0.00	44.30	44.30	0.00
d_A, Approach Delay [s/veh]	11.75			12.25			0.00			0.10		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	0.29											
Intersection LOS	B											

Intersection Level Of Service Report
#2: Nason Street / Ironwood Avenue

Control Type:	Signalized	Delay (sec / veh):	28.6
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.676

Intersection Setup

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			25.00			45.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			no			yes			no		

Volumes

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	197	5	54	0	4	2	0	176	148	47	151	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	180	0	59	0	0	0	0	73	132	58	96	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	31	0	0	2	0	0	20	0	0	0
Total Hourly Volume [veh/h]	397	6	87	0	4	0	0	267	275	110	262	1
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	101	2	22	0	1	0	0	68	70	28	67	0
Total Analysis Volume [veh/h]	405	6	89	0	4	0	0	272	281	112	267	1
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	75
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LagFO
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	8	0	0	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	5.0	0.0	0.0	5.0	0.0	4.0	5.0	0.0	4.0	5.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	28	0	0	28	0	10	28	0	19	37	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
Minimum Recall		no			no		no	no		no	no	
Maximum Recall		no			no		no	yes		no	yes	
Pedestrian Recall		no			no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	C	R	C	L	C	L	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	5.00	6.00	5.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	3.00	4.00	3.00	4.00
g_i, Effective Green Time [s]	20	20	20	0	31	7	38
g / C, Green / Cycle	0.27	0.27	0.27	0.00	0.42	0.09	0.51
(v / s)_i Volume / Saturation Flow Rate	0.25	0.06	0.00	0.00	0.36	0.07	0.16
s, saturation flow rate [veh/h]	1670	1425	1545	1597	1539	1597	1675
c, Capacity [veh/h]	542	382	462	2	642	141	845
d1, Uniform Delay [s]	26.67	21.47	20.20	0.00	19.90	33.58	10.99
k, delay calibration	0.23	0.04	0.04	0.04	0.50	0.04	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	4.66	0.11	0.00	0.00	14.15	3.81	0.99
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

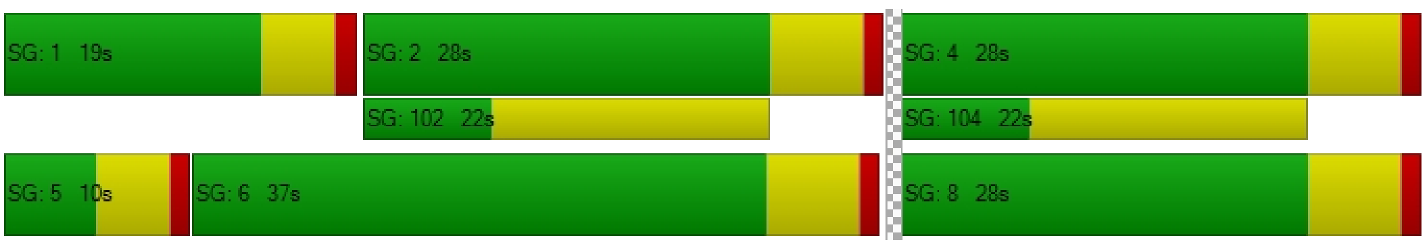
X, volume / capacity	0.76	0.23	0.01	0.00	0.86	0.79	0.32
d, Delay for Lane Group [s/veh]	31.33	21.59	20.20	0.00	34.04	37.39	11.98
Lane Group LOS	C	C	C	A	C	D	B
Critical Lane Group	yes	no	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	7.08	1.12	0.05	0.00	9.91	1.96	2.24
50th-Percentile Queue Length [ft]	177.03	28.11	1.27	0.00	247.72	48.91	55.95
95th-Percentile Queue Length [veh]	11.45	2.02	0.09	0.00	15.07	3.52	4.03
95th-Percentile Queue Length [ft]	286.13	50.59	2.29	0.00	376.79	88.04	100.71

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	31.33	31.33	21.59	20.20	20.20	20.20	0.00	34.04	34.04	37.39	11.98	11.98
Movement LOS	C	C	C	C	C	C	A	C	C	D	B	B
d_A, Approach Delay [s/veh]		29.60			20.20			34.04			19.47	
Approach LOS		C			C			C			B	
d_I, Intersection Delay [s/veh]	28.60											
Intersection LOS	C											
Intersection V/C	0.676											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

HCM 2010 Signalized Intersection Summary — Ironwood Residential TIA (JN 09386)
3: Nason Street & Elder Avenue/SR-60 Westbound Ramps — 2/24/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	24	104	194	26	106	160	413	604	35	379	11
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1863	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	10	26	42	211	28	105	174	449	554	38	412	8
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	2	0	0	0	0	0	0	0	0
Cap, veh/h	22	100	270	243	336	340	208	1970	1103	60	1682	33
Arrive On Green	0.01	0.05	0.05	0.14	0.18	0.18	0.11	0.55	0.55	0.03	0.46	0.46
Sat Flow, veh/h	1810	1900	1615	1774	1900	1615	1810	3610	1615	1810	3622	70
Grp Volume(v), veh/h	10	26	42	211	28	105	174	449	554	38	205	215
Grp Sat Flow(s),veh/h/ln	1810	1900	1615	1774	1900	1615	1810	1805	1615	1810	1805	1887
Q Serve(g_s), s	0.5	1.2	2.1	11.1	1.2	5.2	8.9	6.1	15.7	2.0	6.5	6.5
Cycle Q Clear(g_c), s	0.5	1.2	2.1	11.1	1.2	5.2	8.9	6.1	15.7	2.0	6.5	6.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.04
Lane Grp Cap(c), veh/h	22	100	270	243	336	340	208	1970	1103	60	838	876
V/C Ratio(X)	0.45	0.26	0.16	0.87	0.08	0.31	0.84	0.23	0.50	0.63	0.24	0.25
Avail Cap(c_a), veh/h	95	380	508	243	540	513	267	1970	1103	95	838	876
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.75	0.75	0.75	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.6	43.2	33.8	40.2	32.6	31.7	41.2	11.2	7.3	45.3	15.4	15.4
Incr Delay (d2), s/veh	5.3	0.5	0.1	26.0	0.0	0.2	10.6	0.2	1.2	4.0	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.7	1.0	7.1	0.6	2.4	5.1	3.1	7.3	1.0	3.4	3.6
LnGrp Delay(d),s/veh	51.9	43.8	33.9	66.1	32.7	31.9	51.8	11.4	8.5	49.3	16.1	16.0
LnGrp LOS	D	D	C	E	C	C	D	B	A	D	B	B
Approach Vol, veh/h		78			344			1177			458	
Approach Delay, s/veh		39.5			52.9			16.0			18.8	
Approach LOS		D			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.2	57.9	18.0	11.0	15.9	50.1	6.2	22.8
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	5.0	36.0	13.0	19.0	14.0	27.0	5.0	27.0
Max Q Clear Time (g_c+I1), s	4.0	17.7	13.1	4.1	10.9	8.5	2.5	7.2
Green Ext Time (p_c), s	0.0	4.1	0.0	0.3	0.1	4.1	0.0	0.4

Intersection Summary	
HCM 2010 Ctrl Delay	23.7
HCM 2010 LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	145	3	713	0	0	0	0	1032	139	83	594	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1876	1881				0	1898	1900	1900	1881	0
Adj Flow Rate, veh/h	153	0	482				0	1086	135	87	625	0
Adj No. of Lanes	1	0	2				0	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	33	1				0	0	0	0	1	0
Cap, veh/h	325	0	581				0	1711	212	112	2353	0
Arrive On Green	0.18	0.00	0.18				0.00	0.53	0.53	0.06	0.66	0.00
Sat Flow, veh/h	1792	0	3198				0	3324	401	1810	3668	0
Grp Volume(v), veh/h	153	0	482				0	606	615	87	625	0
Grp Sat Flow(s),veh/h/ln	1792	0	1599				0	1803	1827	1810	1787	0
Q Serve(g_s), s	5.7	0.0	10.9				0.0	17.8	17.9	3.6	5.4	0.0
Cycle Q Clear(g_c), s	5.7	0.0	10.9				0.0	17.8	17.9	3.6	5.4	0.0
Prop In Lane	1.00		1.00				0.00		0.22	1.00		0.00
Lane Grp Cap(c), veh/h	325	0	581				0	955	968	112	2353	0
V/C Ratio(X)	0.47	0.00	0.83				0.00	0.63	0.64	0.78	0.27	0.00
Avail Cap(c_a), veh/h	430	0	768				0	955	968	121	2353	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.91	0.91	0.00
Uniform Delay (d), s/veh	27.5	0.0	29.6				0.0	12.5	12.5	34.7	5.3	0.0
Incr Delay (d2), s/veh	0.4	0.0	4.5				0.0	3.2	3.2	20.4	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	0.0	5.2				0.0	9.6	9.7	2.4	2.7	0.0
LnGrp Delay(d),s/veh	27.9	0.0	34.1				0.0	15.7	15.7	55.1	5.6	0.0
LnGrp LOS	C		C					B	B	E	A	
Approach Vol, veh/h		635						1221			712	
Approach Delay, s/veh		32.6						15.7			11.6	
Approach LOS		C						B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	9.6	45.7		19.6		55.4		
Change Period (Y+Rc), s	5.0	6.0		6.0		6.0		
Max Green Setting (Gmax), s	5.0	35.0		18.0		45.0		
Max Q Clear Time (g_c+I1), s	5.6	19.9		12.9		7.4		
Green Ext Time (p_c), s	0.0	6.8		0.7		9.2		

Intersection Summary	
HCM 2010 Ctrl Delay	18.7
HCM 2010 LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Intersection Level Of Service Report
#5: Street "B"/Lantz Lane / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	12.8
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	5	0	5	0	0	0	0	222	8	6	194	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.00	1.00	1.00	1.00	1.10	1.10	1.10	1.10	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	0	1	0	0	0	0	125	7	1	148	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	0	7	0	0	0	0	369	16	8	361	0
Peak Hour Factor	0.9300	0.9300	0.9300	1.0000	1.0000	1.0000	1.0000	0.9300	0.9300	0.9300	0.9300	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	2	0	0	0	0	99	4	2	97	0
Total Analysis Volume [veh/h]	13	0	8	0	0	0	0	397	17	9	388	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes			
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	12.66	12.84	10.79	0.00	0.00	0.00	0.00	0.00	0.00	8.17	0.00	0.00
Movement LOS	B	B	B					A	A	A	A	
95th-Percentile Queue Length [veh]	0.12	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	1.57	1.57	0.00
95th-Percentile Queue Length [ft]	3.03	3.03	3.03	0.00	0.00	0.00	0.00	0.00	0.00	39.15	39.15	0.00
d_A, Approach Delay [s/veh]	11.95			0.00			0.00			0.19		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.39											
Intersection LOS	B											

Intersection Level Of Service Report
#7: Oliver Street / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	13.0
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	6	0	3	0	0	0	0	222	5	12	194	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10	1.00	1.10	1.10	1.10	1.10	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	4	0	1	0	0	0	0	122	4	1	145	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	11	0	4	0	0	0	0	366	10	14	358	0
Peak Hour Factor	0.9100	0.9100	0.9100	1.0000	1.0000	1.0000	1.0000	0.9100	0.9100	0.9100	0.9100	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	1	0	0	0	0	101	3	4	98	0
Total Analysis Volume [veh/h]	12	0	4	0	0	0	0	402	11	15	393	0
Pedestrian Volume [ped/h]	0			0			0			0		

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes			
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	12.79	12.97	10.78	0.00	0.00	0.00	0.00	0.00	0.00	8.18	0.00	0.00
Movement LOS	B	B	B					A	A	A	A	
95th-Percentile Queue Length [veh]	0.10	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.00	1.63	1.63	0.00
95th-Percentile Queue Length [ft]	2.43	2.43	2.43	0.00	0.00	0.00	0.00	0.00	0.00	40.75	40.75	0.00
d_A, Approach Delay [s/veh]	12.29			0.00			0.00			0.30		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.38											
Intersection LOS	B											

APPENDIX 6.2:

OPENING YEAR CUMULATIVE (2020) WITH PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS

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Intersection Level Of Service Report
#1: Nason Street / Street "A"

Control Type:	Two-way stop	Delay (sec / veh):	8.9
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.036

Intersection Setup

Name	Nason Street		Nason Street		Street "A"	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Nason Street		Nason Street		Street "A"	
Base Volume Input [veh/h]	5	0	0	7	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	11	0	0	31	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	11	0	8	31	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	3	0	2	8	0
Total Analysis Volume [veh/h]	7	12	0	9	34	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.04	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.25	0.00	8.91	8.51
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.11	0.11
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	2.77	2.77
d_A, Approach Delay [s/veh]	0.00		0.00		8.91	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	4.89					
Intersection LOS	A					

Intersection Level Of Service Report
#2: Nason Street / Ironwood Avenue

Control Type:	Signalized	Delay (sec / veh):	54.7
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.877

Intersection Setup

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			25.00			45.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			no			yes			no		

Volumes

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	221	4	40	0	7	0	1	199	244	31	208	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	73	9	49	0	26	5	2	86	142	68	60	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	18	0	0	0	0	0	38	0	0	0
Total Hourly Volume [veh/h]	316	13	75	0	34	5	3	305	372	102	289	0
Peak Hour Factor	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	99	4	23	0	11	2	1	95	116	32	90	0
Total Analysis Volume [veh/h]	394	16	94	0	42	6	4	380	464	127	360	0
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LagFO
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	8	0	0	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	5.0	0.0	0.0	5.0	0.0	4.0	5.0	0.0	4.0	5.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	29	0	0	29	0	10	67	0	14	71	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
Minimum Recall		no			no		no	no		no	no	
Maximum Recall		no			no		no	yes		no	yes	
Pedestrian Recall		no			no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Lane Group Calculations

Lane Group	C	R	C	L	C	L	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	5.00	6.00	5.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	3.00	4.00	3.00	4.00
g_i, Effective Green Time [s]	23	23	23	1	61	9	69
g / C, Green / Cycle	0.21	0.21	0.21	0.01	0.55	0.08	0.63
(v / s)_i Volume / Saturation Flow Rate	0.24	0.07	0.03	0.00	0.55	0.08	0.21
s, saturation flow rate [veh/h]	1675	1425	1498	1597	1528	1597	1676
c, Capacity [veh/h]	415	298	346	10	846	132	1056
d1, Uniform Delay [s]	45.14	36.81	35.43	54.44	24.49	50.29	9.60
k, delay calibration	0.50	0.04	0.04	0.04	0.50	0.25	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	41.26	0.22	0.07	9.28	30.42	46.85	0.88
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.99	0.32	0.14	0.40	1.00	0.96	0.34
d, Delay for Lane Group [s/veh]	86.40	37.03	35.50	63.72	54.91	97.14	10.48
Lane Group LOS	F	D	D	E	D	F	B
Critical Lane Group	yes	no	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	15.82	2.09	1.07	0.13	26.11	5.03	3.59
50th-Percentile Queue Length [ft]	395.50	52.28	26.74	3.33	652.84	125.75	89.77
95th-Percentile Queue Length [veh]	22.34	3.76	1.93	0.24	34.49	8.71	6.46
95th-Percentile Queue Length [ft]	558.57	94.10	48.14	6.00	862.35	217.71	161.58

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	86.40	86.40	37.03	35.50	35.50	35.50	63.72	54.91	54.91	97.14	10.48	10.48
Movement LOS	F	F	D	D	D	D	E	D	D	F	B	B
d_A, Approach Delay [s/veh]	77.19			35.50			54.95			33.08		
Approach LOS	E			D			D			C		
d_I, Intersection Delay [s/veh]	54.75											
Intersection LOS	D											
Intersection V/C	0.877											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
#5: Street "B"/Lantz Lane / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	14.5
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.048

Intersection Setup

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	12	0	4	0	0	0	0	232	7	1	227	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	1	5	0	35	12	122	1	1	91	2
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	15	0	5	5	0	35	12	377	9	2	341	2
Peak Hour Factor	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	0	2	2	0	11	4	116	3	1	105	1
Total Analysis Volume [veh/h]	19	0	6	6	0	43	15	465	11	2	421	2
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes	yes		
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.00	0.01	0.01	0.00	0.07	0.01	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	14.55	13.90	11.54	13.88	13.93	11.24	8.21	0.00	0.00	8.32	0.00	0.00
Movement LOS	B	B	B	B	B	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.18	0.18	0.18	0.27	0.27	0.27	2.14	2.14	0.00	1.89	1.89	1.89
95th-Percentile Queue Length [ft]	4.58	4.58	4.58	6.67	6.67	6.67	53.47	53.47	0.00	47.14	47.14	47.14
d_A, Approach Delay [s/veh]	13.82			11.56			0.25			0.04		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	1.06											
Intersection LOS	B											

Intersection Level Of Service Report
#6: Oliver Street / Street "C"

Control Type:	Two-way stop	Delay (sec / veh):	8.9
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street		Oliver Street		Street "C"	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Oliver Street		Oliver Street		Street "C"	
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	10	0	0	0	0	31
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	10	0	0	0	0	31
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	0	0	0	8
Total Analysis Volume [veh/h]	11	0	0	0	0	34
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.00	0.03
d_M, Delay for Movement [s/veh]	7.23	0.00	0.00	0.00	8.92	8.43
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.02	0.02	0.00	0.00	0.10	0.10
95th-Percentile Queue Length [ft]	0.51	0.51	0.00	0.00	2.42	2.42
d_A, Approach Delay [s/veh]	7.23		0.00		8.43	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	8.13					
Intersection LOS	A					

Intersection Level Of Service Report
#7: Oliver Street / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	13.9
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.060

Intersection Setup

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	3	0	9	0	0	0	0	235	1	3	225	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	1	0	1	21	0	10	3	124	1	1	82	7
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	0	11	21	0	10	3	383	2	4	330	7
Peak Hour Factor	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	0	3	6	0	3	1	118	1	1	102	2
Total Analysis Volume [veh/h]	5	0	14	26	0	12	4	473	2	5	407	9
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes	yes		
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.02	0.06	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.47	13.40	11.33	13.95	13.80	11.26	8.16	0.00	0.00	8.33	0.00	0.00
Movement LOS	B	B	B	B	B	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.11	0.11	0.11	0.26	0.26	0.26	2.10	2.10	0.00	1.85	1.85	1.85
95th-Percentile Queue Length [ft]	2.72	2.72	2.72	6.38	6.38	6.38	52.40	52.40	0.00	46.37	46.37	46.37
d_A, Approach Delay [s/veh]	11.89			13.10			0.07			0.10		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	0.83											
Intersection LOS	B											

Intersection Level Of Service Report
#1: Nason Street / Street "A"

Control Type:	Two-way stop	Delay (sec / veh):	8.9
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.023

Intersection Setup

Name	Nason Street		Nason Street		Street "A"	
Approach	Northbound		Southbound		Westbound	
Lane Configuration	⊢		⊣		T	
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Nason Street		Nason Street		Street "A"	
Base Volume Input [veh/h]	6	0	0	6	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	35	0	0	20	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	35	0	7	20	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	10	0	2	5	0
Total Analysis Volume [veh/h]	8	38	0	8	22	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.31	0.00	8.91	8.52
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.07	0.07
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	1.79	1.79
d_A, Approach Delay [s/veh]	0.00		0.00		8.91	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.58					
Intersection LOS	A					

Intersection Level Of Service Report
#2: Nason Street / Ironwood Avenue

Control Type:	Signalized	Delay (sec / veh):	32.7
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.717

Intersection Setup

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			25.00			45.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			no			yes			no		

Volumes

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	197	5	54	0	4	2	0	176	148	47	151	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	180	29	93	0	17	3	6	90	132	78	106	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	31	0	0	2	0	0	20	0	0	0
Total Hourly Volume [veh/h]	397	35	121	0	21	3	6	284	275	130	272	1
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	101	9	31	0	5	1	2	72	70	33	69	0
Total Analysis Volume [veh/h]	405	36	123	0	21	3	6	290	281	133	278	1
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	85
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LagFO
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	8	0	0	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	5.0	0.0	0.0	5.0	0.0	4.0	5.0	0.0	4.0	5.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	28	0	0	28	0	46	40	0	17	11	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
Minimum Recall		no			no		no	no		no	no	
Maximum Recall		no			no		no	yes		no	yes	
Pedestrian Recall		no			no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	C	R	C	L	C	L	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	5.00	6.00	5.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	3.00	4.00	3.00	4.00
g_i, Effective Green Time [s]	22	22	22	1	37	9	45
g / C, Green / Cycle	0.26	0.26	0.26	0.01	0.44	0.10	0.53
(v / s)_i Volume / Saturation Flow Rate	0.26	0.09	0.02	0.00	0.37	0.08	0.17
s, saturation flow rate [veh/h]	1675	1425	1492	1597	1543	1597	1675
c, Capacity [veh/h]	515	369	429	15	678	163	892
d1, Uniform Delay [s]	31.70	25.57	23.73	41.92	21.24	37.43	11.17
k, delay calibration	0.37	0.04	0.04	0.04	0.50	0.04	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	12.97	0.20	0.02	6.70	12.14	3.78	0.92
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

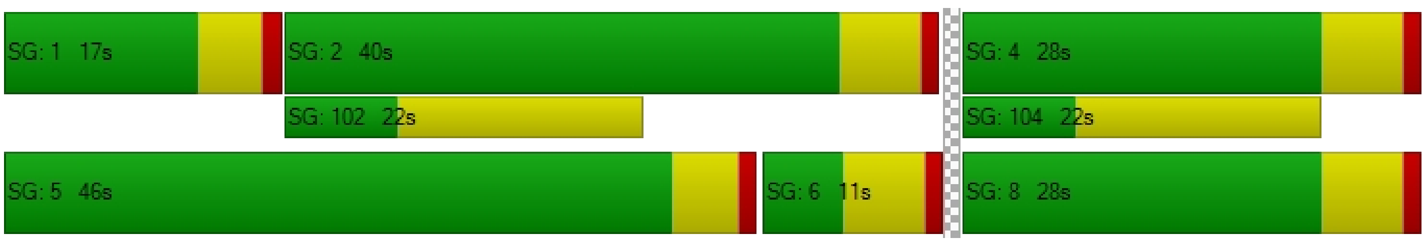
X, volume / capacity	0.86	0.33	0.06	0.41	0.84	0.82	0.31
d, Delay for Lane Group [s/veh]	44.67	25.77	23.75	48.63	33.38	41.21	12.09
Lane Group LOS	D	C	C	D	C	D	B
Critical Lane Group	yes	no	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	10.20	1.90	0.36	0.15	11.05	2.67	2.58
50th-Percentile Queue Length [ft]	254.94	47.42	9.10	3.67	276.32	66.68	64.40
95th-Percentile Queue Length [veh]	15.43	3.41	0.66	0.26	16.51	4.80	4.64
95th-Percentile Queue Length [ft]	385.87	85.36	16.38	6.61	412.63	120.02	115.92

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	44.67	44.67	25.77	23.75	23.75	23.75	48.63	33.38	33.38	41.21	12.09	12.09
Movement LOS	D	D	C	C	C	C	D	C	C	D	B	B
d_A, Approach Delay [s/veh]	40.54			23.75			33.54			21.49		
Approach LOS	D			C			C			C		
d_I, Intersection Delay [s/veh]	32.75											
Intersection LOS	C											
Intersection V/C	0.717											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Intersection Level Of Service Report
#5: Street "B"/Lantz Lane / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	14.5
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.033

Intersection Setup

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	5	0	5	0	0	0	0	222	8	6	194	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	0	1	3	0	23	40	136	7	1	155	6
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	0	7	3	0	23	40	380	16	8	368	6
Peak Hour Factor	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	2	1	0	6	11	102	4	2	99	2
Total Analysis Volume [veh/h]	13	0	8	3	0	25	43	409	17	9	396	6
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes	yes		
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.01	0.01	0.00	0.04	0.04	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	14.46	14.24	10.97	13.93	14.07	10.81	8.23	0.00	0.00	8.20	0.00	0.00
Movement LOS	B	B	B	B	B	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.14	0.14	0.14	0.14	0.14	0.14	1.88	1.88	0.00	1.68	1.68	1.68
95th-Percentile Queue Length [ft]	3.55	3.55	3.55	3.58	3.58	3.58	47.10	47.10	0.00	41.90	41.90	41.90
d_A, Approach Delay [s/veh]	13.13			11.15			0.75			0.18		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	1.09											
Intersection LOS	B											

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Intersection Level Of Service Report
#6: Oliver Street / Street "C"

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street		Oliver Street		Street "C"	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Oliver Street		Oliver Street		Street "C"	
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	34	0	0	0	0	21
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	34	0	0	0	0	21
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	0	0	0	0	6
Total Analysis Volume [veh/h]	37	0	0	0	0	23
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.02
d_M, Delay for Movement [s/veh]	7.27	0.00	0.00	0.00	9.17	8.39
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.07	0.07	0.00	0.00	0.06	0.06
95th-Percentile Queue Length [ft]	1.75	1.75	0.00	0.00	1.62	1.62
d_A, Approach Delay [s/veh]	7.27		0.00		8.39	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	7.70					
Intersection LOS	A					

Intersection Level Of Service Report
#7: Oliver Street / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	13.6
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	6	0	3	0	0	0	0	222	5	12	194	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	4	0	1	14	0	7	11	125	4	1	151	23
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	11	0	4	14	0	7	11	369	10	14	364	23
Peak Hour Factor	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	1	4	0	2	3	101	3	4	100	6
Total Analysis Volume [veh/h]	12	0	4	15	0	8	12	405	11	15	400	25
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes	yes		
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.01	0.03	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	13.39	13.51	10.83	13.47	13.61	10.98	8.21	0.00	0.00	8.19	0.00	0.00
Movement LOS	B	B	B	B	B	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.10	0.10	0.10	0.15	0.15	0.15	1.71	1.71	0.00	1.84	1.84	1.84
95th-Percentile Queue Length [ft]	2.58	2.58	2.58	3.63	3.63	3.63	42.78	42.78	0.00	45.98	45.98	45.98
d_A, Approach Delay [s/veh]	12.75			12.60			0.23			0.28		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	0.79											
Intersection LOS	B											

APPENDIX 6.2:

OPENING YEAR CUMULATIVE (2020) WITH PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS

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Intersection Level Of Service Report
#1: Nason Street / Street "A"

Control Type:	Two-way stop	Delay (sec / veh):	8.9
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.036

Intersection Setup

Name	Nason Street		Nason Street		Street "A"	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Nason Street		Nason Street		Street "A"	
Base Volume Input [veh/h]	5	0	0	7	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	11	0	0	31	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	11	0	8	31	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	3	0	2	8	0
Total Analysis Volume [veh/h]	7	12	0	9	34	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.04	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.25	0.00	8.91	8.51
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.11	0.11
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	2.77	2.77
d_A, Approach Delay [s/veh]	0.00		0.00		8.91	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	4.89					
Intersection LOS	A					

Intersection Level Of Service Report
#2: Nason Street / Ironwood Avenue

Control Type:	Signalized	Delay (sec / veh):	54.7
Analysis Method:	HCM2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.877

Intersection Setup

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			25.00			45.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			no			yes			no		

Volumes

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	221	4	40	0	7	0	1	199	244	31	208	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	73	9	49	0	26	5	2	86	142	68	60	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	18	0	0	0	0	0	38	0	0	0
Total Hourly Volume [veh/h]	316	13	75	0	34	5	3	305	372	102	289	0
Peak Hour Factor	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	99	4	23	0	11	2	1	95	116	32	90	0
Total Analysis Volume [veh/h]	394	16	94	0	42	6	4	380	464	127	360	0
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	110
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LagFO
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	8	0	0	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	5.0	0.0	0.0	5.0	0.0	4.0	5.0	0.0	4.0	5.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	29	0	0	29	0	10	67	0	14	71	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
Minimum Recall		no			no		no	no		no	no	
Maximum Recall		no			no		no	yes		no	yes	
Pedestrian Recall		no			no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	C	R	C	L	C	L	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	5.00	6.00	5.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	3.00	4.00	3.00	4.00
g_i, Effective Green Time [s]	23	23	23	1	61	9	69
g / C, Green / Cycle	0.21	0.21	0.21	0.01	0.55	0.08	0.63
(v / s)_i Volume / Saturation Flow Rate	0.24	0.07	0.03	0.00	0.55	0.08	0.21
s, saturation flow rate [veh/h]	1675	1425	1498	1597	1528	1597	1676
c, Capacity [veh/h]	415	298	346	10	846	132	1056
d1, Uniform Delay [s]	45.14	36.81	35.43	54.44	24.49	50.29	9.60
k, delay calibration	0.50	0.04	0.04	0.04	0.50	0.25	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	41.26	0.22	0.07	9.28	30.42	46.85	0.88
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.99	0.32	0.14	0.40	1.00	0.96	0.34
d, Delay for Lane Group [s/veh]	86.40	37.03	35.50	63.72	54.91	97.14	10.48
Lane Group LOS	F	D	D	E	D	F	B
Critical Lane Group	yes	no	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	15.82	2.09	1.07	0.13	26.11	5.03	3.59
50th-Percentile Queue Length [ft]	395.50	52.28	26.74	3.33	652.84	125.75	89.77
95th-Percentile Queue Length [veh]	22.34	3.76	1.93	0.24	34.49	8.71	6.46
95th-Percentile Queue Length [ft]	558.57	94.10	48.14	6.00	862.35	217.71	161.58

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	86.40	86.40	37.03	35.50	35.50	35.50	63.72	54.91	54.91	97.14	10.48	10.48
Movement LOS	F	F	D	D	D	D	E	D	D	F	B	B
d_A, Approach Delay [s/veh]	77.19			35.50			54.95			33.08		
Approach LOS	E			D			D			C		
d_I, Intersection Delay [s/veh]	54.75											
Intersection LOS	D											
Intersection V/C	0.877											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	60	211	95	15	43	96	373	570	86	473	2
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1863	1900	1900	1900	1810	1900	1881	1827	1881	1900
Adj Flow Rate, veh/h	9	73	100	116	18	42	117	455	605	105	577	2
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	0	4	2	0	0	0	5	0	1	4	1	1
Cap, veh/h	20	148	262	146	286	346	145	1961	998	110	1909	7
Arrive On Green	0.01	0.08	0.08	0.08	0.15	0.15	0.08	0.54	0.54	0.06	0.52	0.52
Sat Flow, veh/h	1810	1827	1583	1810	1900	1615	1723	3610	1599	1740	3654	13
Grp Volume(v), veh/h	9	73	100	116	18	42	117	455	605	105	282	297
Grp Sat Flow(s),veh/h/ln	1810	1827	1583	1810	1900	1615	1723	1805	1599	1740	1787	1879
Q Serve(g_s), s	0.5	3.6	5.3	6.0	0.8	2.0	6.3	6.3	21.7	5.7	8.5	8.5
Cycle Q Clear(g_c), s	0.5	3.6	5.3	6.0	0.8	2.0	6.3	6.3	21.7	5.7	8.5	8.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.01
Lane Grp Cap(c), veh/h	20	148	262	146	286	346	145	1961	998	110	934	982
V/C Ratio(X)	0.45	0.49	0.38	0.79	0.06	0.12	0.81	0.23	0.61	0.96	0.30	0.30
Avail Cap(c_a), veh/h	95	327	416	286	540	561	200	1961	998	110	934	982
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.40	0.40	0.40	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.7	41.8	35.3	42.9	34.6	30.1	42.8	11.3	10.8	44.4	12.9	12.9
Incr Delay (d2), s/veh	5.7	0.9	0.3	3.7	0.0	0.1	4.7	0.1	1.1	71.0	0.8	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.9	2.4	3.1	0.4	0.9	3.2	3.1	9.8	4.9	4.4	4.6
LnGrp Delay(d),s/veh	52.4	42.7	35.7	46.6	34.6	30.2	47.4	11.4	11.9	115.4	13.7	13.7
LnGrp LOS	D	D	D	D	C	C	D	B	B	F	B	B
Approach Vol, veh/h		182			176			1177			684	
Approach Delay, s/veh		39.3			41.4			15.3			29.3	
Approach LOS		D			D			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	57.6	12.7	13.7	13.0	55.6	6.1	20.3
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	6.0	35.0	15.0	17.0	11.0	30.0	5.0	27.0
Max Q Clear Time (g_c+I1), s	7.7	23.7	8.0	7.3	8.3	10.5	2.5	4.0
Green Ext Time (p_c), s	0.0	4.1	0.1	0.4	0.0	5.0	0.0	0.5

Intersection Summary	
HCM 2010 Ctrl Delay	23.6
HCM 2010 LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	37	2	531	0	0	0	0	1002	167	146	633	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1840	1845				0	1881	1900	1900	1881	0
Adj Flow Rate, veh/h	45	0	353				0	1222	171	178	772	0
Adj No. of Lanes	1	0	2				0	2	0	1	2	0
Peak Hour Factor	0.82	0.82	0.82				0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	3	50	3				0	1	1	0	1	0
Cap, veh/h	251	0	448				0	1735	242	145	2492	0
Arrive On Green	0.14	0.00	0.14				0.00	0.55	0.55	0.08	0.70	0.00
Sat Flow, veh/h	1757	0	3136				0	3246	439	1810	3668	0
Grp Volume(v), veh/h	45	0	353				0	691	702	178	772	0
Grp Sat Flow(s),veh/h/ln	1757	0	1568				0	1787	1804	1810	1787	0
Q Serve(g_s), s	1.7	0.0	8.2				0.0	21.2	21.5	6.0	6.3	0.0
Cycle Q Clear(g_c), s	1.7	0.0	8.2				0.0	21.2	21.5	6.0	6.3	0.0
Prop In Lane	1.00		1.00				0.00		0.24	1.00		0.00
Lane Grp Cap(c), veh/h	251	0	448				0	984	993	145	2492	0
V/C Ratio(X)	0.18	0.00	0.79				0.00	0.70	0.71	1.23	0.31	0.00
Avail Cap(c_a), veh/h	422	0	753				0	984	993	145	2492	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.92	0.92	0.00
Uniform Delay (d), s/veh	28.3	0.0	31.1				0.0	12.3	12.4	34.5	4.4	0.0
Incr Delay (d2), s/veh	0.1	0.0	1.2				0.0	4.2	4.2	146.4	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	0.0	3.6				0.0	11.5	11.7	8.9	3.1	0.0
LnGrp Delay(d),s/veh	28.4	0.0	32.2				0.0	16.5	16.7	180.9	4.7	0.0
LnGrp LOS	C		C					B	B	F	A	
Approach Vol, veh/h		398						1393			950	
Approach Delay, s/veh		31.8						16.6			37.7	
Approach LOS		C						B			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	11.0	47.3		16.7		58.3		
Change Period (Y+Rc), s	5.0	6.0		6.0		6.0		
Max Green Setting (Gmax), s	6.0	34.0		18.0		45.0		
Max Q Clear Time (g_c+I1), s	8.0	23.5		10.2		8.3		
Green Ext Time (p_c), s	0.0	6.5		0.6		12.1		

Intersection Summary		
HCM 2010 Ctrl Delay		26.1
HCM 2010 LOS		C

Notes

User approved volume balancing among the lanes for turning movement.

Intersection Level Of Service Report
#5: Street "B"/Lantz Lane / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	14.5
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.048

Intersection Setup

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	12	0	4	0	0	0	0	232	7	1	227	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	2	0	1	5	0	35	12	122	1	1	91	2
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	15	0	5	5	0	35	12	377	9	2	341	2
Peak Hour Factor	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	0	2	2	0	11	4	116	3	1	105	1
Total Analysis Volume [veh/h]	19	0	6	6	0	43	15	465	11	2	421	2
Pedestrian Volume [ped/h]	0			0			0			0		

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes	yes		
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.00	0.01	0.01	0.00	0.07	0.01	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	14.55	13.90	11.54	13.88	13.93	11.24	8.21	0.00	0.00	8.32	0.00	0.00
Movement LOS	B	B	B	B	B	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.18	0.18	0.18	0.27	0.27	0.27	2.14	2.14	0.00	1.89	1.89	1.89
95th-Percentile Queue Length [ft]	4.58	4.58	4.58	6.67	6.67	6.67	53.47	53.47	0.00	47.14	47.14	47.14
d_A, Approach Delay [s/veh]	13.82			11.56			0.25			0.04		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	1.06											
Intersection LOS	B											

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Intersection Level Of Service Report
#6: Oliver Street / Street "C"

Control Type:	Two-way stop	Delay (sec / veh):	8.9
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street		Oliver Street		Street "C"	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Oliver Street		Oliver Street		Street "C"	
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	10	0	0	0	0	31
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	10	0	0	0	0	31
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	0	0	0	8
Total Analysis Volume [veh/h]	11	0	0	0	0	34
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.00	0.03
d_M, Delay for Movement [s/veh]	7.23	0.00	0.00	0.00	8.92	8.43
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.02	0.02	0.00	0.00	0.10	0.10
95th-Percentile Queue Length [ft]	0.51	0.51	0.00	0.00	2.42	2.42
d_A, Approach Delay [s/veh]	7.23		0.00		8.43	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	8.13					
Intersection LOS	A					

Intersection Level Of Service Report
#7: Oliver Street / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	13.9
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.060

Intersection Setup

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	3	0	9	0	0	0	0	235	1	3	225	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	1	0	1	21	0	10	3	124	1	1	82	7
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	4	0	11	21	0	10	3	383	2	4	330	7
Peak Hour Factor	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100	0.8100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	1	0	3	6	0	3	1	118	1	1	102	2
Total Analysis Volume [veh/h]	5	0	14	26	0	12	4	473	2	5	407	9
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes	yes		
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.02	0.06	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.47	13.40	11.33	13.95	13.80	11.26	8.16	0.00	0.00	8.33	0.00	0.00
Movement LOS	B	B	B	B	B	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.11	0.11	0.11	0.26	0.26	0.26	2.10	2.10	0.00	1.85	1.85	1.85
95th-Percentile Queue Length [ft]	2.72	2.72	2.72	6.38	6.38	6.38	52.40	52.40	0.00	46.37	46.37	46.37
d_A, Approach Delay [s/veh]	11.89			13.10			0.07			0.10		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	0.83											
Intersection LOS	B											

Intersection Level Of Service Report
#1: Nason Street / Street "A"

Control Type:	Two-way stop	Delay (sec / veh):	8.9
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.023

Intersection Setup

Name	Nason Street		Nason Street		Street "A"	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Nason Street		Nason Street		Street "A"	
Base Volume Input [veh/h]	6	0	0	6	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	35	0	0	20	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	35	0	7	20	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	10	0	2	5	0
Total Analysis Volume [veh/h]	8	38	0	8	22	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.31	0.00	8.91	8.52
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.07	0.07
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	1.79	1.79
d_A, Approach Delay [s/veh]	0.00		0.00		8.91	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.58					
Intersection LOS	A					

Intersection Level Of Service Report
#2: Nason Street / Ironwood Avenue

Control Type:	Signalized	Delay (sec / veh):	32.7
Analysis Method:	HCM2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.717

Intersection Setup

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			25.00			45.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			no			yes			no		

Volumes

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	197	5	54	0	4	2	0	176	148	47	151	1
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	180	29	93	0	17	3	6	90	132	78	106	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	31	0	0	2	0	0	20	0	0	0
Total Hourly Volume [veh/h]	397	35	121	0	21	3	6	284	275	130	272	1
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	101	9	31	0	5	1	2	72	70	33	69	0
Total Analysis Volume [veh/h]	405	36	123	0	21	3	6	290	281	133	278	1
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	85
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LagFO
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	8	0	0	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	5.0	0.0	0.0	5.0	0.0	4.0	5.0	0.0	4.0	5.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	28	0	0	28	0	46	40	0	17	11	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
Minimum Recall		no			no		no	no		no	no	
Maximum Recall		no			no		no	yes		no	yes	
Pedestrian Recall		no			no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	C	R	C	L	C	L	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	5.00	6.00	5.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	3.00	4.00	3.00	4.00
g_i, Effective Green Time [s]	22	22	22	1	37	9	45
g / C, Green / Cycle	0.26	0.26	0.26	0.01	0.44	0.10	0.53
(v / s)_i Volume / Saturation Flow Rate	0.26	0.09	0.02	0.00	0.37	0.08	0.17
s, saturation flow rate [veh/h]	1675	1425	1492	1597	1543	1597	1675
c, Capacity [veh/h]	515	369	429	15	678	163	892
d1, Uniform Delay [s]	31.70	25.57	23.73	41.92	21.24	37.43	11.17
k, delay calibration	0.37	0.04	0.04	0.04	0.50	0.04	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	12.97	0.20	0.02	6.70	12.14	3.78	0.92
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

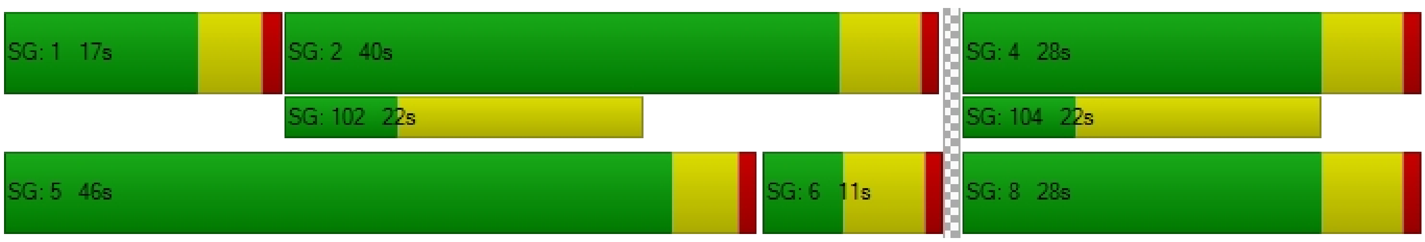
X, volume / capacity	0.86	0.33	0.06	0.41	0.84	0.82	0.31
d, Delay for Lane Group [s/veh]	44.67	25.77	23.75	48.63	33.38	41.21	12.09
Lane Group LOS	D	C	C	D	C	D	B
Critical Lane Group	yes	no	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	10.20	1.90	0.36	0.15	11.05	2.67	2.58
50th-Percentile Queue Length [ft]	254.94	47.42	9.10	3.67	276.32	66.68	64.40
95th-Percentile Queue Length [veh]	15.43	3.41	0.66	0.26	16.51	4.80	4.64
95th-Percentile Queue Length [ft]	385.87	85.36	16.38	6.61	412.63	120.02	115.92

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	44.67	44.67	25.77	23.75	23.75	23.75	48.63	33.38	33.38	41.21	12.09	12.09
Movement LOS	D	D	C	C	C	C	D	C	C	D	B	B
d_A, Approach Delay [s/veh]	40.54			23.75			33.54			21.49		
Approach LOS	D			C			C			C		
d_I, Intersection Delay [s/veh]	32.75											
Intersection LOS	C											
Intersection V/C	0.717											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↑	↱	↰	↑↱	
Volume (veh/h)	9	24	104	194	26	117	160	465	604	52	399	11
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1863	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	10	26	42	211	28	117	174	505	554	57	434	8
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	2	0	0	0	0	0	0	0	0
Cap, veh/h	22	100	270	243	337	352	208	1943	1090	74	1684	31
Arrive On Green	0.01	0.05	0.05	0.14	0.18	0.18	0.11	0.54	0.54	0.04	0.46	0.46
Sat Flow, veh/h	1810	1900	1615	1774	1900	1615	1810	3610	1615	1810	3626	67
Grp Volume(v), veh/h	10	26	42	211	28	117	174	505	554	57	216	226
Grp Sat Flow(s),veh/h/ln	1810	1900	1615	1774	1900	1615	1810	1805	1615	1810	1805	1888
Q Serve(g_s), s	0.5	1.2	2.1	11.1	1.2	5.8	8.9	7.1	16.1	3.0	6.9	6.9
Cycle Q Clear(g_c), s	0.5	1.2	2.1	11.1	1.2	5.8	8.9	7.1	16.1	3.0	6.9	6.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.04
Lane Grp Cap(c), veh/h	22	100	270	243	337	352	208	1943	1090	74	838	877
V/C Ratio(X)	0.45	0.26	0.16	0.87	0.08	0.33	0.84	0.26	0.51	0.77	0.26	0.26
Avail Cap(c_a), veh/h	95	380	508	243	540	525	267	1943	1090	95	838	877
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.71	0.71	0.71	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.6	43.2	33.8	40.2	32.6	31.3	41.2	11.8	7.6	45.1	15.5	15.5
Incr Delay (d2), s/veh	5.3	0.5	0.1	26.0	0.0	0.2	10.2	0.2	1.2	18.1	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.7	1.0	7.1	0.6	2.6	5.1	3.6	7.4	1.9	3.6	3.8
LnGrp Delay(d),s/veh	51.9	43.7	33.9	66.1	32.7	31.5	51.3	12.0	8.8	63.2	16.2	16.2
LnGrp LOS	D	D	C	E	C	C	D	B	A	E	B	B
Approach Vol, veh/h		78			356			1233			499	
Approach Delay, s/veh		39.5			52.1			16.1			21.6	
Approach LOS		D			D			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.9	57.1	18.0	11.0	15.9	50.1	6.2	22.8
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	5.0	36.0	13.0	19.0	14.0	27.0	5.0	27.0
Max Q Clear Time (g_c+I1), s	5.0	18.1	13.1	4.1	10.9	8.9	2.5	7.8
Green Ext Time (p_c), s	0.0	4.4	0.0	0.3	0.1	4.5	0.0	0.4

Intersection Summary	
HCM 2010 Ctrl Delay	24.1
HCM 2010 LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	174	3	713	0	0	0	0	1055	139	90	607	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1876	1881				0	1898	1900	1900	1881	0
Adj Flow Rate, veh/h	183	0	482				0	1111	135	95	639	0
Adj No. of Lanes	1	0	2				0	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	33	1				0	0	0	0	1	0
Cap, veh/h	326	0	582				0	1699	206	121	2352	0
Arrive On Green	0.18	0.00	0.18				0.00	0.52	0.52	0.07	0.66	0.00
Sat Flow, veh/h	1792	0	3198				0	3333	393	1810	3668	0
Grp Volume(v), veh/h	183	0	482				0	618	628	95	639	0
Grp Sat Flow(s),veh/h/ln	1792	0	1599				0	1803	1828	1810	1787	0
Q Serve(g_s), s	7.0	0.0	10.9				0.0	18.6	18.7	3.9	5.6	0.0
Cycle Q Clear(g_c), s	7.0	0.0	10.9				0.0	18.6	18.7	3.9	5.6	0.0
Prop In Lane	1.00		1.00				0.00		0.21	1.00		0.00
Lane Grp Cap(c), veh/h	326	0	582				0	946	959	121	2352	0
V/C Ratio(X)	0.56	0.00	0.83				0.00	0.65	0.65	0.79	0.27	0.00
Avail Cap(c_a), veh/h	430	0	768				0	946	959	121	2352	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.91	0.91	0.00
Uniform Delay (d), s/veh	27.9	0.0	29.5				0.0	12.9	12.9	34.5	5.3	0.0
Incr Delay (d2), s/veh	0.6	0.0	4.5				0.0	3.5	3.5	24.3	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	0.0	5.2				0.0	10.0	10.2	2.7	2.8	0.0
LnGrp Delay(d),s/veh	28.5	0.0	34.0				0.0	16.4	16.4	58.8	5.6	0.0
LnGrp LOS	C		C					B	B	E	A	
Approach Vol, veh/h		665						1246			734	
Approach Delay, s/veh		32.5						16.4			12.5	
Approach LOS		C						B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	10.0	45.4		19.6		55.4		
Change Period (Y+Rc), s	5.0	6.0		6.0		6.0		
Max Green Setting (Gmax), s	5.0	35.0		18.0		45.0		
Max Q Clear Time (g_c+I1), s	5.9	20.7		12.9		7.6		
Green Ext Time (p_c), s	0.0	6.8		0.8		9.5		

Intersection Summary			
HCM 2010 Ctrl Delay			19.4
HCM 2010 LOS			B

Notes

User approved volume balancing among the lanes for turning movement.

Intersection Level Of Service Report
#5: Street "B"/Lantz Lane / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	14.5
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.033

Intersection Setup

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	5	0	5	0	0	0	0	222	8	6	194	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	0	1	3	0	23	40	136	7	1	155	6
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	0	7	3	0	23	40	380	16	8	368	6
Peak Hour Factor	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300	0.9300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	2	1	0	6	11	102	4	2	99	2
Total Analysis Volume [veh/h]	13	0	8	3	0	25	43	409	17	9	396	6
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes	yes		
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.01	0.01	0.00	0.04	0.04	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	14.46	14.24	10.97	13.93	14.07	10.81	8.23	0.00	0.00	8.20	0.00	0.00
Movement LOS	B	B	B	B	B	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.14	0.14	0.14	0.14	0.14	0.14	1.88	1.88	0.00	1.68	1.68	1.68
95th-Percentile Queue Length [ft]	3.55	3.55	3.55	3.58	3.58	3.58	47.10	47.10	0.00	41.90	41.90	41.90
d_A, Approach Delay [s/veh]	13.13			11.15			0.75			0.18		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	1.09											
Intersection LOS	B											

Intersection Level Of Service Report
#6: Oliver Street / Street "C"

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street		Oliver Street		Street "C"	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Oliver Street		Oliver Street		Street "C"	
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	34	0	0	0	0	21
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	34	0	0	0	0	21
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	0	0	0	0	6
Total Analysis Volume [veh/h]	37	0	0	0	0	23
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.02
d_M, Delay for Movement [s/veh]	7.27	0.00	0.00	0.00	9.17	8.39
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.07	0.07	0.00	0.00	0.06	0.06
95th-Percentile Queue Length [ft]	1.75	1.75	0.00	0.00	1.62	1.62
d_A, Approach Delay [s/veh]	7.27		0.00		8.39	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	7.70					
Intersection LOS	A					

Intersection Level Of Service Report
#7: Oliver Street / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	13.6
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	6	0	3	0	0	0	0	222	5	12	194	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	4	0	1	14	0	7	11	125	4	1	151	23
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	11	0	4	14	0	7	11	369	10	14	364	23
Peak Hour Factor	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	1	4	0	2	3	101	3	4	100	6
Total Analysis Volume [veh/h]	12	0	4	15	0	8	12	405	11	15	400	25
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes	yes		
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.01	0.03	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	13.39	13.51	10.83	13.47	13.61	10.98	8.21	0.00	0.00	8.19	0.00	0.00
Movement LOS	B	B	B	B	B	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.10	0.10	0.10	0.15	0.15	0.15	1.71	1.71	0.00	1.84	1.84	1.84
95th-Percentile Queue Length [ft]	2.58	2.58	2.58	3.63	3.63	3.63	42.78	42.78	0.00	45.98	45.98	45.98
d_A, Approach Delay [s/veh]	12.75			12.60			0.23			0.28		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	0.79											
Intersection LOS	B											

APPENDIX 6.3:

OPENING YEAR CUMULATIVE (2020) WITHOUT PROJECT CONDITIONS TRAFFIC SIGNAL WARRANT ANALYSIS

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Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

Traffic Conditions = **Opening Year (2020) Cumulative Without Project Conditions - Weekday AM Peak Hou**

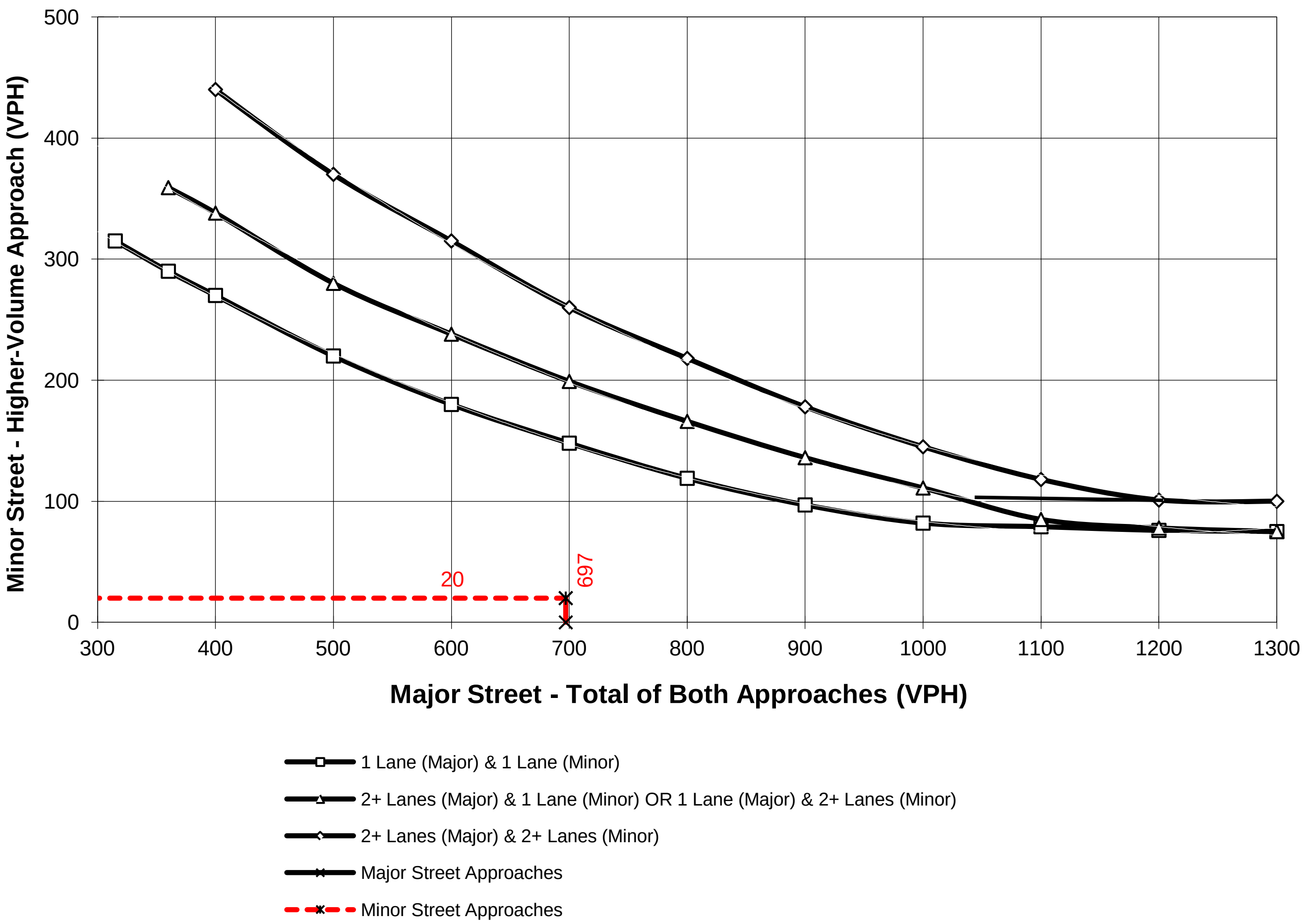
Major Street Name = **Ironwood Avenue**

Total of Both Approaches (VPH) = **697**
Number of Approach Lanes Major Street = **1**

Minor Street Name = **Lantz Lane**

High Volume Approach (VPH) = **20**
Number of Approach Lanes Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 100 vph applies as the lower threshold for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold for a minor-street approach with one lane

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

Traffic Conditions = **Opening Year (2020) Cumulative Without Project Conditions - Weekday PM Peak Hou**

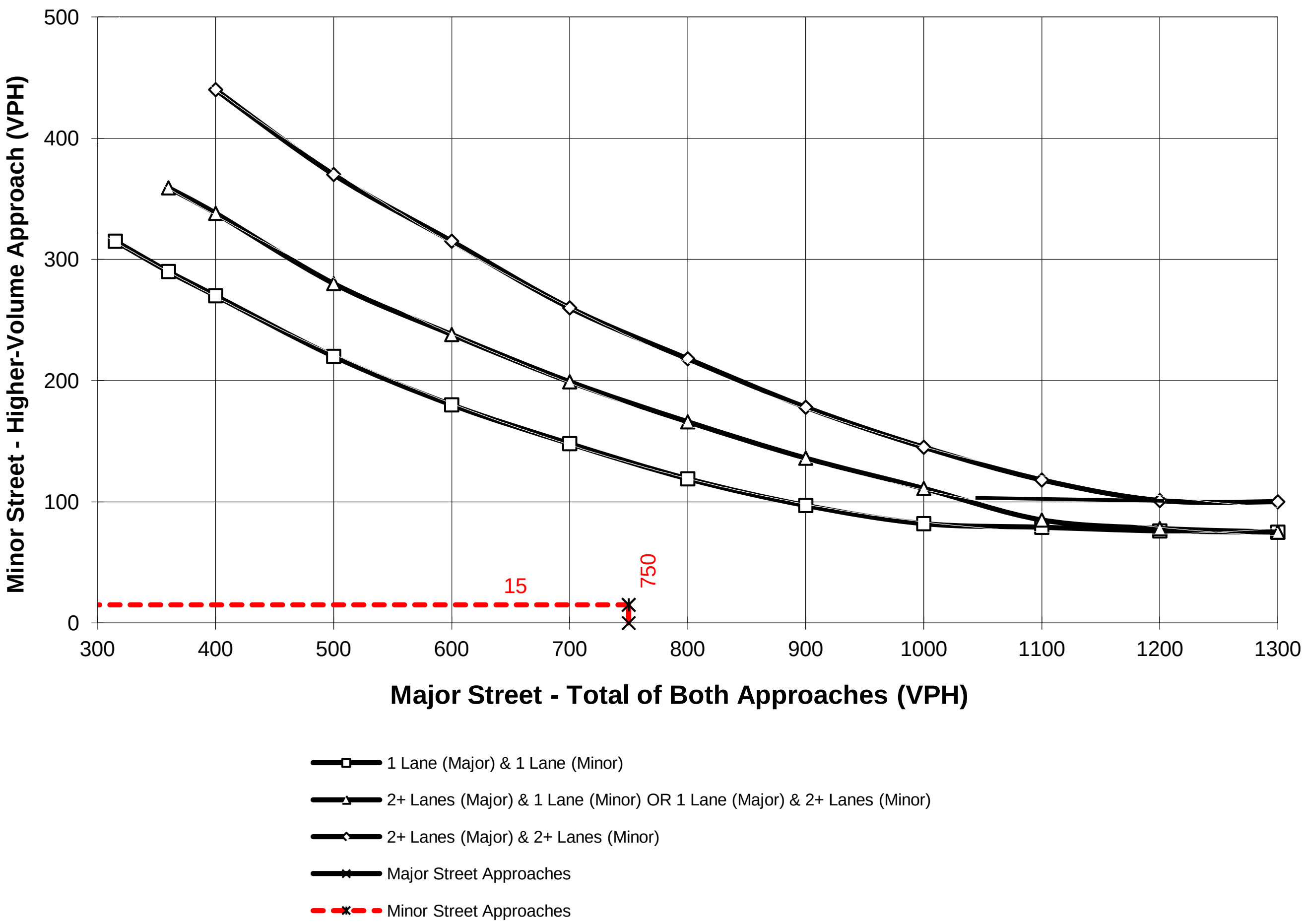
Major Street Name = **Ironwood Avenue**

Total of Both Approaches (VPH) = **750**
Number of Approach Lanes Major Street = **1**

Minor Street Name = **Oliver Street**

High Volume Approach (VPH) = **15**
Number of Approach Lanes Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 100 vph applies as the lower threshold for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold for a minor-street approach with one lane

APPENDIX 6.4:

OPENING YEAR CUMULATIVE (2020) WITH PROJECT CONDITIONS TRAFFIC SIGNAL WARRANT ANALYSIS

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Figure 4C-103 (CA). Traffic Signal Warrants Worksheet
(Average Traffic Estimate Form)

DIST	CO	RTE	PM	TRAFFIC CONDITIONS	**2020 WP**
___	___	___	___	CALC CHS	DATE 08/25/15
				CHK CHS	DATE 08/25/15

Jurisdiction: **City of Moreno Valley**
Major Street: **Nason Street**
Minor Street: **Street "A"**

Critical Approach Speed (Major) 25 mph
Critical Approach Speed (Minor) 25 mph

Major Street Approach Lanes = **1** lane
Minor Street Approach Lanes **1** lane

Major Street Future ADT = **392** vpd
Minor Street Future ADT = **259** vpd

Speed limit or critical speed on major street traffic > 64 km/h (40 mph); ………..

or **URBAN (U)**

In built up area of isolated community of < 10,000 population ……………………

(Based on Estimated Average Daily Traffic - See Note)

URBAN	RURAL	Minimum Requirements EADT			
XX					
CONDITION A - Minimum Vehicular Volume		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied	Not Satisfied				
	XX				
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1 **392**	1 **259**	8,000	5,600	2,400	1,680
2 +	1	9,600	6,720	2,400	1,680
2 +	2 +	9,600	6,720	3,200	2,240
1	2 +	8,000	5,600	3,200	2,240
CONDITION B - Interruption of Continuous Traffic		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied	Not Satisfied				
	XX				
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1 **392**	1 **259**	12,000	8,400	1,200	850
2 +	1	14,400	10,080	1,200	850
2 +	2 +	14,400	10,080	1,600	1,120
1	2 +	12,000	8,400	1,600	1,120
Combination of CONDITIONS A + B		2 CONDITIONS 80%		2 CONDITIONS 80%	
Satisfied	Not Satisfied				
	XX				
No one condition satisfied, but following conditions fulfilled 80% of more …..					
A 5%	**B** 3%				

Note: To be used only for NEW INTERSECTIONS or other locations where it is not reasonable to count actual traffic volumes.

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

Traffic Conditions = **Opening Year (2020) Cumulative With Project Conditions - Weekday AM Peak Hour**

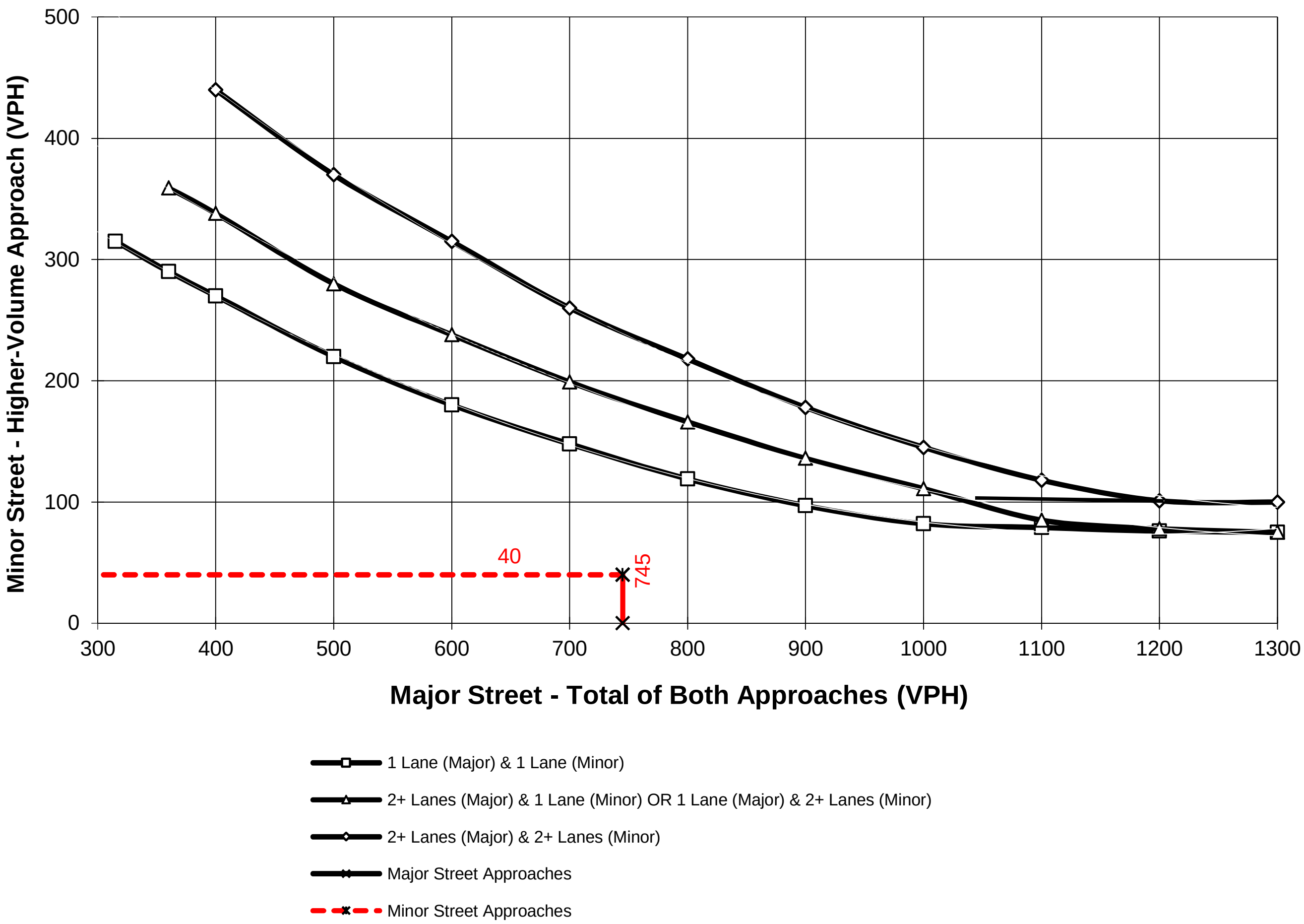
Major Street Name = **Ironwood Avenue**

Total of Both Approaches (VPH) = **745**
Number of Approach Lanes Major Street = **1**

Minor Street Name = **Lantz Lane**

High Volume Approach (VPH) = **40**
Number of Approach Lanes Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 100 vph applies as the lower threshold for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold for a minor-street approach with one lane

California MUTCD 2014 (FHWA's MUTCD 2009, as amended for use in California)

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet
(Average Traffic Estimate Form)

TRAFFIC CONDITIONS **2020 WP**

DIST	CO	RTE	PM	CALC	CHS	DATE	08/25/15
				CHK	CHS	DATE	08/25/15

Jurisdiction: **City of Moreno Valley**
Major Street: **Oliver Street**
Minor Street: **Street "C"**

Critical Approach Speed (Major) 25 mph
Critical Approach Speed (Minor) 25 mph

Major Street Approach Lanes = **1** lane
Minor Street Approach Lanes **1** lane

Major Street Future ADT = **259** vpd
Minor Street Future ADT = **259** vpd

Speed limit or critical speed on major street traffic > 64 km/h (40 mph); ……….. ☐

or **URBAN (U)**

In built up area of isolated community of < 10,000 population …………………… ☐

(Based on Estimated Average Daily Traffic - See Note)

URBAN	RURAL	Minimum Requirements EADT			
XX					
CONDITION A - Minimum Vehicular Volume		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied	Not Satisfied				
	XX				
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1 **259**	1 **259**	8,000	5,600	2,400	1,680
2 +	1	9,600	6,720	2,400	1,680
2 +	2 +	9,600	6,720	3,200	2,240
1	2 +	8,000	5,600	3,200	2,240
CONDITION B - Interruption of Continuous Traffic		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied	Not Satisfied				
	XX				
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1 **259**	1 **259**	12,000	8,400	1,200	850
2 +	1	14,400	10,080	1,200	850
2 +	2 +	14,400	10,080	1,600	1,120
1	2 +	12,000	8,400	1,600	1,120
Combination of CONDITIONS A + B		2 CONDITIONS 80%		2 CONDITIONS 80%	
Satisfied	Not Satisfied				
	XX				
No one condition satisfied, but following conditions fulfilled 80% of more …..	A: 3% B: 2%				

Note: To be used only for NEW INTERSECTIONS or other locations where it is not reasonable to count actual traffic volumes.

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

Traffic Conditions = **Opening Year (2020) Cumulative With Project Conditions - Weekday AM Peak Hour**

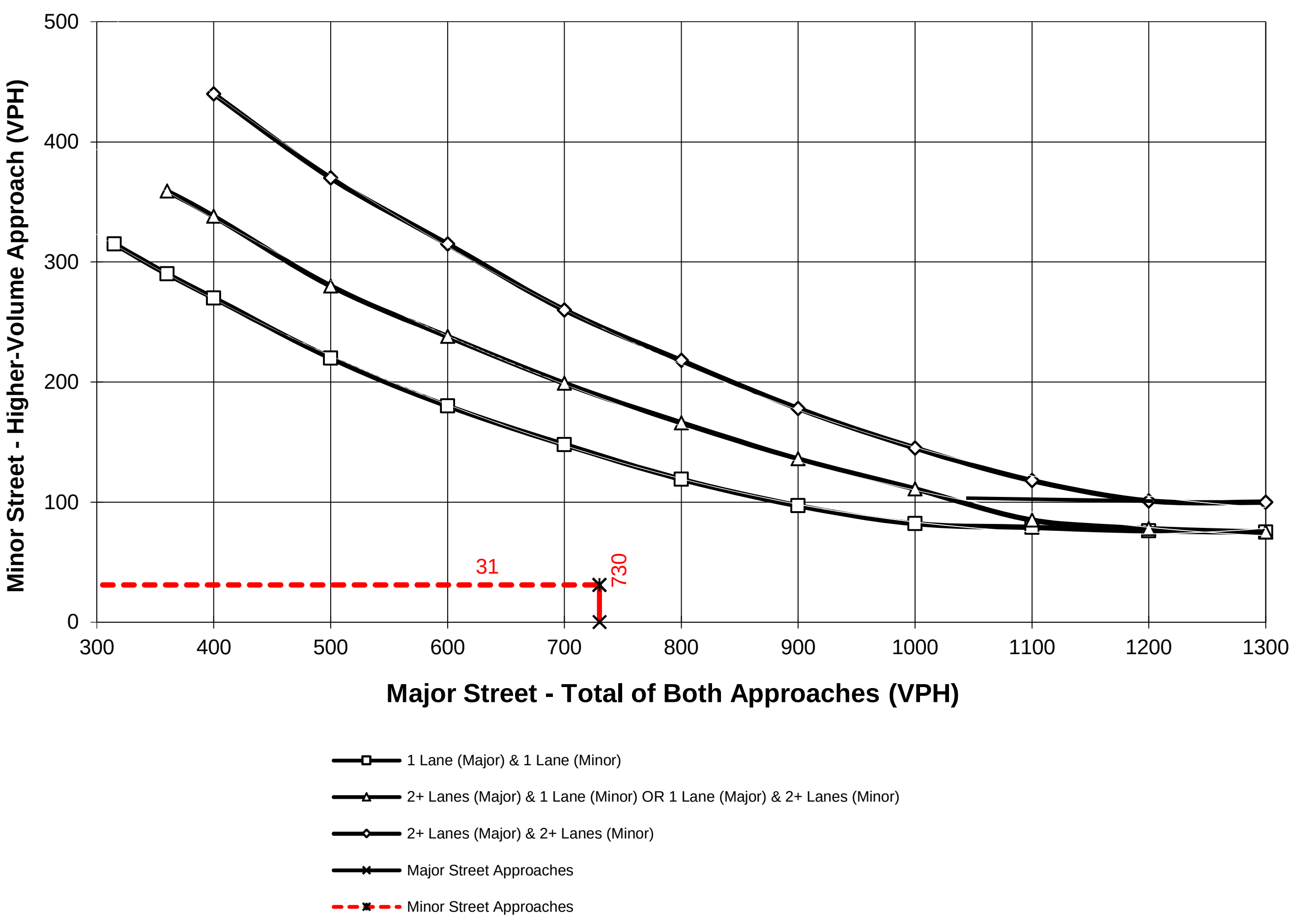
Major Street Name = **Ironwood Avenue**

Total of Both Approaches (VPH) = **730**
Number of Approach Lanes Major Street = **1**

Minor Street Name = **Oliver Street**

High Volume Approach (VPH) = **31**
Number of Approach Lanes Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 100 vph applies as the lower threshold for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold for a minor-street approach with one lane

APPENDIX 6.5:

OPENING YEAR CUMULATIVE (2020) WITHOUT PROJECT OFF-RAMP QUEUING ANALYSIS WORKSHEETS

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	7	70	248	112	18	49	112	422	671	72	529
v/c Ratio	0.07	0.39	0.47	0.57	0.04	0.08	0.64	0.22	0.52	0.53	0.31
Control Delay	44.7	44.9	9.3	51.4	25.8	1.0	57.4	15.6	3.4	57.7	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.7	44.9	9.3	51.4	25.8	1.0	57.4	15.6	3.4	57.7	18.3
Queue Length 50th (ft)	4	41	24	65	8	0	65	75	24	42	101
Queue Length 95th (ft)	17	68	57	103	22	2	109	118	57	#96	163
Internal Link Dist (ft)		689			1331			796			788
Turn Bay Length (ft)	120		120	1000		200	360		150	100	
Base Capacity (vph)	95	328	552	285	540	637	204	1907	1328	138	1726
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.21	0.45	0.39	0.03	0.08	0.55	0.22	0.51	0.52	0.31

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	33	314	312	1370	163	723
v/c Ratio	0.13	0.79	0.78	0.82	0.60	0.29
Control Delay	25.9	25.1	24.6	22.1	44.8	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.9	25.1	24.6	22.1	44.8	5.6
Queue Length 50th (ft)	14	48	47	280	69	54
Queue Length 95th (ft)	30	98	97	315	#178	96
Internal Link Dist (ft)		1293		1072		796
Turn Bay Length (ft)	805		225		250	
Base Capacity (vph)	416	515	516	1679	271	2474
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.61	0.60	0.82	0.60	0.29

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	10	26	113	211	28	115	174	449	657	38	424
v/c Ratio	0.11	0.16	0.25	0.89	0.08	0.19	0.73	0.22	0.48	0.34	0.24
Control Delay	45.4	39.4	2.7	78.6	29.1	2.3	57.2	13.1	2.0	51.5	17.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.4	39.4	2.7	78.6	29.1	2.3	57.2	13.1	2.0	51.5	17.5
Queue Length 50th (ft)	6	15	0	126	15	0	101	55	0	22	63
Queue Length 95th (ft)	23	35	18	#254	33	19	#182	138	44	55	152
Internal Link Dist (ft)		689			1331			796			788
Turn Bay Length (ft)	120		120	1000		200	360		150	100	
Base Capacity (vph)	95	380	486	242	540	596	273	2013	1382	111	1749
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.07	0.23	0.87	0.05	0.19	0.64	0.22	0.48	0.34	0.24

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	153	379	375	1232	87	625
v/c Ratio	0.52	0.78	0.77	0.63	0.55	0.26
Control Delay	33.7	20.4	19.7	15.1	49.1	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.7	20.4	19.7	15.1	49.1	5.8
Queue Length 50th (ft)	67	45	43	211	38	48
Queue Length 95th (ft)	110	132	129	305	#112	93
Internal Link Dist (ft)		1293		1072		796
Turn Bay Length (ft)	805		225		250	
Base Capacity (vph)	428	576	576	1950	158	2411
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.66	0.65	0.63	0.55	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

APPENDIX 6.6:

OPENING YEAR CUMULATIVE (2020) WITH PROJECT OFF-RAMP QUEUING ANALYSIS WORKSHEETS

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	9	73	257	116	18	52	117	455	695	105	579
v/c Ratio	0.09	0.41	0.50	0.58	0.04	0.08	0.65	0.27	0.57	0.56	0.34
Control Delay	45.1	45.5	12.2	51.3	25.7	1.3	57.8	17.6	4.8	54.7	19.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.1	45.5	12.2	51.3	25.7	1.3	57.8	17.6	4.8	54.7	19.0
Queue Length 50th (ft)	5	43	38	68	8	0	68	88	44	60	115
Queue Length 95th (ft)	19	71	73	106	22	4	113	127	85	#147	179
Internal Link Dist (ft)		689			1331			796			788
Turn Bay Length (ft)	120		120	1000		200	360		150	100	
Base Capacity (vph)	95	326	538	285	540	682	205	1716	1268	186	1709
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.22	0.48	0.41	0.03	0.08	0.57	0.27	0.55	0.56	0.34

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	45	326	324	1426	178	772
v/c Ratio	0.16	0.82	0.81	0.88	0.64	0.32
Control Delay	25.6	29.5	28.9	26.3	48.5	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.6	29.5	28.9	26.3	48.5	6.1
Queue Length 50th (ft)	18	63	62	299	79	65
Queue Length 95th (ft)	37	120	118	335	#196	104
Internal Link Dist (ft)		1293		1072		796
Turn Bay Length (ft)	805		225		250	
Base Capacity (vph)	420	499	499	1621	276	2422
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.65	0.65	0.88	0.64	0.32

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	10	26	113	211	28	127	174	505	657	57	446
v/c Ratio	0.11	0.16	0.25	0.89	0.08	0.21	0.73	0.25	0.48	0.46	0.26
Control Delay	45.4	39.4	2.7	78.6	29.1	3.0	57.2	13.8	2.0	55.4	17.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.4	39.4	2.7	78.6	29.1	3.0	57.2	13.8	2.0	55.4	17.7
Queue Length 50th (ft)	6	15	0	126	15	0	101	65	0	33	67
Queue Length 95th (ft)	23	35	18	#254	33	25	#182	156	44	#92	160
Internal Link Dist (ft)		689			1331			796			788
Turn Bay Length (ft)	120		120	1000		200	360		150	100	
Base Capacity (vph)	95	380	486	242	540	608	273	1984	1375	125	1749
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.07	0.23	0.87	0.05	0.21	0.64	0.25	0.48	0.46	0.26

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	183	379	375	1257	95	639
v/c Ratio	0.59	0.78	0.77	0.66	0.58	0.27
Control Delay	35.4	20.3	19.6	16.0	50.4	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	20.3	19.6	16.0	50.4	6.1
Queue Length 50th (ft)	79	47	46	231	42	53
Queue Length 95th (ft)	129	137	134	315	#123	95
Internal Link Dist (ft)		1293		1072		796
Turn Bay Length (ft)	805		225		250	
Base Capacity (vph)	428	570	570	1911	165	2377
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.66	0.66	0.66	0.58	0.27

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

APPENDIX 7.1:

HORIZON YEAR (2035) WITHOUT PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS

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Intersection Level Of Service Report
#2: Nason Street / Ironwood Avenue

Control Type:	Signalized	Delay (sec / veh):	256.1
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.631

Intersection Setup

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			25.00			45.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			no			yes			no		

Volumes

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	349	5	91	5	9	5	5	331	453	79	302	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	18	0	0	0	0	0	38	0	0	0
Total Hourly Volume [veh/h]	349	5	73	5	9	5	5	331	415	79	302	5
Peak Hour Factor	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	109	2	23	2	3	2	2	103	129	25	94	2
Total Analysis Volume [veh/h]	435	6	91	6	11	6	6	413	517	99	377	6
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LagFO
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	8	0	0	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	5.0	0.0	0.0	5.0	0.0	4.0	5.0	0.0	4.0	5.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	29	0	0	29	0	10	31	0	10	31	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
Minimum Recall		no			no		no	no		no	no	
Maximum Recall		no			no		no	yes		no	yes	
Pedestrian Recall		no			no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Lane Group Calculations

Lane Group	C	R	C	L	C	L	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	5.00	6.00	5.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	3.00	4.00	3.00	4.00
g_i, Effective Green Time [s]	23	23	23	1	25	5	29
g / C, Green / Cycle	0.33	0.33	0.33	0.01	0.36	0.07	0.42
(v / s)_i Volume / Saturation Flow Rate	0.96	0.06	0.06	0.00	0.61	0.06	0.23
s, saturation flow rate [veh/h]	459	1425	384	1597	1527	1597	1671
c, Capacity [veh/h]	253	468	191	15	545	116	702
d1, Uniform Delay [s]	28.25	16.90	18.25	34.53	22.56	32.15	15.32
k, delay calibration	0.50	0.04	0.04	0.04	0.50	0.08	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	351.04	0.07	0.10	5.94	326.31	12.22	3.04
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

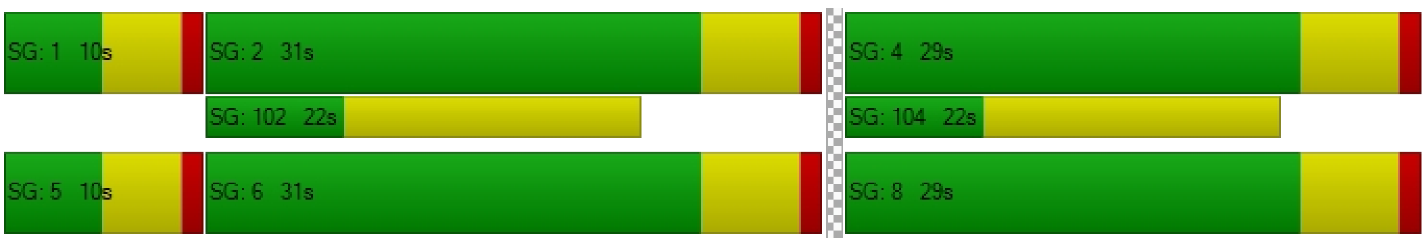
X, volume / capacity	1.74	0.19	0.12	0.39	1.71	0.85	0.55
d, Delay for Lane Group [s/veh]	379.30	16.98	18.35	40.47	348.87	44.37	18.36
Lane Group LOS	F	B	B	D	F	D	B
Critical Lane Group	yes	no	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	28.67	0.93	0.25	0.12	56.94	1.88	4.20
50th-Percentile Queue Length [ft]	716.66	23.35	6.21	3.00	1423.42	46.89	105.05
95th-Percentile Queue Length [veh]	47.84	1.68	0.45	0.22	90.05	3.38	7.56
95th-Percentile Queue Length [ft]	1195.88	42.02	11.18	5.40	2251.14	84.41	189.08

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	379.30	379.30	16.98	18.35	18.35	18.35	40.47	348.87	348.87	44.37	18.36	18.36
Movement LOS	F	F	B	B	B	B	D	F	F	D	B	B
d_A, Approach Delay [s/veh]	317.32			18.35			346.89			23.70		
Approach LOS	F			B			F			C		
d_I, Intersection Delay [s/veh]	256.13											
Intersection LOS	F											
Intersection V/C	1.631											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	66	244	132	30	44	108	392	627	67	487	3
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1863	1900	1900	1900	1810	1900	1881	1810	1881	1900
Adj Flow Rate, veh/h	9	80	141	161	37	44	132	478	675	82	594	4
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	0	4	2	0	0	0	5	0	1	5	1	1
Cap, veh/h	20	190	313	195	381	421	161	1792	966	104	1686	11
Arrive On Green	0.01	0.10	0.10	0.11	0.20	0.20	0.09	0.50	0.50	0.06	0.46	0.46
Sat Flow, veh/h	1810	1827	1583	1810	1900	1615	1723	3610	1599	1723	3640	25
Grp Volume(v), veh/h	9	80	141	161	37	44	132	478	675	82	292	306
Grp Sat Flow(s),veh/h/ln	1810	1827	1583	1810	1900	1615	1723	1805	1599	1723	1787	1877
Q Serve(g_s), s	0.5	3.9	7.5	8.3	1.5	2.0	7.1	7.3	27.5	4.5	9.9	9.9
Cycle Q Clear(g_c), s	0.5	3.9	7.5	8.3	1.5	2.0	7.1	7.3	27.5	4.5	9.9	9.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.01
Lane Grp Cap(c), veh/h	20	190	313	195	381	421	161	1792	966	104	828	869
V/C Ratio(X)	0.45	0.42	0.45	0.83	0.10	0.10	0.82	0.27	0.70	0.79	0.35	0.35
Avail Cap(c_a), veh/h	95	327	431	286	540	556	200	1792	966	109	828	869
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.39	0.39	0.39	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.7	39.9	33.6	41.5	31.0	26.7	42.3	13.9	12.9	44.0	16.4	16.4
Incr Delay (d2), s/veh	5.7	0.5	0.4	7.9	0.0	0.0	6.9	0.1	1.7	27.7	1.2	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	2.0	3.3	4.5	0.8	0.9	3.7	3.7	12.4	2.9	5.1	5.4
LnGrp Delay(d),s/veh	52.4	40.4	33.9	49.5	31.0	26.7	49.1	14.0	14.6	71.7	17.5	17.5
LnGrp LOS	D	D	C	D	C	C	D	B	B	E	B	B
Approach Vol, veh/h		230			242			1285			680	
Approach Delay, s/veh		36.9			42.5			17.9			24.0	
Approach LOS		D			D			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.7	53.2	15.2	15.9	13.9	50.0	6.1	25.1
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	6.0	35.0	15.0	17.0	11.0	30.0	5.0	27.0
Max Q Clear Time (g_c+I1), s	6.5	29.5	10.3	9.5	9.1	11.9	2.5	4.0
Green Ext Time (p_c), s	0.0	2.9	0.1	0.5	0.0	5.3	0.0	0.7

Intersection Summary	
HCM 2010 Ctrl Delay	23.9
HCM 2010 LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	33	3	600	0	0	0	0	1094	183	188	674	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1836	1845				0	1881	1900	1900	1881	0
Adj Flow Rate, veh/h	40	0	438				0	1334	190	229	822	0
Adj No. of Lanes	1	0	2				0	2	0	1	2	0
Peak Hour Factor	0.82	0.82	0.82				0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	4	50	3				0	1	1	0	1	0
Cap, veh/h	284	0	511				0	1584	224	261	2515	0
Arrive On Green	0.16	0.00	0.16				0.00	0.50	0.50	0.14	0.70	0.00
Sat Flow, veh/h	1740	0	3136				0	3239	445	1810	3668	0
Grp Volume(v), veh/h	40	0	438				0	754	770	229	822	0
Grp Sat Flow(s),veh/h/ln	1740	0	1568				0	1787	1803	1810	1787	0
Q Serve(g_s), s	1.8	0.0	12.2				0.0	32.6	33.3	11.2	8.0	0.0
Cycle Q Clear(g_c), s	1.8	0.0	12.2				0.0	32.6	33.3	11.2	8.0	0.0
Prop In Lane	1.00		1.00				0.00		0.25	1.00		0.00
Lane Grp Cap(c), veh/h	284	0	511				0	900	908	261	2515	0
V/C Ratio(X)	0.14	0.00	0.86				0.00	0.84	0.85	0.88	0.33	0.00
Avail Cap(c_a), veh/h	348	0	627				0	900	908	261	2515	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.87	0.87	0.00
Uniform Delay (d), s/veh	32.3	0.0	36.6				0.0	19.2	19.4	37.7	5.1	0.0
Incr Delay (d2), s/veh	0.1	0.0	8.3				0.0	9.1	9.7	23.2	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	0.0	5.9				0.0	18.2	18.9	7.3	4.0	0.0
LnGrp Delay(d),s/veh	32.3	0.0	44.9				0.0	28.3	29.1	60.9	5.4	0.0
LnGrp LOS	C		D					C	C	E	A	
Approach Vol, veh/h		478						1524			1051	
Approach Delay, s/veh		43.9						28.7			17.5	
Approach LOS		D						C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	18.0	51.3		20.7		69.3		
Change Period (Y+Rc), s	5.0	6.0		6.0		6.0		
Max Green Setting (Gmax), s	13.0	42.0		18.0		60.0		
Max Q Clear Time (g_c+I1), s	13.2	35.3		14.2		10.0		
Green Ext Time (p_c), s	0.0	4.9		0.4		15.0		

Intersection Summary		
HCM 2010 Ctrl Delay		27.2
HCM 2010 LOS		C

Notes

User approved volume balancing among the lanes for turning movement.

Intersection Level Of Service Report
#5: Street "B"/Lantz Lane / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	14.1
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	17	0	6	0	0	0	0	418	10	5	370	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	17	0	6	0	0	0	0	418	10	5	370	0
Peak Hour Factor	0.8100	0.8100	0.8100	1.0000	1.0000	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	0	2	0	0	0	0	129	3	2	114	0
Total Analysis Volume [veh/h]	21	0	7	0	0	0	0	516	12	6	457	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes			
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	14.06	14.08	11.97	0.00	0.00	0.00	0.00	0.00	0.00	8.48	0.00	0.00
Movement LOS	B	B	B					A	A	A	A	
95th-Percentile Queue Length [veh]	0.20	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	2.34	2.34	0.00
95th-Percentile Queue Length [ft]	4.96	4.96	4.96	0.00	0.00	0.00	0.00	0.00	0.00	58.39	58.39	0.00
d_A, Approach Delay [s/veh]	13.54			0.00			0.00			0.11		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.42											
Intersection LOS	B											

Intersection Level Of Service Report
#7: Oliver Street / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	13.9
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	5	0	12	0	0	0	0	419	5	5	370	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	0	12	0	0	0	0	419	5	5	370	0
Peak Hour Factor	0.8100	0.8100	0.8100	1.0000	1.0000	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	0	4	0	0	0	0	129	2	2	114	0
Total Analysis Volume [veh/h]	6	0	15	0	0	0	0	517	6	6	457	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes	yes		
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	13.84	13.86	11.75	13.90	13.64	10.96	0.00	0.00	0.00	8.47	0.00	0.00
Movement LOS	B	B	B	B	B	B		A	A	A	A	
95th-Percentile Queue Length [veh]	0.13	0.13	0.13	0.00	0.00	0.00	0.00	0.00	0.00	2.32	2.32	0.00
95th-Percentile Queue Length [ft]	3.21	3.21	3.21	0.00	0.00	0.00	0.00	0.00	0.00	57.97	57.97	0.00
d_A, Approach Delay [s/veh]	12.35			12.83			0.00			0.11		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	0.31											
Intersection LOS	B											

Intersection Level Of Service Report
#2: Nason Street / Ironwood Avenue

Control Type:	Signalized	Delay (sec / veh):	141.2
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.231

Intersection Setup

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			25.00			45.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			no			yes			no		

Volumes

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	437	9	130	5	6	5	5	315	325	121	289	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	31	0	0	2	0	0	20	0	0	0
Total Hourly Volume [veh/h]	437	9	99	5	6	3	5	315	305	121	289	5
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	111	2	25	1	2	1	1	80	78	31	74	1
Total Analysis Volume [veh/h]	446	9	101	5	6	3	5	321	311	123	295	5
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LagFO
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	8	0	0	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	5.0	0.0	0.0	5.0	0.0	4.0	5.0	0.0	4.0	5.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	32	0	0	32	0	10	28	0	10	28	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
Minimum Recall		no			no		no	no		no	no	
Maximum Recall		no			no		no	yes		no	yes	
Pedestrian Recall		no			no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	C	R	C	L	C	L	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	5.00	6.00	5.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	3.00	4.00	3.00	4.00
g_i, Effective Green Time [s]	26	26	26	1	22	5	27
g / C, Green / Cycle	0.37	0.37	0.37	0.01	0.31	0.07	0.38
(v / s)_i Volume / Saturation Flow Rate	0.74	0.07	0.06	0.00	0.41	0.08	0.18
s, saturation flow rate [veh/h]	611	1425	224	1597	1543	1597	1672
c, Capacity [veh/h]	328	529	153	13	484	116	633
d1, Uniform Delay [s]	26.13	14.94	17.59	34.60	24.06	32.52	16.51
k, delay calibration	0.50	0.04	0.04	0.04	0.50	0.20	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	191.39	0.06	0.10	6.38	151.42	69.76	2.54
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

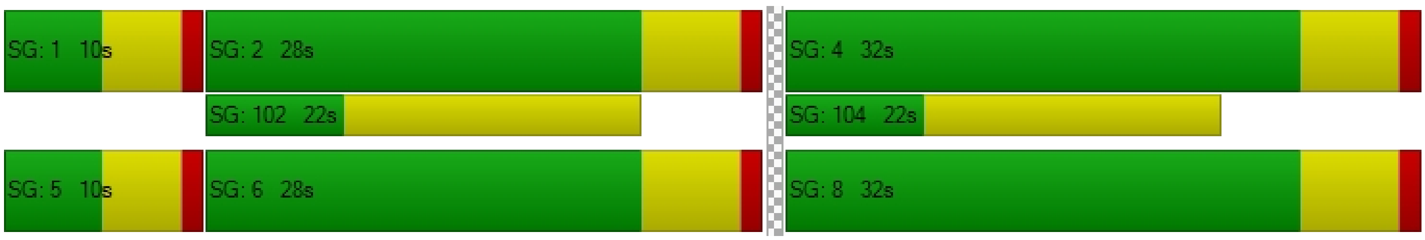
X, volume / capacity	1.39	0.19	0.09	0.38	1.30	1.06	0.47
d, Delay for Lane Group [s/veh]	217.52	15.00	17.68	40.98	175.48	102.29	19.05
Lane Group LOS	F	B	B	D	F	F	B
Critical Lane Group	yes	no	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	22.68	0.95	0.14	0.10	27.29	4.01	3.40
50th-Percentile Queue Length [ft]	566.96	23.81	3.48	2.57	682.22	100.14	84.93
95th-Percentile Queue Length [veh]	36.43	1.71	0.25	0.18	41.59	7.21	6.12
95th-Percentile Queue Length [ft]	910.67	42.86	6.27	4.62	1039.87	180.25	152.88

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	217.52	217.52	15.00	17.68	17.68	17.68	40.98	175.48	175.48	102.29	19.05	19.05
Movement LOS	F	F	B	B	B	B	D	F	F	F	B	B
d_A, Approach Delay [s/veh]	180.73			17.68			174.42			43.26		
Approach LOS	F			B			F			D		
d_I, Intersection Delay [s/veh]	141.19											
Intersection LOS	F											
Intersection V/C	1.231											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	28	52	192	226	61	117	225	486	683	39	416	13
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1863	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	30	57	138	246	66	117	245	528	639	42	452	10
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	2	0	0	0	0	0	0	0	0
Cap, veh/h	52	187	397	243	392	390	267	1798	1025	64	1393	31
Arrive On Green	0.03	0.10	0.10	0.14	0.21	0.21	0.15	0.50	0.50	0.04	0.39	0.39
Sat Flow, veh/h	1810	1900	1615	1774	1900	1615	1810	3610	1615	1810	3611	80
Grp Volume(v), veh/h	30	57	138	246	66	117	245	528	639	42	226	236
Grp Sat Flow(s),veh/h/ln	1810	1900	1615	1774	1900	1615	1810	1805	1615	1810	1805	1885
Q Serve(g_s), s	1.6	2.6	6.7	13.0	2.7	5.6	12.7	8.2	22.7	2.2	8.3	8.4
Cycle Q Clear(g_c), s	1.6	2.6	6.7	13.0	2.7	5.6	12.7	8.2	22.7	2.2	8.3	8.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.04
Lane Grp Cap(c), veh/h	52	187	397	243	392	390	267	1798	1025	64	697	728
V/C Ratio(X)	0.58	0.31	0.35	1.01	0.17	0.30	0.92	0.29	0.62	0.66	0.32	0.32
Avail Cap(c_a), veh/h	95	380	561	243	540	516	267	1798	1025	95	697	728
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.48	0.48	0.48	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.6	39.8	29.6	41.0	31.0	29.5	39.9	14.0	10.5	45.3	20.5	20.5
Incr Delay (d2), s/veh	3.7	0.3	0.2	61.2	0.1	0.2	20.0	0.2	1.4	4.2	1.2	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	1.4	3.0	10.5	1.4	2.5	7.8	4.1	10.5	1.2	4.4	4.6
LnGrp Delay(d),s/veh	49.3	40.2	29.7	102.3	31.1	29.6	59.9	14.2	11.9	49.5	21.7	21.7
LnGrp LOS	D	D	C	F	C	C	E	B	B	D	C	C
Approach Vol, veh/h		225			429			1412			504	
Approach Delay, s/veh		35.0			71.5			21.1			24.0	
Approach LOS		C			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.3	53.3	18.0	15.3	19.0	42.7	7.7	25.6
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	5.0	36.0	13.0	19.0	14.0	27.0	5.0	27.0
Max Q Clear Time (g_c+I1), s	4.2	24.7	15.0	8.7	14.7	10.4	3.6	7.6
Green Ext Time (p_c), s	0.0	4.1	0.0	0.6	0.0	4.8	0.0	0.8

Intersection Summary			
HCM 2010 Ctrl Delay			31.3
HCM 2010 LOS			C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	160	4	785	0	0	0	0	1234	153	181	653	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1875	1881				0	1898	1900	1900	1881	0
Adj Flow Rate, veh/h	168	0	558				0	1299	150	191	687	0
Adj No. of Lanes	1	0	2				0	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	33	1				0	0	0	0	1	0
Cap, veh/h	359	0	641				0	1426	164	248	2322	0
Arrive On Green	0.20	0.00	0.20				0.00	0.44	0.44	0.14	0.65	0.00
Sat Flow, veh/h	1792	0	3198				0	3355	375	1810	3668	0
Grp Volume(v), veh/h	168	0	558				0	716	733	191	687	0
Grp Sat Flow(s),veh/h/ln	1792	0	1599				0	1803	1832	1810	1787	0
Q Serve(g_s), s	6.6	0.0	13.5				0.0	29.6	30.0	8.1	6.7	0.0
Cycle Q Clear(g_c), s	6.6	0.0	13.5				0.0	29.6	30.0	8.1	6.7	0.0
Prop In Lane	1.00		1.00				0.00		0.20	1.00		0.00
Lane Grp Cap(c), veh/h	359	0	641				0	789	801	248	2322	0
V/C Ratio(X)	0.47	0.00	0.87				0.00	0.91	0.91	0.77	0.30	0.00
Avail Cap(c_a), veh/h	403	0	720				0	789	801	248	2322	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.84	0.84	0.00
Uniform Delay (d), s/veh	28.2	0.0	31.0				0.0	21.0	21.1	33.3	6.1	0.0
Incr Delay (d2), s/veh	0.4	0.0	9.5				0.0	16.1	16.8	10.7	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	0.0	6.8				0.0	18.0	18.8	4.8	3.3	0.0
LnGrp Delay(d),s/veh	28.6	0.0	40.5				0.0	37.1	37.9	44.0	6.4	0.0
LnGrp LOS	C		D					D	D	D	A	
Approach Vol, veh/h		726						1449			878	
Approach Delay, s/veh		37.7						37.5			14.5	
Approach LOS		D						D			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	17.0	41.0		22.0		58.0		
Change Period (Y+Rc), s	6.0	* 6		6.0		6.0		
Max Green Setting (Gmax), s	10.0	* 35		18.0		50.0		
Max Q Clear Time (g_c+I1), s	10.1	32.0		15.5		8.7		
Green Ext Time (p_c), s	0.0	1.8		0.5		3.1		

Intersection Summary	
HCM 2010 Ctrl Delay	31.0
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Intersection Level Of Service Report
#5: Street "B"/Lantz Lane / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	13.5
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	13	0	7	0	0	0	0	433	17	8	402	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	13	0	7	0	0	0	0	433	17	8	402	0
Peak Hour Factor	0.9300	0.9300	0.9300	1.0000	1.0000	1.0000	1.0000	0.9300	0.9300	0.9300	0.9300	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	2	0	0	0	0	116	5	2	108	0
Total Analysis Volume [veh/h]	14	0	8	0	0	0	0	466	18	9	432	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes			
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	13.44	13.53	11.38	0.00	0.00	0.00	0.00	0.00	0.00	8.37	0.00	0.00
Movement LOS	B	B	B					A	A	A	A	
95th-Percentile Queue Length [veh]	0.14	0.14	0.14	0.00	0.00	0.00	0.00	0.00	0.00	2.02	2.02	0.00
95th-Percentile Queue Length [ft]	3.52	3.52	3.52	0.00	0.00	0.00	0.00	0.00	0.00	50.58	50.58	0.00
d_A, Approach Delay [s/veh]	12.69			0.00			0.00			0.17		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.37											
Intersection LOS	B											

Intersection Level Of Service Report
#7: Oliver Street / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	13.8
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	12	0	5	0	0	0	0	430	10	16	399	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.10	1.10	1.10	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	0	5	0	0	0	0	430	10	16	399	0
Peak Hour Factor	0.9100	0.9100	0.9100	1.0000	1.0000	1.0000	1.0000	0.9100	0.9100	0.9100	0.9100	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	1	0	0	0	0	118	3	4	110	0
Total Analysis Volume [veh/h]	13	0	5	0	0	0	0	473	11	18	438	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes			
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
d_M, Delay for Movement [s/veh]	13.68	13.76	11.40	0.00	0.00	0.00	0.00	0.00	0.00	8.39	0.00	0.00
Movement LOS	B	B	B					A	A	A	A	
95th-Percentile Queue Length [veh]	0.12	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	2.14	2.14	0.00
95th-Percentile Queue Length [ft]	3.01	3.01	3.01	0.00	0.00	0.00	0.00	0.00	0.00	53.45	53.45	0.00
d_A, Approach Delay [s/veh]	13.04			0.00			0.00			0.33		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.40											
Intersection LOS	B											

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

APPENDIX 7.2:

HORIZON YEAR (2035) WITH PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS

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Intersection Level Of Service Report
#1: Nason Street / Street "A"

Control Type:	Two-way stop	Delay (sec / veh):	9.0
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.036

Intersection Setup

Name	Nason Street		Nason Street		Street "A"	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Nason Street		Nason Street		Street "A"	
Base Volume Input [veh/h]	15	0	0	19	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	11	0	0	31	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	15	11	0	19	31	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	3	0	5	8	0
Total Analysis Volume [veh/h]	16	12	0	21	34	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.04	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.27	0.00	8.98	8.56
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.11	0.11
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	2.81	2.81
d_A, Approach Delay [s/veh]	0.00		0.00		8.98	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.68					
Intersection LOS	A					

Intersection Level Of Service Report
#2: Nason Street / Ironwood Avenue

Control Type:	Signalized	Delay (sec / veh):	367.1
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	2.637

Intersection Setup

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			25.00			45.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			no			yes			no		

Volumes

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	349	5	91	5	9	5	5	331	453	79	302	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	9	10	0	26	5	2	5	0	30	15	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	18	0	0	0	0	0	38	0	0	0
Total Hourly Volume [veh/h]	349	14	83	5	35	10	7	336	415	109	317	5
Peak Hour Factor	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020	0.8020
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	109	4	26	2	11	3	2	105	129	34	99	2
Total Analysis Volume [veh/h]	435	17	103	6	44	12	9	419	517	136	395	6
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			1		

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LagFO
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	8	0	0	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	5.0	0.0	0.0	5.0	0.0	4.0	5.0	0.0	4.0	5.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	32	0	0	32	0	10	28	0	10	28	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
I1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
I2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
Minimum Recall		no			no		no	no		no	no	
Maximum Recall		no			no		no	yes		no	yes	
Pedestrian Recall		no			no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	C	R	C	L	C	L	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	5.00	6.00	5.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	3.00	4.00	3.00	4.00
g_i, Effective Green Time [s]	26	26	26	1	22	5	26
g / C, Green / Cycle	0.37	0.37	0.37	0.01	0.31	0.07	0.37
(v / s)_i Volume / Saturation Flow Rate	1.94	0.07	0.07	0.01	0.61	0.09	0.24
s, saturation flow rate [veh/h]	233	1425	855	1597	1528	1597	1671
c, Capacity [veh/h]	187	529	373	21	480	116	624
d1, Uniform Delay [s]	29.17	14.96	15.51	34.34	24.06	32.52	18.11
k, delay calibration	0.50	0.04	0.04	0.04	0.50	0.27	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	652.74	0.07	0.08	4.99	435.46	115.34	5.02
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

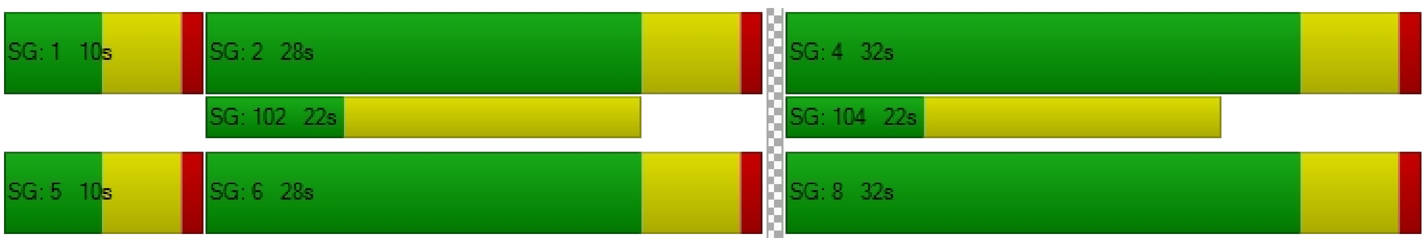
X, volume / capacity	2.41	0.19	0.17	0.43	1.95	1.17	0.64
d, Delay for Lane Group [s/veh]	681.91	15.03	15.59	39.33	459.51	147.86	23.13
Lane Group LOS	F	B	B	D	F	F	C
Critical Lane Group	yes	no	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	36.91	0.97	0.63	0.17	64.88	5.47	5.18
50th-Percentile Queue Length [ft]	922.81	24.32	15.64	4.27	1621.96	136.86	129.47
95th-Percentile Queue Length [veh]	63.80	1.75	1.13	0.31	103.54	9.76	8.91
95th-Percentile Queue Length [ft]	1594.93	43.78	28.16	7.69	2588.41	244.10	222.78

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	681.91	681.91	15.03	15.59	15.59	15.59	39.33	459.51	459.51	147.86	23.13	23.13
Movement LOS	F	F	B	B	B	B	D	F	F	F	C	C
d_A, Approach Delay [s/veh]		558.14			15.59			455.51			54.72	
Approach LOS		F			B			F			D	
d_I, Intersection Delay [s/veh]	367.12											
Intersection LOS	F											
Intersection V/C	2.637											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	66	244	132	30	47	108	408	627	93	517	3
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1827	1863	1900	1900	1900	1810	1900	1881	1810	1881	1900
Adj Flow Rate, veh/h	9	80	141	161	37	47	132	498	675	113	630	4
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	0	4	2	0	0	0	5	0	1	5	1	1
Cap, veh/h	20	190	313	195	381	426	161	1782	961	109	1686	11
Arrive On Green	0.01	0.10	0.10	0.11	0.20	0.20	0.09	0.49	0.49	0.06	0.46	0.46
Sat Flow, veh/h	1810	1827	1583	1810	1900	1615	1723	3610	1599	1723	3641	23
Grp Volume(v), veh/h	9	80	141	161	37	47	132	498	675	113	309	325
Grp Sat Flow(s),veh/h/ln	1810	1827	1583	1810	1900	1615	1723	1805	1599	1723	1787	1877
Q Serve(g_s), s	0.5	3.9	7.4	8.3	1.5	2.1	7.1	7.7	27.7	6.0	10.7	10.7
Cycle Q Clear(g_c), s	0.5	3.9	7.4	8.3	1.5	2.1	7.1	7.7	27.7	6.0	10.7	10.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.01
Lane Grp Cap(c), veh/h	20	190	313	195	381	426	161	1782	961	109	828	869
V/C Ratio(X)	0.45	0.42	0.45	0.83	0.10	0.11	0.82	0.28	0.70	1.04	0.37	0.37
Avail Cap(c_a), veh/h	95	327	431	286	540	561	200	1782	961	109	828	869
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.36	0.36	0.36	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.7	39.9	33.6	41.5	31.0	26.5	42.3	14.1	13.1	44.5	16.6	16.6
Incr Delay (d2), s/veh	5.7	0.5	0.4	7.9	0.0	0.0	6.3	0.1	1.6	96.9	1.3	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	2.0	3.3	4.5	0.8	0.9	3.7	3.8	12.4	5.8	5.5	5.8
LnGrp Delay(d),s/veh	52.4	40.4	33.9	49.5	31.0	26.6	48.6	14.3	14.6	142.0	17.8	17.8
LnGrp LOS	D	D	C	D	C	C	D	B	B	F	B	B
Approach Vol, veh/h		230			245			1305			747	
Approach Delay, s/veh		36.9			42.3			17.9			36.6	
Approach LOS		D			D			B			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	52.9	15.2	15.9	13.9	50.0	6.1	25.1
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	6.0	35.0	15.0	17.0	11.0	30.0	5.0	27.0
Max Q Clear Time (g_c+I1), s	8.0	29.7	10.3	9.4	9.1	12.7	2.5	4.1
Green Ext Time (p_c), s	0.0	2.9	0.1	0.5	0.0	5.5	0.0	0.7

Intersection Summary			
HCM 2010 Ctrl Delay			27.5
HCM 2010 LOS			C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	42	3	600	0	0	0	0	1101	183	198	694	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1827	1836	1845				0	1881	1900	1900	1881	0
Adj Flow Rate, veh/h	51	0	438				0	1343	190	241	846	0
Adj No. of Lanes	1	0	2				0	2	0	1	2	0
Peak Hour Factor	0.82	0.82	0.82				0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	4	50	3				0	1	1	0	1	0
Cap, veh/h	284	0	512				0	1585	223	261	2515	0
Arrive On Green	0.16	0.00	0.16				0.00	0.50	0.50	0.14	0.70	0.00
Sat Flow, veh/h	1740	0	3136				0	3242	442	1810	3668	0
Grp Volume(v), veh/h	51	0	438				0	758	775	241	846	0
Grp Sat Flow(s),veh/h/ln	1740	0	1568				0	1787	1803	1810	1787	0
Q Serve(g_s), s	2.3	0.0	12.2				0.0	32.9	33.7	11.8	8.3	0.0
Cycle Q Clear(g_c), s	2.3	0.0	12.2				0.0	32.9	33.7	11.8	8.3	0.0
Prop In Lane	1.00		1.00				0.00		0.25	1.00		0.00
Lane Grp Cap(c), veh/h	284	0	512				0	900	908	261	2515	0
V/C Ratio(X)	0.18	0.00	0.86				0.00	0.84	0.85	0.92	0.34	0.00
Avail Cap(c_a), veh/h	348	0	627				0	900	908	261	2515	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.87	0.87	0.00
Uniform Delay (d), s/veh	32.5	0.0	36.6				0.0	19.3	19.5	38.0	5.2	0.0
Incr Delay (d2), s/veh	0.1	0.0	8.3				0.0	9.4	10.0	31.7	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.0	5.9				0.0	18.4	19.1	8.2	4.1	0.0
LnGrp Delay(d),s/veh	32.6	0.0	44.9				0.0	28.7	29.5	69.7	5.5	0.0
LnGrp LOS	C		D					C	C	E	A	
Approach Vol, veh/h		489						1533			1087	
Approach Delay, s/veh		43.6						29.1			19.7	
Approach LOS		D						C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	18.0	51.3		20.7		69.3		
Change Period (Y+Rc), s	5.0	6.0		6.0		6.0		
Max Green Setting (Gmax), s	13.0	42.0		18.0		60.0		
Max Q Clear Time (g_c+I1), s	13.8	35.7		14.2		10.3		
Green Ext Time (p_c), s	0.0	4.7		0.5		15.4		

Intersection Summary	
HCM 2010 Ctrl Delay	28.1
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Intersection Level Of Service Report
#5: Street "B"/Lantz Lane / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	14.2
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	17	0	6	0	0	0	0	418	10	5	370	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	5	0	35	12	3	0	0	10	2
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	17	0	6	5	0	35	12	421	10	5	380	2
Peak Hour Factor	0.8100	0.8100	0.8100	1.0000	1.0000	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	0	2	1	0	9	3	130	3	2	117	1
Total Analysis Volume [veh/h]	21	0	7	5	0	35	12	520	12	6	469	2
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes			
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	14.18	14.18	12.02	0.00	0.00	0.00	0.00	0.00	0.00	8.50	0.00	0.00
Movement LOS	B	B	B					A	A	A	A	
95th-Percentile Queue Length [veh]	0.20	0.20	0.20	0.00	0.00	0.00	0.00	0.00	0.00	2.46	2.46	0.00
95th-Percentile Queue Length [ft]	5.02	5.02	5.02	0.00	0.00	0.00	0.00	0.00	0.00	61.41	61.41	0.00
d_A, Approach Delay [s/veh]	13.64			0.00			0.00			0.11		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.42											
Intersection LOS	B											

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Intersection Level Of Service Report
#6: Oliver Street / Street "C"

Control Type:	Two-way stop	Delay (sec / veh):	8.8
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street		Oliver Street		Street "C"	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Oliver Street		Oliver Street		Street "C"	
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	10	0	0	0	0	31
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	10	0	0	0	0	31
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	0	0	0	8
Total Analysis Volume [veh/h]	11	0	0	0	0	31
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	7.23	0.00	0.00	0.00	8.82	0.00
Movement LOS	A	A	A	A	A	
95th-Percentile Queue Length [veh]	0.02	0.02	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.51	0.51	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	7.23		0.00		8.82	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	7.23					
Intersection LOS	A					

Intersection Level Of Service Report
#7: Oliver Street / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	14.6
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.052

Intersection Setup

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	5	0	12	0	0	0	0	419	5	5	370	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	21	0	10	3	5	0	0	2	7
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	5	0	12	21	0	10	3	424	5	5	372	7
Peak Hour Factor	0.8100	0.8100	0.8100	1.0000	1.0000	1.0000	1.0000	0.8100	0.8100	0.8100	0.8100	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	0	4	5	0	3	1	131	2	2	115	2
Total Analysis Volume [veh/h]	6	0	15	21	0	10	3	523	6	6	459	7
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no	no		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes	yes		
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.03	0.05	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	14.08	13.91	11.81	14.56	14.28	11.57	0.00	0.00	0.00	8.49	0.00	0.00
Movement LOS	B	B	B	B	B	B		A	A	A	A	
95th-Percentile Queue Length [veh]	0.13	0.13	0.13	0.22	0.22	0.22	0.00	0.00	0.00	2.36	2.36	0.00
95th-Percentile Queue Length [ft]	3.26	3.26	3.26	5.53	5.53	5.53	0.00	0.00	0.00	58.91	58.91	0.00
d_A, Approach Delay [s/veh]	12.46			13.59			0.00			0.11		
Approach LOS	B			B			A			A		
d_I, Intersection Delay [s/veh]	0.70											
Intersection LOS	B											

Intersection Level Of Service Report
#1: Nason Street / Street "A"

Control Type:	Two-way stop	Delay (sec / veh):	9.0
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.024

Intersection Setup

Name	Nason Street		Nason Street		Street "A"	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Nason Street		Nason Street		Street "A"	
Base Volume Input [veh/h]	19	0	0	16	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	35	0	0	20	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	19	35	0	16	20	0
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	10	0	4	5	0
Total Analysis Volume [veh/h]	21	38	0	17	22	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			no
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.33	0.00	8.98	8.59
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.07	0.07
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	1.82	1.82
d_A, Approach Delay [s/veh]	0.00		0.00		8.98	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.02					
Intersection LOS	A					

Intersection Level Of Service Report
#2: Nason Street / Ironwood Avenue

Control Type:	Signalized	Delay (sec / veh):	259.5
Analysis Method:	HCM2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	2.091

Intersection Setup

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	1	0	0	1	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	120.00	100.00	100.00	200.00	100.00	100.00
Speed [mph]	45.00			25.00			45.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	yes			no			yes			no		

Volumes

Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	437	9	130	5	6	5	5	315	325	121	289	5
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	29	34	0	17	3	6	17	0	20	10	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	31	0	0	2	0	0	20	0	0	0
Total Hourly Volume [veh/h]	437	38	133	5	23	6	11	332	305	141	299	5
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	111	10	34	1	6	2	3	85	78	36	76	1
Total Analysis Volume [veh/h]	446	39	136	5	23	6	11	339	311	144	305	5
Presence of On-Street Parking	no		no	no		no	no		no	no		no
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	yes
Signal Coordination Group	-
Cycle Length [s]	70
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Fully actuated
Offset [s]	0.0
Offset Reference	LagFO
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Split	Split	Split	Split	Split	Split	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss
Signal Group	0	8	0	0	4	0	5	2	0	1	6	0
Auxiliary Signal Groups												
Lead / Lag	-	-	-	-	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	0	5	0	0	5	0	5	5	0	5	5	0
Maximum Green [s]	0	30	0	0	30	0	30	30	0	30	30	0
Amber [s]	0.0	5.0	0.0	0.0	5.0	0.0	4.0	5.0	0.0	4.0	5.0	0.0
All red [s]	0.0	1.0	0.0	0.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	0.0
Split [s]	0	32	0	0	32	0	10	28	0	10	28	0
Vehicle Extension [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
l1, Start-Up Lost Time [s]	0.0	2.0	0.0	0.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	0.0
l2, Clearance Lost Time [s]	0.0	4.0	0.0	0.0	4.0	0.0	3.0	4.0	0.0	3.0	4.0	0.0
Minimum Recall		no			no		no	no		no	no	
Maximum Recall		no			no		no	yes		no	yes	
Pedestrian Recall		no			no		no	no		no	no	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Calculations

Lane Group	C	R	C	L	C	L	C
L, Total Lost Time per Cycle [s]	6.00	6.00	6.00	5.00	6.00	5.00	6.00
l1_p, Permitted Start-Up Lost Time [s]	2.00	0.00	2.00	0.00	0.00	0.00	0.00
l2, Clearance Lost Time [s]	4.00	4.00	4.00	3.00	4.00	3.00	4.00
g_i, Effective Green Time [s]	26	26	26	1	22	5	26
g / C, Green / Cycle	0.37	0.37	0.37	0.01	0.31	0.07	0.37
(v / s)_i Volume / Saturation Flow Rate	1.58	0.10	0.05	0.01	0.42	0.09	0.19
s, saturation flow rate [veh/h]	307	1425	635	1597	1546	1597	1672
c, Capacity [veh/h]	212	529	294	25	486	116	621
d1, Uniform Delay [s]	28.19	15.35	15.98	34.23	24.06	32.52	17.02
k, delay calibration	0.50	0.04	0.04	0.04	0.50	0.31	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	592.60	0.09	0.06	4.57	165.87	145.17	2.86
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

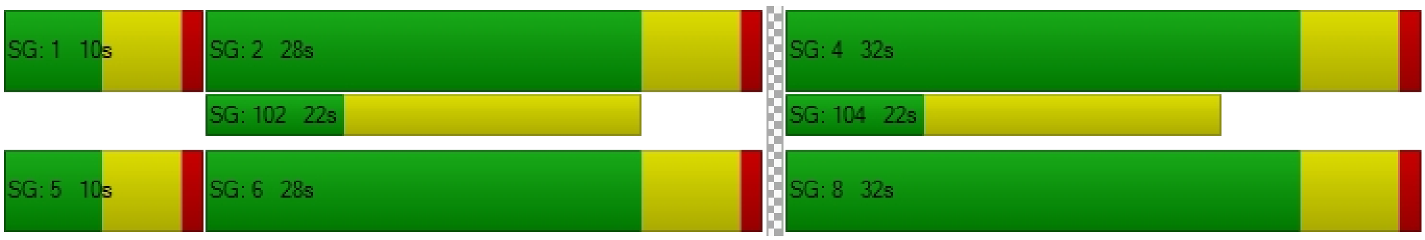
X, volume / capacity	2.28	0.26	0.12	0.44	1.34	1.24	0.50
d, Delay for Lane Group [s/veh]	620.79	15.44	16.04	38.80	189.92	177.69	19.88
Lane Group LOS	F	B	B	D	F	F	B
Critical Lane Group	yes	no	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	38.33	1.32	0.34	0.20	29.30	6.44	3.62
50th-Percentile Queue Length [ft]	958.18	32.95	8.45	5.11	732.44	160.90	90.44
95th-Percentile Queue Length [veh]	65.72	2.37	0.61	0.37	44.82	11.29	6.51
95th-Percentile Queue Length [ft]	1643.01	59.32	15.21	9.20	1120.53	282.37	162.79

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	620.79	620.79	15.44	16.04	16.04	16.04	38.80	189.92	189.92	177.69	19.88	19.88
Movement LOS	F	F	B	B	B	B	D	F	F	F	B	B
d_A, Approach Delay [s/veh]	488.22			16.04			187.41			69.94		
Approach LOS	F			B			F			E		
d_I, Intersection Delay [s/veh]	259.52											
Intersection LOS	F											
Intersection V/C	2.091											

Sequence

Ring 1	1	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	5	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↑	↱	↰	↑↑→	
Volume (veh/h)	28	52	192	226	61	128	225	538	683	56	436	13
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1863	1900	1900	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	30	57	138	246	66	129	245	585	639	61	474	10
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	2	0	0	0	0	0	0	0	0
Cap, veh/h	52	187	397	243	392	404	267	1767	1012	79	1394	29
Arrive On Green	0.03	0.10	0.10	0.14	0.21	0.21	0.15	0.49	0.49	0.04	0.39	0.39
Sat Flow, veh/h	1810	1900	1615	1774	1900	1615	1810	3610	1615	1810	3615	76
Grp Volume(v), veh/h	30	57	138	246	66	129	245	585	639	61	236	248
Grp Sat Flow(s),veh/h/ln	1810	1900	1615	1774	1900	1615	1810	1805	1615	1810	1805	1886
Q Serve(g_s), s	1.6	2.6	6.7	13.0	2.7	6.2	12.7	9.4	23.2	3.2	8.8	8.8
Cycle Q Clear(g_c), s	1.6	2.6	6.7	13.0	2.7	6.2	12.7	9.4	23.2	3.2	8.8	8.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.04
Lane Grp Cap(c), veh/h	52	187	397	243	392	404	267	1767	1012	79	696	728
V/C Ratio(X)	0.58	0.30	0.35	1.01	0.17	0.32	0.92	0.33	0.63	0.77	0.34	0.34
Avail Cap(c_a), veh/h	95	380	561	243	540	529	267	1767	1012	95	696	728
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.44	0.44	0.44	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.6	39.8	29.5	41.0	31.0	29.0	39.9	14.8	11.0	45.0	20.6	20.6
Incr Delay (d2), s/veh	3.7	0.3	0.2	61.2	0.1	0.2	18.7	0.2	1.3	21.8	1.3	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.8	1.4	3.0	10.5	1.4	2.8	7.7	4.7	10.6	2.1	4.7	4.9
LnGrp Delay(d),s/veh	49.3	40.1	29.7	102.3	31.1	29.2	58.6	15.0	12.3	66.8	21.9	21.9
LnGrp LOS	D	D	C	F	C	C	E	B	B	E	C	C
Approach Vol, veh/h		225			441			1469			545	
Approach Delay, s/veh		35.0			70.3			21.1			26.9	
Approach LOS		C			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.1	52.5	18.0	15.4	19.0	42.6	7.7	25.6
Change Period (Y+Rc), s	5.0	6.0	5.0	6.0	5.0	6.0	5.0	6.0
Max Green Setting (Gmax), s	5.0	36.0	13.0	19.0	14.0	27.0	5.0	27.0
Max Q Clear Time (g_c+I1), s	5.2	25.2	15.0	8.7	14.7	10.8	3.6	8.2
Green Ext Time (p_c), s	0.0	4.3	0.0	0.7	0.0	5.1	0.0	0.8

Intersection Summary	
HCM 2010 Ctrl Delay	31.5
HCM 2010 LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	189	4	785	0	0	0	0	1257	153	188	666	0
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1875	1881				0	1898	1900	1900	1881	0
Adj Flow Rate, veh/h	199	0	558				0	1323	150	198	701	0
Adj No. of Lanes	1	0	2				0	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95				0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	33	1				0	0	0	0	1	0
Cap, veh/h	359	0	642				0	1429	161	248	2321	0
Arrive On Green	0.20	0.00	0.20				0.00	0.44	0.44	0.14	0.65	0.00
Sat Flow, veh/h	1792	0	3198				0	3362	369	1810	3668	0
Grp Volume(v), veh/h	199	0	558				0	727	746	198	701	0
Grp Sat Flow(s),veh/h/ln	1792	0	1599				0	1803	1833	1810	1787	0
Q Serve(g_s), s	8.0	0.0	13.5				0.0	30.4	30.9	8.5	6.8	0.0
Cycle Q Clear(g_c), s	8.0	0.0	13.5				0.0	30.4	30.9	8.5	6.8	0.0
Prop In Lane	1.00		1.00				0.00		0.20	1.00		0.00
Lane Grp Cap(c), veh/h	359	0	642				0	789	802	248	2321	0
V/C Ratio(X)	0.55	0.00	0.87				0.00	0.92	0.93	0.80	0.30	0.00
Avail Cap(c_a), veh/h	403	0	720				0	789	802	248	2321	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	1.00	1.00	0.84	0.84	0.00
Uniform Delay (d), s/veh	28.8	0.0	31.0				0.0	21.2	21.3	33.5	6.1	0.0
Incr Delay (d2), s/veh	0.5	0.0	9.5				0.0	17.8	18.7	13.3	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	0.0	6.8				0.0	18.9	19.7	5.2	3.4	0.0
LnGrp Delay(d),s/veh	29.2	0.0	40.4				0.0	39.0	40.1	46.8	6.4	0.0
LnGrp LOS	C		D					D	D	D	A	
Approach Vol, veh/h		757						1473			899	
Approach Delay, s/veh		37.5						39.6			15.3	
Approach LOS		D						D			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	16.9	41.0		22.1		57.9		
Change Period (Y+Rc), s	6.0	* 6		6.0		6.0		
Max Green Setting (Gmax), s	10.0	* 35		18.0		50.0		
Max Q Clear Time (g_c+I1), s	10.5	32.9		15.5		8.8		
Green Ext Time (p_c), s	0.0	1.3		0.5		3.2		

Intersection Summary			
HCM 2010 Ctrl Delay			32.1
HCM 2010 LOS			C

Notes

User approved volume balancing among the lanes for turning movement.

Intersection Level Of Service Report
#5: Street "B"/Lantz Lane / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	13.6
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Lantz Lane			Street "B"			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	13	0	7	0	0	0	0	433	17	8	402	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	3	0	23	40	11	0	0	7	6
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	13	0	7	3	0	23	40	444	17	8	409	6
Peak Hour Factor	0.9300	0.9300	0.9300	1.0000	1.0000	1.0000	1.0000	0.9300	0.9300	0.9300	0.9300	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	2	1	0	6	10	119	5	2	110	2
Total Analysis Volume [veh/h]	14	0	8	3	0	23	40	477	18	9	440	6
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes			
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	13.57	13.65	11.48	0.00	0.00	0.00	0.00	0.00	0.00	8.40	0.00	0.00
Movement LOS	B	B	B					A	A	A	A	
95th-Percentile Queue Length [veh]	0.14	0.14	0.14	0.00	0.00	0.00	0.00	0.00	0.00	2.12	2.12	0.00
95th-Percentile Queue Length [ft]	3.57	3.57	3.57	0.00	0.00	0.00	0.00	0.00	0.00	52.90	52.90	0.00
d_A, Approach Delay [s/veh]	12.81			0.00			0.00			0.17		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.37											
Intersection LOS	B											

Intersection Level Of Service Report
#6: Oliver Street / Street "C"

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street		Oliver Street		Street "C"	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00		25.00		25.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	no		no		yes	

Volumes

Name	Oliver Street		Oliver Street		Street "C"	
Base Volume Input [veh/h]	0	0	0	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.10	1.00	1.00	1.10
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	34	0	0	0	0	21
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	34	0	0	0	0	21
Peak Hour Factor	0.9200	0.9200	0.9200	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	9	0	0	0	0	6
Total Analysis Volume [veh/h]	37	0	0	0	0	23
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			yes
Number of Storage Spaces in Median	0	0	2

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	7.27	0.00	0.00	0.00	9.09	0.00
Movement LOS	A	A		A	A	
95th-Percentile Queue Length [veh]	0.07	0.07	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	1.75	1.75	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	7.27		0.00		9.09	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	7.27					
Intersection LOS	A					

Intersection Level Of Service Report
#7: Oliver Street / Ironwood Avenue

Control Type:	Two-way stop	Delay (sec / veh):	13.8
Analysis Method:	HCM2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	25.00			25.00			55.00			55.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	no			no			no			no		

Volumes

Name	Oliver Street			Oliver Street			Ironwood Avenue			Ironwood Avenue		
Base Volume Input [veh/h]	12	0	5	0	0	0	0	430	10	16	399	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.10	1.10	1.10	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	14	0	7	11	3	0	0	6	23
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	0	5	14	0	7	11	433	10	16	405	23
Peak Hour Factor	0.9100	0.9100	0.9100	1.0000	1.0000	1.0000	1.0000	0.9100	0.9100	0.9100	0.9100	1.0000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	1	4	0	2	3	119	3	4	111	6
Total Analysis Volume [veh/h]	13	0	5	14	0	7	11	476	11	18	445	23
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	no			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	yes			
Number of Storage Spaces in Median	2	2	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
d_M, Delay for Movement [s/veh]	13.75	13.83	11.43	0.00	0.00	0.00	0.00	0.00	0.00	8.40	0.00	0.00
Movement LOS	B	B	B					A	A	A	A	
95th-Percentile Queue Length [veh]	0.12	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00	2.20	2.20	0.00
95th-Percentile Queue Length [ft]	3.03	3.03	3.03	0.00	0.00	0.00	0.00	0.00	0.00	55.06	55.06	0.00
d_A, Approach Delay [s/veh]	13.10			0.00			0.00			0.33		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	0.40											
Intersection LOS	B											

APPENDIX 7.3:

HORIZON YEAR (2035) WITHOUT PROJECT CONDITIONS TRAFFIC SIGNAL WARRANT ANALYSIS

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Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

Traffic Conditions = **Horizon Year (2035) Without Project Conditions - Weekday AM Peak Hour**

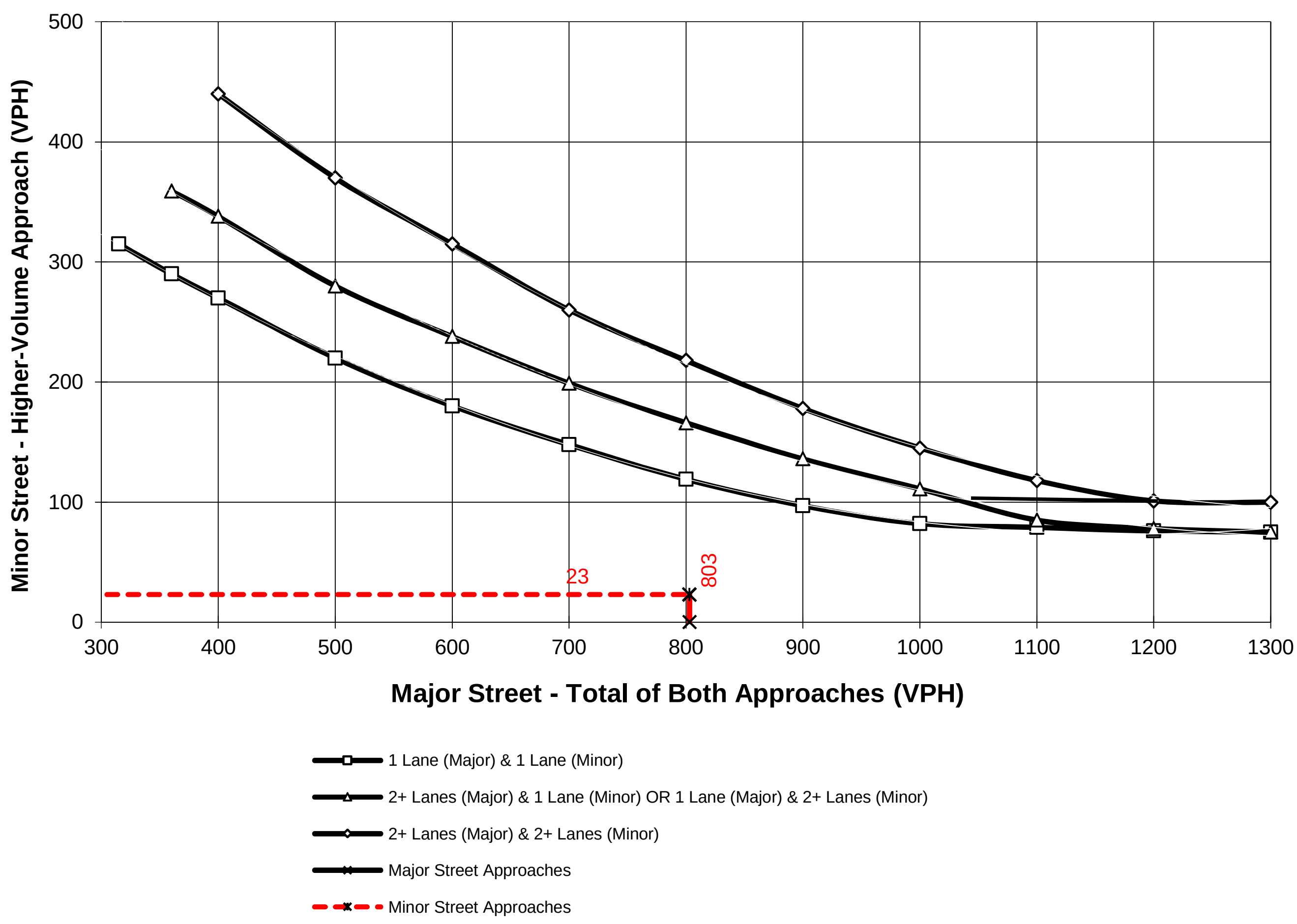
Major Street Name = **Ironwood Avenue**

Total of Both Approaches (VPH) = **803**
Number of Approach Lanes Major Street = **1**

Minor Street Name = **Lantz Lane**

High Volume Approach (VPH) = **23**
Number of Approach Lanes Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 100 vph applies as the lower threshold for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold for a minor-street approach with one lane

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

Traffic Conditions = **Horizon Year (2035) Without Project Conditions - Weekday AM Peak Hour**

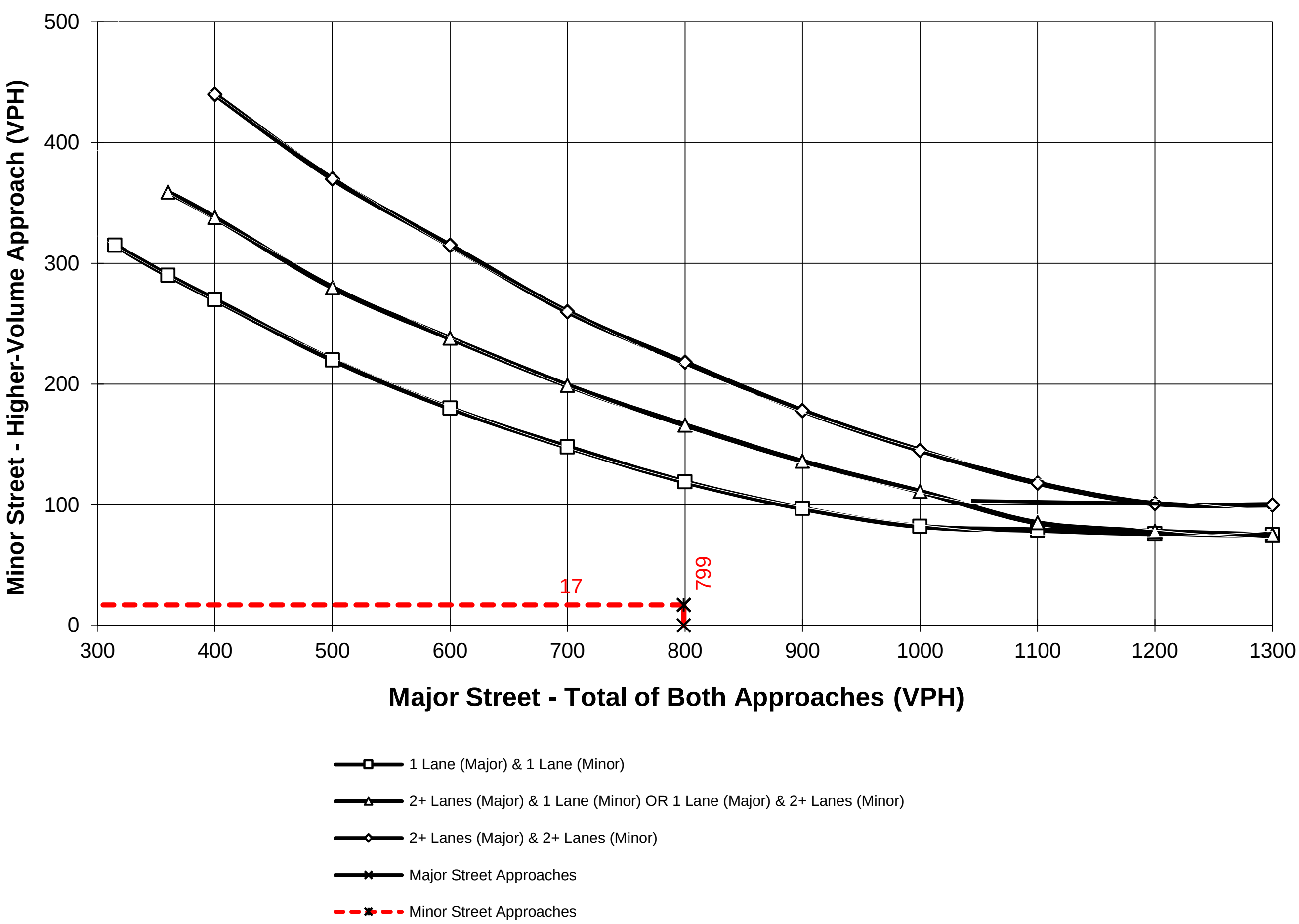
Major Street Name = **Ironwood Avenue**

Total of Both Approaches (VPH) = **799**
Number of Approach Lanes Major Street = **1**

Minor Street Name = **Oliver Street**

High Volume Approach (VPH) = **17**
Number of Approach Lanes Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 100 vph applies as the lower threshold for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold for a minor-street approach with one lane

APPENDIX 7.4:

HORIZON YEAR (2035) WITH PROJECT CONDITIONS TRAFFIC SIGNAL WARRANT ANALYSIS

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Figure 4C-103 (CA). Traffic Signal Warrants Worksheet
(Average Traffic Estimate Form)

___ DIST	___ CO	___ RTE	___ PM		TRAFFIC CONDITIONS		**2035 WP**
				CALC	CHS	DATE	08/25/15
Jurisdiction:	**City of Moreno Valley**			CHK	CHS	DATE	08/25/15
Major Street:	**Nason Street**				Critical Approach Speed (Major)		25 mph
Minor Street:	**Street "A"**				Critical Approach Speed (Minor)		25 mph

Major Street Approach Lanes = **1** lane Minor Street Approach Lanes **1** lane

Major Street Future ADT = **559** vpd Minor Street Future ADT = **259** vpd

Speed limit or critical speed on major street traffic > 64 km/h (40 mph); ………. [ ]

or **URBAN (U)**

In built up area of isolated community of < 10,000 population …………………… [ ]

(Based on Estimated Average Daily Traffic - See Note)

URBAN	RURAL	Minimum Requirements EADT			
XX					
CONDITION A - Minimum Vehicular Volume		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied	Not Satisfied				
	XX				
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1 **559**	1 **259**	8,000	5,600	2,400	1,680
2 +	1	9,600	6,720	2,400	1,680
2 +	2 +	9,600	6,720	3,200	2,240
1	2 +	8,000	5,600	3,200	2,240
CONDITION B - Interruption of Continuous Traffic		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied	Not Satisfied				
	XX				
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1 **559**	1 **259**	12,000	8,400	1,200	850
2 +	1	14,400	10,080	1,200	850
2 +	2 +	14,400	10,080	1,600	1,120
1	2 +	12,000	8,400	1,600	1,120
Combination of CONDITIONS A + B		2 CONDITIONS 80%		2 CONDITIONS 80%	
Satisfied	Not Satisfied				
	XX				
No one condition satisfied, but following conditions fulfilled 80% of more …..					
A: **7%**	B: **5%**				

Note: To be used only for NEW INTERSECTIONS or other locations where it is not reasonable to count actual traffic volumes.

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

URBAN CROSSROADS

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

Traffic Conditions = **Horizon Year (2035) With Project Conditions - Weekday AM Peak Hour**

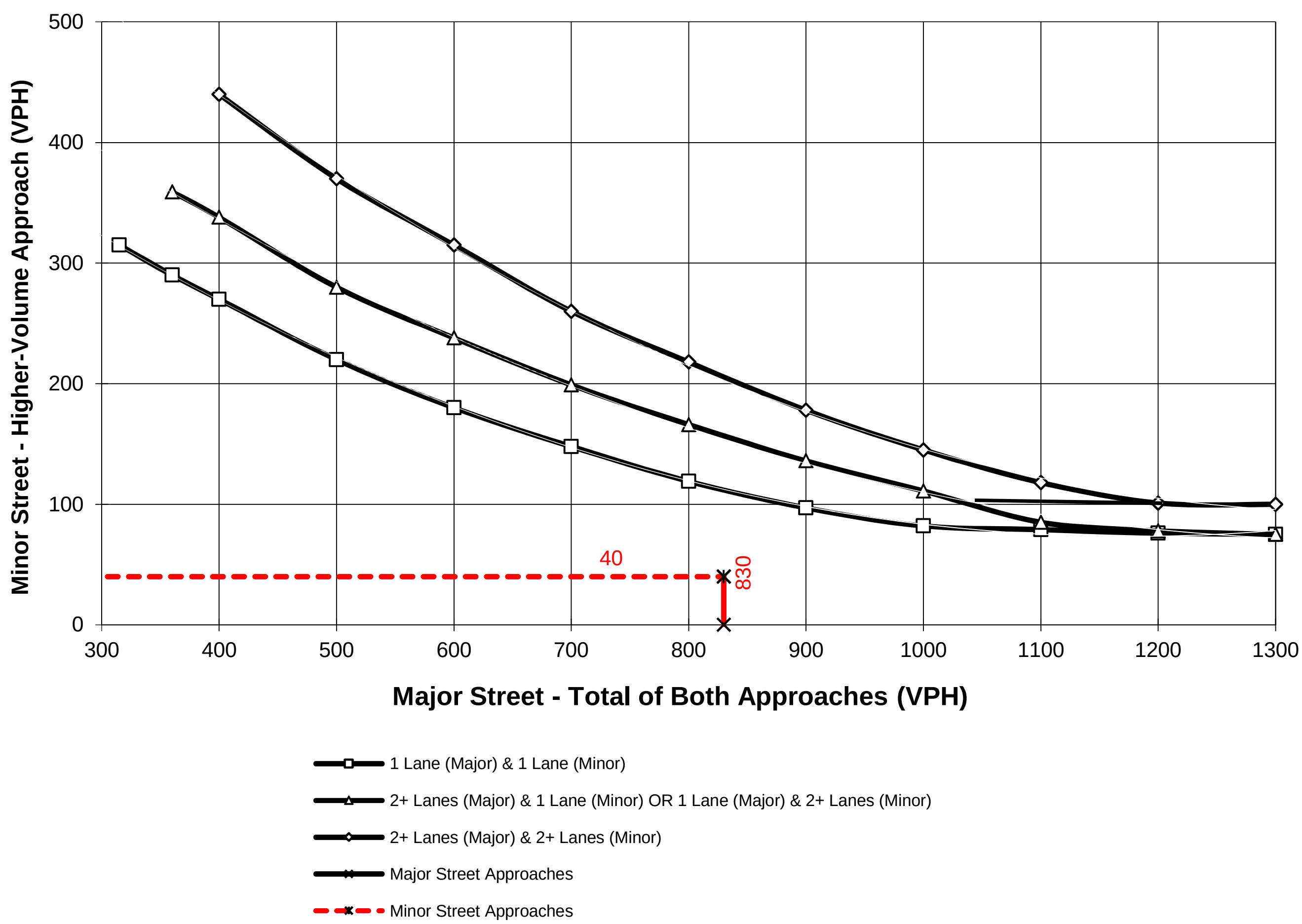
Major Street Name = **Ironwood Avenue**

Total of Both Approaches (VPH) = **830**
Number of Approach Lanes Major Street = **1**

Minor Street Name = **Lantz Lane**

High Volume Approach (VPH) = **40**
Number of Approach Lanes Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 100 vph applies as the lower threshold for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold for a minor-street approach with one lane

Figure 4C-103 (CA). Traffic Signal Warrants Worksheet
(Average Traffic Estimate Form)

TRAFFIC CONDITIONS **2035 WP**

DIST ___ CO ___ RTE ___ PM ___ CALC CHS DATE 08/25/15

Jurisdiction: **City of Moreno Valley** CHK CHS DATE 08/25/15

Major Street: **Oliver Street** Critical Approach Speed (Major) 25 mph

Minor Street: **Street "C"** Critical Approach Speed (Minor) 25 mph

Major Street Approach Lanes = **1** lane Minor Street Approach Lanes **1** lane

Major Street Future ADT = **259** vpd Minor Street Future ADT = **259** vpd

Speed limit or critical speed on major street traffic > 64 km/h (40 mph); ……….. ☐

or **URBAN (U)**

In built up area of isolated community of < 10,000 population …………………… ☐

(Based on Estimated Average Daily Traffic - See Note)

URBAN / RURAL		Minimum Requirements EADT			
XX					
CONDITION A - Minimum Vehicular Volume		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied	Not Satisfied: XX				
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1 **259**	1 **259**	8,000	5,600	2,400	1,680
2 +	1	9,600	6,720	2,400	1,680
2 +	2 +	9,600	6,720	3,200	2,240
1	2 +	8,000	5,600	3,200	2,240
CONDITION B - Interruption of Continuous Traffic		Vehicles Per Day on Major Street (Total of Both Approaches)		Vehicles Per Day on Higher-Volume Minor Street Approach (One Direction Only)	
Satisfied	Not Satisfied: XX				
Number of lanes for moving traffic on each approach					
Major Street	Minor Street	Urban	Rural	Urban	Rural
1 **259**	1 **259**	12,000	8,400	1,200	850
2 +	1	14,400	10,080	1,200	850
2 +	2 +	14,400	10,080	1,600	1,120
1	2 +	12,000	8,400	1,600	1,120
Combination of CONDITIONS A + B		2 CONDITIONS 80%		2 CONDITIONS 80%	
Satisfied	Not Satisfied: XX				
No one condition satisfied, but following conditions fulfilled 80% of more …..	A: 3% B: 2%				

Note: To be used only for NEW INTERSECTIONS or other locations where it is not reasonable to count actual traffic volumes.

The satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal.

URBAN CROSSROADS

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 64 km/h OR ABOVE 40 mph ON MAJOR STREET)

Traffic Conditions = **Horizon Year (2035) With Project Conditions - Weekday AM Peak Hour**

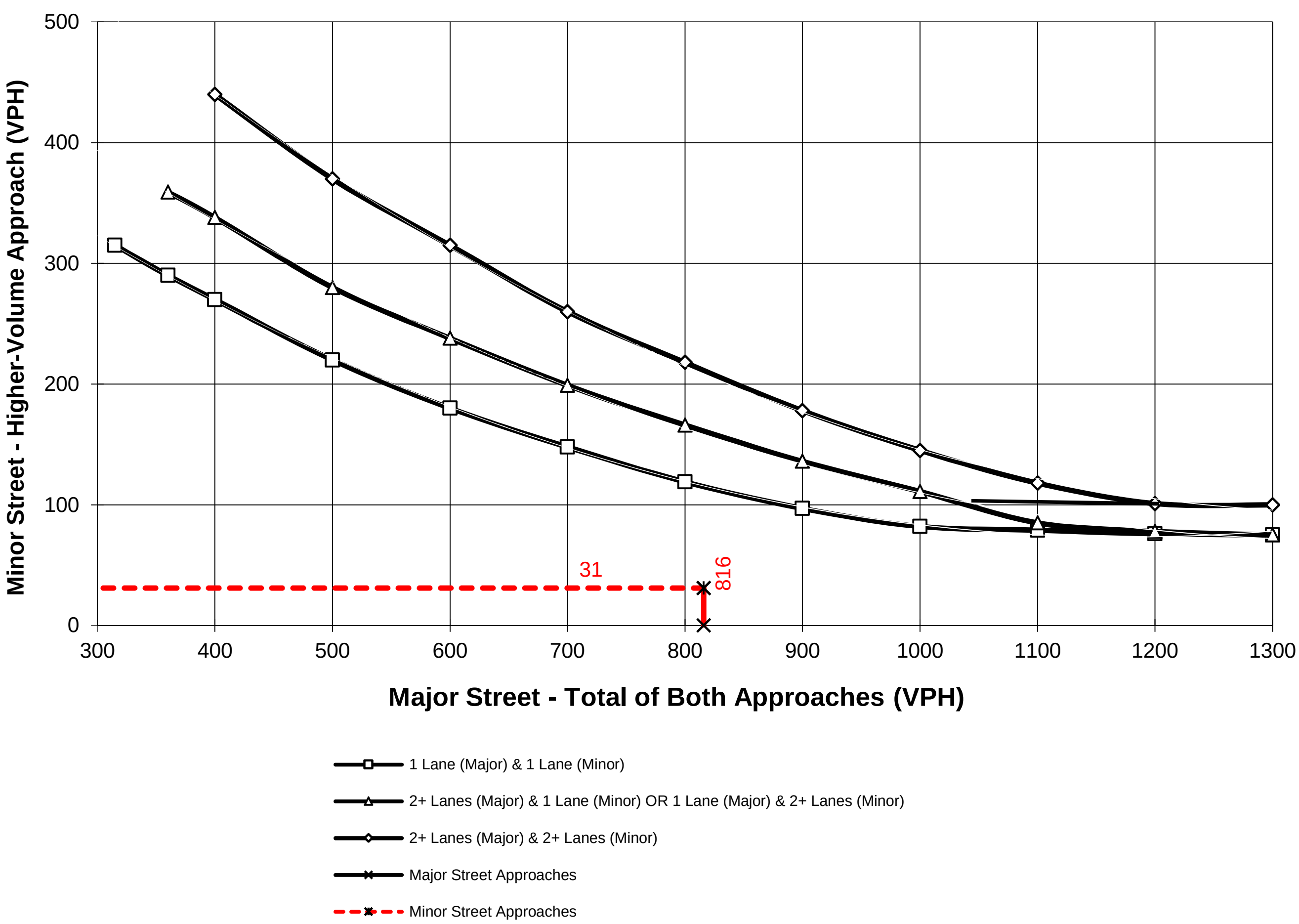
Major Street Name = **Ironwood Avenue**

Total of Both Approaches (VPH) = **816**
Number of Approach Lanes Major Street = **1**

Minor Street Name = **Oliver Street**

High Volume Approach (VPH) = **31**
Number of Approach Lanes Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 100 vph applies as the lower threshold for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold for a minor-street approach with one lane

APPENDIX 7.5:

HORIZON YEAR (2035) WITHOUT PROJECT OFF-RAMP QUEUING ANALYSIS WORKSHEETS

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	9	80	298	161	37	54	132	478	765	82	598
v/c Ratio	0.09	0.44	0.58	0.69	0.08	0.08	0.68	0.28	0.62	0.55	0.37
Control Delay	45.1	46.2	18.0	55.1	25.3	1.5	58.5	17.9	5.9	57.6	20.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.1	46.2	18.0	55.1	25.3	1.5	58.5	17.9	5.9	57.6	20.9
Queue Length 50th (ft)	5	47	72	94	16	0	77	94	61	47	128
Queue Length 95th (ft)	19	76	113	140	36	5	#128	134	128	#112	185
Internal Link Dist (ft)		689			1331			796			788
Turn Bay Length (ft)	120		120	1000		200	360		150	100	
Base Capacity (vph)	95	326	527	285	552	681	213	1721	1268	148	1606
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.25	0.57	0.56	0.07	0.08	0.62	0.28	0.60	0.55	0.37

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	40	370	366	1557	229	822
v/c Ratio	0.14	0.90	0.89	0.88	0.87	0.33
Control Delay	31.4	42.0	40.2	28.1	69.8	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.4	42.0	40.2	28.1	69.8	6.0
Queue Length 50th (ft)	19	95	92	422	129	93
Queue Length 95th (ft)	42	#180	#171	451	#223	108
Internal Link Dist (ft)		1293		1072		796
Turn Bay Length (ft)	805		225		250	
Base Capacity (vph)	347	459	460	1771	269	2516
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.81	0.80	0.88	0.85	0.33

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	30	57	209	246	66	127	245	528	742	42	466
v/c Ratio	0.32	0.31	0.34	1.02	0.17	0.20	0.76	0.30	0.56	0.37	0.34
Control Delay	52.4	42.2	8.2	104.8	31.2	3.1	53.9	16.4	2.9	52.3	23.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.4	42.2	8.2	104.8	31.2	3.1	53.9	16.4	2.9	52.3	23.8
Queue Length 50th (ft)	18	33	24	~154	35	0	137	96	10	25	107
Queue Length 95th (ft)	47	62	66	#308	62	25	#292	163	65	#61	167
Internal Link Dist (ft)		689			1331			796			788
Turn Bay Length (ft)	120		120	1000		200	360		150	100	
Base Capacity (vph)	95	380	612	242	540	626	324	1789	1330	113	1363
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.15	0.34	1.02	0.12	0.20	0.76	0.30	0.56	0.37	0.34

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	168	417	413	1460	191	687
v/c Ratio	0.53	0.86	0.86	0.85	0.85	0.29
Control Delay	34.9	30.7	29.6	25.2	67.8	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.9	30.7	29.6	25.2	67.8	6.3
Queue Length 50th (ft)	74	75	73	337	95	71
Queue Length 95th (ft)	129	#226	#220	#505	#208	102
Internal Link Dist (ft)		1293		1072		796
Turn Bay Length (ft)	805		225		250	
Base Capacity (vph)	402	541	541	1725	225	2398
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.77	0.76	0.85	0.85	0.29

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

APPENDIX 7.6:

HORIZON YEAR (2035) WITH PROJECT OFF-RAMP QUEUING ANALYSIS WORKSHEETS

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	9	80	298	161	37	57	132	498	765	113	634
v/c Ratio	0.09	0.44	0.58	0.69	0.08	0.08	0.68	0.31	0.64	0.56	0.39
Control Delay	45.1	46.2	18.0	55.1	25.3	1.7	58.5	19.5	6.9	53.3	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.1	46.2	18.0	55.1	25.3	1.7	58.5	19.5	6.9	53.3	21.1
Queue Length 50th (ft)	5	47	72	94	16	0	77	105	81	64	138
Queue Length 95th (ft)	19	76	113	140	36	6	#128	140	143	#160	197
Internal Link Dist (ft)		689			1331			796			788
Turn Bay Length (ft)	120		120	1000		200	360		150	100	
Base Capacity (vph)	95	326	527	285	552	729	213	1605	1225	203	1606
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.25	0.57	0.56	0.07	0.08	0.62	0.31	0.62	0.56	0.39

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	51	370	366	1566	241	846
v/c Ratio	0.18	0.91	0.90	0.90	0.88	0.34
Control Delay	31.9	44.6	42.6	30.3	70.0	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.9	44.6	42.6	30.3	70.0	6.2
Queue Length 50th (ft)	24	102	100	426	137	97
Queue Length 95th (ft)	50	#202	#187	455	#239	112
Internal Link Dist (ft)		1293		1072		796
Turn Bay Length (ft)	805		225		250	
Base Capacity (vph)	347	451	452	1737	275	2504
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.82	0.81	0.90	0.88	0.34

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	30	57	209	246	66	139	245	585	742	61	488
v/c Ratio	0.32	0.31	0.34	1.02	0.17	0.22	0.76	0.33	0.57	0.47	0.36
Control Delay	52.4	42.2	8.2	104.8	31.2	3.8	53.9	17.3	3.3	56.0	24.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.4	42.2	8.2	104.8	31.2	3.8	53.9	17.3	3.3	56.0	24.0
Queue Length 50th (ft)	18	33	24	~154	35	0	137	113	17	36	114
Queue Length 95th (ft)	47	62	66	#308	62	31	#292	182	82	#99	175
Internal Link Dist (ft)		689			1331			796			788
Turn Bay Length (ft)	120		120	1000		200	360		150	100	
Base Capacity (vph)	95	380	612	242	540	638	324	1758	1313	129	1365
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.15	0.34	1.02	0.12	0.22	0.76	0.33	0.57	0.47	0.36

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	NBT	SBL	SBT
Lane Group Flow (vph)	199	417	413	1484	198	701
v/c Ratio	0.61	0.86	0.86	0.87	0.88	0.29
Control Delay	37.4	31.2	30.0	26.7	72.8	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.4	31.2	30.0	26.7	72.8	6.4
Queue Length 50th (ft)	88	80	76	352	99	74
Queue Length 95th (ft)	152	#232	#226	#518	#217	104
Internal Link Dist (ft)		1293		1072		796
Turn Bay Length (ft)	805		225		250	
Base Capacity (vph)	402	535	536	1710	225	2381
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.78	0.77	0.87	0.88	0.29

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

APPENDIX 7.7:

HORIZON YEAR (2035) WITHOUT PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS WITH IMPROVEMENTS

Attachment: Traffic Impact Analysis Appendices (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

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Option 2: AM Improvement

Number	2											
Intersection	Nason Street / Ironwood Avenue											
Control Type	Signalized											
Analysis Method	HCM 2010											
Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	349	5	91	5	9	5	5	331	453	79	302	5
Total Analysis Volume [veh/h]	435	6	91	6	11	6	6	413	517	99	377	6

Intersection Settings

Cycle Length [s]	110											
Coordination Type	Time of Day Pattern Coordinated											
Actuation Type	Fully actuated											
Lost time [s]	0.00											
Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss
Signal Group	3	8	0	7	4	0	5	2	3	1	6	0
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	0	5	5	0	5	5	5	5	5	0
Maximum Green [s]	0	0	0	0	0	0	0	0	0	0	0	0
Amber [s]	3.0	5.0	0.0	3.0	5.0	0.0	4.0	5.0	3.0	4.0	5.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0
Split [s]	41	11	0	58	28	0	10	28	41	13	31	0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	2.0	0.0
Minimum Recall	no	no		no	no		no	no	no	no	no	
Maximum Recall	no	no		no	no		no	yes	no	no	yes	
Pedestrian Recall	no	no		no	no		no	no	no	no	no	

Lane Group Calculations

g / C, Green / Cycle	0.29	0.30	0.30	0.01	0.02	0.01	0.42	0.77	0.07	0.49
(v / s)_i Volume / Saturation Flow Rate	0.27	0.00	0.06	0.00	0.01	0.00	0.25	0.36	0.06	0.23
so, Base Saturation Flow per Lane [veh/h/ln]	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Arrival type	3			3		3			3	
s, saturation flow rate [veh/h]	1597	1676	1425	1597	1578	1597	1676	1425	1597	1671
c, Capacity [veh/h]	467	508	432	12	29	12	714	1101	116	820
X, volume / capacity	0.93	0.01	0.21	0.49	0.59	0.49	0.58	0.47	0.85	0.47
d, Delay for Lane Group [s/veh]	58.15	26.81	28.62	82.30	60.36	65.47	27.46	5.90	71.11	20.40
Lane Group LOS	E	C	C	F	E	E	C	A	E	C
Critical Lane Group	yes	no	no	no	yes	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	13.41	0.11	1.73	0.26	0.52	0.20	8.35	3.19	3.23	6.18
50th-Percentile Queue Length [ft]	335.31	2.68	43.29	6.52	13.11	4.96	208.72	79.65	80.82	154.46
95th-Percentile Queue Length [veh]	19.42	0.19	3.12	0.47	0.94	0.36	13.09	5.74	5.82	10.25
95th-Percentile Queue Length [ft]	485.46	4.82	77.93	11.73	23.60	8.94	327.19	143.38	145.47	256.37

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	58.15	26.81	28.62	82.30	60.36	60.36	65.47	27.46	5.90	71.11	20.40	20.40
Movement LOS	E	C	C	F	E	E	E	C	A	E	C	C
Critical Movement	no	no	no	yes	no	no	no	no	no	no	no	no
d_A, Approach Delay [s/veh]		52.74			66.08			15.80			30.82	
Approach LOS		D			E			B			C	
d_I, Intersection Delay [s/veh]						30.01						
Intersection LOS						C						
Intersection V/C						0.595						

Option 2: PM Improvement

Number	2											
Intersection	Nason Street / Ironwood Avenue											
Control Type	Signalized											
Analysis Method	HCM 2010											
Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	437	9	130	5	6	5	5	315	325	121	289	5
Total Analysis Volume [veh/h]	446	9	101	5	6	3	5	321	311	123	295	5

Intersection Settings

Cycle Length [s]	110											
Coordination Type	Time of Day Pattern Coordinated											
Actuation Type	Fully actuated											
Lost time [s]	0.00											
Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss
Signal Group	3	8	0	7	4	0	5	2	3	1	6	0
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	0	5	5	0	5	5	5	5	5	0
Maximum Green [s]	0	0	0	0	0	0	0	0	0	0	0	0
Amber [s]	3.0	5.0	0.0	3.0	5.0	0.0	4.0	5.0	3.0	4.0	5.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0
Split [s]	39	11	0	56	28	0	10	28	39	15	33	0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	2.0	0.0
Minimum Recall	no	no		no	no		no	no	no	no	no	
Maximum Recall	no	no		no	no		no	yes	no	no	yes	
Pedestrian Recall	no	no		no	no		no	no	no	no	no	

Lane Group Calculations

g / C, Green / Cycle	0.30	0.30	0.30	0.01	0.01	0.01	0.41	0.76	0.09	0.50
(v / s)_i Volume / Saturation Flow Rate	0.28	0.01	0.07	0.00	0.01	0.00	0.19	0.22	0.08	0.18
so, Base Saturation Flow per Lane [veh/h/ln]	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Arrival type	3			3		3			3	
s, saturation flow rate [veh/h]	1597	1676	1425	1597	1583	1597	1676	1425	1597	1672
c, Capacity [veh/h]	471	503	427	10	17	10	691	1086	145	830
X, volume / capacity	0.95	0.02	0.24	0.49	0.52	0.49	0.46	0.29	0.85	0.36
d, Delay for Lane Group [s/veh]	62.36	27.12	29.13	86.06	62.83	67.11	25.76	4.65	68.63	18.22
Lane Group LOS	E	C	C	F	E	E	C	A	E	B
Critical Lane Group	yes	no	no	no	yes	no	yes	no	yes	no
50th-Percentile Queue Length [veh]	14.31	0.16	1.95	0.23	0.29	0.17	6.16	1.68	3.95	4.45
50th-Percentile Queue Length [ft]	357.69	4.05	48.70	5.73	7.28	4.26	153.92	41.93	98.67	111.15
95th-Percentile Queue Length [veh]	20.51	0.29	3.51	0.41	0.52	0.31	10.23	3.02	7.10	7.90
95th-Percentile Queue Length [ft]	512.78	7.28	87.66	10.31	13.11	7.67	255.66	75.47	177.61	197.60

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	62.36	27.12	29.13	86.06	62.83	62.83	67.11	25.76	4.65	68.63	18.22	18.22
Movement LOS	E	C	C	F	E	E	E	C	A	E	B	B
Critical Movement	no	no	no	yes	no	no	no	no	no	no	no	no
d_A, Approach Delay [s/veh]	55.75			71.13			15.78			32.88		
Approach LOS	E			E			B			C		
d_I, Intersection Delay [s/veh]	34.33											
Intersection LOS	C											
Intersection V/C	0.554											

APPENDIX 7.8:

HORIZON YEAR (2035) WITH PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS WITH IMPROVEMENTS

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Option 2: AM Improvement

Number	2											
Intersection	Nason Street / Ironwood Avenue											
Control Type	Signalized											
Analysis Method	HCM 2010											
Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	349	5	91	5	9	5	5	331	453	79	302	5
Total Analysis Volume [veh/h]	435	17	103	6	44	12	9	419	517	136	395	6

Intersection Settings

Cycle Length [s]	110											
Coordination Type	Time of Day Pattern Coordinated											
Actuation Type	Fully actuated											
Lost time [s]	0.00											
Control Type	Protecte	Permissi	Permissi	Protecte	Permissi	Permissi	Protecte	Permissi	Overlap	Protecte	Permissi	Permissi
Signal Group	3	8	0	7	4	0	5	2	3	1	6	0
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	0	5	5	0	5	5	5	5	5	0
Maximum Green [s]	0	0	0	0	0	0	0	0	0	0	0	0
Amber [s]	3.0	5.0	0.0	3.0	5.0	0.0	4.0	5.0	3.0	4.0	5.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0
Split [s]	38	11	0	55	28	0	10	28	38	16	34	0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	2.0	0.0
Minimum Recall	no	no		no	no		no	no	no	no	no	
Maximum Recall	no	no		no	no		no	yes	no	no	yes	
Pedestrian Recall	no	no		no	no		no	no	no	no	no	

Lane Group Calculations

g / C, Green / Cycle	0.29	0.33	0.33	0.01	0.04	0.01	0.38	0.72	0.10	0.46
(v / s)_i Volume / Saturation Flow Rate	0.27	0.01	0.07	0.00	0.03	0.01	0.25	0.36	0.09	0.24
so, Base Saturation Flow per Lane [ve	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Arrival type	3			3		3			3	
s, saturation flow rate [veh/h]	1597	1676	1425	1597	1615	1597	1676	1425	1597	1671
c, Capacity [veh/h]	463	546	464	12	70	17	630	1027	160	777
X, volume / capacity	0.94	0.03	0.22	0.49	0.80	0.52	0.66	0.50	0.85	0.52
d, Delay for Lane Group [s/veh]	61.95	25.28	27.06	82.23	59.83	62.62	34.01	8.51	68.38	23.15
Lane Group LOS	E	C	C	F	E	E	C	A	E	C
Critical Lane Group	yes	no	no	no	yes	no	no	yes	yes	no
50th-Percentile Queue Length [veh]	13.90	0.29	1.90	0.26	1.69	0.28	9.62	4.54	4.36	7.03
50th-Percentile Queue Length [ft]	347.48	7.35	47.56	6.52	42.27	7.06	240.54	113.56	109.07	175.87
95th-Percentile Queue Length [veh]	20.01	0.53	3.42	0.47	3.04	0.51	14.71	8.04	7.79	11.38
95th-Percentile Queue Length [ft]	500.34	13.22	85.61	11.73	76.08	12.71	367.71	200.94	194.70	284.62

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	61.95	25.28	27.06	82.23	59.83	59.83	62.62	34.01	8.51	68.38	23.15	23.15
Movement LOS	E	C	C	F	E	E	E	C	A	E	C	C
Critical Movement	no	no	no	yes	no	no	no	no	no	no	no	no
d_A, Approach Delay [s/veh]	54.35			62.00			20.33			34.60		
Approach LOS	D			E			C			C		
d_I, Intersection Delay [s/veh]	34.21											
Intersection LOS	C											
Intersection V/C	0.643											

Option 2: PM Improvement

Number	2											
Intersection	Nason Street / Ironwood Avenue											
Control Type	Signalized											
Analysis Method	HCM 2010											
Name				Nason Street			Ironwood Avenue			Ironwood Avenue		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Base Volume Input [veh/h]	437	9	130	5	6	5	5	315	325	121	289	5
Total Analysis Volume [veh/h]	446	39	136	5	23	6	11	339	311	144	305	5

Intersection Settings

Cycle Length [s]	115											
Coordination Type	Time of Day Pattern Coordinated											
Actuation Type	Fully actuated											
Lost time [s]	0.00											
Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Protecte	Permiss	Overlap	Protecte	Permiss	Permiss
Signal Group	3	8	0	7	4	0	5	2	3	1	6	0
Lead / Lag	Lead	-	-	Lead	-	-	Lead	-	-	Lead	-	-
Minimum Green [s]	5	5	0	5	5	0	5	5	5	5	5	0
Maximum Green [s]	0	0	0	0	0	0	0	0	0	0	0	0
Amber [s]	3.0	5.0	0.0	3.0	5.0	0.0	4.0	5.0	3.0	4.0	5.0	0.0
All red [s]	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0
Split [s]	42	11	0	59	28	0	10	28	42	17	35	0
Walk [s]	0	0	0	0	7	0	0	7	0	0	0	0
Pedestrian Clearance [s]	0	0	0	0	15	0	0	15	0	0	0	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	2.0	2.0	2.0	2.0	2.0	0.0
Minimum Recall	no	no		no	no		no	no	no	no	no	
Maximum Recall	no	no		no	no		no	yes	no	no	yes	
Pedestrian Recall	no	no		no	no		no	no	no	no	no	

Lane Group Calculations

g / C, Green / Cycle	0.30	0.32	0.32	0.01	0.03	0.01	0.39	0.74	0.10	0.48
(v / s)_i Volume / Saturation Flow Rate	0.28	0.02	0.10	0.00	0.02	0.01	0.20	0.22	0.09	0.19
so, Base Saturation Flow per Lane [veh/h/ln]	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Arrival type	3			3		3			3	
s, saturation flow rate [veh/h]	1597	1676	1425	1597	1617	1597	1676	1425	1597	1672
c, Capacity [veh/h]	474	530	451	10	42	21	654	1053	167	805
X, volume / capacity	0.94	0.07	0.30	0.49	0.68	0.54	0.52	0.30	0.86	0.38
d, Delay for Lane Group [s/veh]	62.23	27.53	29.84	88.77	62.50	64.21	29.72	5.72	72.65	20.36
Lane Group LOS	E	C	C	F	E	E	C	A	E	C
Critical Lane Group	yes	no	no	no	yes	no	yes	no	yes	no
50th-Percentile Queue Length [veh]	14.69	0.73	2.76	0.24	0.92	0.35	7.30	2.11	4.91	5.09
50th-Percentile Queue Length [ft]	367.14	18.31	69.07	5.91	23.06	8.86	182.43	52.70	122.69	127.17
95th-Percentile Queue Length [veh]	20.97	1.32	4.97	0.43	1.66	0.64	11.73	3.79	8.54	8.79
95th-Percentile Queue Length [ft]	524.26	32.95	124.32	10.64	41.51	15.94	293.19	94.85	213.51	219.64

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	62.23	27.53	29.84	88.77	62.50	62.50	64.21	29.72	5.72	72.65	20.36	20.36
Movement LOS	E	C	C	F	E	E	E	C	A	E	C	C
Critical Movement	no	no	no	yes	no	no	no	no	no	no	no	no
d_A, Approach Delay [s/veh]	52.96			66.36			19.00			36.94		
Approach LOS	D			E			B			D		
d_I, Intersection Delay [s/veh]	36.43											
Intersection LOS	D											
Intersection V/C	0.590											

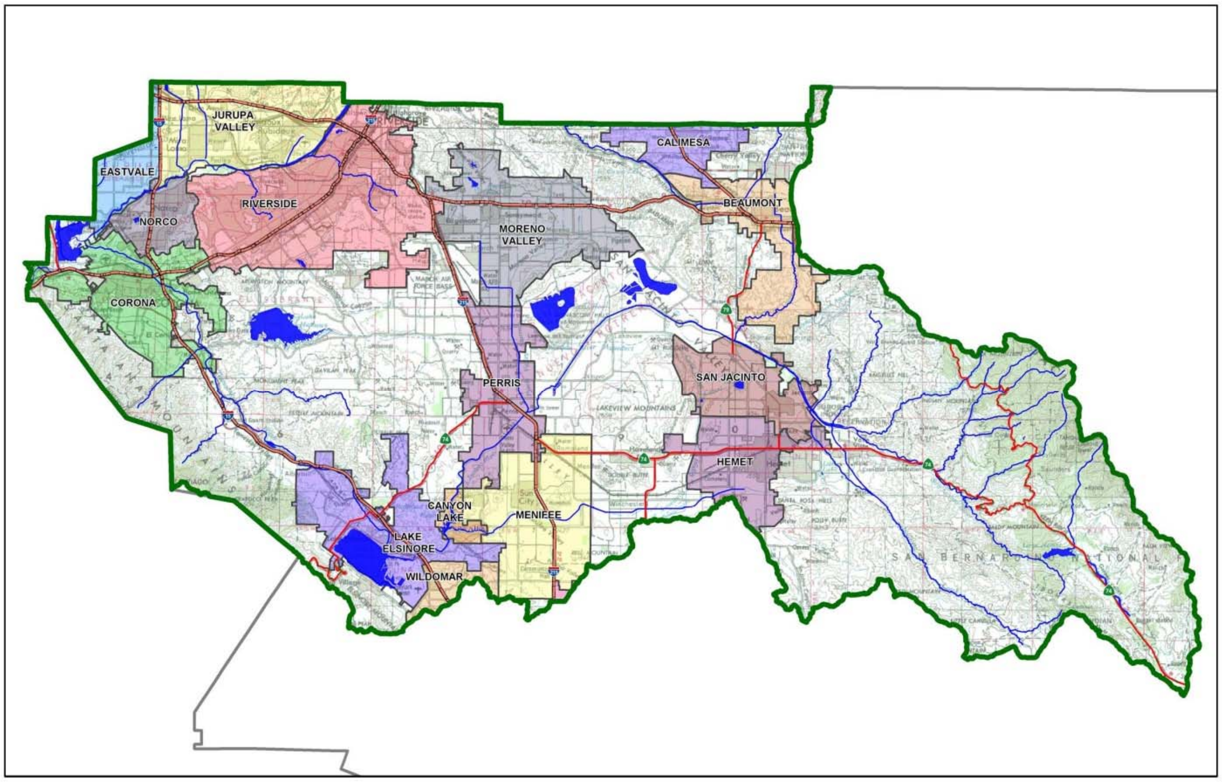
Project Specific Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

Project Title: Ironwood

Development No: Tentative Tract Map 37001

Design Review/Case No: Preliminary



☒ **Preliminary**
☐ **Final**

Original Date Prepared: September 29, 2015

Revision Date(s):

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**

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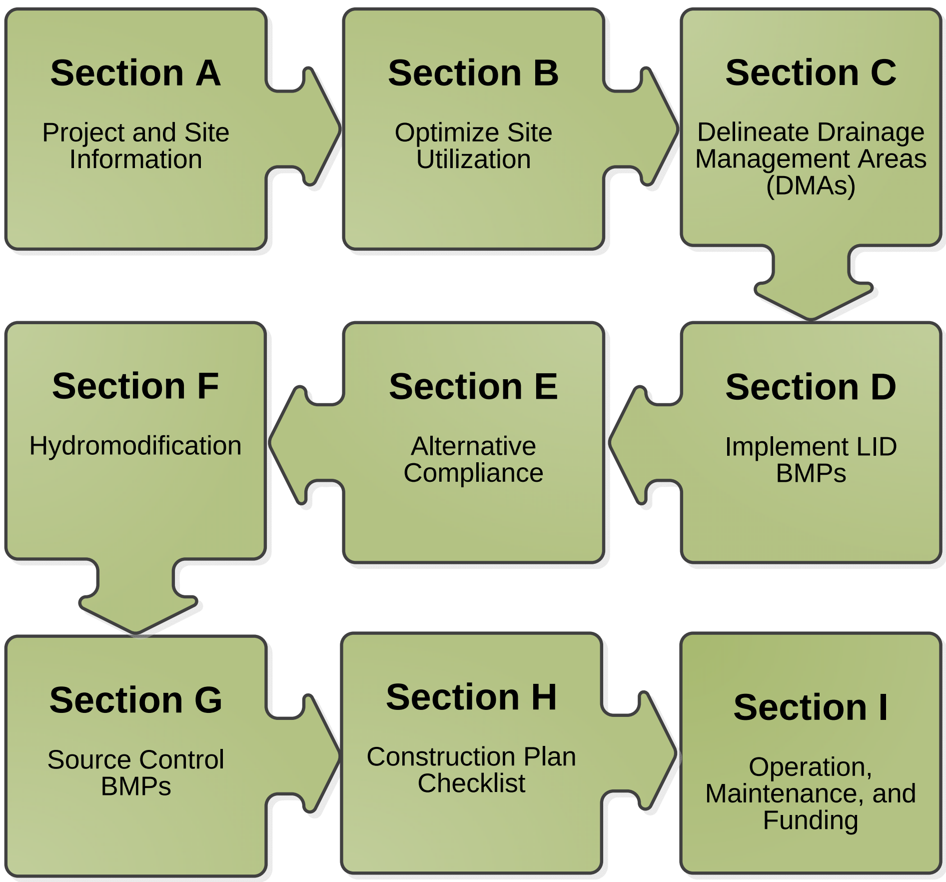
A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your "how-to" manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Global Investment by JLC Engineering and Consulting, Inc. for the Ironwood Project, Tentative Tract Map 37001.

This WQMP is intended to comply with the requirements of the City of Moreno Valley for Ordinance No. 827 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under the City of Moreno Valley Water Quality Ordinance 827.

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

	September 29, 2015
Preparer's Signature	Date
Joseph L. Castaneda	P.E. / Project Manager
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

Table of Contents

List of Tables

List of Appendices

Section A: Project and Site Information

PROJECT INFORMATION		
Type of Project:	Residential	
Planning Area:	N/A	
Community Name:	City Of Moreno Valley	
Development Name:	Ironwood – TTM 37001	
PROJECT LOCATION		
Latitude & Longitude (DMS): 33°56'52"N 117°11'13"W		
Project Watershed and Sub-Watershed: Santa Ana River Watershed, San Jacinto River Sub-Watershed		
APN(s): Portions of 473-160-004		
Map Book and Page No.: Book 473, page 160		
PROJECT CHARACTERISTICS		
Proposed or Potential Land Use(s)		Residential
Proposed or Potential SIC Code(s)		N/A
Area of Impervious Project Footprint (SF)		1,470,368
Total Area of <u>proposed</u> Impervious Surfaces within the Project Limits (SF)/or Replacement		1,470,368
Does the project consist of offsite road improvements?		☒ Y ☐ N
Does the project propose to construct unpaved roads?		☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?		☐ Y ☒ N
EXISTING SITE CHARACTERISTICS		
Total area of <u>existing</u> Impervious Surfaces within the project limits (SF)		0
Is the project located within any MSHCP Criteria Cell?		☐ Y ☒ N
If so, identify the Cell number:		N/A
Are there any natural hydrologic features on the project site?		☐ Y ☒ N
Is a Geotechnical Report attached?		☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)		Hydrologic Soil "A", "C" and "D"
What is the Water Quality Design Storm Depth for the project?		0.70

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Natural Stream	N/A	N/A	Not a RARE-designated water body
Nason Basin	N/A	N/A	N/A
Moreno MDP Line I Storm Drain	N/A	N/A	N/A
Moreno ADP Line F Storm Drain	N/A	N/A	N/A
Kitching Street Channel – Line N	N/A	N/A	Not a RARE-designated water body
Perris Valley Channel	N/A	N/A	Not a RARE-designated water body
San Jacinto River	N/A	MUN, AGR, GWR, REC1, REC2, WARM, WILD	Not a RARE-designated water body
Canyon Lake	Nutrients, Pathogens (Bacteria & Viruses)	MUN, AGR, GWR, REC1, REC2, WAR, WILD	Not a RARE-designated water body
San Jacinto River	N/A	MUN, AGR, GWR, REC1, REC2, WARM, WILD	Not a RARE-designated water body
Lake Elsinore	Metals (Mercury), Nutrients, Organic Enrichment/Low Dissolved Oxygen, Polychlorinated biphenyls, sediment Toxicity, Sedimentation, Unknown Toxicity	REC1, REC2, WARM, WILD	Not a RARE-designated water body

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)*	☐ Y	☐ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, constraints might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. Opportunities might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

The project site currently drains from the north and to the south into three existing culverts crossing Ironwood Avenue. The project will preserve these existing drainage patterns.

Did you identify and protect existing vegetation? If so, how? If not, why?

The project will preserve existing vegetation through the central portion of the project site, as well as a portion of the northerly project site.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

The infiltration rates for the project site are low, with the highest rate being 0.82 in/hr. Open space areas are proposed within the project limits which will preserve natural infiltration capabilities, however, infiltration will not be utilized as a method of water quality treatment due to the low infiltration rates.

Did you identify and minimize impervious area? If so, how? If not, why?

The project site minimizes impervious areas, where feasible.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

The project site will direct roof runoff through adjacent landscaping.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
DMA A	Roof, Landscaping, Street, Natural Soil D	2,128,777	Type “D”
DMA B	Roof, Landscaping, Street, Natural Soil D	4,864,781	Type “D”

[1]*Reference Table 2-1 in the WQMP Guidance Document to populate this column*

Table C.2 Type ‘A’, Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)

Table C.3 Type ‘B’, Self-Retaining Areas

Self-Retaining Area				**Type ‘C’ DMAs that are draining to the Self-Retaining Area**		
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet) [A]	Post-project surface type	Runoff factor [B]	Product [C] = [A] x [B]	DMA name /ID	Area (square feet) [D]	Ratio [C]/[D]

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
DMA A	Bioretention Basin A
DMA B	Bioretention Basin B

<u>Note</u>: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site. If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?	X	
If Yes, list affected DMAs: DMA A and DMA B		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		X
Describe here:		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

DMA's A and B have low infiltration rates, specifically 0.45 in/hr, 0.50 in/hr, and 0.82 in/hr, which are significantly lower than the minimum 1.6 in/hr required to utilize infiltration as a water quality treatment mechanism. Therefore the project site did not utilize infiltration. The Preliminary Geotechnical Evaluation has been included in Appendix 3.

D.2 Harvest and Use Assessment

Please check what applies*:*

- ☐ Reclaimed water will be used for the non-potable water demands for the project.
- ☐ Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).
- ☐ The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If neither of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: 33.76

Type of Landscaping (Conservation Design or Active Turf): Conservation

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 33.76

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: 1.32

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: 44.56

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
44.56	33.76

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: 453

Project Type: Residential

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 33.76

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-1 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: 116

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: 3,916

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	Projected number of toilet users (Step 1)
3,916	453

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

N/A

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-3 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-3: N/A

Step 4: Multiply the unit value obtained from Step 4 by the total of impervious areas from Step 3 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: N/A

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
N/A	N/A

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment, unless a site-specific analysis has been completed that demonstrates technical infeasibility as noted in D.3 below.

Based upon the Harvest and Use analysis, the project site does not have sufficient irrigated landscaped area or toilet users to utilize Harvest and Use BMPs.

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.3 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
DMA A	☐	☐	☒	☐	☐
DMA B	☐	☐	☒	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

The project site will utilize bioretention basins to treat for water quality purposes. The required water quality volume was determined by using the Santa Ana Watershed BMP Design Volume Spreadsheets. The effective impervious fraction was calculated using 50% impervious area for the onsite area, and natural soil type "D" for the offsite area. The following table summarizes the effective impervious fraction calculations:

Area "A"

Land Cover	Area (ac)	Effective Impervious Fraction
Residential – Impervious	11.2	1.0
Residential – Pervious	11.2	0.1
Natural Cover – Soil D	26.47	0.4
TOTAL	**48.87**	**0.47**

Area "B"

Land Cover	Area (ac)	Effective Impervious Fraction
Residential – Impervious	22.56	1.0
Residential – Pervious	22.55	0.1
Natural Cover – Soil D	66.57	0.4
TOTAL	**111.68**	**0.46**

The bioretention basins have been designed so that the water quality volume will not pond higher than 6" above the soil media using the Bioretention Basin Design Spreadsheets. The remaining volume will be utilized for meeting the hydrologic conditions of concern and mitigating for increased runoff.

The water quality volume calculations and effective impervious fraction calculations have been included in Appendix 6.

D.4 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed. **NOTE: Proposed volume is up to 0.5 feet of depth. Bioretention basins include storage within soil media and gravel layers.**

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Bioretention Basin A/DMA A*		
	[A]		[B]	[C]	[A] x [C]			
DMA A-1	*2128777.2*	*Mixed surface types*	*0.47*	*0.32*	*682396.8*	*Design Storm Depth (in)*	*Design Capture Volume,* V_{BMP} *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	2128777.2				682396.8	0.70	39806.5	57912.8

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Table D.4 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Bioretention Basin B/DMA B*		
	[A]		[B]	[C]	[A] x [C]			
DMA B-1	*4864780.8*	*Mixed surface types*	*0.46*	*0.31*	*1530004.2*	*Design Storm Depth (in)*	*Design Capture Volume,* V_{BMP} *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	4864780.8				1530004.2	0.70	89250.2	93429.9

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

N/A

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☐ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft^2)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft^2)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☐	☐	☐	☐	☐	☐	☐	☐

P = Potential

N = Not Potential

(1) *A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected*

(2) *A potential Pollutant if the project includes uncovered parking areas; otherwise not expected*

(3) *A potential Pollutant is land use involving animal waste*

(4) *Specifically petroleum hydrocarbons*

(5) *Specifically solvents*

(6) *Bacterial indicators are routinely detected in pavement runoff*

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
Total Credit Percentage[1]	

[1]Cannot Exceed 50%
[2]Obtain corresponding data from Table 3-8 in the WQMP Guidance Document

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Area x Runoff Factor		***Enter BMP Name / Identifier Here***		
	[A]		[B]	[C]	[A] x [C]				
						Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
	$A_T = \Sigma[A]$				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$	[F] X (1-[H])	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12
[H] is from the Total Credit Percentage as Calculated from Table E.2 above
[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.
[2] Cross Reference Table E.1 above to populate this column.
[3] As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	N/A	N/A	N/A
Volume (Cubic Feet)	N/A	N/A	N/A

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

N/A

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

The project will address HCOC's by mitigating the 2-year, 24-hour storm duration flow rates. The proposed bioretention basins have been designed to store the required volume to address HCOC's. During the preliminary stages, the required volume to address the Hydrologic Conditions of Concern was determined by taking the delta 2-year, 24-hour unit hydrograph volumes from the post-project minus the pre-project conditions. Additionally, the water quality volume was also added to determine a total required basin volume. The following tables summarize the results:

		Pre-Project		Post-Project		Post-Pre
	Area (ac)	2-yr 24-hr Q (ft^3/s)	2-yr 24-hr Vol. (ac-ft)	2-yr 24-hr Q (ft^3/s)	2-yr 24-hr Vol (ac-ft)	Delta 2-yr Vol (ac-ft)
DMA A	48.87	1.30	0.8144	4.11	2.5801	1.7657
DMA B	111.68	2.95	1.8609	7.07	4.4662	2.6053

The following table summarizes the basin volumes and required volumes:

Area	Area (AC)	VBMP (sq. ft)	VBMP (ac-ft)	Bottom Surface Area (sq.ft)	Volume @ 0.5' *	Req'd Mitigation Volume	Total Req'd Volume (WQ + Mit) (ac-ft)	Volume Provided (ac-ft)**
DMA A	48.87	39,801	0.9137	32,174	57,913	1.7657	2.6794	3.7150
DMA B	111.68	89,250	2.0489	51,906	93,430	2.6053	4.6542	8.3660

* Volume at 0.5 feet is surface area times 0.5 feet, plus the storage volume within the soil media and gravel layer. The volume within the soil media is equal to the bottom surface area multiplied by 3 feet of depth, and multiplied by 0.3 to account for the 30% void ratio. The volume within the gravel layer below the media is equal to the bottom surface area multiplied by 1 foot of depth, and multiplied by 0.4 to account for the 40% void ratio. This is also calculated on the bioretention basin spreadsheets.

**The volume provided does not include 1’ of freeboard.

The unit hydrograph calculations have been included in Appendix 7.

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources***: Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit***: Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative***: Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	• Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	• Maintain and periodically repaint or replace inlet markings • Provide Stormwater pollution prevention information to new site owners, lessees, or operators. • See applicable optional BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www. cabmphandbooks.com • Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
Landscape/Outdoor Pesticide Use	State that final landscape plans will accomplish all of the following. • Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. • Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. • Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant to saturated soil conditions. • Consider using pest-resistant plants, especially adjacent to hardscape. To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	• Maintain landscaping using minimum or no pesticides. • See applicable operational BMPs in "What you should know for…. Landscape and Gardening" at http://rcflood.org/stormwater/. • Provide IPM information to new owners, lessees and operators.
Pools, spas, ponds, decorative fountains, and other water features	• If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	• See applicable operational BMPs in "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
Roofing, gutters and trim	Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	
Sidewalks		• Sweep sidewalks regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into storm drain system.
Vehicular Restrictions		• Restrict vehicular onsite power washes • Restrict vehicular onsite maintenance and repairs

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
A	Bioretention Basin A	Figure 3 – Site Plan
B	Bioretention Basin B	Figure 3 – Site Plan

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: Home Owner's Association

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

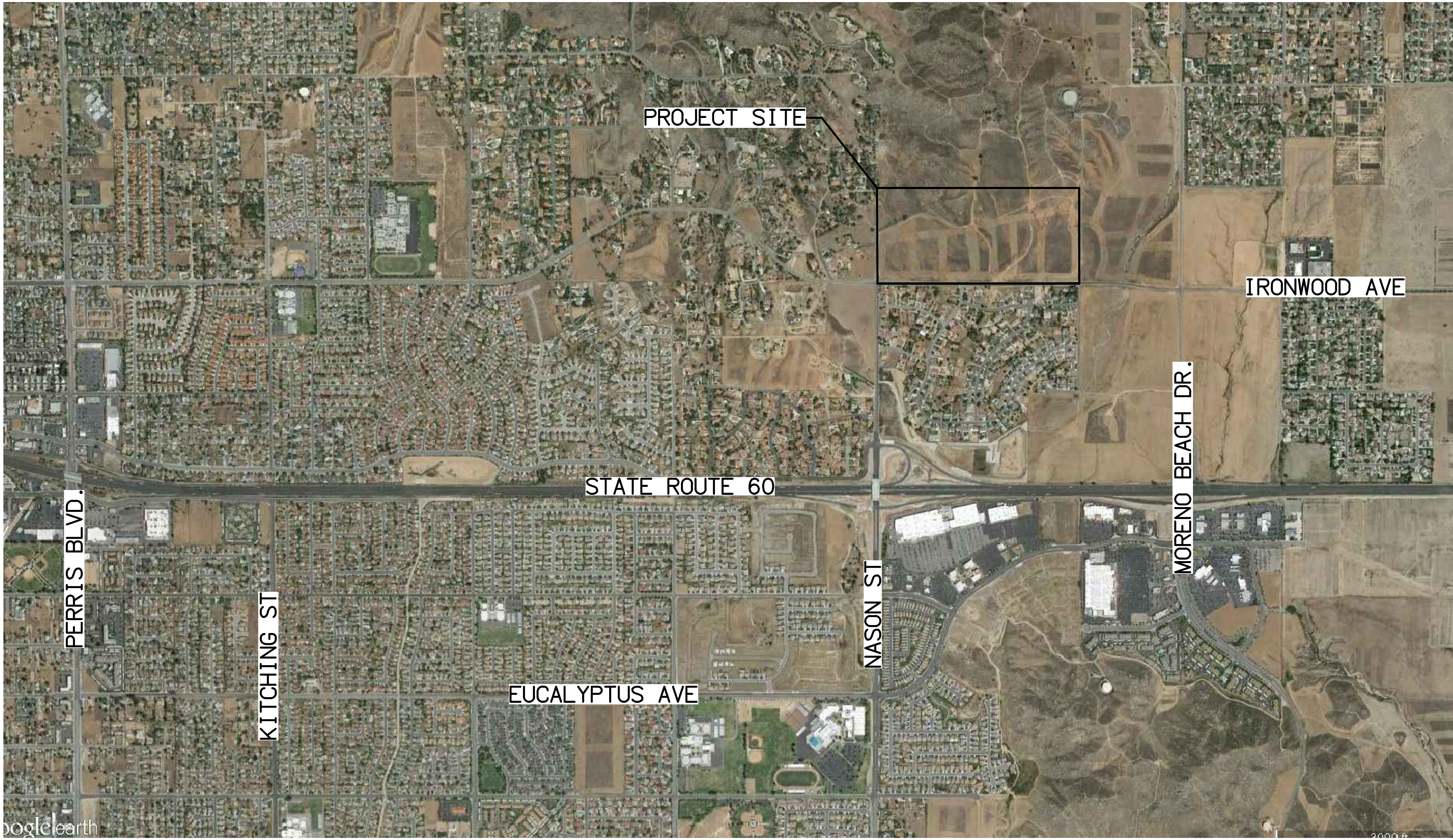
☒ Y ☐ N

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

Figure 1 – Vicinity Map



TRACT 37001 VICINITY MAP

N

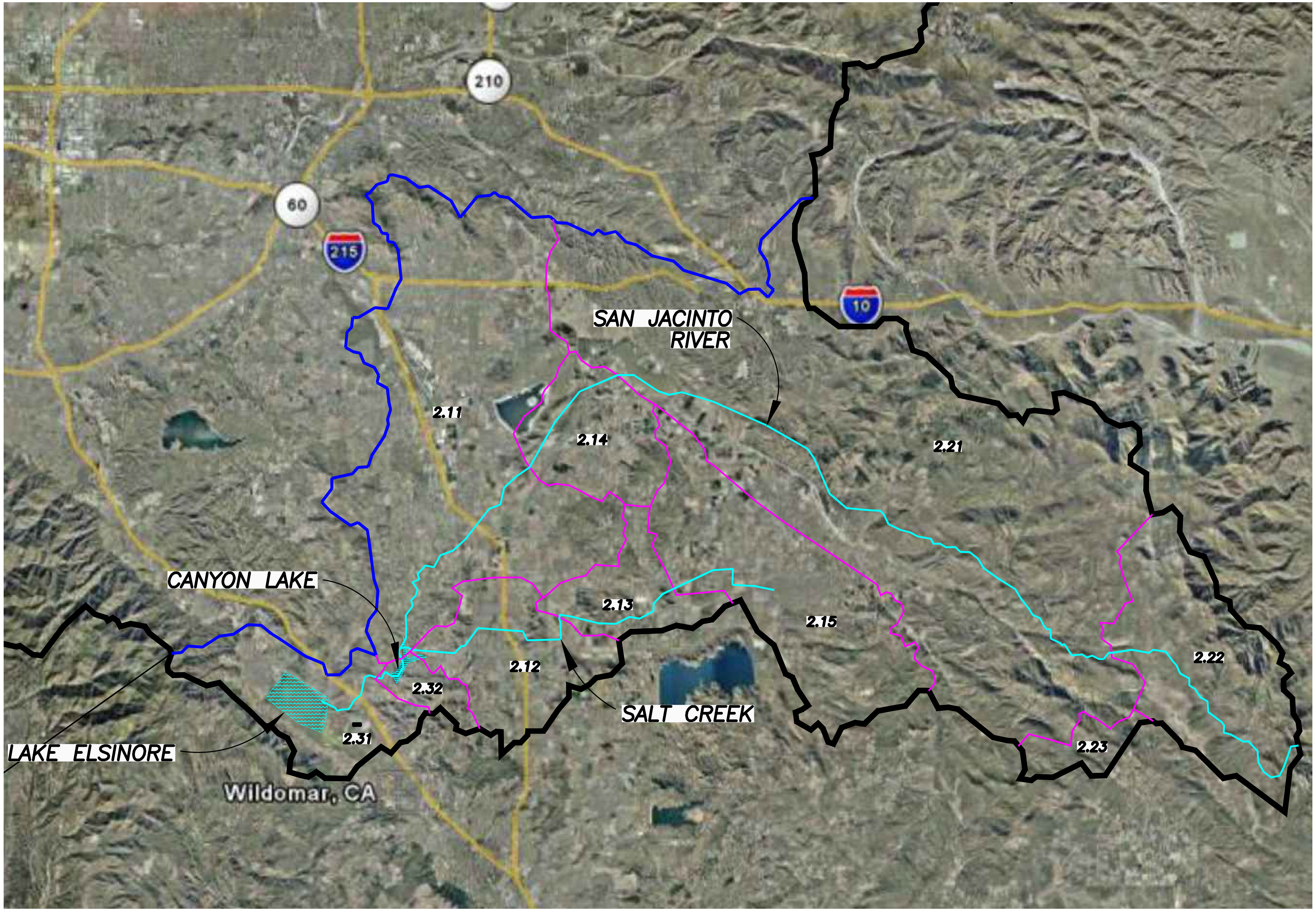
JLC Engineering & Consulting, Inc.
36263 CALLE DE LOBO
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

FIGURE 1

Drawing Name: O:\150.06.14\Engineering\WQMP\Appendix 1 – Maps & Site Plan\Receiving waters–San Jacinto and Vicinity.dwg
Last Opened: Oct 05, 2015 – 10:51am by jcarver

Attachment: Preliminary Water Quality Management Plan (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Figure 2 – Receiving Waters Map



TENTATIVE TRACT MAP 37001 RECEIVING WATERS MAP
SAN JACINTO WATERSHED

N

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FIGURE 2

Drawing Name: O:\150.06.14\Engineering\WQMP\Appendix 1 – Maps & Site Plan\Receiving waters–San Jacinto and Vicinity.dwg
Last Opened: Oct 05, 2015 – 10:52am by jcarver

Attachment: Preliminary Water Quality Management Plan (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

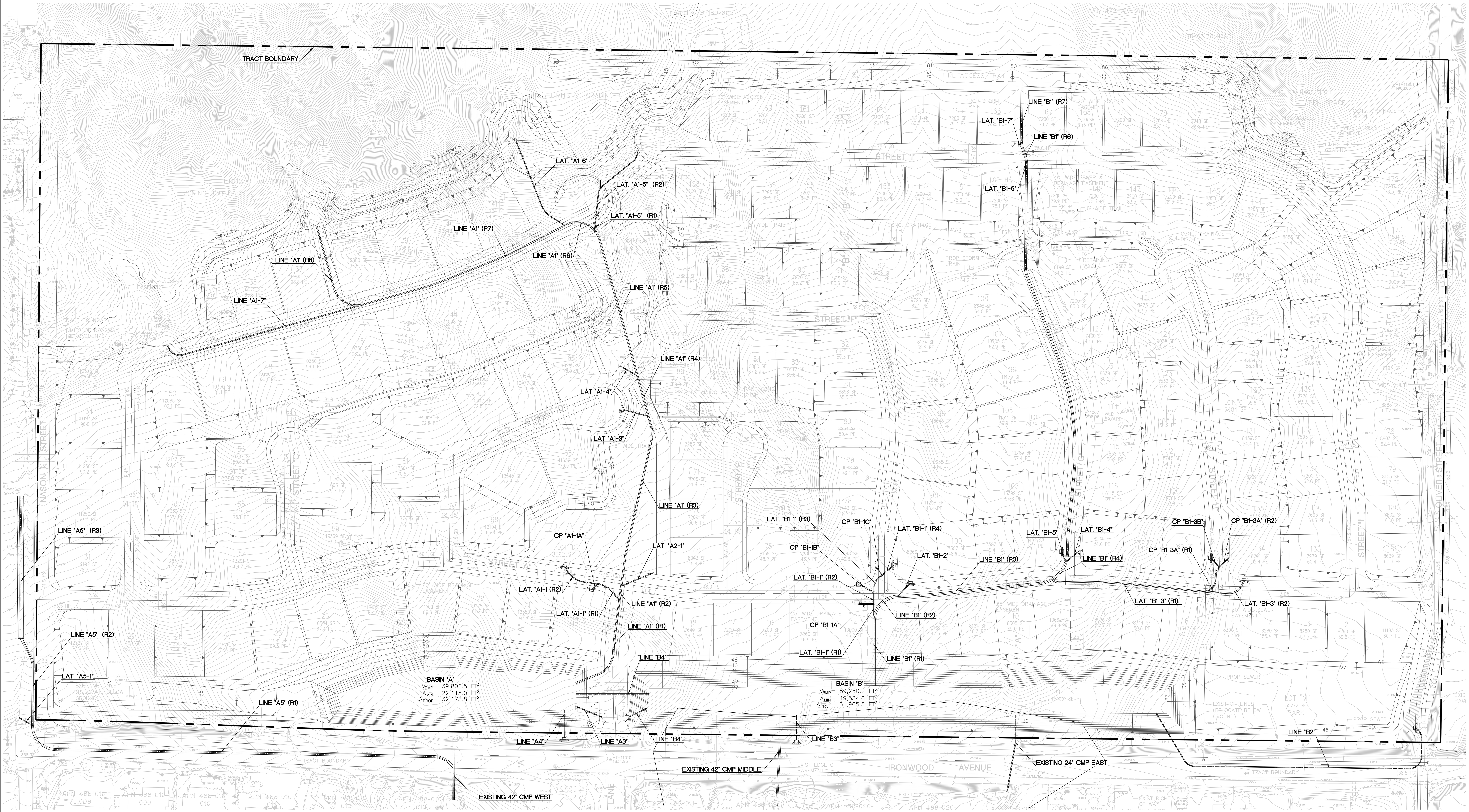
Figure 3 – WQMP Site Plan

SHEET 1 OF 1

TENTATIVE TRACT MAP NO. 37001

CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

WQMP SITE PLAN



LEGEND:

— — - — —	TRACT BOUNDARY
V_{BMP} =	DESIGN CAPTURE VOLUME
A_{MIN} =	MINIMUM BASIN BOTTOM SURFACE AREA
A_{PROP} =	PROPOSED BASIN BOTTOM SURFACE AREA

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FIGURE 3

TTM 37001

WQMP
SITE PLAN

Appendix 2: Construction Plans

Grading and Drainage Plans

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

EEI
Geotechnical & Environmental Solutions

DUE DILIGENCE LEVEL PRELIMINARY GEOTECHNICAL EVALUATION

Proposed Residential Development
NWC Ironwood Avenue and Oliver Street,
Moreno Valley, Riverside County, California

EEI Project No.: GLO-71982.4

November 25, 2014

Corporate Office: 2195 Faraday Avenue • Suite K • Carlsbad, California 92008-7207 • Ph: 760-431-3747
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DUE DILIGENCE LEVEL PRELIMINARY GEOTECHNICAL EVALUATION

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Project Site Location:

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Moreno Valley, Riverside County, California

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EEI Project No.: GLO-71982.4

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Distribution: (3) Addressee one via electronic copy

1.0 INTRODUCTION

1.1 Purpose

The purpose of this evaluation was to provide due diligence level preliminary geotechnical information to Anderson Consulting Engineers, Inc. ("Client"), regarding the subject property in the City of Moreno Valley, Riverside County, California. The information developed in this evaluation is intended to provide the Client with an understanding of the physical conditions of site-specific subsurface soils, groundwater, and the regional geologic setting which could affect the cost or design of the proposed development at the subject property (Site Vicinity Map-**Figure 1**, Aerial Site Map-**Figure 2**).

This Due Diligence Preliminary Geotechnical Evaluation has been conducted in general accordance with the accepted geotechnical engineering principles and in general conformance with the approved revised proposal and cost estimate for the project by EEI, dated September 23, 2014.

EEI conducted an onsite field exploration on October 16 and 17, 2014 that included excavation and sampling of four (4) exploratory backhoe trenches and drilling and sampling of four (4) hollow stem auger geotechnical borings for the proposed development at the subject property. Also, three (3) additional shallow borings were drilled to depths of 3 feet or less below the existing ground surface in the areas of proposed detention basins in order to perform field percolation testing. Three (3) additional hollow stem auger geotechnical borings were drilled and sampled for the proposed offsite sewer alignment located approximately ¼ mile south of the main subject property. This Due Diligence Preliminary Geotechnical Evaluation has been prepared for the sole use of Anderson Consulting Engineers, Inc. Other parties, without the express written consent of EEI and the Client should not rely upon this due diligence level preliminary geotechnical evaluation.

1.2 Project Description

We understand that the Client is considering purchasing the subject property for a residential project. Based on a Project Exhibit provided to EEI by Anderson Consulting Engineers, Inc., it appears that the subject property will be developed into approximately 146 residential building pads and associated streets and other improvements. A future offsite sewer extension is proposed for the right-of-way near the southern terminus of Oliver Street approximately ¼ mile south of the subject property. The approximate depth of the proposed sewer is about 25 feet below the existing ground surface within the Eastern Municipal Water District (EMWD) water main right-of-way. No further information is known at this time.

1.3 Scope of Services

The scope of our services included:

- A review of readily available data pertinent to the subject property, including published and unpublished geologic reports/maps, aerial photographs, local groundwater information, and soils data for the area (**References**).
- Conduct a geotechnical reconnaissance of the subject property and nearby vicinity.
- Coordinate with Underground Service Alert to identify the presence of underground utilities for clearance of proposed boring and test pit locations.

- The drilling and logging of four (4) hollow stem auger (HSA) borings (B-1 through B-4) throughout the subject property, ranging from 16 to 50.5 feet below existing grade elevations (bgs). One of the HSA exploratory borings was extended to 50.5 feet bgs for preliminary evaluation of settlement.

- The drilling and logging of three (3) additional hollow stem (HSA) auger borings (B-5 through B-7) in readily accessible areas along the proposed offsite sewer extension near the southern terminus of Oliver Street. The three (3) borings were extended to depths of approximately 26.5 feet below the existing ground surface along the approximate proposed sewer alignment

- Perform field percolation testing at three (3) locations (P-1 through P-3) at depths of approximately 3 feet below the existing ground surface at the locations of proposed detention basins as shown on the Project Exhibit. Testing was performed in general accordance with the County of Riverside guidelines for percolation test methods for preliminary percolation/infiltration information. Percolation testing results are presented in **Table 4**.

- Excavate four (4) exploratory trenches (T-1 through T-4) utilizing a backhoe in readily accessible but widely separated areas of the subject property at depths from approximately 6.5 to 9 feet below the existing ground surface.

- The locations of each of the offsite exploratory borings (for the proposed offsite sewer) are presented on **Figure 2** (Aerial Site Map/Offsite Boring Location Plan). The locations of the exploratory borings, exploratory trenches and percolation test pits on the subject property are presented on **Figure 3** (Field Exploration Plan).

- An evaluation of seismicity and geologic hazards to include an evaluation of faulting.

- Completion of laboratory testing of representative earth materials encountered onsite to ascertain their pertinent soils engineering properties, including corrosion potential (**Appendix B**).

- The preparation of this report which presents our preliminary findings, conclusions, and recommendations.

2.0 BACKGROUND

2.1 Subject Property Description

Based on the information provided by Anderson Consulting Engineers, Inc. ("Client"), and a review of the Google Earth© online database, the subject property consists of approximately 80-acres of undeveloped vacant land located at the northwest corner of the intersection of Oliver Street and Ironwood Avenue, in the City of Moreno Valley, Riverside County, California. Nason Street forms the majority of the western boundary; Ironwood borders the south; and Oliver Street forms the eastern boundary. Vacant land is present to the north. In general, the area is characterized by rural residential and vacant land. Proposed development is for multi or single-family residential.

We understand that an offsite sewer alignment is proposed which is located approximately ¼ miles south of the main subject property area. The sewer alignment is proposed to be extended approximately 900 feet to the south from the existing terminus on Oliver Street near the intersection with Carol Place.

The subject property is approximately situated at 33.9448° north latitude and 117.1871° west longitude (GoogleEarth®, 2013).

2.2 Site Topography

A review of the Sunnymead, California 7.5-minute topographic quadrangle (USGS, 2012) and Project Exhibit/topographic map prepared by Anderson Consulting Engineers, Inc. indicates that the subject property elevation varies from approximately 1,840 to 1,980 feet above mean sea level (amsl). From east-west across the property is a series of north-south oriented ridges and alternating drainage gullies in the lower, southern portion of the property. The intervening ridges are generally about 5 to 10 feet higher in elevation than the adjacent drainage gullies. Rounded granitic outcrops are exposed in the northwestern and northeastern sections of the subject property. The site topography can be generally described as a relatively well-dissected alluvial fan descending from the eroded hills to the north. The overall surface gradient across the property is gently to moderately south or south-southeast.

2.3 Geologic Setting

The subject property and vicinity lies within the Peninsular Ranges Geomorphic Province of California (CGS, 2002). The Peninsular Ranges Geomorphic Province extends from the Transverse Ranges Geomorphic Province and the Los Angeles Basin, south to Baja California. This province varies in width from about 30- to 100-miles. It is bounded on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province. The Transverse Ranges Geomorphic Province bounds the Peninsular Ranges on the north. The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks. Major fault zones and subordinate fault zones found in the Peninsular Ranges Province typically trend in a northwest-southeast direction.

Regional geologic maps of the subject property vicinity (Morton et al., 2004) indicate the property is underlain by Cretaceous-age plutonic rocks composed of tonalite and Holocene age Younger Alluvial Fan deposits. Outcroppings of the weathered tonalite bedrock are exposed in the northwestern and northeastern portions of the property. Over the remainder of the property, the tonalite bedrock was found to be weathering into a soil with a "decomposed granite" or "dg" texture at depth in the exploratory borings and trenches and in general is covered with several feet of alluvial and colluvial (younger alluvial fan) soils also derived from the weathered tonalite. The alluvial and colluvial soils are generally comprised of relatively loose to dense silty sand. The property is relatively undeveloped and artificial fill was not encountered during our field exploration at the property.

Due to the proximity of the subject property area to several nearby active faults, strong ground shaking could occur at the property as a result of an earthquake on any one of the faults. Our review indicates that there are no known active faults crossing the property and the property is not within a State of California Earthquake Fault Zone (Jennings, 1994; Hart and Bryant, 1997, CDMG, 1974; 1998). Due to the presence of shallow bedrock and the lack of shallow groundwater at the property, the property is considered as having a low susceptibility to liquefaction.

2.4 Regional Groundwater

A seismic hazard zone map and report have not been completed for the Sunnymead Quadrangle, therefore, the depth to the historic high groundwater at the subject property is not known. Due to the presence of relatively shallow granitic bedrock at the property, static groundwater is not expected and groundwater was not encountered in any of the exploratory borings or trenches excavated at the property to a maximum explored depth of 50.5 feet below the existing ground surface. Within the lower drainage gullies, up to 30 feet in thickness of silty sand alluvium was encountered. Although not encountered within the alluvium during our field excavation, during times of heavy precipitation or runoff, a localized perched groundwater condition could exist. A review of topographic maps of the general vicinity of the subject property indicates regional topographic relief slopes gently towards the south or south-southeast.

This information suggests that regional groundwater in the property vicinity could be inferred to flow in the same general topographic direction.

3.0 FAULTING AND SEISMICITY

The portion of Southern California that includes the subject property is considered to be seismically active. Due to the proximity of the property area to several nearby active faults, strong ground shaking could occur at the property as a result of an earthquake on any one of the faults. Our review indicates that there are no known active faults crossing the property (Blake, 2000) and the property is not within an Earthquake Fault Zone (Hart and Bryant, 1997). It is our opinion, therefore, that the likelihood of surface fault rupture at the property is low. **Table 1** lists the major active faults within 25 miles that are likely to affect the property.

TABLE 1
Summary of Major Active Faults

	Fault Name	Approximate Distance From Site miles (kilometers)	Maximum Moment Magnitude
1	San Jacinto-San Jacinto Valley	1.5 (2.4)	6.9
2	San Jacinto-San Bernardino	5.8 (9.3)	6.7
3	San Andreas – San Bernardino M-1	12.1 (19.5)	7.5
4	San Andreas – SB-Coach. M-2b	12.1 (19.5)	7.7
5	San Andreas – SB-Coach. M-1b-2	12.1 (19.5)	7.7
6	San Andreas – Whole M-1a	12.1 (19.5)	8.0
7	North Frontal Fault Zone (West)	19.4 (31.2)	7.2
8	San Jacinto – Anza	21.0 (33.8)	7.2
9	Elsinore (Glen Ivy)	21.7 (35.0)	6.8
10	Cucamonga	21.9 (35.2)	6.9
11	Elsinore (Temecula)	22.8 (36.7)	6.8
12	Cleghorn	23.1 (37.2)	6.5
13	Chino-Central Ave. (Elsinore)	23.3 (37.5)	6.7

3.1 Seismic Parameters and Peak Ground Acceleration

Maximum considered ground motion maps provided in the California Building Code (CBC, 2013) were utilized with coordinates of 33.9448° north latitude and 117.1871° west longitude, to determine the subject property seismic parameters. EEI utilized seismic design criteria provided in the CBC (2013).

In accordance with the guidelines of the CBC (2013), the spectral parameters for the subject property (based on a Site Class B soil) are estimated to be $S_s = 2.166g$ and $S_1 = 0.982g$. Review of the geotechnical data obtained during our subsurface exploration, however, indicates that the property should be classified as Class D per the CBC (Table 1613.5.2). Consequently, Site Coefficients $F_a = 1.000$ and $F_v = 1.500$ appear to be appropriate for the property. Based on this information, the adjusted maximum considered earthquake spectral response parameters $S_{MS} = 2.166g$ and $S_{M1} = 1.472g$ are recommended for seismic design of the project. Assuming an occupancy category of II (Table 1604A.5), an S_{DS} value of 1.444g and an S_{D1} value of 0.982g, the proposed building at the property can be assigned a seismic design category of D [Table 1613.5.6 (1) and (2)]. Final selection of the appropriate seismic design coefficients should be made by the structural consultant based on the local laws and ordinances, expected building response, and desired level of conservatism.

Seismic Hazard Response Parameters are listed in **Table 2**.

TABLE 2
Seismic Hazard Response Parameters and Design Parameters CBC (2013)

Latitude: 33.9448° - Longitude: -117.1871° Seismic Parameter	Period (Sec)		Value
Mapped Spectral Acceleration Value, Soil Class B	0.2	S_s	2.166g
Mapped Spectral Acceleration Value, Soil Class B	1.0	S_1	0.982g
Site Coefficient, Subject Site Soil Classification D per 2013 CBC Table 1613.5.2	--	F_a	1.000
Site Coefficient, Subject Site Soil Classification D per 2013 CBC Table 1613.5.2	--	F_v	1.500
Adjusted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Site Class D	0.2	S_{MS}	2.166g
Adjusted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Site Class D	1.0	S_{M1}	1.472g
Design Spectral Response Acceleration Occupancy Category II per 2013 CBC Table1604.5	0.2	S_{DS}	1.444g
Design Spectral Response Acceleration Occupancy Category II per 2013 CBC Table1604.5	1.0	S_{D1}	0.982g
Peak Ground Acceleration Adjusted For Site Class Effects.		PGA_M	0.837g
Building Assigned Seismic Design Category per Table 1613.5.6 (1) and (2)	--	--	D

3.2 Ground Lurching or Shallow Ground Rupture

Based on the geography, topography and site-specific geotechnical conditions encountered during our preliminary geotechnical evaluation at the subject property, we consider the potential for ground lurching or shallow ground rupture at the property to be low; however, due to the active seismicity of California, this possibility cannot be completely ruled out. In light of this, the unlikely hazard of lurching or ground-rupture should not preclude consideration of "flexible" design for onsite utility lines and connections.

3.3 Liquefaction

Liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading. Liquefaction and related phenomena have been responsible for substantial structural damage in historical earthquakes, and are a design concern under certain conditions. Liquefaction occurs in saturated soils that are soils in which the space between individual particles is completely filled with water. This pore water exerts a pressure on the soil particles that influences how tightly the particles themselves are pressed together.

Prior to an earthquake, pore water pressure is typically low; however, earthquake motion can cause the pore water pressure to increase to the point where the soil particles can readily move with respect to each other. When liquefaction occurs; the strength of the soil decreases and the ability of a soil deposit to support structural loads are reduced.

A seismic hazard zone map and report for the Sunnymead Quadrangle has not been issued by the California Geological Survey (CGS) so the subject property is, therefore, not situated within a mapped Liquefaction Zone. The majority of the property is underlain by generally loose to medium dense alluvial and colluvial deposits that overlie relatively shallow granitic bedrock. The alluvial and colluvial soils are subject to removal and recompaction during site grading for the proposed residential development. It appears that liquefaction is not a significant geotechnical concern at the property.

Cyclic mobility is a liquefaction phenomenon, triggered by cyclic loading, occurring in soil deposits with static shear stresses lower than the soil strength. Deformations due to cyclic mobility develop incrementally because of static and dynamic stresses that exist during an earthquake. Lateral spreading, a common result of cyclic mobility, can occur on gently sloping and on flat ground close to rivers and lakes. These conditions do exist within the subject property, however, based on the conceptual site plan, the property should be relatively level following rough grading with a lack of free channel faces and cyclic mobility should not be an issue post-grading.

3.4 Seismic Induced Settlement

Seismically induced settlement can occur due to reorientation of soil particles during strong shaking of unsaturated sands, as well as in response to liquefaction of saturated loose granular soils.

Based on our evaluation and the geotechnical data obtained from our exploratory borings and trenches, we estimate the total seismic-induced settlement to be less than 1-inch. Differential earthquake induced settlements are estimated to be less than 0.5-inches over a 50-foot span.

4.0 FIELD EXPLORATION AND LABORATORY TESTING

4.1 Field Exploration

Field work for our geotechnical evaluation was conducted on October 16 and 17, 2014. A total of four (4) hollow stem auger borings were drilled on the subject property. Boring depths ranged from 11 feet to 50.5 feet below the existing ground surface. Three (3) additional hollow stem auger borings were drilled offsite in the area of the proposed sewer line extension. All three borings were drilled to an approximate depth of 26.5 feet below existing grade. In addition to the hollow stem auger borings, four (4) exploratory backhoe trenches were excavated on the subject property to depths ranging from 6.5 to 9 feet below existing grade. All exploratory borings and trenches were logged under the supervision of a Registered Professional Engineer and/or Certified Engineering Geologist at EEI. Boring and trench locations were adjusted as necessary due to existing utilities and improvements.

Blow count (N) values were determined utilizing a 140 pound automatic hammer, falling 30-inches onto a Standard Penetration Test (SPT) split-spoon sampler and a Modified California split-tube sampler. A truck mounted hollow-stem auger (HSA) drill rig and rubber-tired backhoe were used during field work. The blows per foot (N value) required to advance the 18-inch long SPT and 12-inch long Modified California split-tube samplers was measured at various initial depths followed by 5-foot intervals, recorded on the boring logs. The boring logs and trench logs for the field exploration are presented in **Appendix A**-Soil Classification Chart and Boring & Trench Logs. Relatively "undisturbed" samples were collected in a 2.42-inch (inside diameter) California Modified split-tube sampler for visual examination and laboratory testing in the exploratory borings. The soils were classified in accordance with the Unified Soil Classification System (ASTM, 2008). Representative bulk samples were also collected from both the exploratory borings and trenches for appropriate laboratory testing.

4.2 Subsurface Conditions

The results of our geotechnical exploration indicate that the proposed residential development is underlain by weathered Cretaceous-age plutonic rocks composed of tonalite. This material was observed to extend beyond the maximum depth of our exploratory borings and test pits (approximately 50.5 feet below existing grades). Alluvial soils up to 30 feet thick were observed to mantle the weathered tonalite bedrock within the lower lying channel/drainage areas.

On the higher, elevated ridge areas on the subject property, colluvial soils were observed to mantle the weathered tonalite bedrock with a thickness varying between 3 and 14 feet. The weathered tonalite bedrock can generally be described as gray, white or black speckled or orange to dark grayish-orange (depending on degree of weathering) with a "granitic" or phaneritic texture and was generally unweathered to highly weathered. Outcroppings of the weathered tonalite bedrock are exposed in the northwestern and northeastern portions of the site. Over the remainder of the property, the tonalite bedrock was found to be weathering into a medium dense to very dense silty sand soil with a "decomposed granite" or "dg" texture at depth in the exploratory borings and test pits. The alluvial and colluvial (younger alluvial fan) soils are also derived from the weathered tonalite. The alluvial and colluvial soils are generally comprised of orange-brown or red-brown, medium brown or light gray brown, fine to coarse, damp to moist, loose to dense silty sand. The property is relatively undeveloped and artificial fill was not encountered during our field exploration at the property.

Our exploratory excavations were performed utilizing light-duty equipment which can provide general excavation characteristics of the onsite materials. Large granitic (tonalite) bedrock outcrops are present on the northeast and northwest portions of the property, along with some isolated rock outcrops within the areas of the proposed development area and generally on the higher elevations of the property. Boulders were present at the surface in these areas, some localized "core rock or floaters" should be anticipated at variable depths in these areas. Based on observed subsurface conditions in the exploratory trench excavations and borings, the "decomposed granite" or "dg" is moderately to highly weathered and/or fractured and was relatively easy to excavate to the depths indicated with a light-duty backhoe and a drill rig equipped with flight auger equipment. No refusal was encountered in any of the exploratory excavations during our field exploration.

In general, the ease of rock excavation or rippability depends on various factors such as rock type, rock hardness and density, the amount of weathering, and the existence and characteristics of discontinuities such as joint spacing, foliation, or fractures.

Due to the relatively dense character of the granitic bedrock encountered onsite, it is likely that oversized rock materials will be created during grading operations. Native earth materials appear to be suitable for use as structural fill provided they are moisture conditioned (as needed), meet EEI's recommendations for size (Section 4.2.2 Fills), and are properly compacted. Dependent upon the grading plan, some of the oversized materials may be re-used in landscape areas.

For the proposed offsite sewer line location, weathered tonalite overlain by 15 feet of alluvial soils was encountered in boring B-5. In boring B-6, colluvial soils at depth were mantled by approximately 10 feet of artificial fill. For boring B-7, colluvial soils were encountered from the surface to the total explored depth. All three offsite borings were advanced to a total depth of 26.5 feet below the existing ground surface. The weathered tonalite bedrock and alluvial soils are generally unchanged from the materials encountered on the subject property. The offsite colluvial soils can generally be described as orange brown to brown, fine to coarse, moist, medium dense to dense silty sand and sandy silt. The artificial fill soils encountered can be described as light brown, fine to coarse, and damp, medium dense silty sand. Refusal was not encountered within any of our exploratory borings or test pits. Detailed descriptions of the encountered soils are provided on the boring logs and test pit logs included as **Appendix A.**

Due to the presence of relatively shallow granitic bedrock at subject property, static groundwater is not expected and groundwater was not encountered in any of the exploratory borings or trenches excavated at the property to a maximum explored depth of 50.5 feet below the existing ground surface. Our review of ground water monitoring data from nearby wells suggests that the groundwater level may fluctuate seasonally and yearly.

It should be noted that fluctuations in the ground water level could also occur due to variations in ground surface topography, subsurface stratifications, precipitation, irrigation, and other factors which may not have been evident at the time of our exploration.

4.3 Laboratory Testing and Classification

Representative samples were selected for laboratory testing to confirm their field classification(s). Field descriptions and classifications were visually classified according to the American Society for Testing and Materials (ASTM) D2488 which classifies soils under the Unified Soil Classification System (USCS). Representative soil samples were tested in the lab for grain size distribution, liquid limits, and plastic limits to determine actual classifications by ASTM D2487-Standard Practice for Classification of Soils for Engineering Purposes in accordance to the USCS. Final classifications of soils can be found on the boring logs in **Appendix A** and the laboratory test data in **Appendix B**.

4.3.1 Moisture Content and Dry Density

The in-situ moisture content and dry density of soils were determined for soil samples obtained from the borings. Moisture contents and dry densities of soils help to determine engineering design parameters for foundations, retaining walls, and other engineered structures. Moisture content on soil samples was conducted in general accordance with ASTM D2216, and was recorded as a percentage. In-situ moisture content and dry density information for soil samples retrieved from the field can be found on the boring logs located in **Appendix A**.

4.3.2 Grain Size Distribution

To help check field classifications of soils, the grain size distribution of representative soil samples was determined. In order to find the percentages of different sized particles in a particular soil stratum, soils were tested in general accordance with ASTM D422-Standard Test Method for Particle-Size Analysis of Soils. Grain size distribution curves and gradation results are presented in **Appendix B.**

4.3.3 Maximum Dry Density and Optimum Moisture Content

The maximum dry density and optimum moisture content were determined from a bulk sample obtained from boring B-1 at depths between 0 and 5 feet below existing grade. Our testing was performed in general accordance with ASTM D1557, Method A. Results of our testing are presented in **Appendix B**.

4.3.4 Direct Shear

Direct shear testing was conducted on three representative samples of the upper soils. One sample was remolded to 90 percent of their maximum dry density (based on ASTM D1557), and the other two samples in its natural state, to measure its shear strength characteristics for engineering purposes. The samples were inundated for at least 18 hours. The samples were placed in a shear box and a normal load was applied (10, 20, and 40 kilogram weights were used). The samples were then sheared at a controlled strain rate in a direct shear apparatus that measures horizontal displacement and shear resistance. Shear testing was run in general accordance with ASTM D3080. The results of our testing are presented in **Appendix B**.

4.3.5 Expansion Index

A soil sample from boring B-1 within the upper 5 feet of existing grade was tested for its expansion potential. Our expansion index testing was conducted in general accordance with ASTM D4829. The results of our expansion index testing are presented in **Appendix B.**

4.3.6 Sulfate/Corrosion

One representative sample of onsite earth material was collected for analysis at Clarkson Laboratory and Supply, Inc. located in Chula Vista, California for corrosion/soluble sulfate potential. This corrosion testing included soil minimum resistivity and pH by California Test 643, sulfate by California Test 417, and chloride by California Test 422. Results of these tests are presented in **Appendix B**.

It should be understood that the results provided in **Appendix B** are based upon pre-development conditions. Verification testing is recommended at the conclusion of grading on samples collected at or near finish grade.

5.0 CONCLUSIONS

Based on our field exploration, laboratory testing and engineering and geologic analysis, it is our opinion that the subject property is suitable for the proposed new development and associated improvements from a geotechnical engineering and geologic viewpoint; however, there are existing geotechnical conditions associated with the property that will warrant mitigation and/or consideration during planning stages. If site plans and/or the location of the proposed residential buildings or proposed offsite sewer line are revised, additional field studies may be warranted to address proposed site-specific conditions. As a result, EEI is providing the following conclusions:

- A total of four (4) hollow stem auger borings were drilled on the subject property. Boring depths ranged from 11 feet to 50.5 feet below the existing ground surface. Three (3) additional hollow stem auger borings were drilled offsite in the area of the proposed sewer line extension. All three borings were drilled to an approximate depth of 26.5 feet below existing grade. In addition to the hollow stem auger borings, four (4) exploratory backhoe trenches were excavated on the subject property to depths ranging from 6.5 to 9 feet below existing grade. The subject property is underlain by weathered Cretaceous-age plutonic rocks composed of tonalite. This material was observed to extend beyond the maximum depth of our exploratory borings and test pits (approximately 50.5 feet below existing grades). Alluvial soils up to 30 feet thick were observed to mantle the weathered tonalite bedrock within the lower lying channel/drainage areas. On the higher, elevated ridge areas on the subject property, colluvial soils were observed to mantle the weathered tonalite bedrock with a thickness varying between 3 and 14 feet. The weathered tonalite bedrock was can generally be described as gray, white or black speckled or orange to dark grayish-orange (depending on degree of weathering) with a "granitic" or phaneritic texture and was generally unweathered to highly weathered and very soft to moderately hard. The alluvial and colluvial (younger alluvial fan) soils are also derived from the weathered tonalite. The alluvial and colluvial soils are generally comprised of orange-brown or red-brown, medium brown or light gray brown, fine to coarse, damp to moist loose to dense silty sand.

- On the subject property, the weathered tonalite bedrock was observed to be mantled by up to approximately a 30-foot thick layer of alluvium in the lower drainage/wash areas while a relatively thin layer of colluvial soils, also mainly silty sand was observed in the exploratory borings and test pits on the higher "ridges".

- For the proposed offsite sewer line location, weathered tonalite overlain by 15 feet of alluvial soils was encountered in boring B-5. In boring B-6, colluvial soils at depth were mantled by approximately 10 feet of artificial fill. For boring B-7, colluvial soils were encountered from the surface to the total explored depth. All three offsite borings were advanced to a total depth of 26.5 feet below the existing ground surface. The weathered tonalite bedrock and alluvial soils are generally unchanged from the materials encountered on the subject property. The offsite colluvial soils can generally be described as orange brown to brown, fine to coarse, moist, loose to medium dense silty sand and sandy silt. The artificial fill soils encountered can be described as light brown, fine to coarse, and damp, loose to medium dense silty sand. No refusal was encountered in any of the onsite or offsite exploratory boring or test pit locations.

- We understand that the Client is considering purchasing the subject property for a residential project. Based on a Project Exhibit provided to EEI by Anderson Consulting Engineers, Inc., it appears that the subject property will be developed into approximately 146 residential building pads and associated streets and other improvements. A future offsite sewer extension is proposed for the right-of-way near the southern terminus of Oliver Street approximately ¼ south of the subject property. The approximate depth of the proposed sewer is about 25 feet below the existing ground surface within the Eastern Municipal Water District (EMWD) water main right-of-way. No further information is known at this time.

- Groundwater was not encountered in any of our onsite or offsite exploratory borings or exploratory test pits to the depths explored (approximately 50.5 feet below existing grades). It should be noted that variations in groundwater may result from fluctuations in the ground surface topography, subsurface stratification, precipitation, irrigation and other factors that may not have been evident at the time of our subsurface exploration.

- Laboratory test results indicate that the near surface materials are near neutral (pH = 7.1) and are moderately corrosive to ferrous metals with a minimum resistivity value of 5,200 ohm-cm. Laboratory testing of the upper soils yielded a soluble sulfate concentration of 0.005 percent and a chloride concentration of 0.007 percent, indicating a negligible corrosion potential to reinforced concrete.

- The results of our laboratory Expansion Index (EI) testing indicate an expansion index of 0, for the tested soils which represents a very low expansion potential.

- The subject property is located within an area of Southern California recognized as having a number of active and potentially-active faults. Our review indicates that there are no known active faults crossing the property and the property is not located within an Earthquake Fault Zone. The nearest active faults that could affect the property are the San Jacinto Valley segment of the San Jacinto Fault Zone, located approximately 1.5 miles from the property, the San Bernardino segment of the San Jacinto Fault Zone, located approximately 5.8 miles from the area of study, the San Bernardino M-1 segment of the San Andreas Fault Zone, the San Bernardino-Coachella Valley M-2b segment of the San Andreas Fault Zone, the San Bernardino-Coachella Valley M-1b-2 segment of the San Andreas Fault Zone and the San Bernardino-Coachella Valley M-1a segment of the San Andreas Fault Zone, all located approximately 12.1 miles from the area of study. Each of these active faults is capable of generating severe ground shaking at the property. A list of active faults within an approximate 25 mile radius is presented in **Table 1**.

- Based on EEI's evaluation, earth materials underlying the subject property are not considered susceptible to liquefaction or significant amounts of seismic settlement. Based on EEI's evaluation, the earth materials underlying the subject property of the proposed development appear to be susceptible to some seismically induced settlement on the order of less than one-inch with differential settlements of less than 0.5-inches over a 50-foot span. Liquefaction-induced lateral spreading does not appear to be a concern at the subject property due to the lack of shallow groundwater, the lack of nearby open face channels and the relatively shallow depth to bedrock.

- At this time and for the purposes of this Due Diligence Level Preliminary Evaluation, we cannot present specific footing recommendations that can be incorporated in the structural design, given that we do not have a scope of the proposed project, no grading or foundation plans were available at the time and no information was provided to us other than the Client is considering purchasing the property for future development.

6.0 RECOMMENDATIONS

The recommendations presented herein should be considered as preliminary for the purpose of characterizing the geotechnical and geologic conditions at the subject property prior to purchasing the property, and for preliminary information to aid the initial planning and design phases of development. Guidelines for site preparation, earthwork, and onsite improvements are provided in the following sections based on a limited number of widely spaced exploratory borings and test pits, and the assumption that the planned onsite development will consist of single-family, wood-frame, slab-on-grade 1- to 2-story residential structures and the planned offsite construction for the proposed sewer line. For more detailed and specific recommendations for the design and planning of the proposed structures at the property, we recommend to supplement this Due Diligence Level Preliminary Geotechnical Evaluation with an additional Geotechnical Evaluation. This additional Geotechnical Evaluation would include a supplementary subsurface evaluation, incorporating additional hollow stem auger borings (HSA), to identify more specifically and in areas not covered by this Due Diligence Level Preliminary Geotechnical Evaluation, the subject property's subsurface conditions and other zones potentially susceptible to seismically induced settlement to the depths explored.

6.1 General

Grading should conform to the guidelines presented in the 2013 California Building Code (CBC, 2013), as well as the requirements of the City of Moreno Valley and the County of Riverside. Additionally, general Earthwork and Grading Guidelines are provided herein as **Appendix C**.

During earthwork construction, removals and reprocessing of fill materials, as well as general grading procedures of the contractor should be observed and the fill placed selectively tested by representatives of the geotechnical engineer, EEI. If any unusual or unexpected conditions are exposed in the field, they should be reviewed by the Geotechnical Engineer and if warranted, modified and/or additional remedial recommendations will be offered. Specific guidelines and comments pertinent to the planned development are provided herein.

The recommendations presented herein have been completed using the preliminary information provided to us regarding site development. If information concerning the proposed development is revised, or any changes in the design and location of the proposed property improvements are made, the preliminary conclusions and recommendations contained in this report should not be considered applicable unless the changes are reviewed and conclusions of this report modified or approved in writing by this office.

6.2 Site Preparation and Grading

Debris and other deleterious material, such as organic soils and/or environmentally impacted earth materials should be removed from the subject property prior to the start of grading. Areas to receive fill should be properly benched in accordance with current industry standards of practice and guidelines specified in the CBC and the requirements of the local jurisdiction.

Existing utilities should be removed within the proposed building envelope. Abandoned trenches should be properly backfilled and tested. If unanticipated subsurface improvements (utility lines, septic systems, wells, utilities, etc.) are encountered during earthwork construction, the geotechnical engineer should be informed and appropriate remedial recommendations would then be provided.

6.3 Remedial Earthwork

The encountered portions of the existing surficial soils including the upper portions of the alluvial and colluvial soils were observed to be somewhat loose and variable in moisture content and relative density. As such, they are considered potentially compressible and unsuitable for the support of settlement-sensitive structures or engineered fill in their current condition. Therefore, where not already removed by the proposed site grading, the existing materials should be completely removed and recompacted in the areas to receive the proposed building improvement and other settlement-sensitive improvements. Based on the results of our subsurface exploration, we recommend that these removals extend to approximate depths on the order of a minimum of 4 feet to a maximum of 30 feet below the existing ground surface, or 24-inches below the bottoms of the proposed foundations. At the approximate location of boring B-1, 30 feet of relatively loose to medium dense silty sand alluvium was encountered above the tonalite bedrock and should be removed to a depth of 30 feet. A similar situation likely exists in other, lower elevation portions of the site within the drainage channels.

Following removal of the upper soils, the bottom of the resulting excavation(s) should be observed by a representative of EEI to check that unsuitable materials have been sufficiently removed. It should be understood that based on the observations of our field representative, localized deeper removals may be recommended. The base of the removal area should be level to avoid differential fill thicknesses under proposed improvements. This remedial earthwork should extend at least 5 feet outside the proposed building limits and/or 5 feet beyond the area to receive fill. Note that vertical sides exceeding 5 feet in depth may be prone to sloughing and may require laying back to an inclination of 1:1 (horizontal to vertical).

After removal of the upper soils and observation of the excavation bottoms, the over-excavated areas should be scarified to a minimum depth of 6-inches, moisture conditioned as needed to achieve at least optimum moisture content and re-compacted to at least 90 percent of the maximum dry density (based on ASTM D1557). The over-excavated areas should then be backfilled with onsite and/or imported soils that are placed and compacted as recommended herein until design finish grades are reached.

6.4 Yielding Subgrade Conditions

The soils encountered at the subject property can often exhibit "pumping" or yielding once they become saturated. This can often occur in response to periods of significant precipitation, such as during the winter rainy season, or if the bottom of an excavation is situated relatively close to the groundwater level. In order to help stabilize the yielding subgrade soils within the bottom of the removal areas, the contractor can consider the placement of uniform sized, ¾- to 2-inch crushed rock within areas exhibiting the "pumping" conditions. The crushed rock should be properly tracked into the underlying soils such that it is adequately intruded into and interlocks with the soils. We expect that a 6- to 12-inch thick section of the crushed rock will be required.

Following the placement and tracking of the gravel layer into the underlying "pumping" soils, it is recommended that Mirafi 600X stabilization fabric (or approved equivalent) then be placed upon the gravel layer. Fill soils, which should be placed and compacted in accordance with the recommendations presented herein, should then be placed upon the fabric until design finish grades are reached. The gravel and stabilization fabric should extend at least 5 feet laterally beyond the limits of the "pumping" areas. These operations should be performed under the observation and testing of a representative of EEI in order to evaluate the effectiveness of these measures and to provide additional recommendations for mitigative measures, as warranted.

6.5 Fill Placement

The soils encountered at the subject property can often exhibit "pumping" or yielding once they become saturated. This can often occur in response to periods of significant precipitation, such as during the winter rainy season, or if the bottom of an excavation is situated relatively close to the groundwater level. In order to help stabilize the yielding subgrade soils within the bottom of the removal areas, the contractor can consider the placement of uniform sized, ¾- to 2-inch crushed rock within areas exhibiting the "pumping" conditions. The crushed rock should be properly tracked into the underlying soils such that it is adequately intruded into and interlocks with the soils. We expect that a 6- to 12-inch thick section of the crushed rock will be required. Following the placement and tracking of the gravel layer into the underlying "pumping" soils, it is recommended that Mirafi 600X stabilization fabric (or approved equivalent) then be placed upon the gravel layer. Fill soils, which should be placed and compacted in accordance with the recommendations presented herein, should then be placed upon the fabric until design finish grades are reached. The gravel and stabilization fabric should extend at least 5 feet laterally beyond the limits of the "pumping" areas. These operations should be performed under the observation and testing of a representative of EEI in order to evaluate the effectiveness of these measures and to provide additional recommendations for mitigative measures, as warranted.

If import soils are needed, the earthwork contractor should ensure that all proposed fill materials are approved by the Geotechnical Engineer prior to use. Representative soil samples should be made available for testing at least ten working days prior to hauling to the subject property to allow for laboratory tests.

Fill materials should be placed in 6- to 8-inch loose lifts, moisture conditioned as necessary to at least optimum moisture and compacted to a minimum of 90 percent maximum density according to ASTM D1557. The upper 12-inches of pavement subgrade should be moisture conditioned to at least optimum moisture and compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557. Suitable heavy grading equipment should be utilized to properly mix, spread, moisture condition or dry, and compact each fill lift.

Those areas to receive fill (including over-excavated areas) or surface improvements should be scarified at least 6-inches, moisture conditioned to at least one percent over optimum moisture content and recompacted to at least 90 percent of the maximum dry density (based on ASTM D1557).

6.6 Shrinkage and Bulking

Several factors will impact earthwork balancing on the subject property, including shrinkage, bulking, subsidence, trench spoils from utilities and footing excavations, and final pavement section thickness as well as the accuracy of topography.

Shrinkage, bulking and subsidence are primarily dependent upon the degree of compactive effort achieved during construction. For planning purposes, the shrinkage factor is estimated to be on the order of 10 to 15 percent for the onsite natural soils to be utilized as fill. This shrinkage factor may vary with methods employed by the contractor. Subsidence is estimated to be on the order of 0.1 feet. For preliminary planning purposes, bulking of the granitic bedrock derived materials is estimated to be 0 to 10 percent. Losses from site clearing and removal of existing site improvements as well as generation of oversize material may affect earthwork quantity calculation and should be considered.

The previous estimates are intended as an aid for the project engineers in estimating earthwork quantities. It is recommended that the site development be planned to include an area that could be raised or lowered to accommodate final site balancing.

7.0 PRELIMNARY FOUNDATION RECOMMENDATIONS

7.1 General

The conclusions and recommendations presented herein, are based on the assumption that the planned development will consist of two- to four-story wood frame residential structures with slab-on-grade. It is our understanding that these conceptual plans are also part of the due diligence phase of the project and may or may not be the final design. As such, the conclusions and recommendations contained in this Due Diligence Preliminary Geotechnical Evaluation report should be considered preliminary, and should be reviewed, revised and/or approved in writing by EEI at the time the project design is finalized.

Be advised that as part of the foundation design election process, there is always a cost/benefit evaluation. Although we are providing alternatives for foundation design we have not accomplished the cost/benefit evaluation.

7.2 Preliminary Foundation Design

Lightly loaded wood-frame, two- to four-story residential buildings with a slab-on-grade, can be supported on conventional continuous or isolated spread footings bearing upon at least 24-inches of properly compacted fill materials. In preparation for foundation construction, the earthwork contractor should ensure that the site has been prepared as recommended, and that field density tests have been performed to adequately document the relative compaction of the structural fill.

Conventional foundations can be designed to impose dead plus long term live load bearing pressures of 2,000 pounds per square foot (psf). The allowable foundation bearing pressure is for footings having a minimum width of 15-inches and a minimum depth of 18-inches embedment below the lowest adjacent finish grade for one or two story buildings and 18-inches wide and a minimum 24-inches embedment below lowest adjacent finish grade for three or four-story buildings. The allowable soil bearing pressure can be increased by one-third when considering transient loads of short duration, such as wind or earthquake loads. Based on the prevailing geotechnical conditions encountered during our subsurface exploration, we recommend that foundations be reinforced with at least two No. 4 bars placed at the top of the footing and two placed at the bottom.

Horizontal loads acting on foundations and stem walls cast in open excavations against undisturbed native soil or against properly placed and compacted fill will be resisted by friction acting along the base of the footing and by passive earth pressures against the side of the footing and stem wall. The frictional resistance acting along the base of footings founded on suitable foundation soils may be computed using a coefficient of friction equal to 0.30 with the normal dead load.

Passive earth pressures acting against the side of footings and stem walls may be assumed to be equivalent to a fluid weighing 250 pounds per cubic foot. Passive pressure in the upper 1.0-foot should be neglected unless confined by concrete slabs-on-grade or asphalt concrete pavement. The values given above may be increased by one-third for transient wind or seismic loads.

7.3 Footing Setbacks

All footings should maintain a minimum 7-foot horizontal setback from the base of the footing to any descending slope (if existing onsite). This distance is measured from the outside footing face at the bearing elevation. Footings should maintain a minimum horizontal setback of H/3 (H=slope height) from the base of the footing to the descending slope face and no less than seven feet, or greater than 40 feet.

Footings adjacent to unlined drainage swales or underground utilities (if any) should be deepened to a minimum of 6-inches below the invert of the adjacent unlined swale or utilities. This distance is measured from the footing face at the bearing elevation. Footings for structures adjacent to retaining walls should be deepened so as to extend below a 1:1 projection from the heel of the wall. Alternatively, walls may be designed to accommodate structural loads from buildings or appurtenances.

7.4 Construction

The foundation construction considerations contained herein are presented as minimum preliminary recommendations from a soils engineering standpoint. Laboratory test results indicate the onsite soils' swell (expansion) potential is very low. During grading of the site, we recommend that no soil possessing an Expansion Index of more than 20 be placed within 18-inches of finish grade, if possible. As such, design parameters provided herein assume that finish grade soil materials will have a low expansion potential.

Recommendations by the project's design-structural engineer or architect, which may exceed the soils engineer's recommendations, should take precedence over the following minimum preliminary considerations. Final foundation design should be provided based on the expansion potential of the near surface soils encountered during grading.

7.5 Concrete Slab-on-Grade

Interior slabs can be grade supported by structural fill whose placement/compaction is documented by the project soils engineer/engineer geologist as recommended herein. The thickness of the slab should be in accordance with the structural engineer's design. However, based on geotechnical considerations, we recommend that concrete slabs be a minimum of 4-inches in thickness. Concrete slabs should be underlain by at least 2-inches of clean sand with a Sand Equivalent (SE) of at least 30. Where moisture condensation is undesirable, concrete slabs should be underlain with a moisture/vapor retarder consisting of a minimum 10-mil, visqueen membrane, with all laps sealed. The membrane should be underlain by a 2-inch layer of clean sand with the aforementioned sand layer placed over the visqueen to aid concrete curing. To reduce the potential for buildup of hydrostatic pressures, the free draining material under the slabs should have positive drainage with no low lying areas (i.e., depressions) created.

Floor slabs should be suitably reinforced and jointed (in accordance with Structural Engineer's recommendations) so that a small amount of independent movement can occur without causing damage. Based on the encountered geotechnical conditions, we recommend that floor slabs be reinforced with No. 4 bars spaced on 18-inch centers (each way)

The contractor should take the appropriate precautions to make sure that the reinforcement is placed and maintained within the middle one-third of the slab. Exterior slabs, such as walkways and driveways, can be adequately supported on documented structural fill that is at minimum 12-inches in thickness, and placed and compacted in accordance with the recommendations contained herein.

In preparation for slab or flatwork construction, the earthwork contractor should ensure that the onsite soils have been prepared as recommended and that field density tests have been performed to adequately document the relative compaction of the structural fill. Preparation of the native soils should be documented prior to placement of aggregate, structural components and/or fill.

Some minor cracking of slabs can be expected due to shrinkage. The potential for this slab cracking can be reduced by careful control of water/cement ratios in the concrete. The contractor should take appropriate curing precautions during the pouring of concrete in hot or windy weather to reduce the potential for cracking of slabs. We recommend that a slipsheet (or equivalent) be utilized if grouted fill, tile, or other crack-sensitive floor covering is planned directly on concrete slabs. All slabs should be designed in accordance with structural considerations.

All dedicated exterior flatwork should conform to standards provided by the governing agency including section composition, supporting material thickness and any requirements for reinforcing steel. Concrete mix proportions and construction techniques, including the addition of water and improper curing, can adversely affect the finished quality of the concrete and result in cracking and spalling of the slab. We recommend that all placement and curing be performed in accordance with procedures outlined by the American Concrete Institute and/or Portland Cement Association. Special consideration should be given to concrete placed and cured during hot or cold weather conditions. Proper control joints should be provided to reduce the potential for damage resulting from shrinkage.

Laboratory test results indicate that the upper soils contain soluble sulfate concentrations of 0.005 percent and chloride concentrations of 0.007 percent. The results of these analyses indicate a negligible corrosion potential to concrete. As such, Type II cement can be used in concrete elements that will be in contact with the upper soils.

8.0 PAVEMENT DESIGN RECOMMENDATIONS

Deleterious material, excessively wet or dry pockets, concentrated zones of oversized rock fragments, and any other unsuitable yielding materials encountered during grading should be removed. Once compacted fill and/or native soils are brought to the proposed pavement subgrade elevations, the subgrade should be proof-rolled in order to check for a uniform firm and unyielding surface. Representatives of the project geotechnical engineer should observe all grading and fill placement.

The upper 12-inches of pavement subgrade soils should be scarified; moisture conditioned to at least optimum moisture content and compacted to at least 95 percent of the laboratory standard (ASTM D1557). If loose or yielding materials are encountered during subgrade preparation, evaluation should be performed by EEI. Aggregate base materials should be properly prepared (i.e., processed and moisture conditioned) and compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557. Aggregate base materials should conform to Caltrans specifications for Class 2 aggregate base.

All pavement section changes should be properly transitioned. Although not anticipated, if adverse conditions are encountered during the preparation of subgrade materials, special construction methods may need to be employed. A representative of the project geotechnical engineer should be present for the preparation of subgrade and aggregate base.

For design purposes we have assumed a Traffic Index (TI) of 4.5 for the proposed parking areas and 6.0 for drive areas at the subject property. These assumed TI's should be verified as necessary by the Civil Engineer or Traffic Engineer. For preliminary design purposes, we have conservatively assumed a preliminary R-Value of 20 for the materials likely to be exposed at subgrade. The modulus of subgrade reaction (K-Value) was estimated at 70 pounds per square inch per inch (psi/in) for an R-Value of 20 (Caltrans, 1974).

TABLE 3
Preliminary Pavement Design Recommendations

Traffic Index (TI)	Pavement Surface	Aggregate Base Material (1)
4.5 – Parking Stalls	3.0-inches Asphalt Concrete	6.0-inches
6.0 – Main Drive Areas	4.0-inches Asphalt Concrete	8.0-inches
Trash Area and Concrete Pavement	5.5-inches Portland Cement Concrete (2)	Optional

(1) R-Value of 78 for Caltrans Class 2 aggregate base
(2) Reinforcement and control joints placed in accordance with the structural engineer's requirements

The recommended pavement sections provided above are intended as a preliminary minimum guideline. If thinner or highly variable pavement sections are constructed, increased maintenance and repair could be expected. If the ADT (average daily traffic) or ADTT (average daily truck traffic) increases beyond that intended, as reflected by the assumed traffic index used for design, increased maintenance and repair could be required for the pavement section. Final pavement design should be verified by testing of soils exposed at subgrade after grading has been completed. Thicker pavement sections could result if R-Value testing indicates lower values.

9.0 DEVELOPMENT RECOMMENDATIONS

9.1 Landscape Maintenance and Planting

Water is known to decrease the physical strength of earth materials, significantly reducing stability by high moisture conditions. Surface drainage away from foundations and graded slopes should be maintained. Only the volume and frequency of irrigation necessary to sustain plant life should be applied.

Consideration should be given to selecting lightweight, deep rooted types of landscape vegetation which require low irrigation that are capable of surviving the local climate. From a soils engineering viewpoint, "leaching" of the onsite soils is not recommended for establishing landscaping. If landscape soils are processed for the addition of amendments, the processed soils should be re-compacted to at least 90 percent relative compaction (based on ASTM D1557).

9.2 Site Drainage

Positive site drainage should be maintained at all times. Drainage should not flow uncontrolled over slopes or the subject parcel. Runoff should be channeled away from slopes and structures and not allowed to pond and/or seep uncontrolled into the ground. Pad drainage should be directed toward an acceptable outlet. Although not required, roof gutters and down spouts may be considered to control roof drainage, discharging a minimum of 10 feet from the proposed structures, or into a subsurface drainage system. Consideration should be given to eliminating open bottom planters directly adjacent to proposed structures for a minimum distance of ten feet. As an alternative, closed-bottom type planters could be utilized, with a properly designed drain outlet placed in the bottom of the planter.

9.3 Stormwater Disposal Systems

EEI understands that current plans call for runoff generated from the facility to be disposed of in engineered subsurface features onsite.

9.3.1 Percolation Testing

During our subsurface exploration at the subject property, EEI conducted percolation testing in three widely separated locations (P1, P2 and P3) near the southern property boundary at the locations for proposed detention basins as shown on the conceptual site plan. Our testing was performed at an approximate depth of approximately 3 feet below the existing ground surface. A minimum 2-inch layer of ½-inch diameter crushed gravel was placed at the bottom of the excavation prior to testing. The approximate locations of our percolation test borings are provided on **Figure 3**.

Percolation testing was conducted by one of EEI's field geologists under the guidance of a Registered Engineering Geologist and Registered Civil Engineer with EEI. In general accordance with the County of Riverside guidelines for percolation testing, the percolation test locations were pre-soaked by pouring at least 5 gallons of water into the excavation. Testing was started after the hole was allowed to pre-soak for at least one hour. During testing, a minimum of 12-inches of water was placed in the excavation and the rate of the water drop was recorded at approximately 10 minute intervals. This procedure was repeated for the test hole until rates varied generally less than 10 percent for the test hole. We note that a soil profile's percolation rate is not the same as its infiltration rate. Therefore, the measured/calculated field percolation rate was converted to an estimated infiltration rate utilizing a reduction factor known as the Porchet method (Ritzema, 1974). Upon conclusion of testing, the perforated pipe was removed and the test excavation was backfilled. Results of percolation testing are presented in the following table, **Table 4**.

TABLE 4
Percolation Test Results

Test		Depth of Test (feet below existing grade)	Stabilized Percolation Rate (in/hr)	Infiltration Rate (in/hr)
P1		3	3.84	0.82
P2		3	3.60	0.50
P3		3	3.60	0.45

9.3.2 Summary of Findings

Based on the results of our percolation testing, it appears that a preliminary tested infiltration rate of 0.45-inches per hour can be used in preliminary design of subsurface stormwater retention/disposal devices at the property.

9.3.3 Structural Setback from Retention Devices

It is recommended that retention/disposal devices be situated at least three times their depth, or a minimum of 15 feet (whichever is greater), from the outside bottom edge of structural foundations. Structural foundations include (but are not limited to) buildings, loading docks, retaining walls, and screen walls.

9.4 Additional Site Improvements

Recommendations for additional grading, exterior concrete flatwork design and construction can be provided upon request. If in the future, additional property improvements are planned for the subject property, recommendations concerning the design and construction of improvements would be provided upon request.

9.5 Trenching

All temporary excavations for grading purposes and installation of underground utilities should be constructed in accordance with OSHA guidelines and local safety codes. Temporary excavations over 5 feet in height should be evaluated by the project engineer, and could require shoring, sloping, or a combination thereof. Temporary excavations within the onsite materials should be stable at 1:1 inclinations for cuts less than 10 feet in height.

Footing trench excavations for structures and walls should be observed and approved by a representative of the project soils engineer prior to placing reinforcement. Footing trench spoil and excess soils generated from utility trench excavations should be compacted to a minimum relative compaction of 90 percent (based on ASTM D1557) if not removed from the subject property. All excavations should conform to OSHA and local safety codes.

9.6 Utility Backfill

Fill around the pipe should be placed in accordance with details shown on the drawings, and should be placed in layers not to exceed 8-inches loose (unless otherwise approved by the geotechnical engineer) and compacted to at least 90 percent of the maximum dry density as determined in accordance with ASTM D1557 (Modified Proctor). The geotechnical engineer should approve all backfill material. Select material should be used when called for on the drawings, or when recommended by the geotechnical engineer. Care should be taken during backfill and compaction operations to maintain alignment and prevent damage to the joints. The backfill should be kept free from oversized material, chunks of highly plastic clay, or other objectionable material. Backfill soils should be non-expansive, non-corrosive, and compatible with native earth materials. Backfill materials and testing should be in accordance with the CBC (2013), and the requirements of the local governing jurisdiction.

Pipe backfill areas should be graded and maintained in such a condition that erosion or saturation will not damage the pipe bed or backfill. Flooding trench backfill is not recommended. Heavy equipment should not be operated over any pipe until it has been properly backfilled with a minimum of 2 to 3 feet of cover. The utility trench should be systematically backfilled to allow maximum time for natural settlement. Backfill should not occur over porous, wet, or spongy subgrade surfaces. Should these conditions exist, the areas should be removed, replaced and recompacted.

10.0 PLAN REVIEW

Once detailed site and grading plans are available, they should be submitted to this office for review and comment, to reduce the potential for discrepancies between plans and the preliminary recommendations presented herein. If conditions are found to differ substantially from those stated, appropriate recommendations would be provided. Additional field studies may be warranted.

11.0 LIMITATIONS

This Due Diligence Level Preliminary Geotechnical Evaluation has been conducted in accordance with generally accepted geotechnical engineering principles and practices. Findings provided herein have been derived in accordance with current standards of practice, and no warranty is expressed or implied. Standards of practice are subject to change with time. This Preliminary Evaluation report has been prepared for the sole use of Anderson Consulting Engineers, Inc. (Client), within a reasonable time from its authorization. Site conditions, land use (both onsite and offsite), or other factors may change as a result of man-made influences, and additional work may be required with the passage of time.

This Due Diligence Level Preliminary Geotechnical Evaluation should not be relied upon by other parties without the express written consent of EEI and the Client; therefore, any use or reliance upon this geotechnical evaluation by a party other than the Client should be solely at the risk of such third party and without legal recourse against EEI, its employees, officers, or directors, regardless of whether the action in which recovery of damages is brought or based upon contract, tort, statue, or otherwise. The Client has the responsibility to see that all parties to the project, including the designer, contractor, subcontractor, and building official, etc. are aware of this report in its complete form. This report contains information that may be used in the preparation of contract specifications; however, the report is not designed as a specification document, and may not contain sufficient information for use without additional assessment. EEI assumes no responsibility or liability for work or testing performed by others. In addition, this report may be subject to review by the controlling authorities.

12.0 REFERENCES

American Society of Civil Engineers (ASCE), 2005, Minimum Design Loads for Buildings and Other Structures, ASCE Document ASCE/SEI 7-05.

American Society for Testing and Materials (ASTM), 2008, Annual Book of ASTM Standards, Volume 04.08, Construction: Soil and Rock (I), Standards D 420 - D 5876.

Anderson Consulting Engineers, Inc., 2014, Ironwood – Project Exhibit, scale: 1"=100', dated September 16, 2014.

Blake, T., 2000, "EQFAULT, version 3.0", a Computer Program for Probabilistic Estimation of Peak Acceleration from 3-D Fault Sources," Thomas F. Blake Computer Services and Software, Newbury Park, California.

California Building Code (CBC), 2013, California Code of Regulations, Title 24, Part 2, Volume 2 of 2, California Building Standards Commission, Based on 2012 International Building Code; 2013 California Historical Building Code, Title 24, Part 8; effective January 1, 2014.

California Department of Transportation (Caltrans), 1974, Highway Design Manual, dated October 1.

California Division of Mines and Geology (CDMG), 1974, State of California Special Studies Zones, Sunnymead Quadrangle. Official Map, Effective July 1, 1974, scale 1:24,000.

California Geological Survey (CGS), 2002, California Geomorphic Provinces Note 36, Electronic Copy, Revised December 2002.

California Geological Survey (CGS), 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117, revised and re-adopted September 11, 2008.

Coduto, D. P., 2001, Foundation Design Principles and Practices, Second Edition.

DeLORME, 1999, 3-D TopoQuads, California South, Region 7.

Google Earth®, 2014, Version 6.0.

Hart, E.W., and Bryant, W.A. (Hart and Bryant), 1997, Fault-Rupture Hazard Zones in California: California Department of Conservation, Division of Mines and Geology, Special Publication 42.

Jennings, C.W., 1994, Fault Activity Map of California and Adjacent Areas: California Division of Mines and Geology (CDMG), Map Sheet No. 6, scale 1:750,000.

Mayers & Associates Civil Engineering, Inc., 2008, City of Moreno Valley, Tract No. 31556, Off-Site Sewer, Plan and Profile, Oliver Street 21+00.00 to 32+00.00, scale: 1"=40', Sheet 4 of 8, Plot Date February 21, 2008.

Morton, D.M., 2004, Preliminary Digital Geologic Map of the Santa Ana 30' x 60' Quadrangle, Southern California, Version 2.0: U.S. Geological Survey Open-File Report 99-0172.

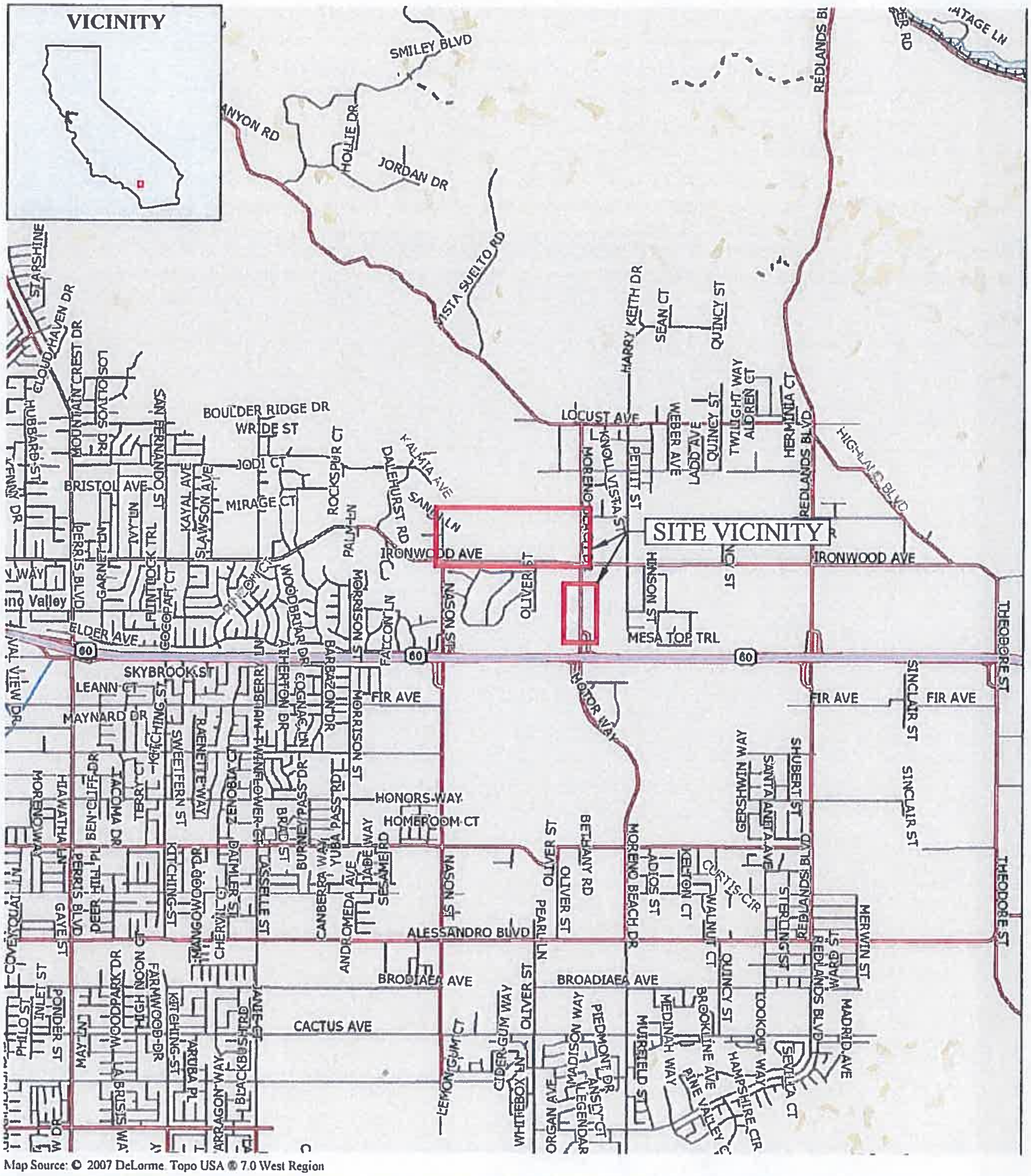
Sowers and Sowers, 1970, Unified Soil Classification System (After U. S. Waterways Experiment Station and ASTM 02487-667) <u>in</u> Introductory Soil Mechanics, New York.

Tokimatsu, K. and Seed, H.B., 1987, "Evaluation of Settlements in Sands Due to Earthquake Shaking," American Society of Civil Engineers Journal of Geotechnical Engineering, Vol. 113, No. 8, pp. 861-878.

United States Geological Survey (USGS), 2002, Earthquake Hazards Program, Interpolated Probalistic Ground Motion for the Conterminous 48 States, http://earthquake.usgs.gov/research/hazmaps/design/.

United States Geological Survey (USGS), 2012, 7.5 Minute Topographic Map, Sunnymead Quadrangle, California, Scale 1:24,000.

FIGURES



Scale: 1" = 4000'

0 FT 2400 FT 4000 FT 8000 FT

Note: All locations are approximate

N

SITE VICINITY MAP

BELLACAP, LLC

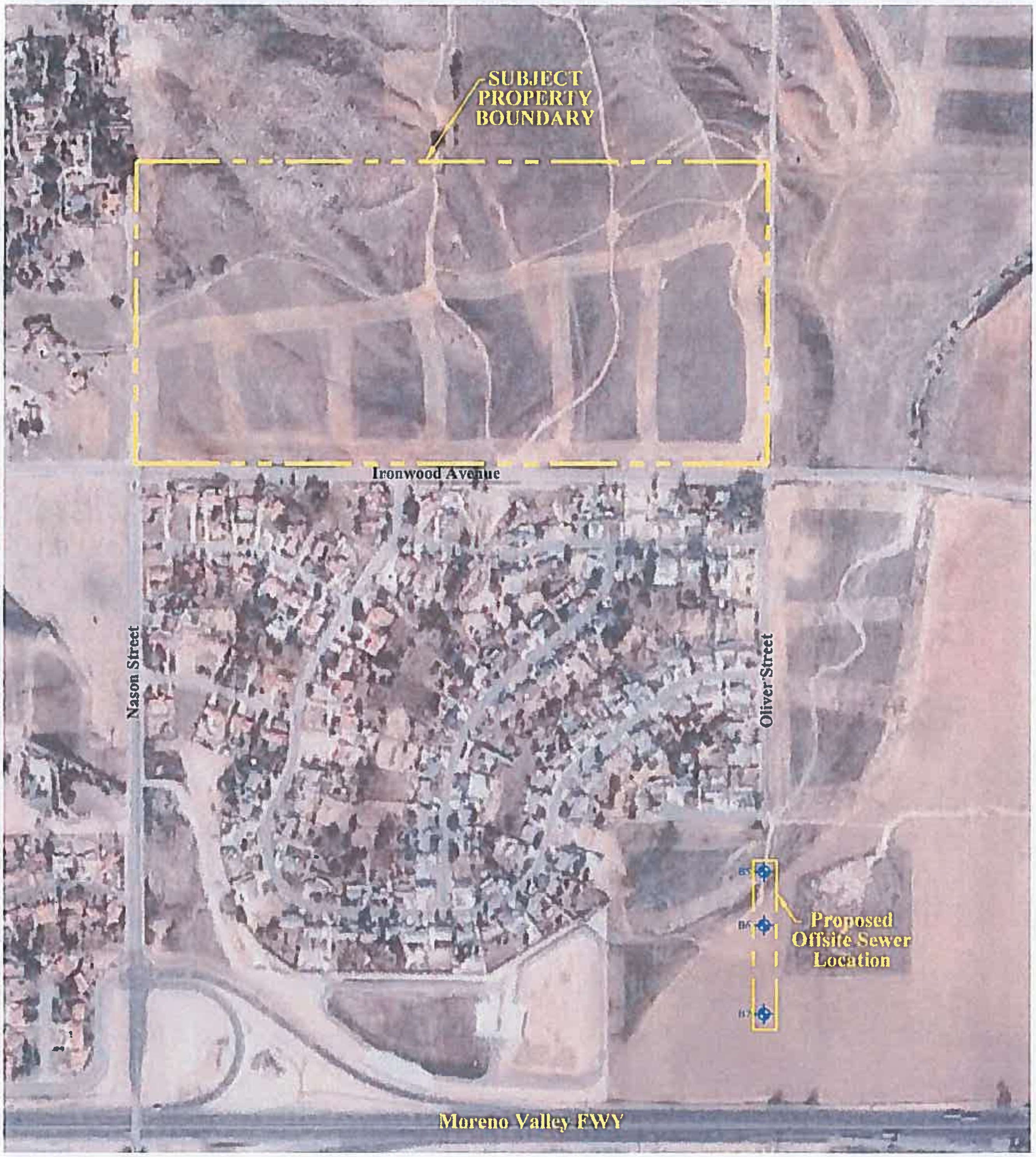
North of Ironwood Avenue Between Oliver Street & Nason Street

Moreno Valley, California 92555

EEI Project No. GLO-71982.4

Created October 2014

EEI Geotechnical & Environmental Solutions	CREATED BY: JAB REVISION DATE: . REVISION NO.: .	**FIGURE 1**



Map Source: © Google Earth 2014, Imagery Date 11/06/2012

B7 Sewerline Boring Locations

Scale: 1" = 600'

0 FT 360 FT 600 FT 1200 FT

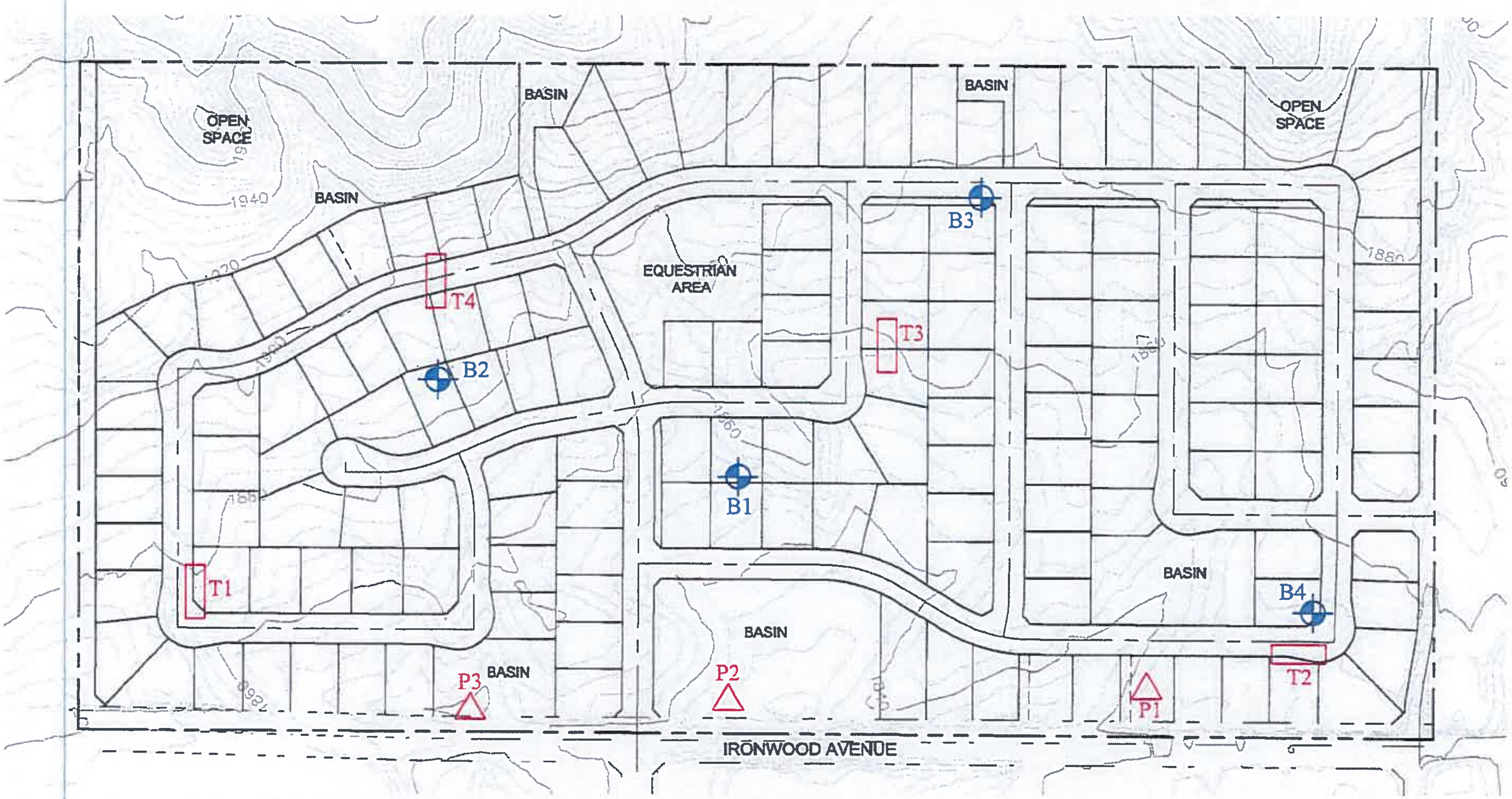
Note: All locations are approximate

N

AERIAL SITE MAP & OFFSITE BORING LOCATION
BELLACAP, LLC
North of Ironwood Avenue Between Oliver Street & Nason Street
Moreno Valley, California 92555
EEI Project No. GLO-71982.4
Created October 2014

EEI Geotechnical & Environmental Solutions

CREATED BY: JAB	
REVISION DATE: .	**FIGURE 2**
REVISION NO: .	



Map Source: Anderson Consulting Engineers, Inc., Ironwood, Project Exhibit, dated Sept. 16, 2014

LEGEND

- T4 Test Pit
- P3 Percolation Test
- B4 Boring

NOTE: All Locations are Approximate

Scale: 1" = 300'

0 FT 180 FT 300 FT 600 FT

Note: All locations are approximate

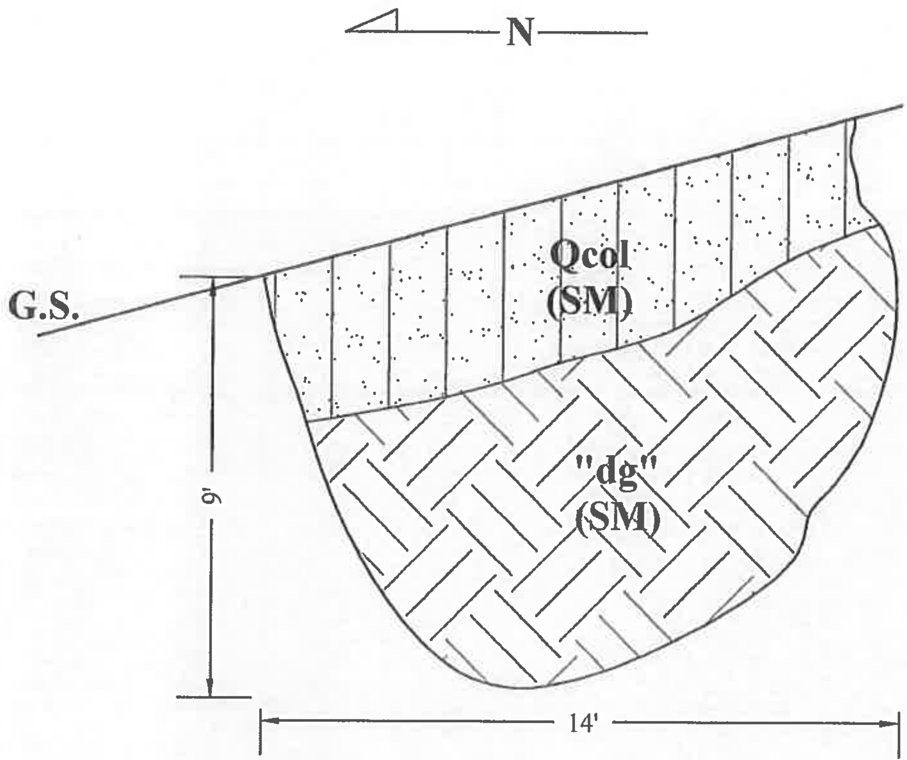
FIELD EXPLORATION PLAN

BELLACAP, LLC
North of Ironwood Avenue Between Oliver Street & Nason Street
Moreno Valley, California 92555
EEI Project No. GLO-71982.4
Created October 2014

EEI

CREATED BY: JAB
REVISION DATE:
REVISION NO.:

FIGURE 3



@ 0-3' COLLUVIUM (Qcol)
Silty-Sand (SM) - red-orange, medium to coarse, slightly moist, medium dense to dense, trace clay, weathered "dg" texture, oxidized.

@ 3'-9' WEATHERED BEDROCK: Tonalite (Kt)
Decomposed Granitics ("dg") - yellow-brown to gray-brown mottled/speckled, medium to coarse, slightly moist to moist, very soft to moderately hard, moderately to heavily weathered, minor clay, "dg" texture, less weathered with depth, weathers to silty sand (SM).

Total Depth = 9'
Bulk Sample @ 0-9'

Scale: 1" = 4'

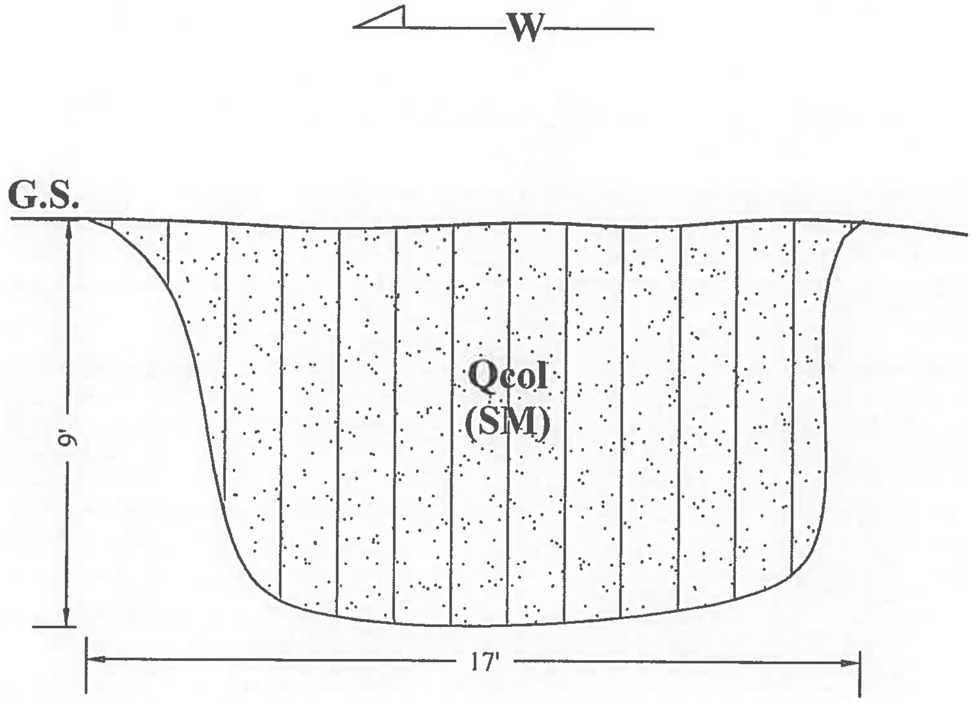
0 FT 2 4 FT 4 FT 8 FT

Note: All locations are approximate

TRENCH LOG
ANDERSON CONSULTING ENGINEERS
Preliminary Geotechnical Evaluation
Ironwood
Moreno Valley, California
EEI Project No. GLO-71982.4
Created November 2014

EEI Geotechnical & Environmental Solutions

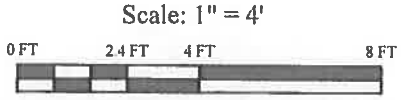
CREATED BY: JAB	
REVISION DATE: .	**FIGURE T1**
REVISION NO: .	



@ 0-9' COLLUVIUM (Qcol)
Silty-Sand (SM) - red-brown, medium to coarse, slightly moist to moist, medium dense to dense, trace clay, weathered "dg" texture, oxidized.

Total Depth = 9'
Bulk Sample @ 0-6'

Scale: 1" = 4'

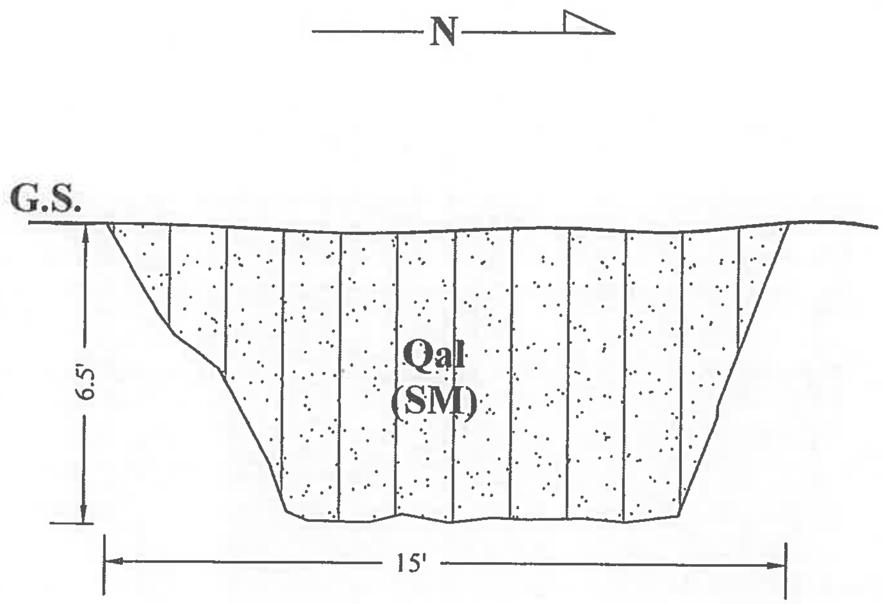


Note: All locations are approximate

TRENCH LOG
ANDERSON CONSULTING ENGINEERS
Preliminary Geotechnical Evaluation
Ironwood
Moreno Valley, California
EEI Project No. GLO-71982.4
Created November 2014

EEI Geotechnical & Environmental Solutions

CREATED BY: JAB	
REVISION DATE: .	**FIGURE T2**
REVISION NO.: .	



@ 0-6.5' ALLUVIUM (Qal)
Silty-Sand (SM) - medium-brown, fine to coarse, slightly moist, medium dense, trace clay, minor pinhole root porosity, trace gravel.

Total Depth = 6.5'
No Sampling

Scale: 1" = 4'

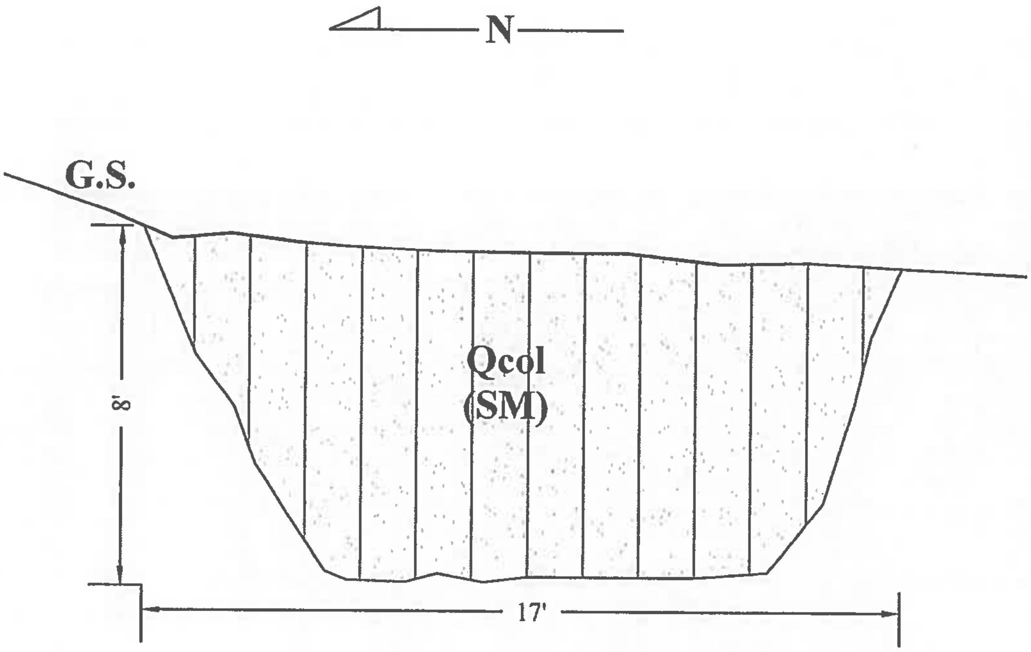
0 FT 2.4 FT 4 FT 8 FT

Note: All locations are approximate

TRENCH LOG
ANDERSON CONSULTING ENGINEERS
Preliminary Geotechnical Evaluation
Ironwood
Moreno Valley, California
EEI Project No. GLO-71982.4
Created November 2014

EEI Geotechnical & Environmental Solutions

CREATED BY: JAB	FIGURE T3
REVISION DATE: .	
REVISION NO.: .	



@ 0-8' COLLUVIUM (Qcol)
Silty-Sand (SM) - light gray-brown mottled, fine to medium, trace coarse, slightly moist to moist, medium dense to dense, trace clay, weathered "dg" texture.

Total Depth = 8'
No Sampling

Scale: 1" = 4'

0 FT 2.4 FT 4 FT 8 FT

Note: All locations are approximate

TRENCH LOG
ANDERSON CONSULTING ENGINEERS
Preliminary Geotechnical Evaluation
Ironwood
Moreno Valley, California
EEI Project No. GLO-71982.4
Created November 2014

EEI Geotechnical & Environmental Solutions

CREATED BY:	
JAB	
REVISION DATE:	**FIGURE T4**
.	
REVISION NO.:	
.	

APPENDIX A
SOIL CLASSIFICATION CHART,
BORING LOGS AND TEST PIT LOGS

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS: GRAPH	SYMBOLS: LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
CLAYSTONE				CL	CLAYSTONE, Plocene Fernando Formation/late Miocene Puente Formation

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

BOREHOLE LOG

EEI Geotechnical & Environmental Solutions		**Client:** Global - Anderson Consulting Engineers	**Number:** B-1 / **Sheet:** 1 of 2
		Location: Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca	
Date Started: 10/17/2014	**Date Finished:** 10/17/2014		
EEI Rep: BM	**Project No.:** GLO-71982.4	**Drill Rig/Sampling Method:** Truck Mounted CME-75 / 140 lb Auto Hammer	**Borehole Diameter:** 6-inch

SAMPLE LOG								BOREHOLE LOG
Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Graphic Log	Geologic Description (SoilType, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					0			**ALLUVIUM** SILTY-SAND, orange-brown mottled, fine to coarse grained, damp, loose
X					1			
X					2			
X	MC	3 4 5	105	3	3			
X					4			
	MC	4 6 8	108	3	5–6			
	MC	3 3 4	138	3	8			
	MC	4 5 6	104	7	10–11			@ 10' Becomes fine to medium grained, moist, loose; micaceous
	SPT	3 3 3		9	15–16	SM		
	MC	6 11 16	122	8	20–21			@ 20' becomes medium dense
	SPT	6 8 8		7	25–26			
	MC	8 10 11	124	7	30–31	SM		**WEATHERED BEDROCK: TONALITE (Kt)** DECOMPOSED GRANITICS ("DG"), gray-white to black speckled, damp, dense; weathered, friable, phaneritic texture, moderate to heavily weathered

EEI Geotechnical & Environmental Solutions

BOREHOLE LOG

Number: B-1	**Client:** Global - Anderson Consulting Engineers	**Sheet:** 2 of 2	
Date Started: 10/17/2014	**Date Finished:** 10/17/2014	**Location:** Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca	
EEI Rep: BM	**Project No.:** GLO-71982.4	**Drill Rig/Sampling Method:** Truck Mounted CME-75 / 140 lb Auto Hammer	**Borehole Diameter:** 6-inch

SAMPLE LOG								BOREHOLE LOG
Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Graphic Log	Geologic Description (SoilType, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					33			
					34			
	SPT	50-4"		4	35			@ 35' Becomes very dense
					36			
					37			
					38			
					39			
	MC	50-3"	103	7	40			
					41	SM		
					42			
					43			
					44			
	SPT	50-5"		7	45			@ 45' DECOMPOSED GRANITICS ("DG"), dark gray, orange and white speckled, damp, medium dense to dense; moderately weathered
					46			
					47			
					48			
					49			
	NR	50-3"			50			@ 50' No sample recovery
					51			
					52			Total depth: 50.5-feet No groundwater encountered Hole backfilled on 10/17/2014 with drilled cuttings
					53			
					54			
					55			
					56			
					57			
					58			
					59			
					60			
					61			
					62			
					63			

EEI Geotechnical & Environmental Solutions

BOREHOLE LOG

Number: B-2	**Client:** Global - Anderson Consulting Engineers	**Sheet:** 1 of 1	
Date Started: 10/17/2014	**Date Finished:** 10/17/2014	**Location:** Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca	
EEI Rep: BM	**Project No.:** GLO-71982.4	**Drill Rig/Sampling Method:** Truck Mounted CME-75 / 140 lb Auto Hammer	**Borehole Diameter:** 6-inch

SAMPLE LOG								BOREHOLE LOG
Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Graphic Log	Geologic Description (SoilType, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					1			**COLLUVIUM** SILTY-SAND, orange-brown mottled, fine to coarse grained, damp, loose
					2			
	MC	4 6 8	111	2	3			
					4			
					5			
	MC	7 8 10	137	3	6	SM		
					7			
	MC	5 6 9	115	4	8			
					9			
					10			
	MC	5 31 50-3"	126	3	11			**WEATHERED BEDROCK: TONALITE (Kt)** DECOMPOSED GRANITICS ("DG"), white, orange and black speckled, damp, dense to very dense; unweathered to moderately weathered
					12			
					13	SM		
					14			
	SPT	23 50-3"		4	15			
					16			Total depth: 15.75-feet No groundwater encountered Hole backfilled on 10/17/2014 with drilled cuttings
					17			
					18			
					19			
					20			
					21			
					22			
					23			
					24			
					25			
					26			
					27			
					28			
					29			
					30			
					31			

BOREHOLE LOG VES-71982.4.GPJ EEI.GDT 11/25/14

EEI Geotechnical & Environmental Solutions

BOREHOLE LOG

Number: B-3	**Sheet:** 1 of 1	**Client:** Global - Anderson Consulting Engineers	**Location:** Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca
Date Started: 10/17/2014	**Date Finished:** 10/17/2014	**EEI Rep:** BM	**Project No.:** GLO-71982.4
Drill Rig/Sampling Method: Truck Mounted CME-75 / 140 lb Auto Hammer	**Borehole Diameter:** 6-inch		

SAMPLE LOG / BOREHOLE LOG

Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Geologic Description (SoilType, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					0–10	SM	**COLLUVIUM** SILTY-SAND, red-brown, fine to coarse grained with occasional gravels, dry to damp, dense
	MC	50-3"	85	5	2.5		
	MC	20 22 26	119	3	5		@ 5' Becomes medium dense
	MC	23 31 34	123	4	7.5		@ 8' Becomes dense
					10–21.5	SM	**WEATHERED BEDROCK: TONALITE (Kt)** DECOMPOSED GRANITICS ("DG"), orange, brown and black speckled, damp, medium dense to dense; occasional unweathered to moderately weathered
	MC	9 13 18	113	2	10		
	SPT	8 9 10		4	15		
					19		@ 19' Becomes very dense
	MC	23 44 50-5"	128	9	20		

Total depth: 21.5-feet
No groundwater encountered

Hole backfilled on 10/17/2014 with drilled cuttings

Geotechnical & Environmental Solutions

BOREHOLE LOG

Number:	B-4
Client:	Global - Anderson Consulting Engineers
Sheet:	1 of 1
Location:	Ironwood - Moreno Valley Moreno Valley, Riverside County, Ca
Date Started:	10/17/2014
Date Finished:	10/17/2014
EEI Rep:	BM
Project No.:	GLO-71982.4
Drill Rig/Sampling Method:	Truck Mounted CME-75 / 140 lb Auto Hammer
Borehole Diameter:	6-inch

SAMPLE LOG						BOREHOLE LOG		
Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Graphic Log	Geologic Description (SoilType, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					0–14	SM		**COLLUVIUM** SILTY-SAND, red-brown, fine to coarse grained with occasional gravels, moist, medium dense
	MC	13 13 19	111	4	3			
	MC	6 7 7	111	3	5.5			@ 5' Becomes loose
	MC	7 21 50-5"	115	5	8			@ 8' Becomes dense to very dense
	MC	39 50-4"	116	8	10.5			
					14–16.5	SM		**WEATHERED BEDROCK: TONALITE (Kt)** DECOMPOSED GRANITICS ("DG"), orange, brown and black speckled, moist, medium dense; weathered
	SPT	6 9 9		4	15			

Total depth: 16.5-feet
No groundwater encountered

Hole backfilled on 10/17/2014 with drilled cuttings

EEI Geotechnical & Environmental Solutions

BOREHOLE LOG

Number: B-5	**Client:** Global - Anderson Consulting Engineers	**Sheet:** 1 of 1	**Location:** Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca
Date Started: 10/17/2014	**Date Finished:** 10/17/2014		
EEI Rep: BM	**Project No.:** GLO-71982.4	**Drill Rig/Sampling Method:** Truck Mounted CME-75 / 140 lb Auto Hammer	**Borehole Diameter:** 6-inch

SAMPLE LOG / BOREHOLE LOG

Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Geologic Description (SoilType, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
Bulk (1–5 ft)					0–15	SM	**ALLUVIUM** SILTY-SAND, Orange-brown mottled, fine to coarse grained, poorly sorted, damp, loose to medium dense
	MC	3, 5, 6	106	3	5		
	MC	5, 9, 15	123	5	10		
	SPT	10, 10, 15		6	15		**WEATHERED BEDROCK: TONALITE (Kt)** DEOMPOSED GRANITICS ("DG"), orange, brown and black speckled, moist, medium dense; weathered
	MC	10, 20, 25	124	12	20	SM	
	SPT	10, 12, 18		11	25		
					26.5		Total depth: 26.5-feet No groundwater encountered Hole backfilled on 10/17/2014 with drilled cuttings

BOREHOLE LOG

EEI Geotechnical & Environmental Solutions		**BOREHOLE LOG**	**Number:** B-6
		Client: Global - Anderson Consulting Engineers	**Sheet:** 1 of 1
Date Started: 10/17/2014	**Date Finished:** 10/17/2014	**Location:** Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca	
EEI Rep: BM	**Project No.:** GLO-71982.4	**Drill Rig/Sampling Method:** Truck Mounted CME-75 / 140 lb Auto Hammer	**Borehole Diameter:** 6-inch

SAMPLE LOG								BOREHOLE LOG
Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Graphic Log	Geologic Description (SoilType, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					0–10	SM		**FILL** SILTY-SAND, light brown, fine to coarse grained, damp, loose
	MC	5 / 7 / 8	116	2	5			
					10–26.5	ML		**COLLUVIUM** SANDY-SILT, orange-brown, fine to medium grained, moderately sorted, moist, medium dense
	MC	8 / 11 / 13	111	7	10			
	SPT	5 / 6 / 6		5	15			
	MC	8 / 13 / 16	118	3	20			
	SPT	8 / 10 / 12		6	25			

Total depth: 26.5-feet
No groundwater encountered

Hole backfilled on 10/17/2014 with drilled cuttings

BOREHOLE LOG VES-71982.4.GPJ EEI.GDT 11/25/14

EEI Geotechnical & Environmental Solutions

BOREHOLE LOG

Number: B-7	**Client:** Global - Anderson Consulting Engineers	**Sheet:** 1 of 1	
Date Started: 10/17/2014	**Date Finished:** 10/17/2014	**Location:** Ironwood - Moreno Valley, Moreno Valley, Riverside County, Ca	
EEI Rep: BM	**Project No.:** GLO-71982.4	**Drill Rig/Sampling Method:** Truck Mounted CME-75 / 140 lb Auto Hammer	**Borehole Diameter:** 6-inch

SAMPLE LOG								BOREHOLE LOG
Bulk	Sample Type	Blows Per 6"	Dry Unit Wt. (pcf)	Moisture (%)	Depth In Feet	USCS Symbol	Graphic Log	Geologic Description (SoilType, Color, Grain, Minor Soil Component, Moisture, Density, Odor, Etc.)
					0–15	SM		**COLLUVIUM** SILTY-SAND, brown to orange-brown, fine to coarse grained, moist, medium dense
	MC	41 24 26	115	3	5–6.5			
	MC	8 14 21	112	3	10–11.5			
					15–26.5	ML		@ 15' SANDY-SILT, brown, fine to coarse, moist, medium dense, micaceous
	SPT	6 10 10		8	15–16.5			
	MC	8 13 19	122	7	20–21.5			
	SPT	8 10 12		5	25–26.5			

Total depth: 26.5-feet
No groundwater encountered

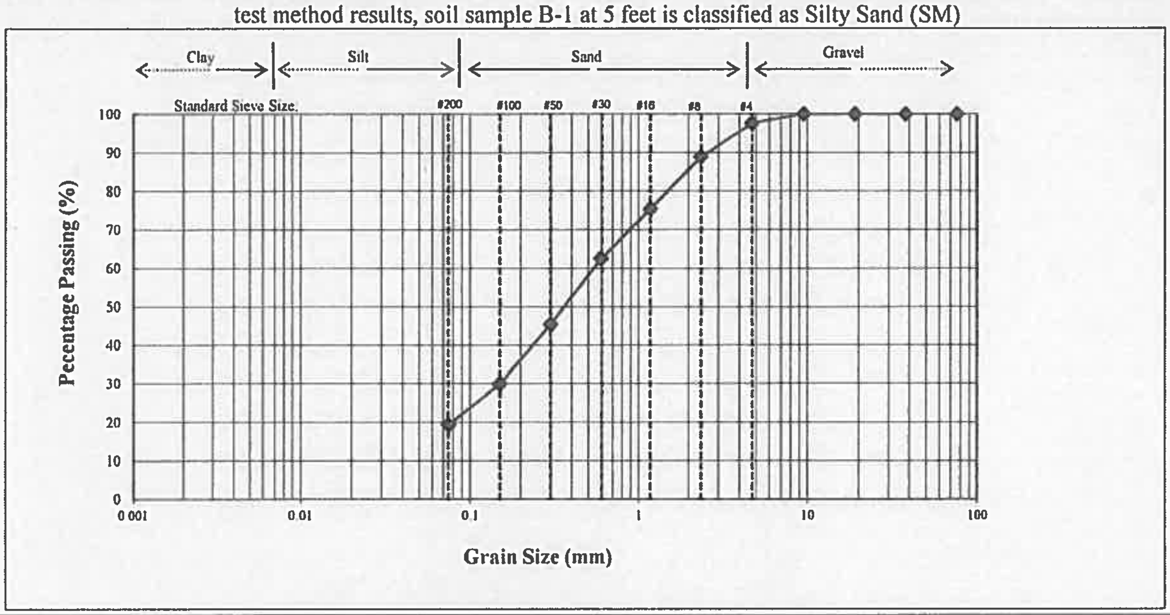
Hole backfilled on 10/17/2014 with drilled cuttings

APPENDIX B
LABORATORY TEST DATA

PARTICLE-SIZE ANALYSIS OF SOILS
ASTM METHOD D 422 (SIEVE ANALYSIS)

Sample :	B-1 @ 5 ft.	D10 (mm)	N/A
Total Weight (g)	129.2	D30 (mm)	0.15
Dry Weight (g)	125.8	D60 (mm)	0.53
Wet Sieve Weight (g)	101.5	Cu	N/A
Initial Moisture (%)	2.7	Cc	N/A

According to ASTM D 2487 Unified Soil Classification System (USCS) and ASTM D 422 (Standard Test Method for Particle-Size Analysis) test method results, soil sample B-1 at 5 feet is classified as Silty Sand (SM)



Sieve Size (in)	Sieve Size (mm)	Cumulative Weight of dry soil (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	3.0	2.4	97.6
#8	2.36	14.0	11.1	88.9
#16	1.18	31.0	24.6	75.4
#30	0.6	47.2	37.5	62.5
#50	0.3	68.7	54.6	45.4
#100	0.15	88.2	70.1	29.9
#200	0.075	101.5	80.7	19.3

Client: Anderson Consulting Engineers

Project Name: Ironwood

Job Number: GLO-71982.4

Date: 10/24/14

Boring Number: B-1

Depth: 5 ft.

Soil Description: Brown Mottled Silty Sand SM

Tested by: B D

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Geotechnical & Environmental Solutions

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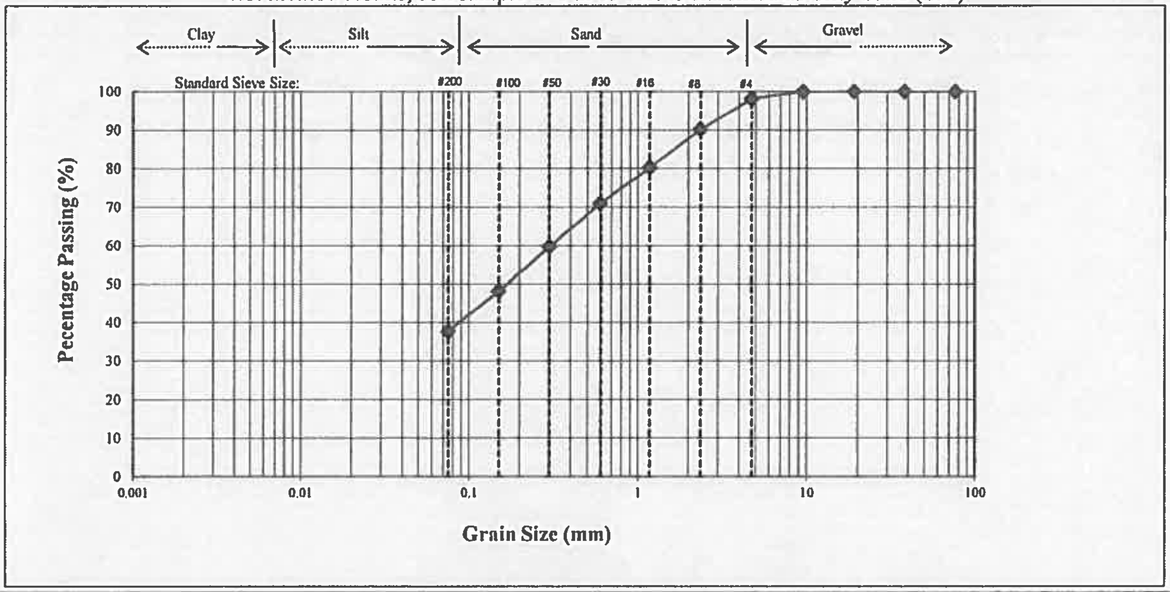
PARTICLE-SIZE ANALYSIS OF SOILS
ASTM METHOD D 422 (SIEVE ANALYSIS)

Sample :	B-1 @15 ft.	D10 (mm)	N/A
Total Weight (g)	117.5	D30 (mm)	N/A
Dry Weight (g)	108.1	D60 (mm)	0.30
Wet Sieve Weight (g)	67.3	Cu	N/A
Initial Moisture (%)	8.7	Cc	N/A

According to ASTM D 2487 Unified Soil Classification System (USCS) and ASTM D 422 (Standard Test Method for Particle-Size Analysis) test method results, soil sample B-1 at 15 feet is classified as Silty Sand (SM)



Sieve Size (in)	Sieve Size (mm)	Cumulative Weight of dry soil (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	2.1	1.9	98.1
#8	2.36	10.6	9.8	90.2
#16	1.18	21.4	19.8	80.2
#30	0.6	31.4	29.0	71.0
#50	0.3	43.6	40.3	59.7
#100	0.15	56.1	51.9	48.1
#200	0.075	67.3	62.3	37.7

Client: Anderson Consulting Engineers

Project Name: Ironwood

Job Number: GLO-71982.4

Date: 10/24/14

Boring Number: B-1

Depth: 15 ft.

Soil Description: Brown Mottled Silty Sand SM

Tested by: B D

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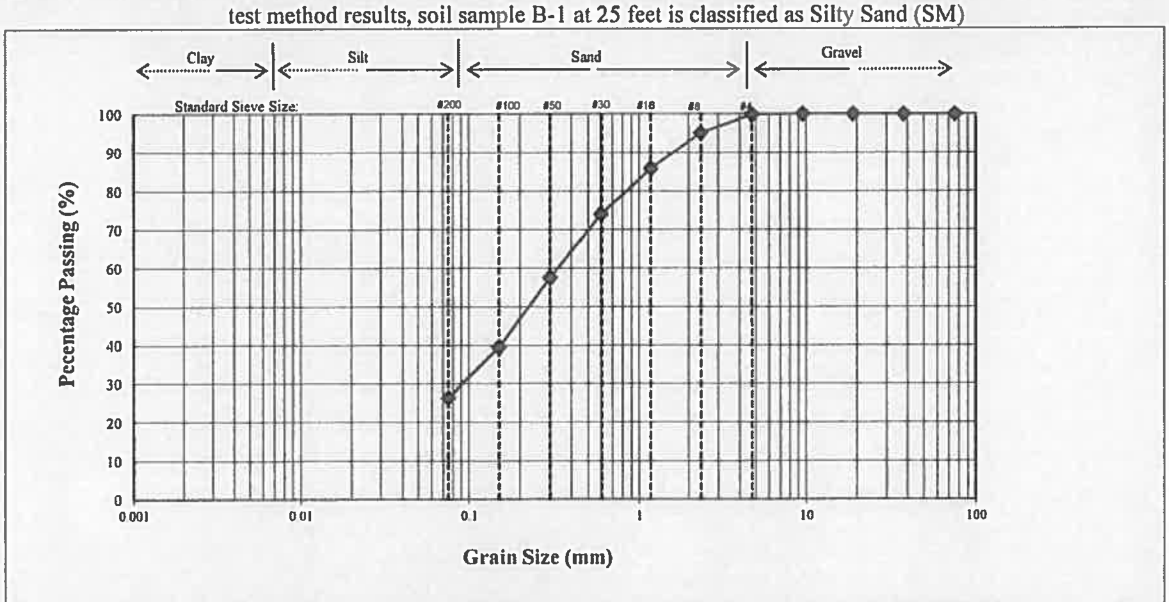
PARTICLE-SIZE ANALYSIS OF SOILS
ASTM METHOD D 422 (SIEVE ANALYSIS)

Sample :	B-1 @ 25 ft.	D10 (mm)	N/A
Total Weight (g)	123.6	D30 (mm)	0.08
Dry Weight (g)	115.8	D60 (mm)	0.33
Wet Sieve Weight (g)	85.3	Cu	N/A
Initial Moisture (%)	6.7	Cc	N/A

According to ASTM D 2487 Unified Soil Classification System (USCS) and ASTM D 422 (Standard Test Method for Particle-Size Analysis) test method results, soil sample B-1 at 25 feet is classified as Silty Sand (SM)



Sieve Size (in)	Sieve Size (mm)	Cumulative Weight of dry soil (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	0.2	0.2	99.8
#8	2.36	5.7	4.9	95.1
#16	1.18	16.4	14.2	85.8
#30	0.6	30.1	26.0	74.0
#50	0.3	49.2	42.5	57.5
#100	0.15	70.1	60.5	39.5
#200	0.075	85.3	73.7	26.3

Client: Anderson Consulting Engineers

Project Name: Ironwood

Job Number: GLO-71982.4

Date: 10/24/14

Boring Number: B-1

Depth: 25 ft.

Soil Description: Brown Mottled Silty Sand SM

Tested by: B D

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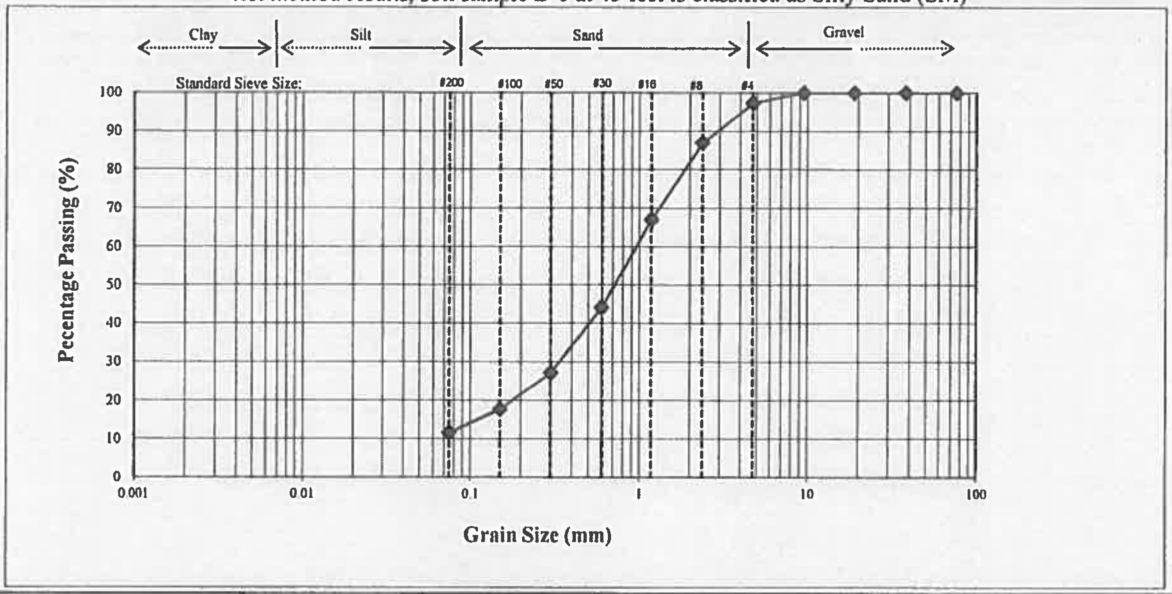
PARTICLE-SIZE ANALYSIS OF SOILS
ASTM METHOD D 422 (SIEVE ANALYSIS)

Sample :	B-1 @ 35 ft.	D10 (mm)	N/A
Total Weight (g)	126.5	D30 (mm)	0.30
Dry Weight (g)	122.1	D60 (mm)	0.90
Wet Sieve Weight (g)	108.0	Cu	N/A
Initial Moisture (%)	3.6	Cc	N/A

According to ASTM D 2487 Unified Soil Classification System (USCS) and ASTM D 422 (Standard Test Method for Particle-Size Analysis) test method results, soil sample B-1 at 45 feet is classified as Silty Sand (SM)



Sieve Size (in)	Sieve Size (mm)	Cumulative Weight of dry soil (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	3.3	2.7	97.3
#8	2.36	15.9	13.0	87.0
#16	1.18	40.3	33.0	67.0
#30	0.6	68.2	55.9	44.1
#50	0.3	89.0	72.9	27.1
#100	0.15	100.5	82.3	17.7
#200	0.075	108.0	88.5	11.5

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Client: Anderson Consulting Engineers

Project Name: Ironwood

Job Number: GLO-71982.4

Date: 10/24/14

Boring Number: B-1

Depth: 35 ft.

Soil Description: Gray-Green Mottled Silty Sand SM

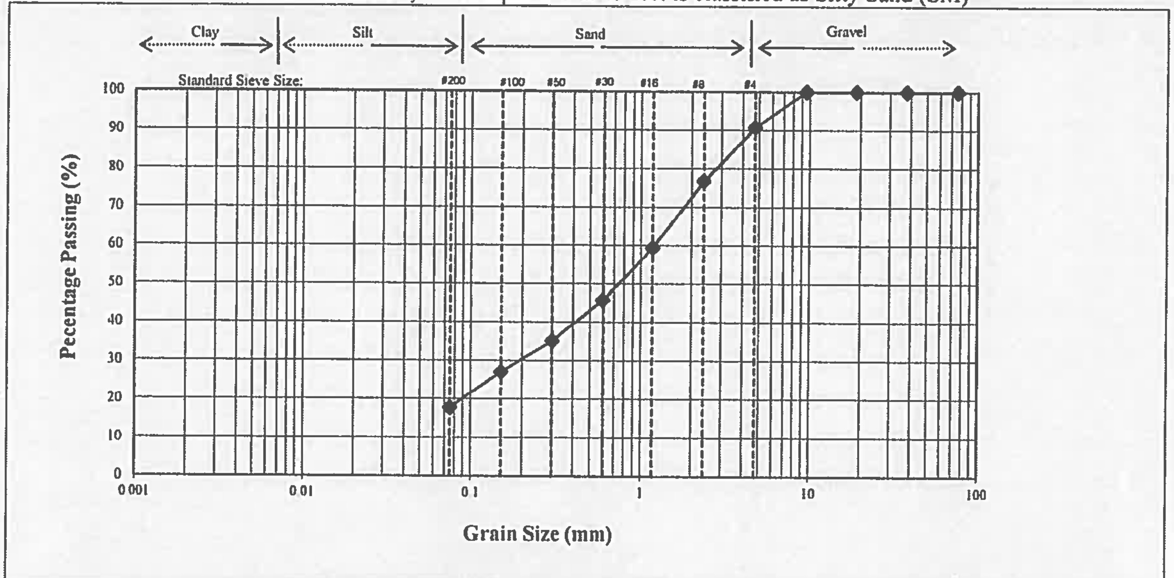
Tested by: B D

PARTICLE-SIZE ANALYSIS OF SOILS
ASTM METHOD D 422 (SIEVE ANALYSIS)

Sample :	B-1 @ 45 ft.
Total Weight (g)	120.2
Dry Weight (g)	112.2
Wet Sieve Weight (g)	92.3
Initial Moisture (%)	7.1

D10 (mm)	N/A
D30 (mm)	0.20
D60 (mm)	1.18
Cu	N/A
Cc	N/A

According to ASTM D 2487 Unified Soil Classification System (USCS) and ASTM D 422 (Standard Test Method for Particle-Size Analysis) test method results, soil sample B-1 at 45 feet is classified as Silty Sand (SM)



Sieve Size (in)	Sieve Size (mm)	Cumulative Weight of dry soil (gm)	Percent Retained (%)	Percent Passing (%)
3"	76.2		0.0	100.0
1.5"	38.1		0.0	100.0
3/4"	19.05		0.0	100.0
3/8"	9.53		0.0	100.0
#4	4.75	10.4	9.3	90.7
#8	2.36	26.1	23.3	76.7
#16	1.18	45.6	40.6	59.4
#30	0.6	60.9	54.3	45.7
#50	0.3	72.8	64.9	35.1
#100	0.15	81.9	73.0	27.0
#200	0.075	92.3	82.3	17.7

Client: Anderson Consulting Engineers

Project Name: Ironwood

Job Number: GLO-71982.4

Date: 10/24/14

Boring Number: B-1

Depth: 45 ft.

Soil Description: Orange-Gray Mottled Silty Sand (SM)

Tested by: B D

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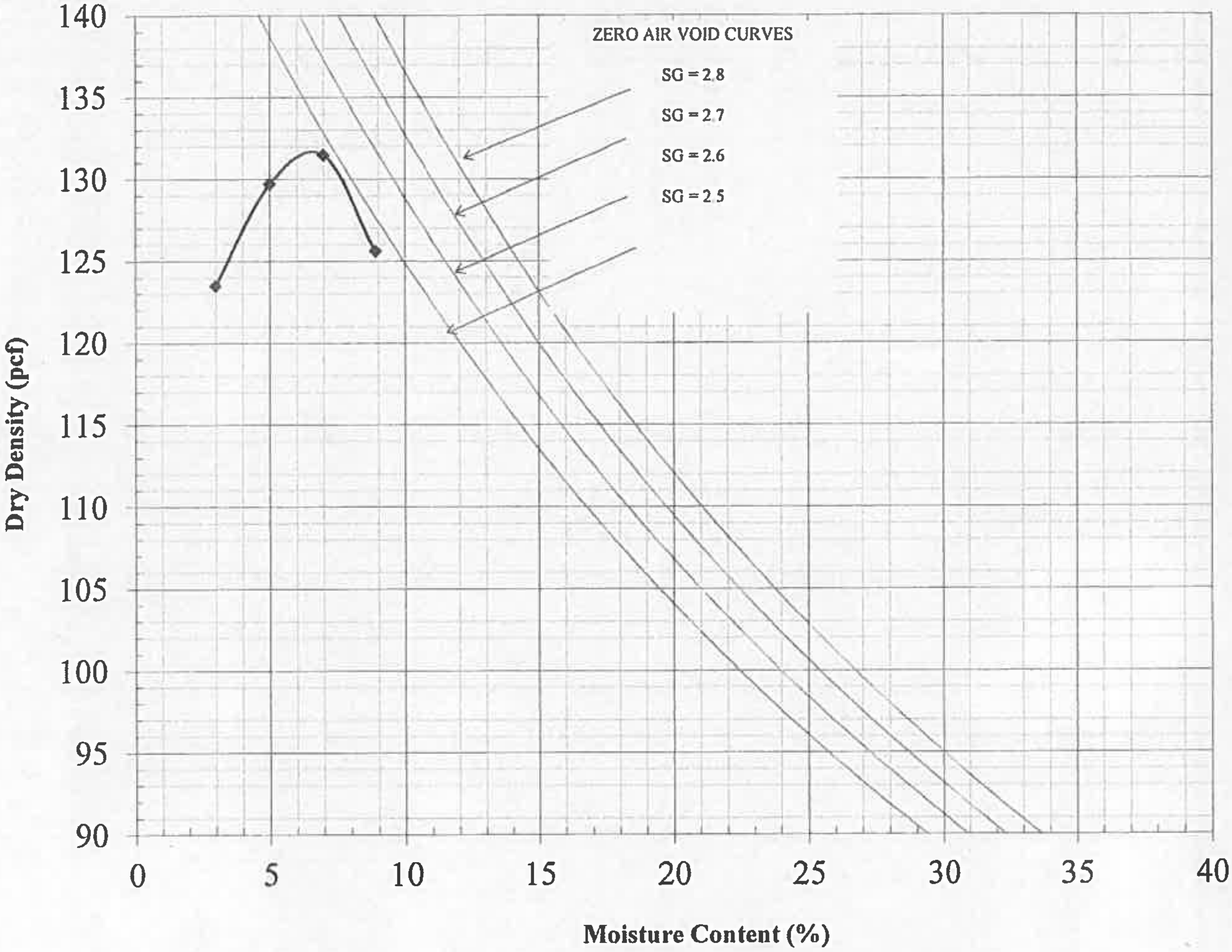
LABORATORY COMPACTION ASTM D 1557

Sample	1	2	3	4
Mold and wet soil (lbs.)	8.550	8.850	9.000	8.870
Mold (lbs.)	4.310	4.310	4.310	4.310
Wet Soil (lbs.)	4.240	4.540	4.690	4.560
Wet Density (pcf)	127.20	136.20	140.70	136.80
Moisture (%)	3.0	5.0	7.0	8.9
Dry Density (pcf)	123.5	129.7	131.5	125.6



Maximum density 132.0 pcf @ 6.5% moisture

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Client: Anderson Consulting Engineers

Project Name: Ironwood

Procedure: Method A

Job Number: GLO-71982.4

Date: 10/21/14

Boring Number: B-1

Location: 0-5 ft.

Soil Description: Brown Mottled Silty Sand SM

Tested by: B D

EXPANSION INDEX TEST

ASTM METHOD D 4829

B-1 @ 1-5 ft.

Moisture Content of Initial Sample		% Saturation of Re-molded Sample		Moisture Content of Final Sample	
Tare No. -	S6	Wt. of Soil and Ring (g) -	615.2	Wt. of Soil and Ring (g) -	641.3
Wet Weight and Tare (g) -	134.0	Ring Weight (g) -	199.0	Ring Weight (g) -	199.0
Dry Weight and Tare (g) -	128.8	Wet Weight of Soil (g) -	416.2	Wet Weight of Soil (g) -	442.3
Tare Weight (g) -	51.2	Dry Weight of Soil (g) -	390.1	Dry Weight of Soil (g) -	390.1
Water Loss (g) -	5.2	Volume of Ring (ft^3) -	0.0073	Weight of Water (g) -	52.2
Dry Weight (g) -	77.6	Dry Density (pcf) -	117.8	*Final Moisture (%)*	*13.4*
Initial Moisture (%) -	*6.7*	*Initital Saturation (%) -*	*42.1*	*Final Saturation (%) -*	*84.0*

Expansion Test - UBC (144 PSF)				
	Date	Time	Reading	
Add Weight	10/21/2014	10:20	0.000	
10 Minutes		10:30	0.000	Initial Reading
Add Water		11:30	0.002	
		3:00	0.002	
	10/22/2014	6:17	0.002	Final Reading

EImeasured	=	2
EI_{50}	=	**0**

Expansion Index, EI_{50}	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
>130	Very High

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2195 Faraday Avenue, Suite K, Carlsbad, CA 92008

Client: Anderson Consulting Engineers
Job Name; Ironwood
Job Number: GLO-71982.4
Date: 10/21/14
Boring Number: B-1
Depth: 0-5 ft.
Soil Description: Brown Mottled Silty Sand SM
Tested by: BD

DIRECT SHEAR TEST ASTM D 3080

Job Data	
Job No.:	GLO-71982.4
Client:	Anderson Consulting Engineers
Date:	10/22/14
Sample Data	
Sample:	B-1 @ 0 - 5 ft.
Remolded:	90 % Relative Compaction
Remarks:	Soaked Before Placing in Shear Box
Soil Description:	Brown Silty Sand (SM)

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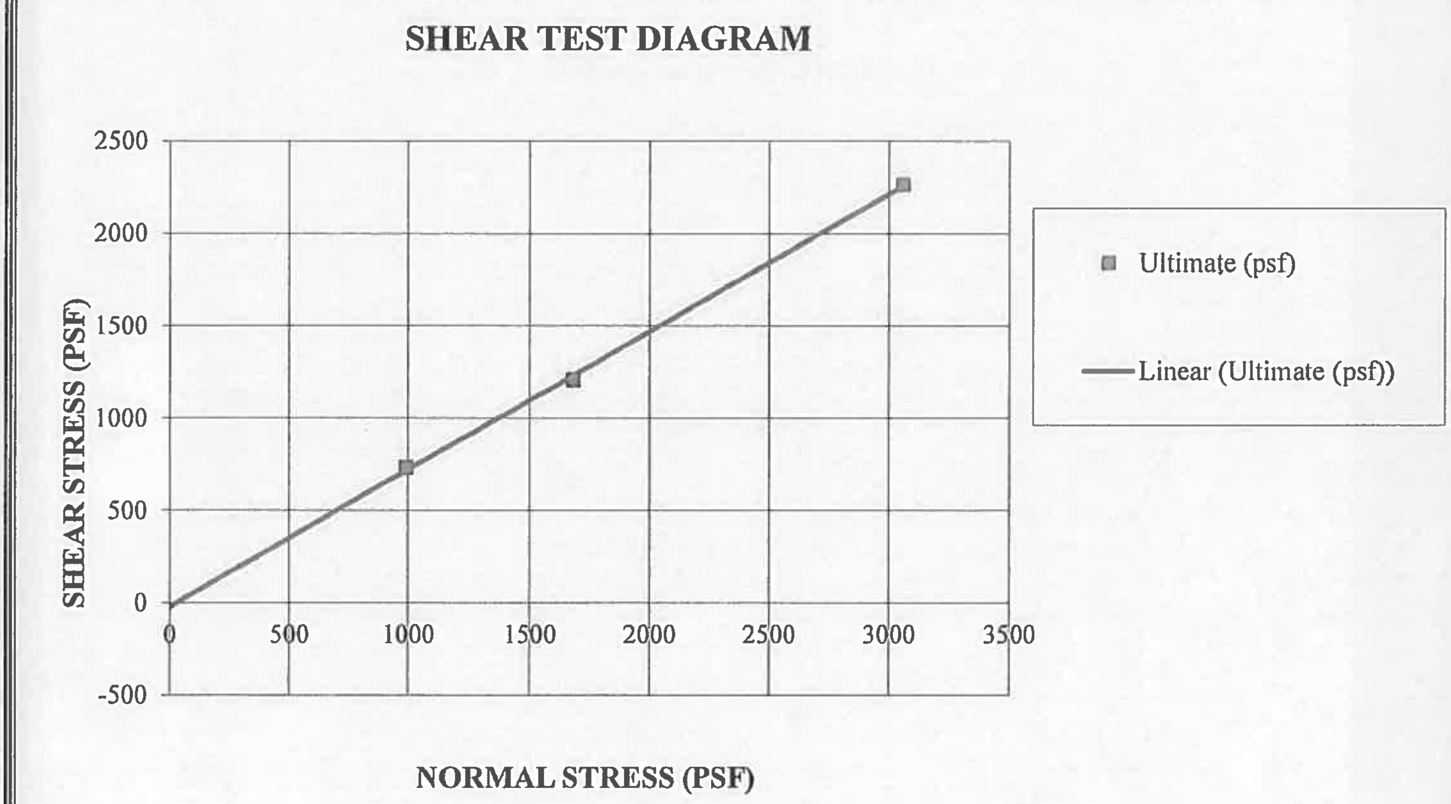

Test Results

	Phi		Cohesion	
Ultimate (psf)	37	degrees	-20	psf

Average Initial Moisture	6.5%
Average Dry Density	118.7 pcf
Average Final Moisture	12.9%

DIRECT SHEAR TEST ASTM D 3080

Job Data	
Job No.:	GLO-71982.4
Client:	Anderson Consulting Engineers
Date:	10/24/14
Sample Data	
Sample:	B-1 @ 5 ft.
Remolded:	90 % Relative Compaction
Remarks:	Soaked Before Placing in Shear Box
Soil Description:	Brown Silty Sand (SM)

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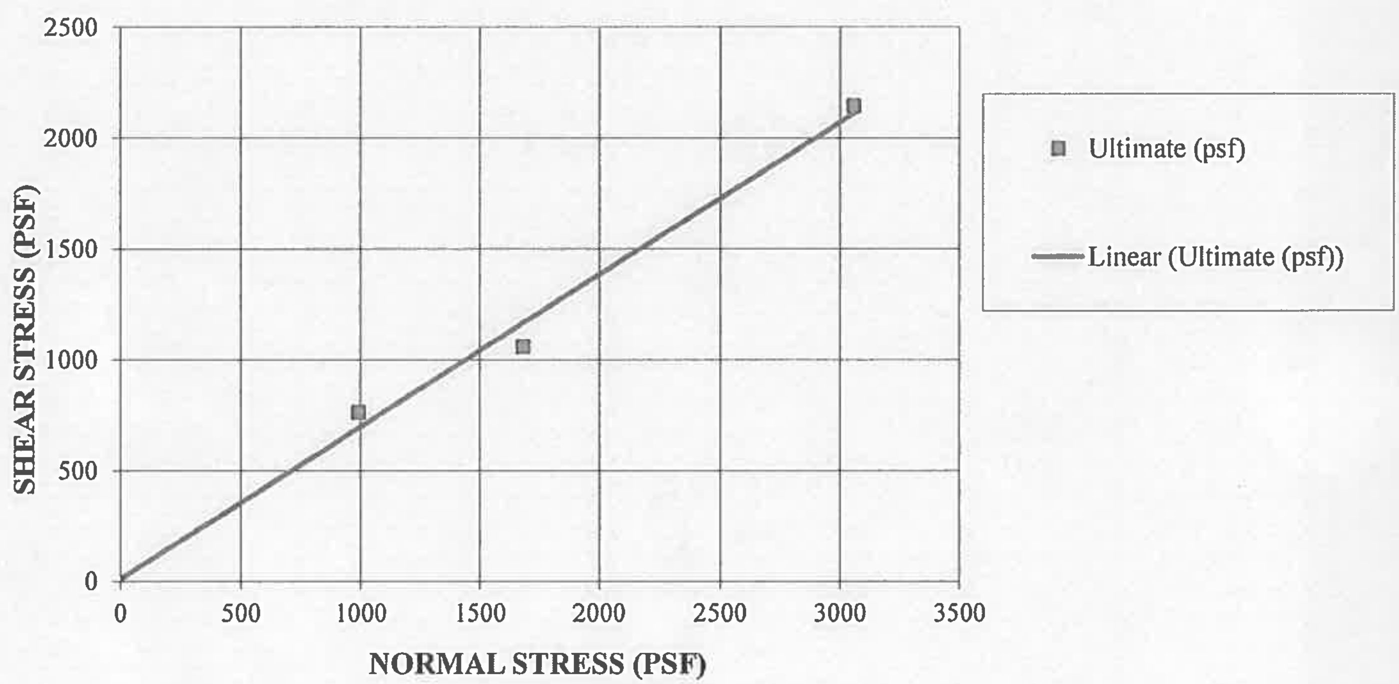
SHEAR TEST DIAGRAM



Test Results

	Phi		Cohesion	
Ultimate (psf)	34	degrees	12	psf

Average Initial Moisture	2.7%
Average Dry Density	109.7 pcf
Average Final Moisture	15.4%

DIRECT SHEAR TEST ASTM D 3080

Job Data	
Job No.:	GLO-71982.4
Client:	Anderson Consulting Engineers
Date:	10/24/14
Sample Data	
Sample:	B-2 @ 5 ft.
Remolded:	90 % Relative Compaction
Remarks:	Soaked Before Placing in Shear Box
Soil Description:	Orange-Brown Silty Sand (SM)

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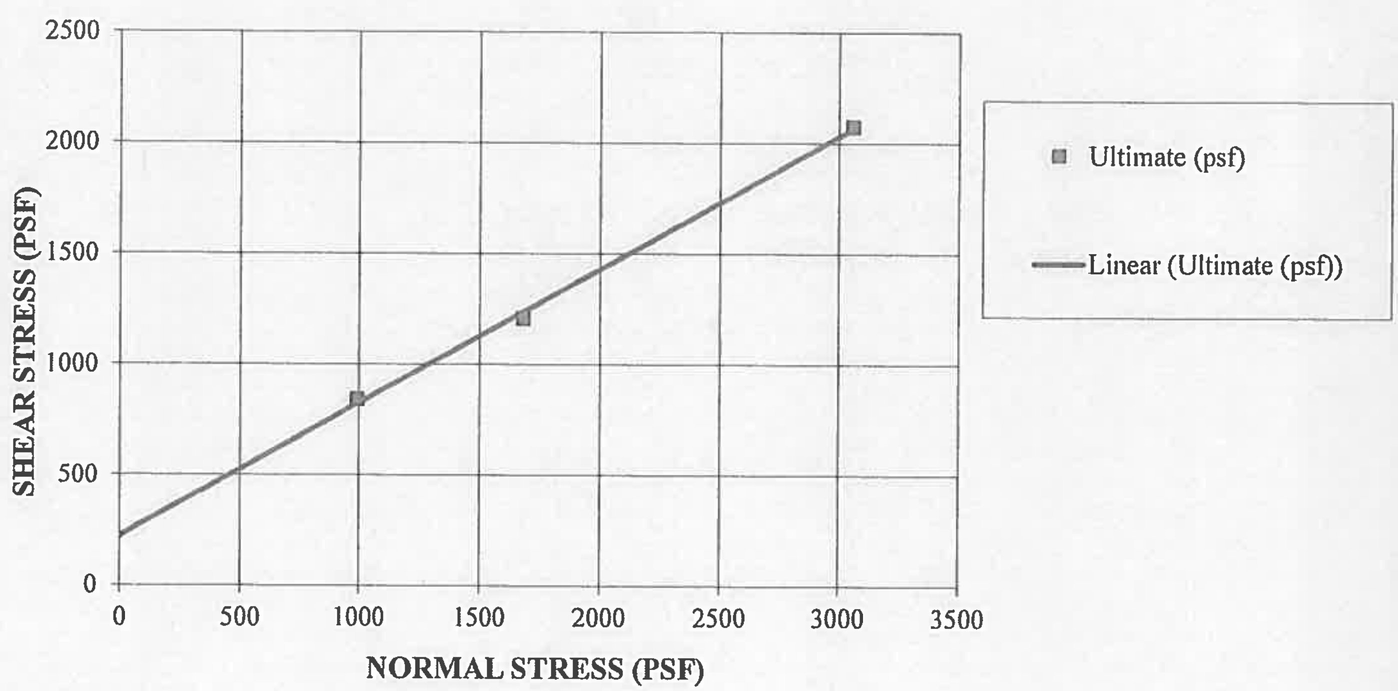
SHEAR TEST DIAGRAM



Test Results

	Phi		Cohesion	
Ultimate (psf)	31	degrees	225	psf

Average Initial Moisture	3.0%
Average Dry Density	112.9 pcf
Average Final Moisture	15.7%

LABORATORY REPORT

Telephone (619) 425-1993 Fax 425-7917 Established 1928

CLARKSON LABORATORY AND SUPPLY INC.
350 Trousdale Dr. Chula Vista, Ca. 91910 www.clarksonlab.com
ANALYTICAL AND CONSULTING CHEMISTS

Date: October 29, 2014
Purchase Order Number: GLO-71982-4
Sales Order Number: 24454
Account Number: EEI
To:

EEI Environmental Equalizers Inc
2195 Faraday Avenue Suite K
Carlsbad, CA 92008
Attention: Hector Estrella/Jeff Blake

Laboratory Number: SO5463 Customers Phone: 760-431-3747

Sample Designation:

One soil sample received on 10/23/14 at 3:00pm, from Global - Ironwood Project# GLO-70982-4, marked as B-1 @ 0'-5' SM.

Analysis By California Test 643, 1999, Department of Transportation Division of Construction, Method for Estimating the Service Life of Steel Culverts.

pH 7.1

Water Added (ml)	Resistivity (ohm-cm)
10	13000
5	9500
5	7800
5	7300
5	6400
5	5800
5	5200
5	5500
5	5800

35 years to perforation for a 16 gauge metal culvert.
46 years to perforation for a 14 gauge metal culvert.
63 years to perforation for a 12 gauge metal culvert.
81 years to perforation for a 10 gauge metal culvert.
98 years to perforation for a 8 gauge metal culvert.

Water Soluble Sulfate	Calif. Test 417	0.005%
Water Soluble Chloride	Calif. Test 422	0.007%

Laura Torres

Laura Torres
LT/dbb

APPENDIX C
EARTHWORK AND GRADING GUIDELINES

EEI
Geotechnical & Environmental Solutions

EARTHWORK AND GRADING GUIDELINES

GENERAL

These guidelines present general procedures and recommendations for earthwork and grading as required on the approved grading plans, including preparation of areas to be filled, placement of fill and installation of subdrains and excavations. The recommendations contained in the geotechnical report are applicable to each specific project, are part of the earthwork and grading guidelines and would supersede the provisions contained hereafter in the case of conflict. Observations and/or testing performed by the consultant during the course of grading may result in revised recommendations which could supersede these guidelines or the recommendations contained in the geotechnical report. Figures A through O are provided at the back of this appendix, exhibiting generalized cross sections relating to these guidelines.

The contractor is responsible for the satisfactory completion of all earthworks in accordance with provisions of the project plans and specifications. The project soil engineer and engineering geologist (geotechnical consultant) or their representatives should provide observation and testing services, and geotechnical consultation throughout the duration of the project.

EARTHWORK OBSERVATIONS AND TESTING

Geotechnical Consultant

Prior to the commencement of grading, a qualified geotechnical consultant (a soil engineer and engineering geologist) should be employed for the purpose of observing earthwork procedures and testing the fills for conformance with the recommendations of the geotechnical report, the approved grading plans, and applicable grading codes and ordinances.

The geotechnical consultant should provide testing and observation so that determination may be made that the work is being completed as specified. It is the responsibility of the contractor to assist the consultant and keep them aware of work schedules and predicted changes, so that the consultant may schedule their personnel accordingly.

All removals, prepared ground to receive fill, key excavations, and subdrains should be observed and documented by the project engineering geologist and/or soil engineer prior to placing any fill. It is the contractor's responsibility to notify the engineering geologist and soil engineer when such areas are ready for observation.

Laboratory and Field Tests

Maximum dry density tests to determine the degree of compaction should be performed in accordance with American Standard Testing Materials test method ASTM designation D-1557-78. Random field compaction tests should be performed in accordance with test method ASTM designations D-1556-82, D-2937 or D-2922 & D-3017, at intervals of approximately two (2) feet of fill height per 10,000 sq. ft. or every one thousand cubic yards of fill placed. These criteria would vary depending on the soil conditions and the size of the project. The location and frequency of testing would be at the discretion of the geotechnical consultant

Contractor's Responsibility

All clearing, site preparation, and earthwork performed on the project should be conducted by the contractor, with observation by geotechnical consultants and staged approval by the appropriate governing agencies. It is the contractor's responsibility to prepare the ground surface to receive the fill to the satisfaction of the soil engineer, and to place, spread, moisture condition, mix and compact the fill in accordance with the recommendations of the soil engineer. The contractor should also remove all major deleterious material considered unsatisfactory by the soil engineer.

It is the sole responsibility of the contractor to provide adequate equipment and methods to accomplish the earthwork in accordance with applicable grading guidelines, codes or agency ordinances, and approved grading plans. Sufficient watering apparatus and compaction equipment should be provided by the contractor with due consideration for the fill material, rate of placement, and climatic conditions. If, in the opinion of the geotechnical consultant, unsatisfactory conditions such as questionable weather, excessive oversized rock, deleterious material or insufficient support equipment are resulting in a quality of work that is not acceptable, the consultant will inform the contractor, and the contractor is expected to rectify the conditions, and if necessary, stop work until conditions are satisfactory.

The contractor will properly grade all surfaces to maintain good drainage and prevent ponding of water. The contractor will take action to control surface water and to prevent erosion control measures that have been installed.

SITE PREPARATION

All vegetation including brush, trees, thick grasses, organic debris, and other deleterious material should be removed and disposed of offsite, and must be concluded prior to placing fill. Existing fill, soil, alluvium, colluvium, or rock materials determined by the soil engineer or engineering geologist as unsuitable for structural in-place support should be removed prior to fill placement. Depending upon the soil conditions, these materials may be reused as compacted fills. Any materials incorporated as part of the compacted fills should be approved by the soil engineer.

Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, or other structures not located prior to grading are to be removed or treated in a manner recommended by the soil engineer. Soft, dry, spongy, highly fractured, or otherwise unsuitable ground extending to such a depth that surface processing cannot adequately improve the condition should be over excavated down to firm ground and approved by the soil engineer before compaction and filling operations continue. Over excavated and processed soils which have been properly mixed and moisture-conditioned should be recompacted to the minimum relative compaction as specified in these guidelines.

Existing ground which is determined to be satisfactory for support of the fills should be scarified to a minimum depth of six (6) inches, or as directed by the soil engineer. After the scarified ground is brought to optimum moisture (or greater) and mixed, the materials should be compacted as specified herein. If the scarified zone is greater than 6 inches in depth, it may be necessary to remove the excess and place the material in lifts restricted to six (6) inches in compacted thickness.

Existing grind which is not satisfactory to support compacted fill should be over excavated as required in the geotechnical report or by the onsite soils engineer and/or engineering geologists. Scarification, discing, or other acceptable form of mixing should continue until the soils are broken down and free of large fragments or clods, until the working surface is reasonably uniform and free from ruts, hollows, hummocks, or other uneven features which would inhibit compaction as described above.

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical) gradient, the ground should be benched. The lowest bench, which will act as a key, should be a minimum of 12 feet wide and should be at least two (2) feet deep into competent material, approved by the soil engineer and/or engineering geologist. In fill over cut slope conditions, the recommended minimum width of the lowest bench or key is at least 15 feet with the key excavated on competent material, as designated by the Geotechnical Consultant. As a general rule, unless superseded by the Soil Engineer, the minimum width of fill keys should be approximately equal to one-half (½) the height of the slope.

Standard benching is typically four feet (minimum) vertically, exposing competent material. Benching may be used to remove unsuitable materials, although it is understood that the vertical height of the bench may exceed four feet. Pre stripping may be considered for removal of unsuitable materials in excess of four feet in thickness.

All areas to receive fill, including processed areas, removal areas, and toe of fill benches should be observed and approved by the soil engineer and/or engineering geologist prior to placement of fill. Fills may then be properly placed and compacted until design grades are attained.

COMPACTED FILLS

Earth materials imported or excavated on the property may be utilized as fill provided that each soil type has been accepted by the soil engineer. These materials should be free of roots, tree branches, other organic matter or other deleterious materials. All unsuitable materials should be removed from the fill as directed by the soil engineer. Soils of poor gradation, undesirable expansion potential, or substandard strength characteristics may be designated unsuitable by the consultant and may require mixing with other earth materials to serve as a satisfactory fill material.

Fill materials generated from benching operations should be dispersed throughout the fill area. Benching operations should not result in the benched material being placed only within a single equipment width away from the fill/bedrock contact.

Oversized materials, defined as rock or other irreducible materials with a maximum size exceeding 12 inches in one dimension, should not be buried or placed in fills unless the location of materials and disposal methods are specifically approved by the soil engineer. Oversized material should be taken offsite or placed in accordance with recommendations of the soil engineer in areas designated as suitable for rock disposal. Oversized material should not be placed vertically within 10 feet of finish grade or horizontally within 20 feet of slope faces.

To facilitate trenching, rock should not be placed within the range of foundation excavations or future utilities unless specifically approved by the soil engineer and/or the representative developers.

If import fill material is required for grading, representative samples of the material should be analyzed in the laboratory by the soil engineer to determine its physical properties. If any material other than that previously analyzed is imported to the fill or encountered during grading, analysis of this material should be conducted by the soil engineer as soon as practical.

Fill material should be placed in areas prepared to receive fill in near-horizontal layers that should not exceed six (6) inches compacted in thickness. The soil engineer may approve thicker lifts if testing indicates the grading procedures are such that adequate compaction is being achieved. Each layer should be spread evenly and mixed to attain uniformity of material and moisture suitable for compaction.

Fill materials at moisture content less than optimum should be watered and mixed, and “wet” fill materials should be aerated by scarification, or should be mixed with drier material. Moisture conditioning and mixing of fill materials should continue until the fill materials have uniform moisture content at or above optimum moisture.

After each layer has been evenly spread, moisture-conditioned and mixed, it should be uniformly compacted to a minimum of 90 percent of maximum density as determined by ASTM test designation, D 1557-78, or as otherwise recommended by the soil engineer. Compaction equipment should be adequately sized and should be reliable to efficiently achieve the required degree of compaction.

Where tests indicate that the density of any layer of fill, or portion thereof, is below the required relative compaction or improper moisture content, the particular layer or portion will be reworked until the required density and/or moisture content has been attained. No additional fill will be placed in an area until the last placed lift of fill has been tested and found to meet the density and moisture requirements, and is approved by the soil engineer.

Compaction of slopes should be accomplished by over-building the outside edge a minimum of three (3) feet horizontally, and subsequently trimming back to the finish design slope configuration. Testing will be performed as the fill is horizontally placed to evaluate compaction as the fill core is being developed. Special efforts may be necessary to attain the specified compaction in the fill slope zone. Final slope shaping should be performed by trimming and removing loose materials with appropriate equipment. A final determination of fill slope compaction should be based on observation and/or testing of the finished slope face.

If an alternative to over-building and cutting back the compacted fill slope is selected, then additional efforts should be made to achieve the required compaction in the outer 10 feet of each lift of fill by undertaking the following:

- Equipment consisting of a heavy short-shanked sheepsfoot should be used to roll (horizontal) parallel to the slopes continuously as fill is placed. The sheepsfoot roller should also be used to roll perpendicular to the slopes, and extend out over the slope to provide adequate compaction to the face slope.

- Loose fill should not be spilled out over the face of the slope as each lift is compacted. Any loose fill spilled over a previously completed slope face should be trimmed off or be subject to re-rolling.

- Field compaction tests will be made in the outer two (2) to five (5) feet of the slope at two (2) to three (3) foot vertical intervals, subsequent to compaction operations.

- After completion of the slope, the slope face should be shaped with a small dozer and then re-rolled with a sheepsfoot to achieve compaction to near the slope face. Subsequent to testing to verify compaction, the slopes should be grid-rolled to achieve adequate compaction to the slope face. Final testing should be used to confirm compaction after grid rolling.

- Where testing indicates less than adequate compaction, the contractor will be responsible to process, moisture condition, mix and recompact the slope materials as necessary to achieve compaction. Additional testing should be performed to verify compaction.

- Erosion control and drainage devices should be designed by the project civil engineer in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the soil engineer or engineering geologist.

EXCAVATIONS

Excavations and cut slopes should be observed and mapped during grading by the engineering geologist. If directed by the engineering geologist, further excavations or over-excavation and refilling of cut areas should be performed. When fills over cut slopes are to be graded, the cut portion of the slope should be observed by the engineering geologist prior to placement of the overlying fill portion of the slope. The engineering geologist should observe all cut slopes and should be notified by the contractor when cut slopes are started.

If, during the course of grading, unanticipated adverse or potentially adverse geologic conditions are encountered, the engineering geologist and soil engineer should investigate, evaluate and make recommendations to mitigate (or limit) these conditions. The need for cut slope buttressing or stabilizing should be based on as-grading evaluations by the engineering geologist, whether anticipated previously or not.

Unless otherwise specified in soil and geological reports, no cut slopes should be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies. Additionally, short-term stability of temporary cut slopes is the contractor's responsibility.

Erosion control and drainage devices should be designed by the project civil engineer and should be constructed in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the soil engineer or engineering geologist.

SUBDRAIN INSTALLATION

Subdrains should be installed in accordance with the approved embedment material, alignment and details indicated by the geotechnical consultant. Subdrain locations or construction materials should not be changed or modified without approval of the geotechnical consultant. The soil engineer and/or engineering geologist may recommend and direct changes in subdrain line, grade and drain material in the field, pending exposed conditions. The location of constructed subdrains should be recorded by the project civil engineer.

COMPLETION

Consultation, observation and testing by the geotechnical consultant should be completed during grading operations in order to state an opinion that all cut and filled areas are graded in accordance with the approved project specifications.

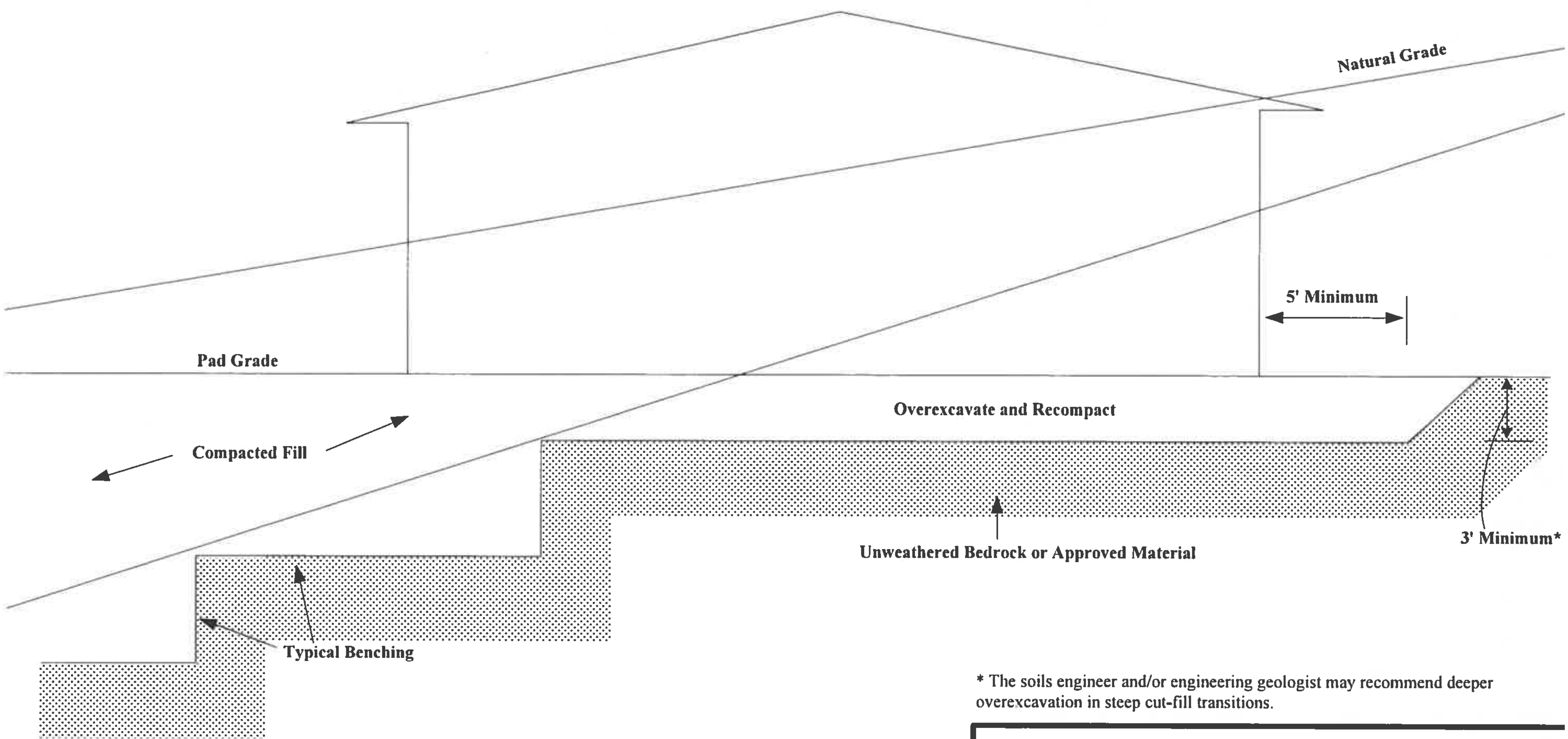
After completion of grading and after the soil engineer and engineering geologist have finished their observations, final reports should be submitted subject to review by the controlling governmental agencies. No additional grading should be undertaken without prior notification of the soil engineer and/or engineering geologist.

All finished cut and fill slopes should be protected from erosion, including but not limited to planting in accordance with the plan design specifications and/or as recommended by a landscape architect. Such protection and/or planning should be undertaken as soon as possible after completion of grading.

ATTACHMENTS

Figure A – Transition Lot Detail Cut Lot
Figure B – Transition Lot Detail Cut - Fill
Figure C – Rock Disposal Pits
Figure D – Detail for Fill Slope Toeing out on a Flat Alluviated Canyon
Figure E – Removal Adjacent to Existing Fill
Figure F – Daylight Cut Lot Detail
Figure G – Skin Fill of Natural Ground
Figure H – Typical Stabilization Buttress Fill Design
Figure I – Stabilization Fill for Unstable Material Exposed in Portion of Cut Slope
Figure J – Fill Over Cut Detail
Figure K – Fill Over Natural Detail
Figure L – Oversize Rock Disposal
Figure M – Canyon Subdrain Detail
Figure N – Canyon Subdrain Alternate Details
Figure O – Typical Stabilization Buttress Subdrain Detail
Figure P – Retaining Wall Backfill

TRANSITION LOT DETAIL
CUT LOT – MATERIAL TYPE TRANSITION



* The soils engineer and/or engineering geologist may recommend deeper overexcavation in steep cut-fill transitions.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
TRANSITION LOT DETAIL
CUT LOT – MATERIAL TYPE TRANSITION

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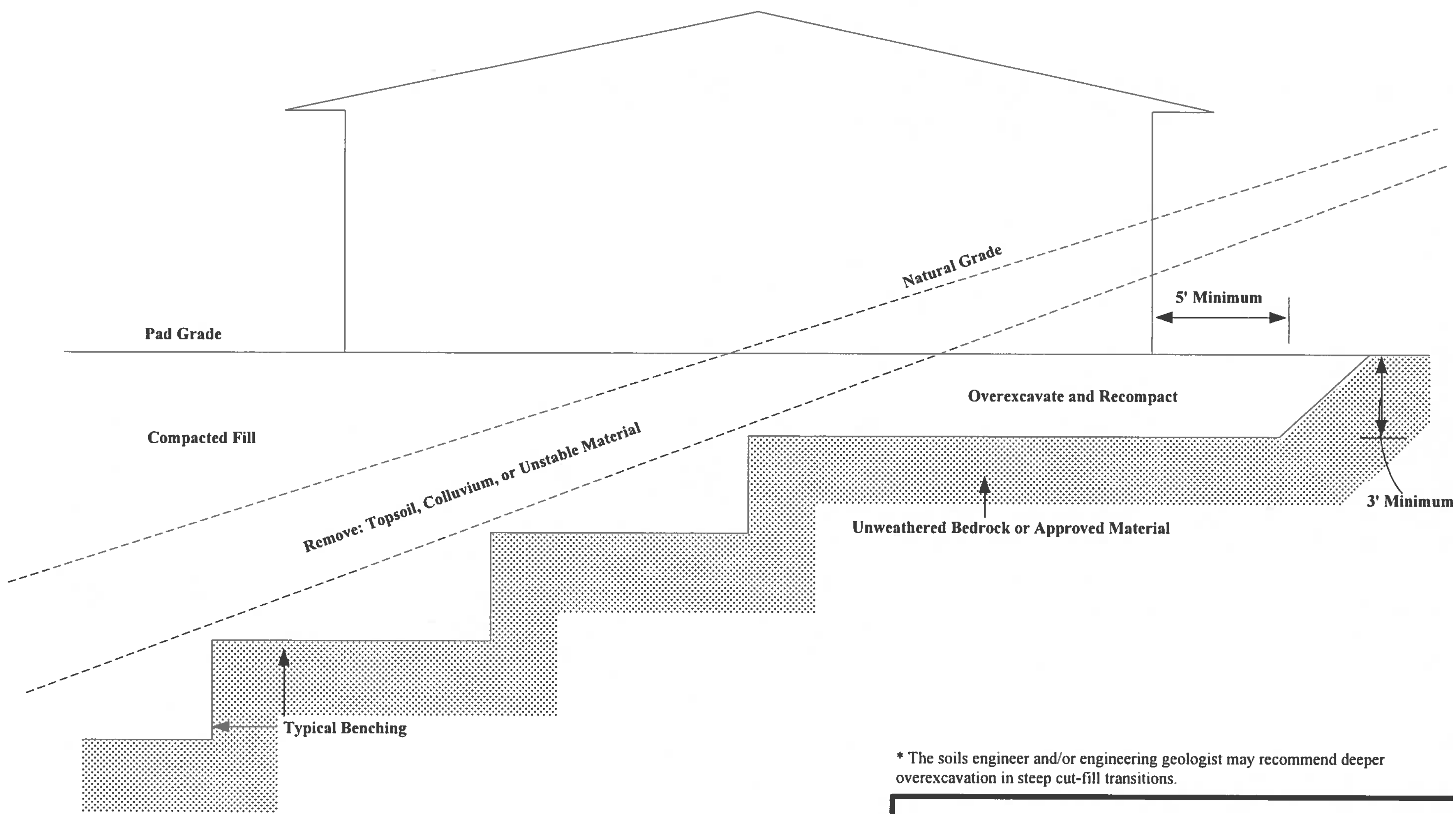
FIGURE A

TRANSITION LOT DETAIL
CUT – FILL – DAYLIGHT TRANSITION



* The soils engineer and/or engineering geologist may recommend deeper overexcavation in steep cut-fill transitions.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
TRANSITION LOT DETAIL
CUT – FILL – DAYLIGHT TRANSITION

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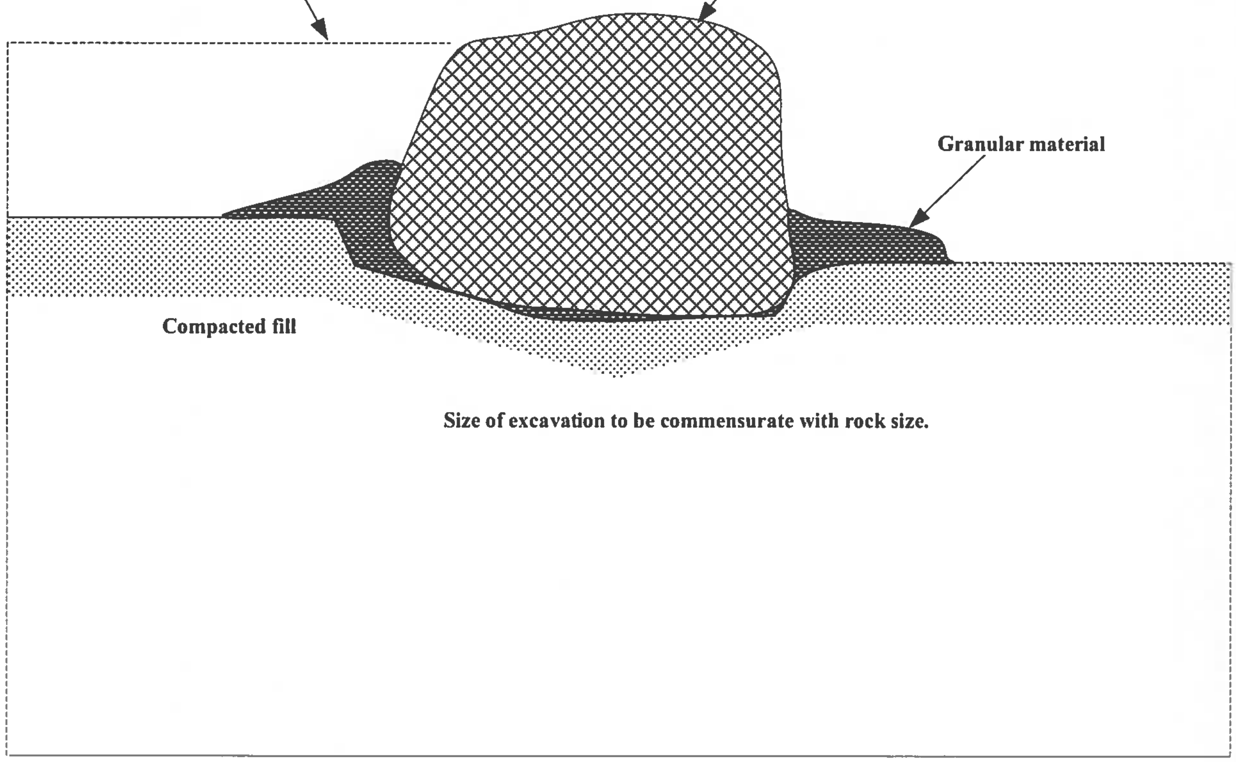
FIGURE B

ROCK DISPOSAL PITS



Note:
(1) Large rock is defined as having a diameter larger than 3 feet in maximum size.
(2) Pit shall be excavated into compacted fill to a depth equal to half of the rock size.
(3) Granular soil shall be pushed into the pit and then flooded around the rock using a sheepsfoot to help with compaction.
(4) A minimum of 3 feet of compacted fill should be laid over each pit.
(5) Pits shall have at least 15 feet of separation between one another, horizontally.
(6) Pits shall be placed at least 20 feet from any fill slope.
(7) Pits shall be used only in deep fill areas.

Note: Figure not to scale

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ROCK DISPOSAL PITS

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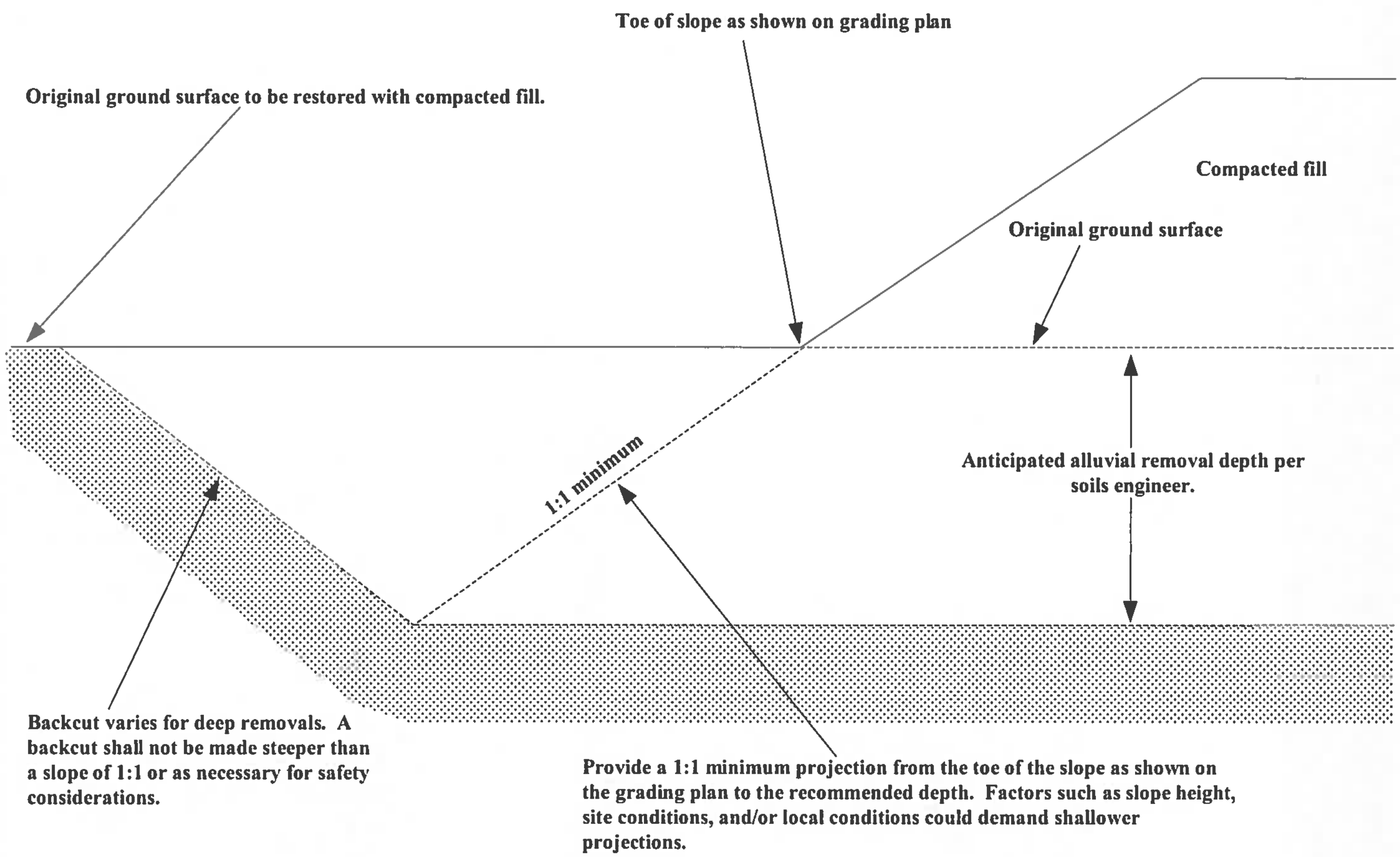
FIGURE C

FLAT ALLUVIATED CANYON



Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
DETAIL FOR FILL SLOPE TOEING OUT ON A FLAT ALLUVIATED CANYON

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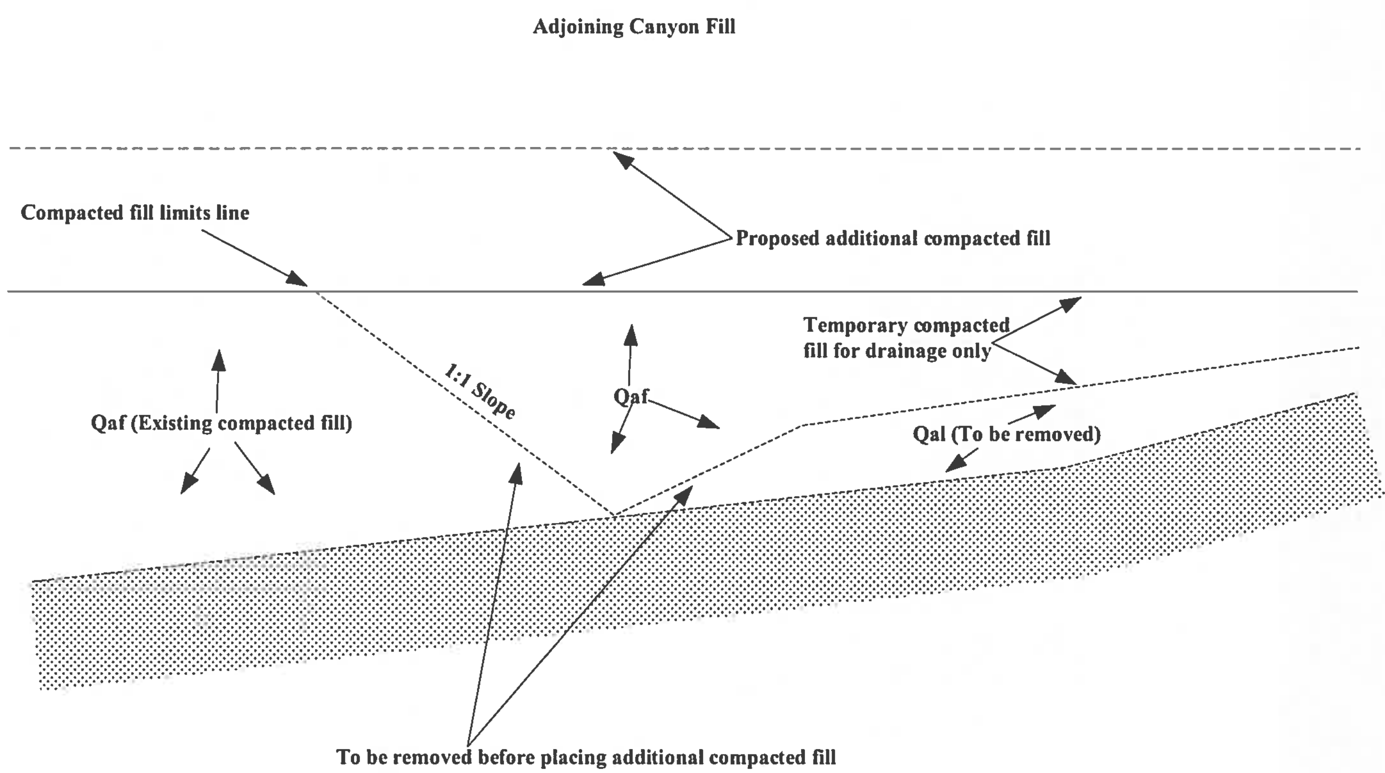
FIGURE D

REMOVAL ADJACENT TO EXISTING FILL



Legend

Qaf - Artificial Fill

Qal - Alluvium

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
REMOVAL ADJACENT TO EXISTING FILL

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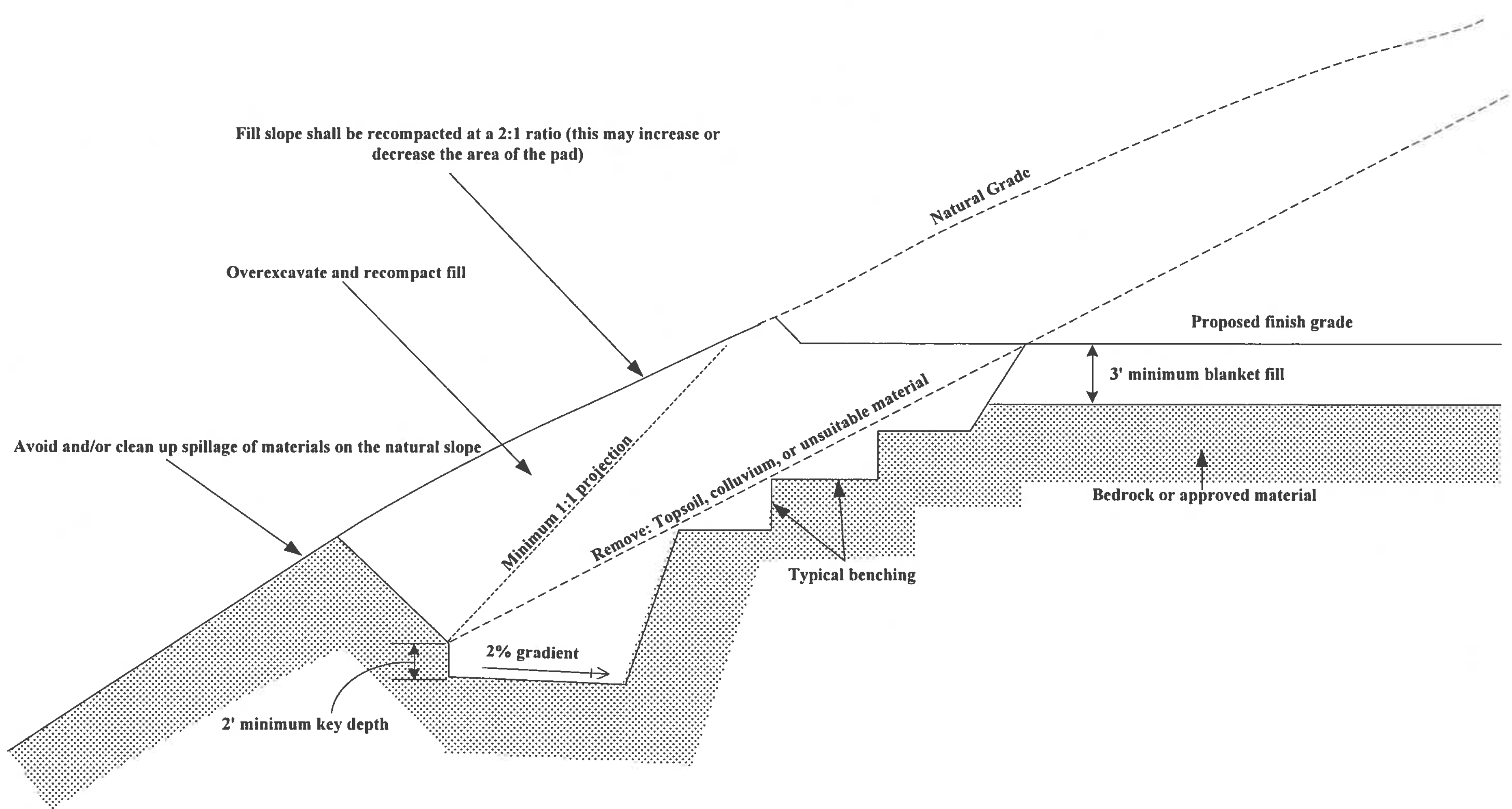
FIGURE E

DAYLIGHT CUT LOT DETAIL



Note: (1) Subdrain and key width requirements shall be determined based on exposed subsurface conditions and the thickness of overburden.

(2) Pad overexcavation and recompaction shall be completed if determined as necessary by the soils engineer and/or engineering geologist.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
DAYLIGHT CUT LOT DETAIL

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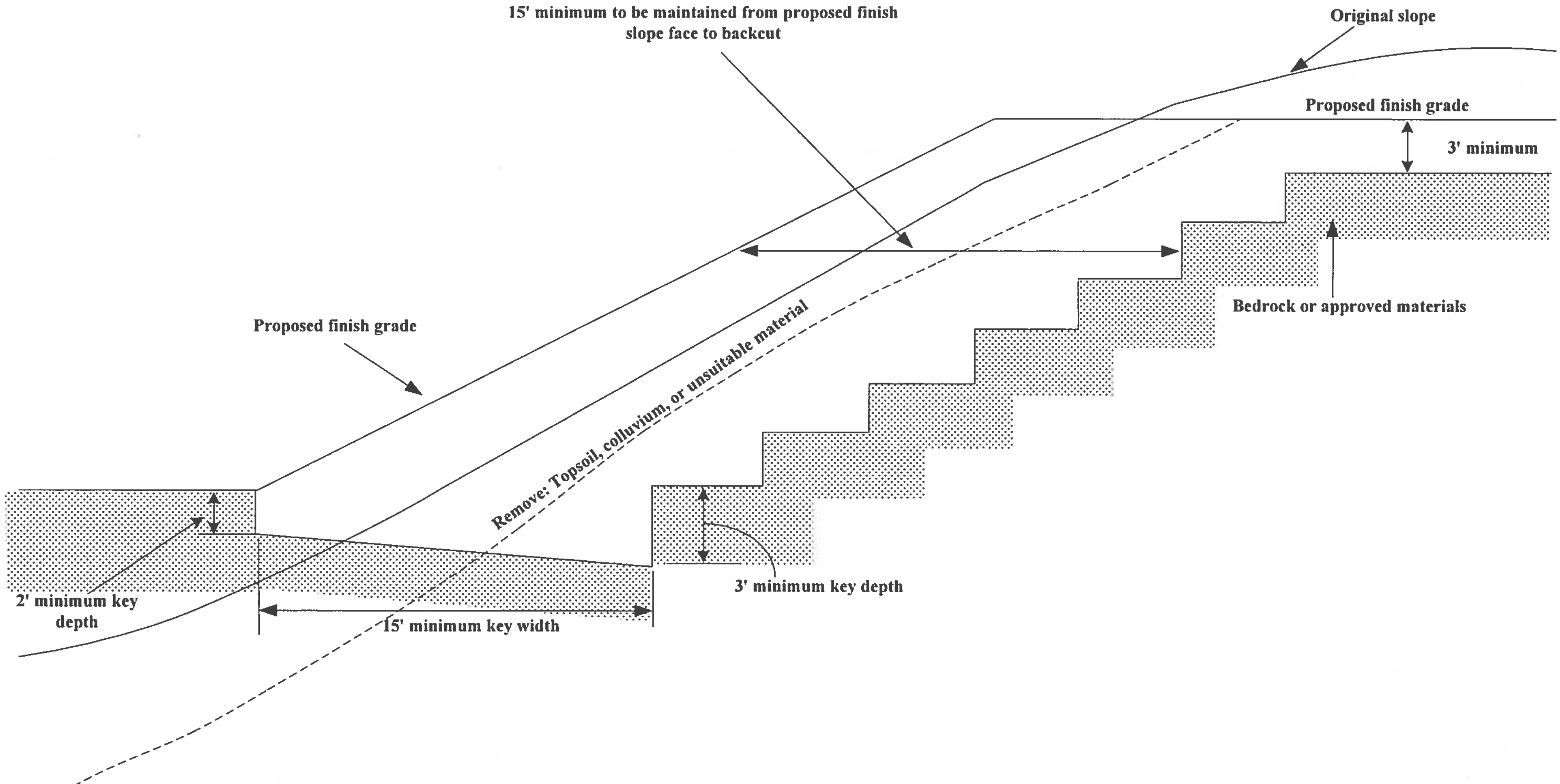
FIGURE F

SKIN FILL OF NATURAL GROUND



Note: (1) The need and disposition of drains will be determined by the soils engineer and/or engineering geologist based on site conditions.

(2) Pad overexcavation and recompaction shall be completed if determined as necessary by the soils engineer and/or engineering geologist.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
SKIN FILL OF NATURAL GROUND

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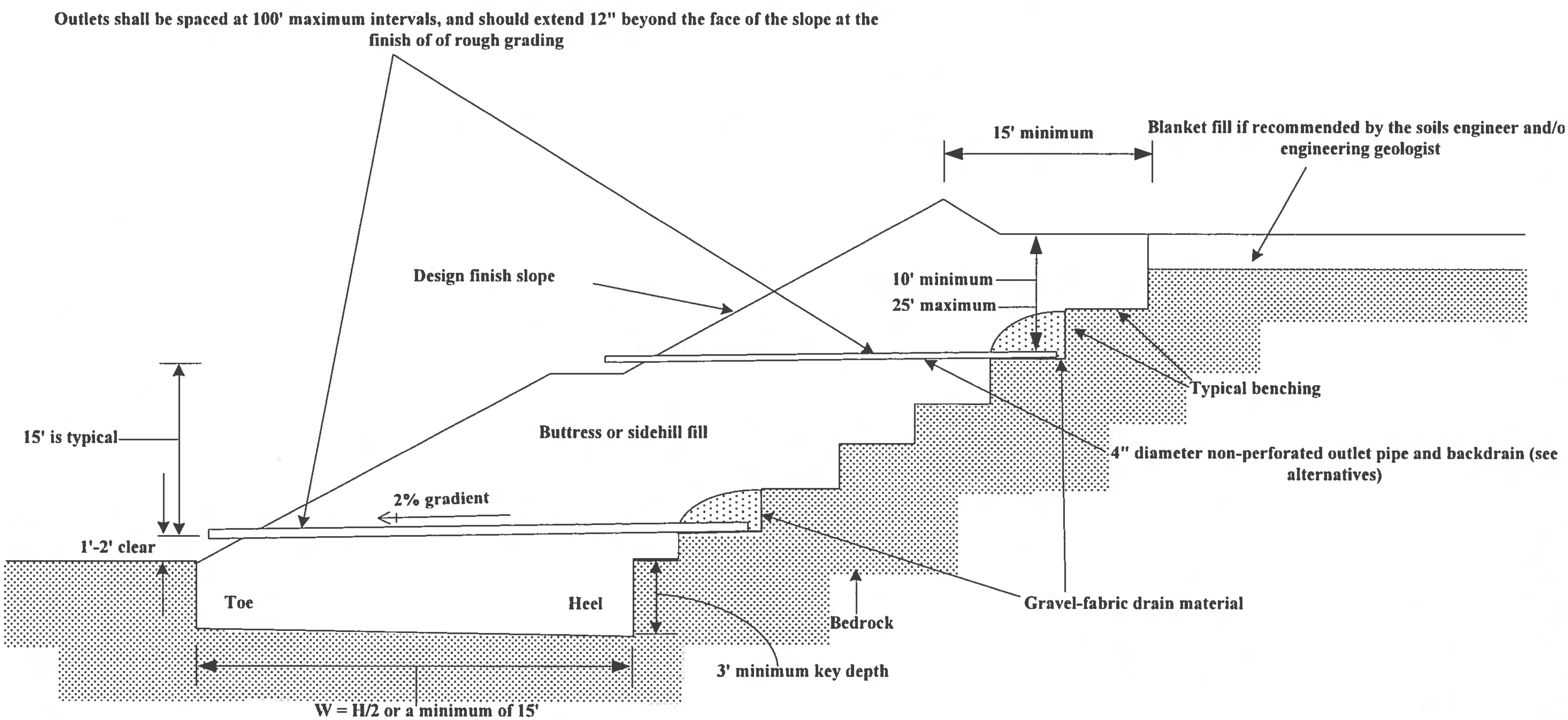
FIGURE G

TYPICAL STABILIZATION BUTTRESS FILL DESIGN



Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
TYPICAL STABILIZATION BUTTRESS FILL DESIC

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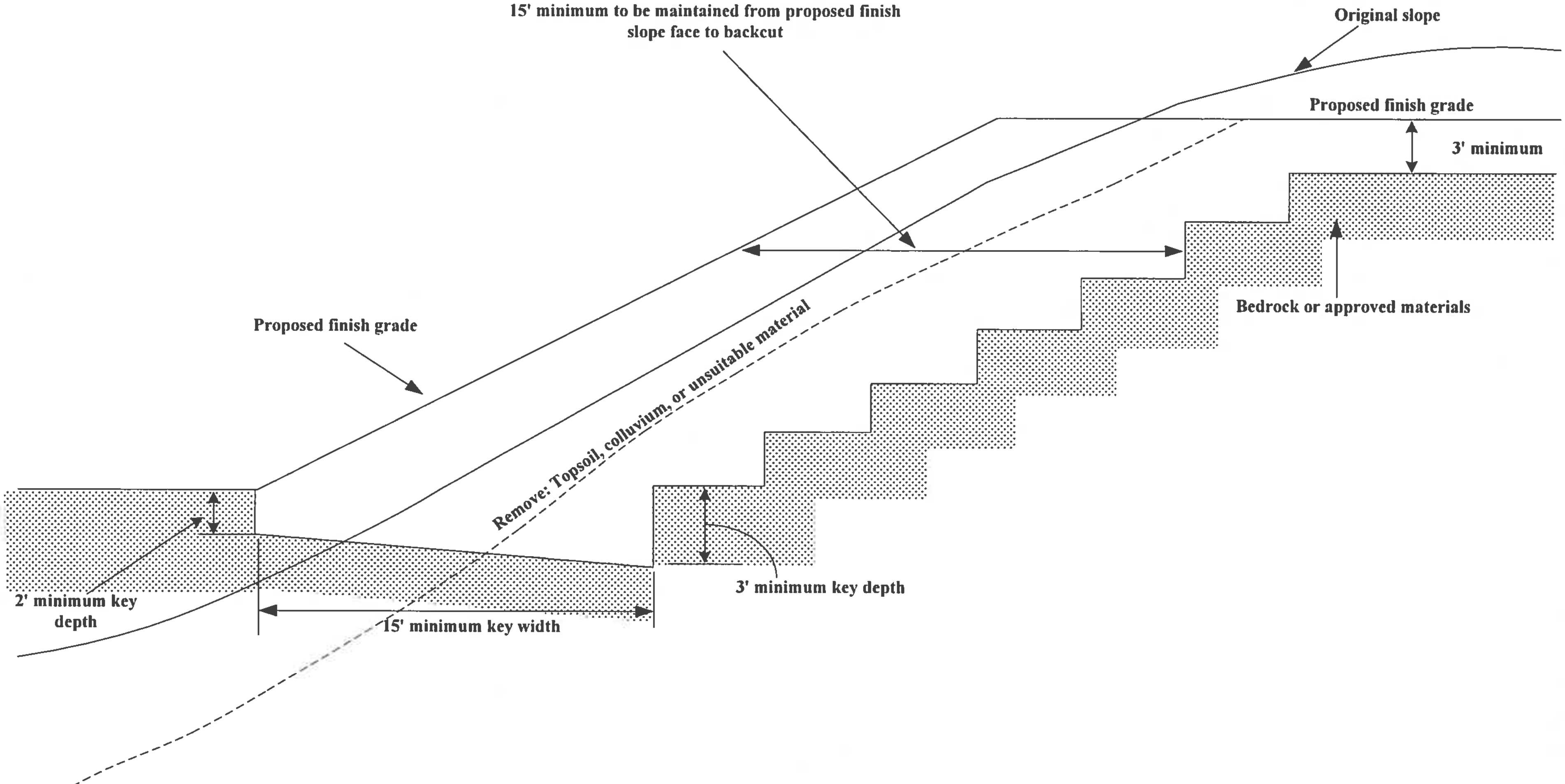
FIGURE H

SKIN FILL OF NATURAL GROUND



Note: (1) The need and disposition of drains will be determined by the soils engineer and/or engineering geologist based on site conditions.

(2) Pad overexcavation and recompaction shall be completed if determined as necessary by the soils engineer and/or engineering geologist.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
SKIN FILL OF NATURAL GROUND

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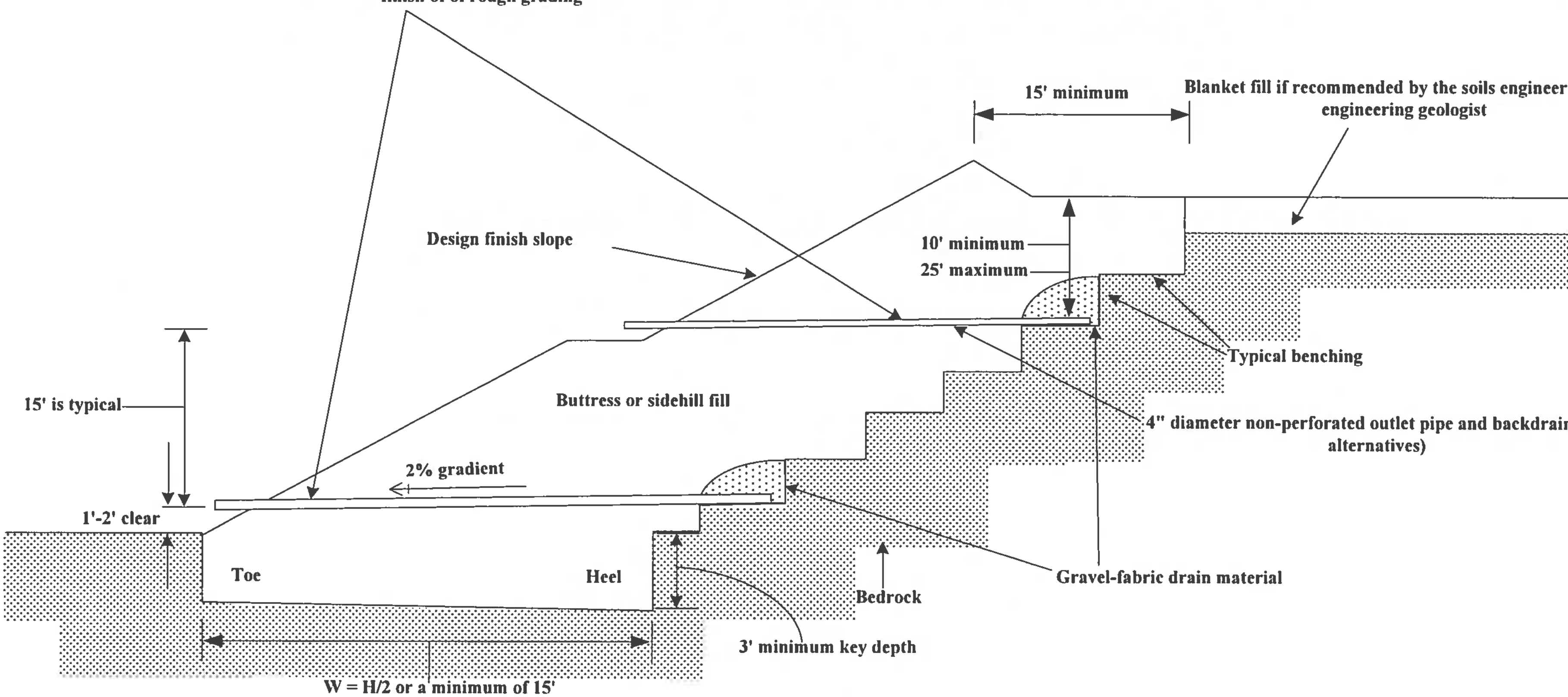
FIGURE G

TYPICAL STABILIZATION BUTTRESS FILL DESIGN



Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
TYPICAL STABILIZATION BUTTRESS FILL DESIC

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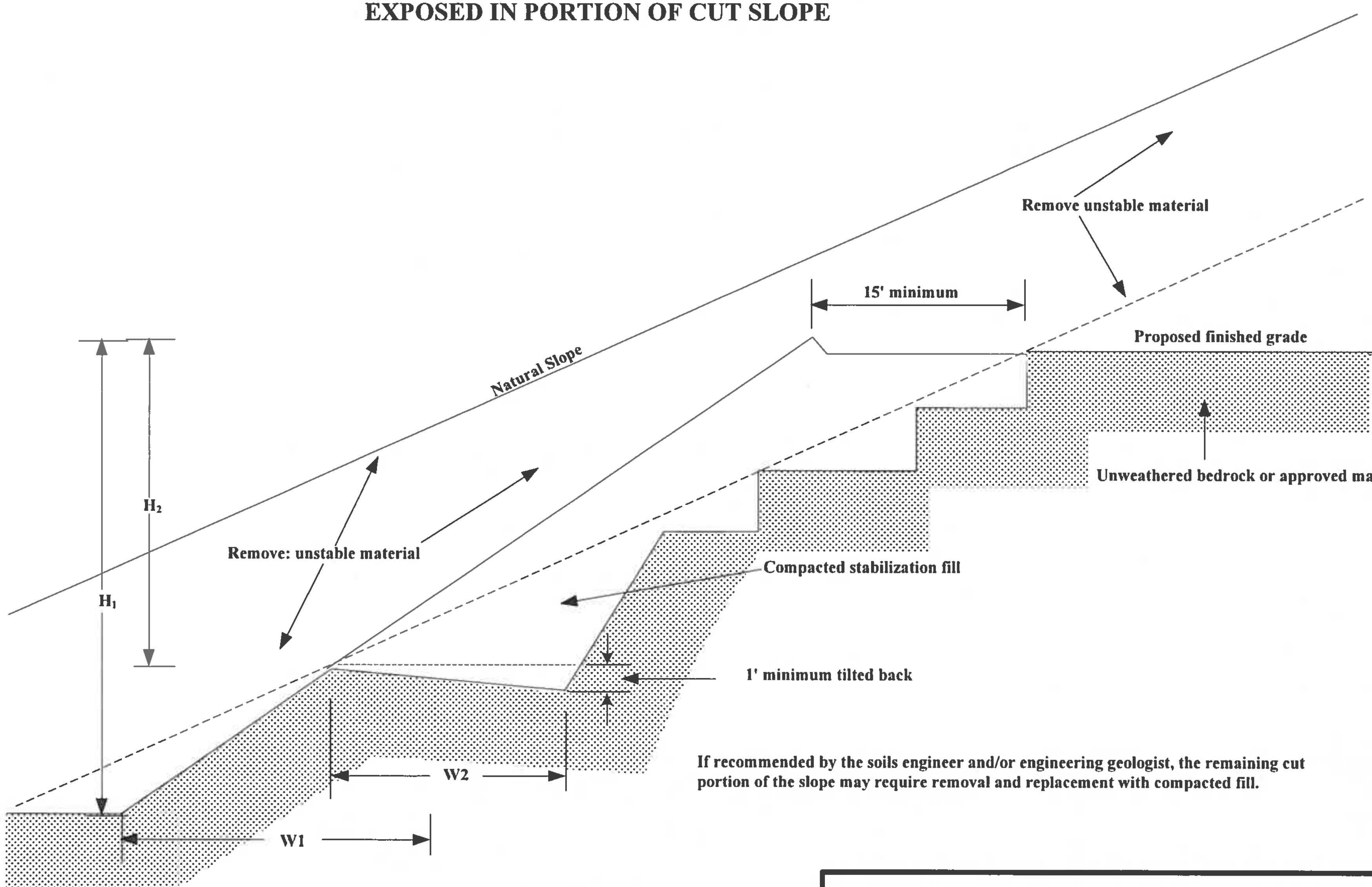
FIGURE H

STABILIZATION FILL FOR UNSTABLE MATERIAL EXPOSED IN PORTION OF CUT SLOPE



If recommended by the soils engineer and/or engineering geologist, the remaining cut portion of the slope may require removal and replacement with compacted fill.

Note: (1) Subdrains are required only if specified by the soils engineer and/or engineering geologist.
(2) "W" shall be the equipment width (15') for slope heights less than 25 feet. For slopes greater than 25 feet "W" shall be determined by the project soils engineer and/or the engineering geologist. "W" shall never be less than H/2.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
STABILIZATION FILL FOR UNSTABLE MATERIA
EXPOSED IN PORTION OF CUT SLOPE

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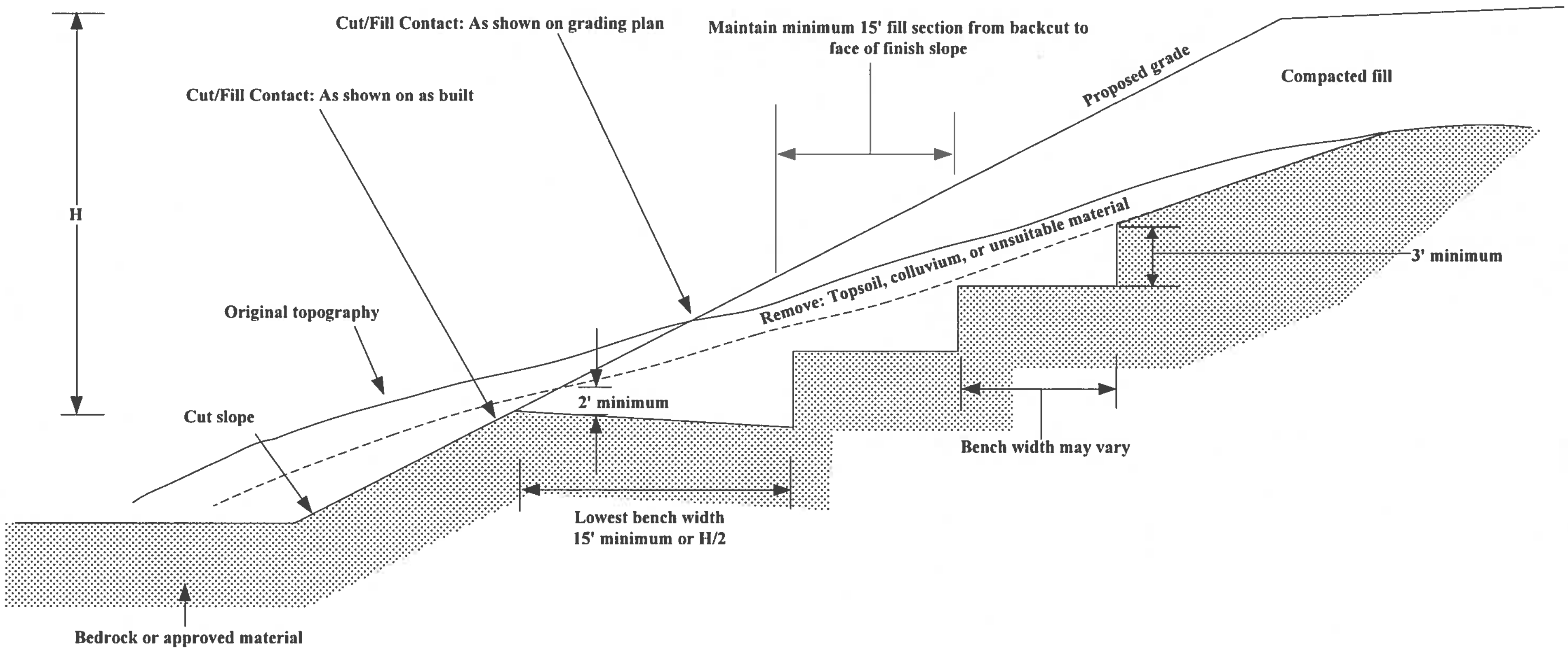
FIGURE I

FILL OVER CUT DETAIL



Note: The cut sectioin shall be excavated and evaluated by the soils engineer/engineering geologist prior to constructing the fill portion.

Note: Figure not to scale

EARTHWORK AND GRADING GUIDELINES
FILL OVER CUT DETAIL

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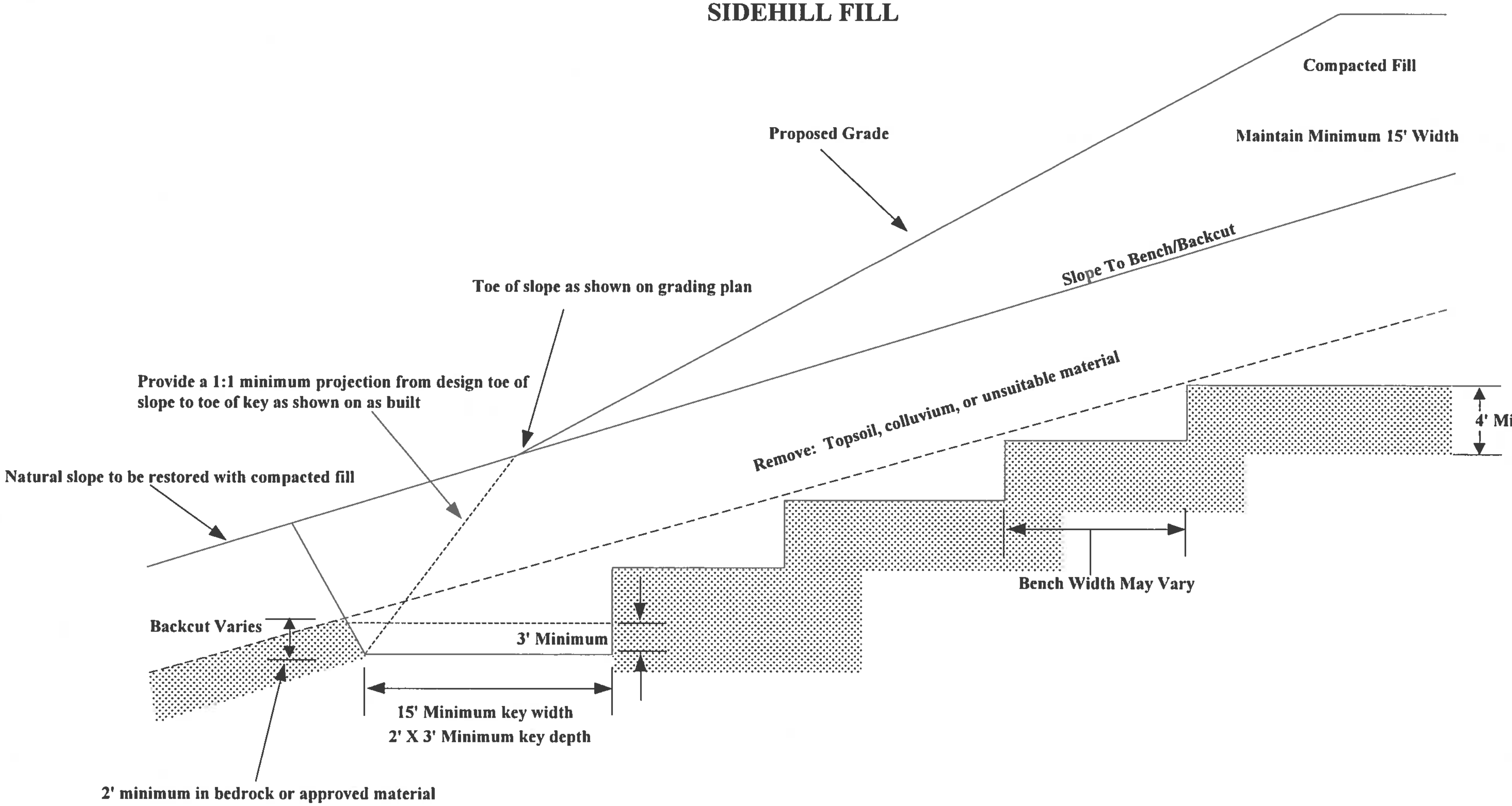
FIGURE J

FILL OVER NATURAL DETAIL
SIDEHILL FILL



Note: (1) Special recommendations shall be provided by the soils engineer/engineering geologist where the natural slope approaches or exceeds the design slope ratio.
(2) The need for and disposition of drains would be determined by the soils engineer/engineering geologist based upon exposed conditions.

Note: Figures not to scale

EARTHWORK AND GRADING GUIDELINES
FILL OVER NATURAL DETAIL
SIDEHILL FILL

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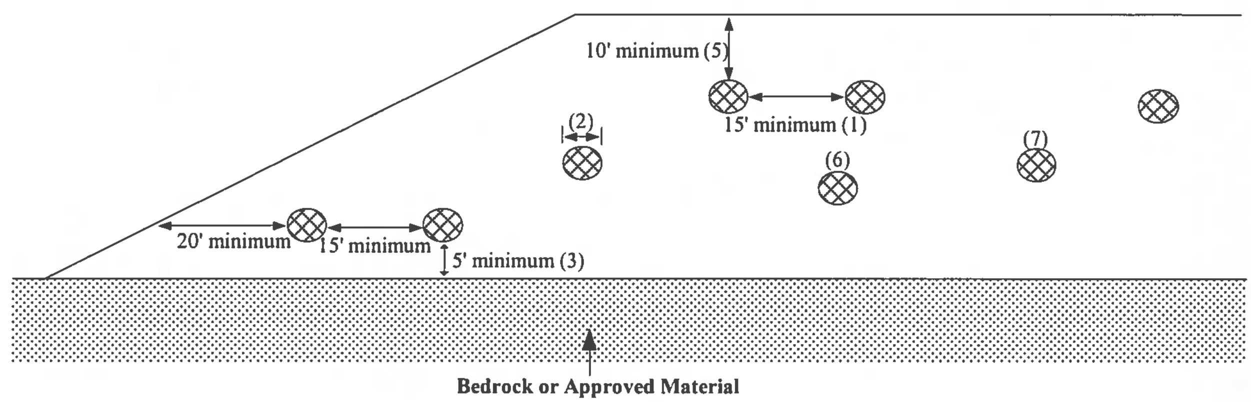
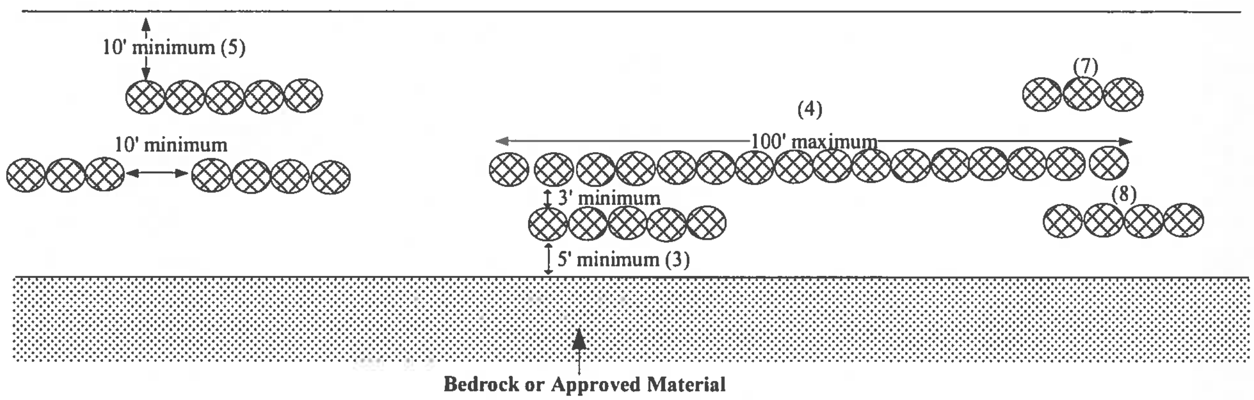
FIGURE K

OVERSIZE ROCK DISPOSAL

View Normal to Slope Face

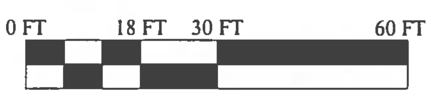


View Parallel to Slope Face



Note:
(1) One Equipment width or a minimum of 15 feet.
(2) Height and width may vary depending on rock size and type of equipment used. Length of windrow shall be no greater than 100 feet maximum.
(3) If approved by the soils engineer and/or engineering geologist.
(4) Orientation of windrows may vary but shall be as recommended by the soils engineer and/or engineering geologist. Unless recommended staggering of windrows is not necessary.
(5) Areas shall be cleared for utility trenches, foundations, and swimming pools.
(6) Voids in windrows shall be filled by flooding granular soil into place. Granular soil shall be any soil which has a unified soil classification system (Universal Building Code (UBC) 29-1). Designation of SM, SP, SW, GP, or GW.
(7) After fill between windrows is placed and compacted with the lift of fill covering windrow, windrow shall be proof rolled with a D-9 dozer or equivalent.
(8) Oversized rock is defined as larger than 12", and less than 4 feet in size.

Approximate Scale: 1" = 30'



Note: All distances are approximate

EARTHWORK AND GRADING GUIDELINES
OVERSIZE ROCK DISPOSAL

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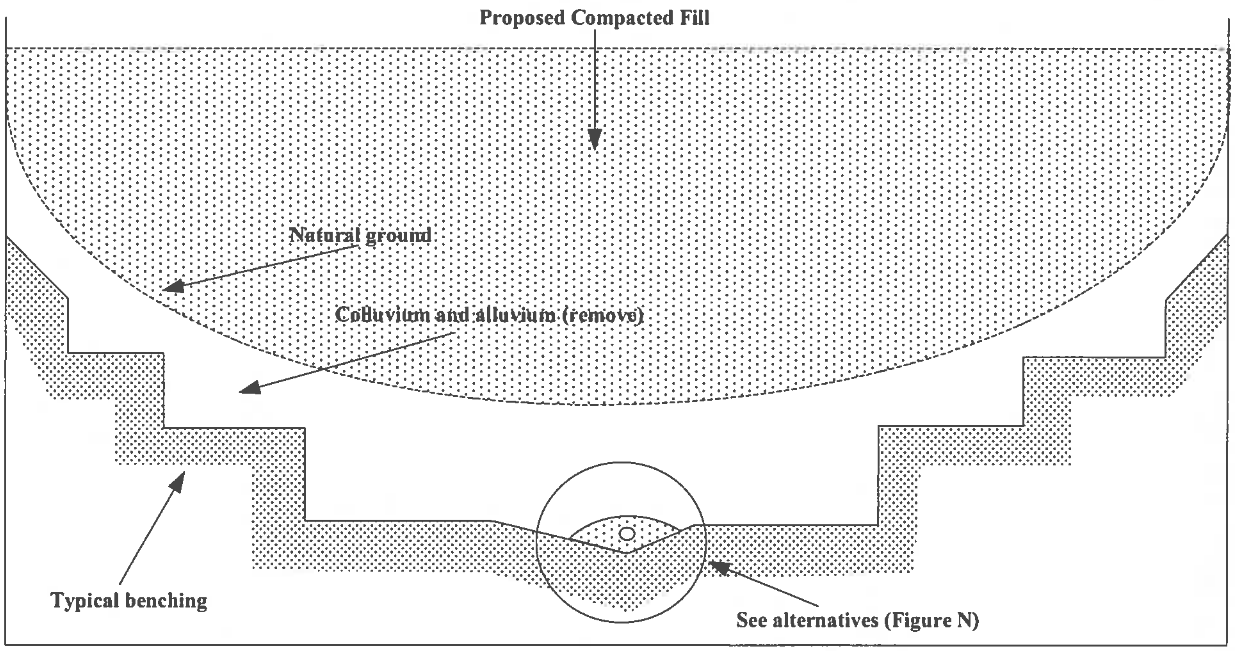
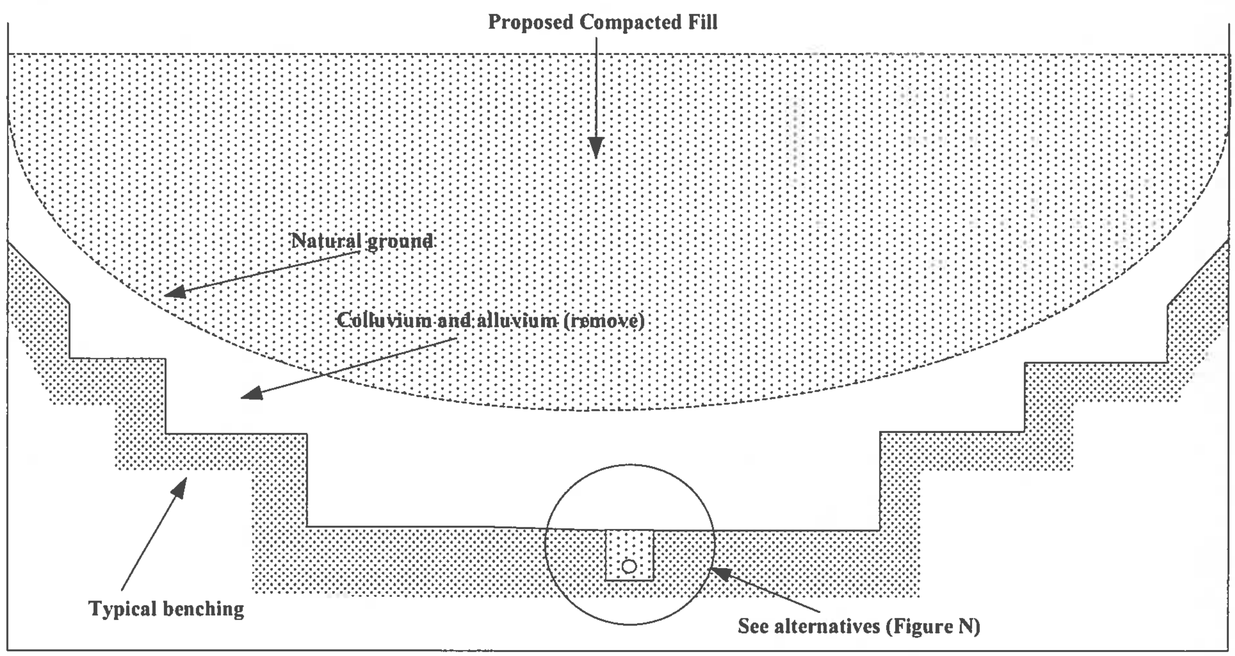
FIGURE L

CANYON SUBDRAIN DETAIL

Type A



Type B



Note: Alternatives, locations, and extent of subdrains should be determined by the soils engineer and/or engineering geologist during actual grading.

Note: Figures not to scale

EARTHWORK AND GRADING GUIDELINES
CANYON SUBDRAIN DETAIL

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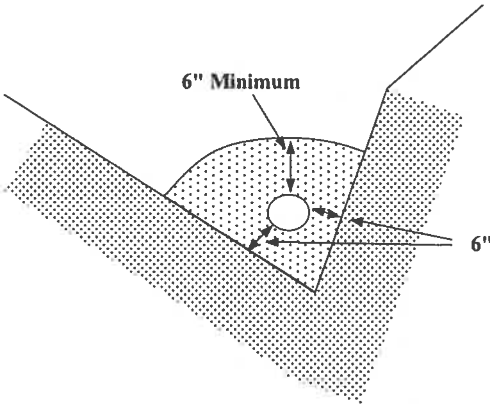
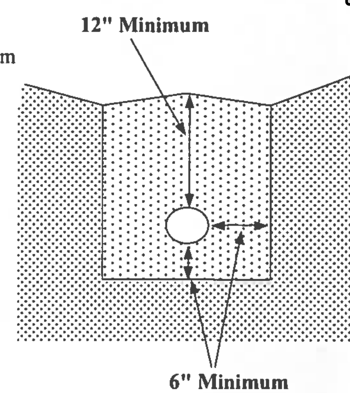
FIGURE M

CANYON SUBDRAIN ALTERNATE DETAILS

Alternate 1: Perforated Pipe and Filter Material



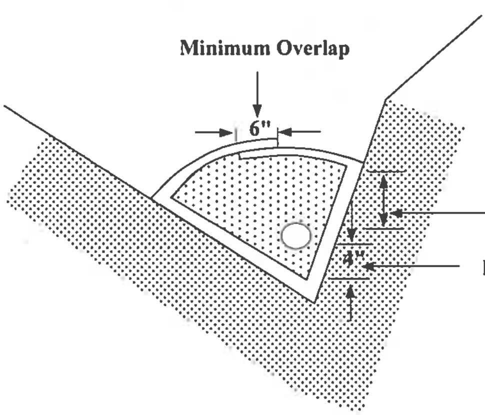
Filter material: Minimum volume of 9 feet^3/linear foot.
6" diameter ABS or PVC pipe or approved substitute with minimum 8 (¼" diameter) perforations per linear foot in bottom half of pipe.
ASTM D 2751, SDR 35 or ASTM D 1527, Schedule 40.
ASTM D 3034, SDR 35 or ASTM D 1785, Schedule 40.
For continuous run in excess of 500 feet use 8" diameter pipe.

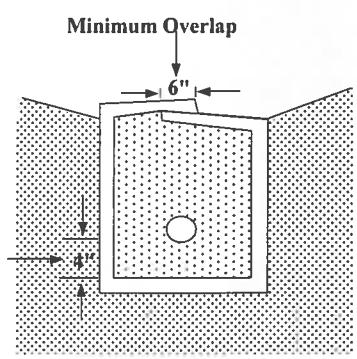


Filter Material

Sieve Size	Percent Passing
1"	100
¾"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

Alternate 2: Perforated Pipe, Gravel and Filter Fabric





Gravel material 9 feet^3/linear foot.
Perforated pipe: see alternate 1.
Gravel: Clean ¾" rock or approved substitute.
Filter Fabric: Mirafi 140 or approved substitute.

Note: Figures not to scale

EARTHWORK AND GRADING GUIDELINES
CANYON SUBDRAIN ALTERNATE DETAILS

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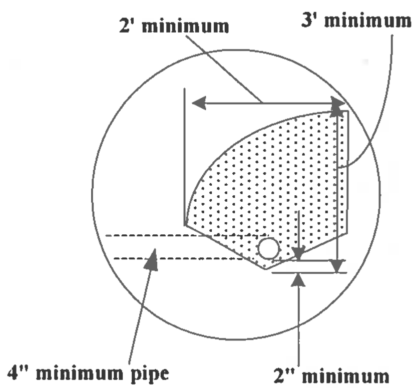
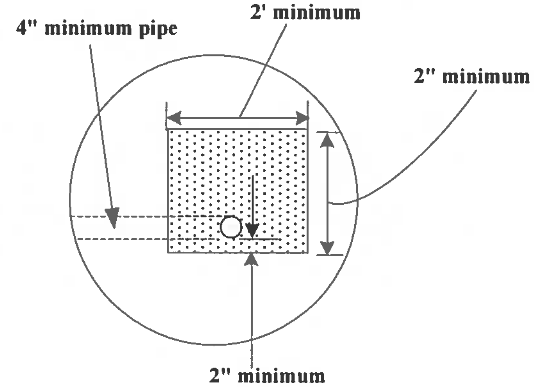
FIGURE N

TYPICAL STABILIZATION BUTTRESS SUBDRAIN DETAIL





Filter Material: Minimum of 5 ft^3/linear foot of pipe or 4 ft^3/linear foot of pipe when placed in square cut trench.

Alternative In Lieu Of Filter Material: Gravel may be encased in approved filter fabric. Filter fabric shall be mirafi 140 or equivalent. Filter fabric shall be lapped a minimum of 12" on all joints.

Minimum 4" Diameter Pipe: ABS-ASTM D-2751, SDR 35 or ASTM D-1527 schedule 40 PVC-ASTM D-3034, SDR 35 or ASTM D-1785 schedule 40 with a crushing strength of 1,000 pounds minimum, and a minimum of 8 uniformly spaced perforations per foot of pipe installed with perforations at bottom of pipe. Provide cap at upstream end of pipe. Slope at 2% to outlet pipe. Outlet pipe shall be connected to the subdrain pipe with tee or elbow.

Note:
(1) Trench for outlet pipes shall be backfilled with onsite soil.
(2) Backdrains and lateral drains shall be located at the elevation of every bench drain. First drain shall be located at the elevation just above the lower lot grade. Additional drains may be required at the discretion of the soils engineer and/or engineering geologist.

Filter Material – Shall be of the following specification or an approved equivalent:

Filter Material

Sieve Size	Percent Passing
1"	100
¾"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

Gravel - Shall be of the following specification or an approved equivalent:

Filter Material

Sieve Size	Percent Passing
1½"	100
No. 4	50
No. 200	8

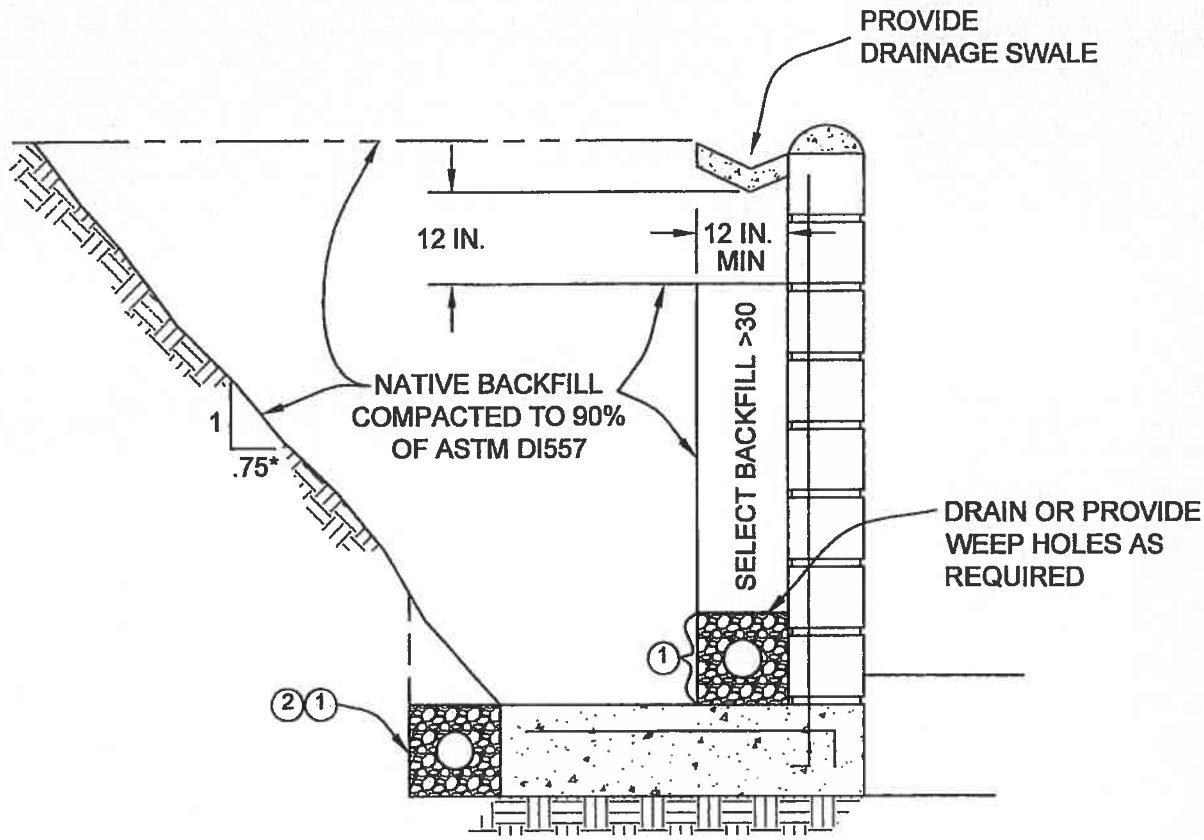
Sand equivalent: Minimum of 50

Note: Figures not to scale

EARTHWORK AND GRADING GUIDELINES
TYPICAL STABILIZATION BUTTRESS SUBDRAI
DETAIL

EEI
Expertise Service . . . *Solutions*

FIGURE O



* OR AS REQUIRED FOR SAFETY

NOTES

1. 4-INCH PERFORATED PVC SCHEDULE 40 OR APPROVED ALTERNATE. PLACE PERFORATION DOWN AND SURROUND WITH A MINIMUM OF 1 CUBIC FOOT PER LINEAL FOOT (1 FT. /FT.) OF 3/4 INCH ROCK OR APPROVED ALTERNATE AND WRAPPED IN FILTER FABRIC.

2. PLACE DRAIN AS SHOWN WHERE MOISTURE MIGRATION THROUGH THE WALL IS UNDESIRABLE.

NOTE: FIGURE NOT TO SCALE

EARTHWORK & GRADING GUIDELINES
TYPICAL RETAINING WALL BACKFILL

EEI
Expertise...Service...*Solutions*

FIGURE P

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

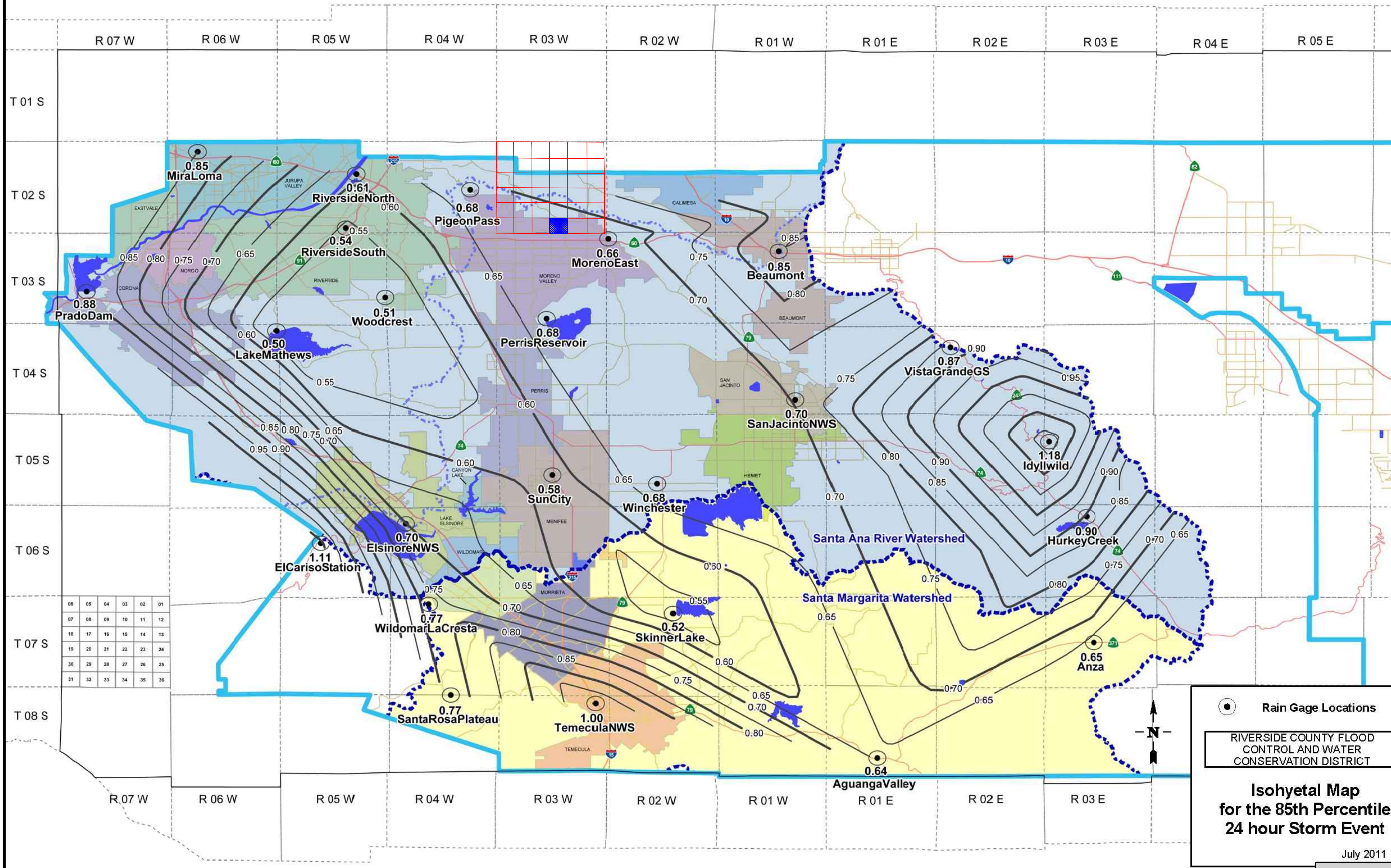
Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Isohyetal Map for the 85th Percentile 24-hour Storm Event



Attachment: Preliminary Water Quality Management Plan (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Santa Ana Watershed – BMP Design Volume Spreadsheets

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries | Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name: JLC Engineering and Consulting, Inc.
Date: 9/29/2015
Designed by: Jilleen Ferris
Case No:
Company Project Number/Name: Ironwood

BMP Identification

BMP NAME / ID: Basin A

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.70 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA A-1	*2128777.2*	*Mixed Surface Types*	*0.47*	*0.32*	*682396.8*			
	2128777.2	***Total***			682396.8	0.70	*39806.5*	*57912.8*

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: JLC Engineering and Consulting, Inc. Date: 9/29/2015

Designed by: Jilleen Ferris Case No:

Company Project Number/Name: Ironwood

BMP Identification

BMP NAME / ID: Basin B

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.70 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA B-1	*4864780.8*	*Mixed Surface Types*	*0.46*	*0.31*	*1530004.2*			
	4864780.8	***Total***			1530004.2	0.70	*89250.2*	*93429.9*

Notes:

Bioretention Facility – Design Procedure Spreadsheets (Irregular Shaped Facility)

Bioretention Facility - Design Procedure (Irregular Shaped Facility)	BMP ID	Legend:	Required Entries
	Basin A		Calculated Cells

Company Name:	JLC Engineering & Consulting	Date:	9/29/2015
Designed By:	Jilleen Ferris	County/City Case No.:	Ironwood

Design Volume

Enter the area tributary to this feature	$A_T =$	48.87	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	$V_{BMP} =$	39806.5	ft^3

Type of Bioretention Facility Design

- (●) Irregular shaped with side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) Irregular shaped with no side slopes required (perpendicular to parking space or planter boxes)

Bioretention Facility Surface Area

Proposed Bottom Surface Area of Irregular Shaped Facility		$A_P =$	32173.8	ft^2
Depth of Soil Filter Media Layer		$d_S =$	3	ft
Total Volume within Soil Media, V_S	$V_S = (A_P * d_S * 0.3)+(A_P * 0.4)$	$V_S =$	41825.9	ft^3
Total Surcharge Storage Volume above Soil Media, V_P		$V_P =$	16086.9	ft^3
Total Effective Storage Volume, V_E	$V_E = V_S + V_P$	$V_E =$	57912.8	ft^3
Total Effective Depth, d_E	$d_E = \frac{V_E}{A_P}$	$d_E =$	1.80	ft
Minimum Surface Area, A_M	$A_M = \frac{V_{BMP}}{d_E}$	$A_M =$	22115	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	$z =$	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0.001	%
6" Check Dam Spacing		0	feet

Describe Vegetation:

Notes: Basin side slopes include 50% at 2:1.

Bioretention Facility - Design Procedure (Irregular Shaped Facility)	BMP ID: Basin B	Legend: Required Entries / Calculated Cells

Company Name: JLC Engineering & Consulting — Date: 9/29/2015

Designed By: Jilleen Ferris — County/City Case No.: Ironwood

Design Volume

Enter the area tributary to this feature — A_T = 111.68 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP} = 89250.2 ft^3

Type of Bioretention Facility Design

- (●) Irregular shaped with side slopes required (parallel to parking spaces or adjacent to walkways)
- ( ) Irregular shaped with no side slopes required (perpendicular to parking space or planter boxes)

Bioretention Facility Surface Area

Proposed Bottom Surface Area of Irregular Shaped Facility — A_P = 51905.5 ft^2

Depth of Soil Filter Media Layer — d_S = 3 ft

Total Volume within Soil Media, V_S — $V_S = (A_P * d_S * 0.3)+(A_P * 0.4)$ — V_S = 67477.2 ft^3

Total Surcharge Storage Volume above Soil Media, V_P — V_P = 25952.8 ft^3

Total Effective Storage Volume, V_E — $V_E = V_S + V_P$ — V_E = 93429.9 ft^3

Total Effective Depth, d_E — $d_E = \frac{V_E}{A_P}$ — d_E = 1.80 ft

Minimum Surface Area, A_M — $A_M = \frac{V_{BMP}}{d_E}$ — A_M = 49584 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0.001 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes: Basin side slopes include 50% at 2:1.

Attachment: Preliminary Water Quality Management Plan (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

Basin Storage Volume Spreadsheet

BASIN "A"

Elevation	Contour Area (sf)	Contour Area (ac)	Contour Interval Volume (ac-ft)	Total Basin Volume (ac-ft)	Total Basin Volume (ft^3)
1835	32173.75	0.739		0	0.00
			0.785		
1836	36216.46	0.831		0.785	34175.17
			0.879		
1837	40380.33	0.927		1.663	72454.69
			0.976		
1838	44665.41	1.025		2.639	114959.56
			1.076		
1839	49071.77	1.127		3.715	161810.88
			1.178		
1840	53605.63	1.231		4.893	213132.89

BASIN "B"

Elevation	Contour Area (sf)	Contour Area (ac)	Contour Interval Volume (ac-ft)	Total Basin Volume (ac-ft)	Total Basin Volume (ft^3)
1827	51905.51	1.192		0	0.00
			1.285		
1828	60162.84	1.381		1.285	55983.41
			1.476		
1829	68546.02	1.574		2.762	120292.29
			1.670		
1830	77055.03	1.769		4.432	193051.34
			1.867		
1831	85689.88	1.967		6.299	274385.58
			2.067		
1832	94450.57	2.168		8.366	364420.28
			2.270		
1833	103337.09	2.372		10.635	463280.83

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

Pre-Project Condition Unit Hydrograph Calculations

Basin A – 2-Year, 24-Hour Storm Duration

```
       U n i t   H y d r o g r a p h   A n a l y s i s

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
              Study date  09/29/15 File: BASINAEX242.out


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6279

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
IRONWOOD PRE-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 2-YEAR, 24-HOUR STORM DURATION
FILENAME: BASINAEX

--------------------------------------------------------------------
Drainage Area =      48.87(Ac.)  =      0.076 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      48.87(Ac.)  =      0.076 Sq. Mi.
USER Entry of lag time in hours
Lag time =    0.192 Hr.
Lag time =    11.51 Min.
25% of lag time =     2.88 Min.
40% of lag time =     4.60 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       48.87           2.00                 97.74

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       48.87           5.00                244.35

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.000(In)
Area Averaged 100-Year Rainfall =    5.000(In)

Point rain (area averaged) =    2.000(In)
Areal adjustment factor =   99.99 %
Adjusted average point rain =    2.000(In)

Sub-Area Data:
Area(Ac.)          Runoff Index   Impervious %
    48.870           85.70         0.000
 Total Area Entered =     48.87(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
85.7  71.1      0.349     0.000        0.349       1.000      0.349
                                                  Sum (F) =   0.349
```

Area averaged mean soil loss (F) (In/Hr) = 0.349
Minimum soil loss rate ((In/Hr)) = 0.174
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.900

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	43.434	4.936	2.431
2	0.167	86.869	20.645	10.168
3	0.250	130.303	28.213	13.895
4	0.333	173.738	15.754	7.759
5	0.417	217.172	7.683	3.784
6	0.500	260.607	5.127	2.525
7	0.583	304.041	3.828	1.885
8	0.667	347.476	2.859	1.408
9	0.750	390.910	2.298	1.132
10	0.833	434.344	1.749	0.862
11	0.917	477.779	1.384	0.681
12	1.000	521.213	1.267	0.624
13	1.083	564.648	0.991	0.488
14	1.167	608.082	0.817	0.402
15	1.250	651.517	0.666	0.328
16	1.333	694.951	0.515	0.254
17	1.417	738.386	0.434	0.214
18	1.500	781.820	0.434	0.214
19	1.583	825.255	0.399	0.197
			Sum = 100.000	Sum= 49.252

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.016	(0.618)	0.014	0.002
2	0.17	0.07	0.016	(0.616)	0.014	0.002
3	0.25	0.07	0.016	(0.614)	0.014	0.002
4	0.33	0.10	0.024	(0.611)	0.022	0.002
5	0.42	0.10	0.024	(0.609)	0.022	0.002
6	0.50	0.10	0.024	(0.606)	0.022	0.002
7	0.58	0.10	0.024	(0.604)	0.022	0.002
8	0.67	0.10	0.024	(0.602)	0.022	0.002
9	0.75	0.10	0.024	(0.599)	0.022	0.002
10	0.83	0.13	0.032	(0.597)	0.029	0.003
11	0.92	0.13	0.032	(0.595)	0.029	0.003
12	1.00	0.13	0.032	(0.592)	0.029	0.003
13	1.08	0.10	0.024	(0.590)	0.022	0.002
14	1.17	0.10	0.024	(0.588)	0.022	0.002
15	1.25	0.10	0.024	(0.585)	0.022	0.002
16	1.33	0.10	0.024	(0.583)	0.022	0.002
17	1.42	0.10	0.024	(0.581)	0.022	0.002
18	1.50	0.10	0.024	(0.578)	0.022	0.002
19	1.58	0.10	0.024	(0.576)	0.022	0.002
20	1.67	0.10	0.024	(0.574)	0.022	0.002
21	1.75	0.10	0.024	(0.571)	0.022	0.002
22	1.83	0.13	0.032	(0.569)	0.029	0.003
23	1.92	0.13	0.032	(0.567)	0.029	0.003
24	2.00	0.13	0.032	(0.564)	0.029	0.003
25	2.08	0.13	0.032	(0.562)	0.029	0.003
26	2.17	0.13	0.032	(0.560)	0.029	0.003
27	2.25	0.13	0.032	(0.558)	0.029	0.003
28	2.33	0.13	0.032	(0.555)	0.029	0.003
29	2.42	0.13	0.032	(0.553)	0.029	0.003

30	2.50	0.13	0.032	(0.551)	0.029	0.003
31	2.58	0.17	0.040	(0.549)	0.036	0.004
32	2.67	0.17	0.040	(0.546)	0.036	0.004
33	2.75	0.17	0.040	(0.544)	0.036	0.004
34	2.83	0.17	0.040	(0.542)	0.036	0.004
35	2.92	0.17	0.040	(0.540)	0.036	0.004
36	3.00	0.17	0.040	(0.537)	0.036	0.004
37	3.08	0.17	0.040	(0.535)	0.036	0.004
38	3.17	0.17	0.040	(0.533)	0.036	0.004
39	3.25	0.17	0.040	(0.531)	0.036	0.004
40	3.33	0.17	0.040	(0.529)	0.036	0.004
41	3.42	0.17	0.040	(0.526)	0.036	0.004
42	3.50	0.17	0.040	(0.524)	0.036	0.004
43	3.58	0.17	0.040	(0.522)	0.036	0.004
44	3.67	0.17	0.040	(0.520)	0.036	0.004
45	3.75	0.17	0.040	(0.518)	0.036	0.004
46	3.83	0.20	0.048	(0.515)	0.043	0.005
47	3.92	0.20	0.048	(0.513)	0.043	0.005
48	4.00	0.20	0.048	(0.511)	0.043	0.005
49	4.08	0.20	0.048	(0.509)	0.043	0.005
50	4.17	0.20	0.048	(0.507)	0.043	0.005
51	4.25	0.20	0.048	(0.505)	0.043	0.005
52	4.33	0.23	0.056	(0.502)	0.050	0.006
53	4.42	0.23	0.056	(0.500)	0.050	0.006
54	4.50	0.23	0.056	(0.498)	0.050	0.006
55	4.58	0.23	0.056	(0.496)	0.050	0.006
56	4.67	0.23	0.056	(0.494)	0.050	0.006
57	4.75	0.23	0.056	(0.492)	0.050	0.006
58	4.83	0.27	0.064	(0.490)	0.058	0.006
59	4.92	0.27	0.064	(0.487)	0.058	0.006
60	5.00	0.27	0.064	(0.485)	0.058	0.006
61	5.08	0.20	0.048	(0.483)	0.043	0.005
62	5.17	0.20	0.048	(0.481)	0.043	0.005
63	5.25	0.20	0.048	(0.479)	0.043	0.005
64	5.33	0.23	0.056	(0.477)	0.050	0.006
65	5.42	0.23	0.056	(0.475)	0.050	0.006
66	5.50	0.23	0.056	(0.473)	0.050	0.006
67	5.58	0.27	0.064	(0.471)	0.058	0.006
68	5.67	0.27	0.064	(0.469)	0.058	0.006
69	5.75	0.27	0.064	(0.467)	0.058	0.006
70	5.83	0.27	0.064	(0.464)	0.058	0.006
71	5.92	0.27	0.064	(0.462)	0.058	0.006
72	6.00	0.27	0.064	(0.460)	0.058	0.006
73	6.08	0.30	0.072	(0.458)	0.065	0.007
74	6.17	0.30	0.072	(0.456)	0.065	0.007
75	6.25	0.30	0.072	(0.454)	0.065	0.007
76	6.33	0.30	0.072	(0.452)	0.065	0.007
77	6.42	0.30	0.072	(0.450)	0.065	0.007
78	6.50	0.30	0.072	(0.448)	0.065	0.007
79	6.58	0.33	0.080	(0.446)	0.072	0.008
80	6.67	0.33	0.080	(0.444)	0.072	0.008
81	6.75	0.33	0.080	(0.442)	0.072	0.008
82	6.83	0.33	0.080	(0.440)	0.072	0.008
83	6.92	0.33	0.080	(0.438)	0.072	0.008
84	7.00	0.33	0.080	(0.436)	0.072	0.008
85	7.08	0.33	0.080	(0.434)	0.072	0.008
86	7.17	0.33	0.080	(0.432)	0.072	0.008
87	7.25	0.33	0.080	(0.430)	0.072	0.008
88	7.33	0.37	0.088	(0.428)	0.079	0.009
89	7.42	0.37	0.088	(0.426)	0.079	0.009
90	7.50	0.37	0.088	(0.424)	0.079	0.009
91	7.58	0.40	0.096	(0.422)	0.086	0.010
92	7.67	0.40	0.096	(0.420)	0.086	0.010
93	7.75	0.40	0.096	(0.419)	0.086	0.010
94	7.83	0.43	0.104	(0.417)	0.094	0.010
95	7.92	0.43	0.104	(0.415)	0.094	0.010
96	8.00	0.43	0.104	(0.413)	0.094	0.010
97	8.08	0.50	0.120	(0.411)	0.108	0.012
98	8.17	0.50	0.120	(0.409)	0.108	0.012
99	8.25	0.50	0.120	(0.407)	0.108	0.012
100	8.33	0.50	0.120	(0.405)	0.108	0.012

101	8.42	0.50	0.120	(0.403)	0.108	0.012
102	8.50	0.50	0.120	(0.401)	0.108	0.012
103	8.58	0.53	0.128	(0.399)	0.115	0.013
104	8.67	0.53	0.128	(0.398)	0.115	0.013
105	8.75	0.53	0.128	(0.396)	0.115	0.013
106	8.83	0.57	0.136	(0.394)	0.122	0.014
107	8.92	0.57	0.136	(0.392)	0.122	0.014
108	9.00	0.57	0.136	(0.390)	0.122	0.014
109	9.08	0.63	0.152	(0.388)	0.137	0.015
110	9.17	0.63	0.152	(0.386)	0.137	0.015
111	9.25	0.63	0.152	(0.385)	0.137	0.015
112	9.33	0.67	0.160	(0.383)	0.144	0.016
113	9.42	0.67	0.160	(0.381)	0.144	0.016
114	9.50	0.67	0.160	(0.379)	0.144	0.016
115	9.58	0.70	0.168	(0.377)	0.151	0.017
116	9.67	0.70	0.168	(0.375)	0.151	0.017
117	9.75	0.70	0.168	(0.374)	0.151	0.017
118	9.83	0.73	0.176	(0.372)	0.158	0.018
119	9.92	0.73	0.176	(0.370)	0.158	0.018
120	10.00	0.73	0.176	(0.368)	0.158	0.018
121	10.08	0.50	0.120	(0.367)	0.108	0.012
122	10.17	0.50	0.120	(0.365)	0.108	0.012
123	10.25	0.50	0.120	(0.363)	0.108	0.012
124	10.33	0.50	0.120	(0.361)	0.108	0.012
125	10.42	0.50	0.120	(0.359)	0.108	0.012
126	10.50	0.50	0.120	(0.358)	0.108	0.012
127	10.58	0.67	0.160	(0.356)	0.144	0.016
128	10.67	0.67	0.160	(0.354)	0.144	0.016
129	10.75	0.67	0.160	(0.352)	0.144	0.016
130	10.83	0.67	0.160	(0.351)	0.144	0.016
131	10.92	0.67	0.160	(0.349)	0.144	0.016
132	11.00	0.67	0.160	(0.347)	0.144	0.016
133	11.08	0.63	0.152	(0.346)	0.137	0.015
134	11.17	0.63	0.152	(0.344)	0.137	0.015
135	11.25	0.63	0.152	(0.342)	0.137	0.015
136	11.33	0.63	0.152	(0.341)	0.137	0.015
137	11.42	0.63	0.152	(0.339)	0.137	0.015
138	11.50	0.63	0.152	(0.337)	0.137	0.015
139	11.58	0.57	0.136	(0.335)	0.122	0.014
140	11.67	0.57	0.136	(0.334)	0.122	0.014
141	11.75	0.57	0.136	(0.332)	0.122	0.014
142	11.83	0.60	0.144	(0.331)	0.130	0.014
143	11.92	0.60	0.144	(0.329)	0.130	0.014
144	12.00	0.60	0.144	(0.327)	0.130	0.014
145	12.08	0.83	0.200	(0.326)	0.180	0.020
146	12.17	0.83	0.200	(0.324)	0.180	0.020
147	12.25	0.83	0.200	(0.322)	0.180	0.020
148	12.33	0.87	0.208	(0.321)	0.187	0.021
149	12.42	0.87	0.208	(0.319)	0.187	0.021
150	12.50	0.87	0.208	(0.317)	0.187	0.021
151	12.58	0.93	0.224	(0.316)	0.202	0.022
152	12.67	0.93	0.224	(0.314)	0.202	0.022
153	12.75	0.93	0.224	(0.313)	0.202	0.022
154	12.83	0.97	0.232	(0.311)	0.209	0.023
155	12.92	0.97	0.232	(0.310)	0.209	0.023
156	13.00	0.97	0.232	(0.308)	0.209	0.023
157	13.08	1.13	0.272	(0.306)	0.245	0.027
158	13.17	1.13	0.272	(0.305)	0.245	0.027
159	13.25	1.13	0.272	(0.303)	0.245	0.027
160	13.33	1.13	0.272	(0.302)	0.245	0.027
161	13.42	1.13	0.272	(0.300)	0.245	0.027
162	13.50	1.13	0.272	(0.299)	0.245	0.027
163	13.58	0.77	0.184	(0.297)	0.166	0.018
164	13.67	0.77	0.184	(0.296)	0.166	0.018
165	13.75	0.77	0.184	(0.294)	0.166	0.018
166	13.83	0.77	0.184	(0.293)	0.166	0.018
167	13.92	0.77	0.184	(0.291)	0.166	0.018
168	14.00	0.77	0.184	(0.290)	0.166	0.018
169	14.08	0.90	0.216	(0.288)	0.194	0.022
170	14.17	0.90	0.216	(0.287)	0.194	0.022
171	14.25	0.90	0.216	(0.285)	0.194	0.022

172	14.33	0.87	0.208	(0.284)	0.187	0.021
173	14.42	0.87	0.208	(0.282)	0.187	0.021
174	14.50	0.87	0.208	(0.281)	0.187	0.021
175	14.58	0.87	0.208	(0.280)	0.187	0.021
176	14.67	0.87	0.208	(0.278)	0.187	0.021
177	14.75	0.87	0.208	(0.277)	0.187	0.021
178	14.83	0.83	0.200	(0.275)	0.180	0.020
179	14.92	0.83	0.200	(0.274)	0.180	0.020
180	15.00	0.83	0.200	(0.272)	0.180	0.020
181	15.08	0.80	0.192	(0.271)	0.173	0.019
182	15.17	0.80	0.192	(0.270)	0.173	0.019
183	15.25	0.80	0.192	(0.268)	0.173	0.019
184	15.33	0.77	0.184	(0.267)	0.166	0.018
185	15.42	0.77	0.184	(0.266)	0.166	0.018
186	15.50	0.77	0.184	(0.264)	0.166	0.018
187	15.58	0.63	0.152	(0.263)	0.137	0.015
188	15.67	0.63	0.152	(0.261)	0.137	0.015
189	15.75	0.63	0.152	(0.260)	0.137	0.015
190	15.83	0.63	0.152	(0.259)	0.137	0.015
191	15.92	0.63	0.152	(0.257)	0.137	0.015
192	16.00	0.63	0.152	(0.256)	0.137	0.015
193	16.08	0.13	0.032	(0.255)	0.029	0.003
194	16.17	0.13	0.032	(0.254)	0.029	0.003
195	16.25	0.13	0.032	(0.252)	0.029	0.003
196	16.33	0.13	0.032	(0.251)	0.029	0.003
197	16.42	0.13	0.032	(0.250)	0.029	0.003
198	16.50	0.13	0.032	(0.248)	0.029	0.003
199	16.58	0.10	0.024	(0.247)	0.022	0.002
200	16.67	0.10	0.024	(0.246)	0.022	0.002
201	16.75	0.10	0.024	(0.245)	0.022	0.002
202	16.83	0.10	0.024	(0.243)	0.022	0.002
203	16.92	0.10	0.024	(0.242)	0.022	0.002
204	17.00	0.10	0.024	(0.241)	0.022	0.002
205	17.08	0.17	0.040	(0.240)	0.036	0.004
206	17.17	0.17	0.040	(0.238)	0.036	0.004
207	17.25	0.17	0.040	(0.237)	0.036	0.004
208	17.33	0.17	0.040	(0.236)	0.036	0.004
209	17.42	0.17	0.040	(0.235)	0.036	0.004
210	17.50	0.17	0.040	(0.234)	0.036	0.004
211	17.58	0.17	0.040	(0.233)	0.036	0.004
212	17.67	0.17	0.040	(0.231)	0.036	0.004
213	17.75	0.17	0.040	(0.230)	0.036	0.004
214	17.83	0.13	0.032	(0.229)	0.029	0.003
215	17.92	0.13	0.032	(0.228)	0.029	0.003
216	18.00	0.13	0.032	(0.227)	0.029	0.003
217	18.08	0.13	0.032	(0.226)	0.029	0.003
218	18.17	0.13	0.032	(0.225)	0.029	0.003
219	18.25	0.13	0.032	(0.224)	0.029	0.003
220	18.33	0.13	0.032	(0.222)	0.029	0.003
221	18.42	0.13	0.032	(0.221)	0.029	0.003
222	18.50	0.13	0.032	(0.220)	0.029	0.003
223	18.58	0.10	0.024	(0.219)	0.022	0.002
224	18.67	0.10	0.024	(0.218)	0.022	0.002
225	18.75	0.10	0.024	(0.217)	0.022	0.002
226	18.83	0.07	0.016	(0.216)	0.014	0.002
227	18.92	0.07	0.016	(0.215)	0.014	0.002
228	19.00	0.07	0.016	(0.214)	0.014	0.002
229	19.08	0.10	0.024	(0.213)	0.022	0.002
230	19.17	0.10	0.024	(0.212)	0.022	0.002
231	19.25	0.10	0.024	(0.211)	0.022	0.002
232	19.33	0.13	0.032	(0.210)	0.029	0.003
233	19.42	0.13	0.032	(0.209)	0.029	0.003
234	19.50	0.13	0.032	(0.208)	0.029	0.003
235	19.58	0.10	0.024	(0.207)	0.022	0.002
236	19.67	0.10	0.024	(0.206)	0.022	0.002
237	19.75	0.10	0.024	(0.205)	0.022	0.002
238	19.83	0.07	0.016	(0.204)	0.014	0.002
239	19.92	0.07	0.016	(0.203)	0.014	0.002
240	20.00	0.07	0.016	(0.203)	0.014	0.002
241	20.08	0.10	0.024	(0.202)	0.022	0.002
242	20.17	0.10	0.024	(0.201)	0.022	0.002

243	20.25	0.10	0.024	(0.200)	0.022	0.002
244	20.33	0.10	0.024	(0.199)	0.022	0.002
245	20.42	0.10	0.024	(0.198)	0.022	0.002
246	20.50	0.10	0.024	(0.197)	0.022	0.002
247	20.58	0.10	0.024	(0.196)	0.022	0.002
248	20.67	0.10	0.024	(0.196)	0.022	0.002
249	20.75	0.10	0.024	(0.195)	0.022	0.002
250	20.83	0.07	0.016	(0.194)	0.014	0.002
251	20.92	0.07	0.016	(0.193)	0.014	0.002
252	21.00	0.07	0.016	(0.193)	0.014	0.002
253	21.08	0.10	0.024	(0.192)	0.022	0.002
254	21.17	0.10	0.024	(0.191)	0.022	0.002
255	21.25	0.10	0.024	(0.190)	0.022	0.002
256	21.33	0.07	0.016	(0.190)	0.014	0.002
257	21.42	0.07	0.016	(0.189)	0.014	0.002
258	21.50	0.07	0.016	(0.188)	0.014	0.002
259	21.58	0.10	0.024	(0.187)	0.022	0.002
260	21.67	0.10	0.024	(0.187)	0.022	0.002
261	21.75	0.10	0.024	(0.186)	0.022	0.002
262	21.83	0.07	0.016	(0.185)	0.014	0.002
263	21.92	0.07	0.016	(0.185)	0.014	0.002
264	22.00	0.07	0.016	(0.184)	0.014	0.002
265	22.08	0.10	0.024	(0.184)	0.022	0.002
266	22.17	0.10	0.024	(0.183)	0.022	0.002
267	22.25	0.10	0.024	(0.182)	0.022	0.002
268	22.33	0.07	0.016	(0.182)	0.014	0.002
269	22.42	0.07	0.016	(0.181)	0.014	0.002
270	22.50	0.07	0.016	(0.181)	0.014	0.002
271	22.58	0.07	0.016	(0.180)	0.014	0.002
272	22.67	0.07	0.016	(0.180)	0.014	0.002
273	22.75	0.07	0.016	(0.179)	0.014	0.002
274	22.83	0.07	0.016	(0.179)	0.014	0.002
275	22.92	0.07	0.016	(0.178)	0.014	0.002
276	23.00	0.07	0.016	(0.178)	0.014	0.002
277	23.08	0.07	0.016	(0.177)	0.014	0.002
278	23.17	0.07	0.016	(0.177)	0.014	0.002
279	23.25	0.07	0.016	(0.177)	0.014	0.002
280	23.33	0.07	0.016	(0.176)	0.014	0.002
281	23.42	0.07	0.016	(0.176)	0.014	0.002
282	23.50	0.07	0.016	(0.176)	0.014	0.002
283	23.58	0.07	0.016	(0.175)	0.014	0.002
284	23.67	0.07	0.016	(0.175)	0.014	0.002
285	23.75	0.07	0.016	(0.175)	0.014	0.002
286	23.83	0.07	0.016	(0.175)	0.014	0.002
287	23.92	0.07	0.016	(0.175)	0.014	0.002
288	24.00	0.07	0.016	(0.174)	0.014	0.002

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              (Loss Rate Not Used)
    Sum =     100.0                              Sum =     2.4
      Flood volume = Effective rainfall      0.20(In)
       times area      48.9(Ac.)/[(In)/(Ft.)] =      0.8(Ac.Ft)
      Total soil loss =      1.80(In)
      Total soil loss =     7.330(Ac.Ft)
      Total rainfall =      2.00(In)
      Flood volume =       35476.2 Cubic Feet
      Total soil loss =      319286.1 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      1.297(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      --------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 -----------------------------------------------------------------------
   0+ 5       0.0000      0.00  Q         |         |         |         |
   0+10       0.0002      0.02  Q         |         |         |         |
   0+15       0.0005      0.04  Q         |         |         |         |
   0+20       0.0008      0.06  Q         |         |         |         |
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  0+25       0.0013       0.07   Q          |          |          |          |
  0+30       0.0019       0.09   Q          |          |          |          |
  0+35       0.0026       0.10   Q          |          |          |          |
  0+40       0.0033       0.10   Q          |          |          |          |
  0+45       0.0040       0.10   Q          |          |          |          |
  0+50       0.0048       0.11   Q          |          |          |          |
  0+55       0.0056       0.12   Q          |          |          |          |
  1+ 0       0.0065       0.13   Q          |          |          |          |
  1+ 5       0.0074       0.14   Q          |          |          |          |
  1+10       0.0084       0.13   Q          |          |          |          |
  1+15       0.0092       0.13   Q          |          |          |          |
  1+20       0.0101       0.12   Q          |          |          |          |
  1+25       0.0109       0.12   Q          |          |          |          |
  1+30       0.0118       0.12   Q          |          |          |          |
  1+35       0.0126       0.12   Q          |          |          |          |
  1+40       0.0134       0.12   Q          |          |          |          |
  1+45       0.0142       0.12   Q          |          |          |          |
  1+50       0.0151       0.12   Q          |          |          |          |
  1+55       0.0160       0.13   Q          |          |          |          |
  2+ 0       0.0169       0.14   Q          |          |          |          |
  2+ 5       0.0179       0.15   Q          |          |          |          |
  2+10       0.0190       0.15   Q          |          |          |          |
  2+15       0.0200       0.15   Q          |          |          |          |
  2+20       0.0211       0.15   QV         |          |          |          |
  2+25       0.0221       0.15   QV         |          |          |          |
  2+30       0.0232       0.15   QV         |          |          |          |
  2+35       0.0243       0.16   QV         |          |          |          |
  2+40       0.0254       0.17   QV         |          |          |          |
  2+45       0.0266       0.18   QV         |          |          |          |
  2+50       0.0279       0.18   QV         |          |          |          |
  2+55       0.0292       0.19   QV         |          |          |          |
  3+ 0       0.0305       0.19   QV         |          |          |          |
  3+ 5       0.0318       0.19   QV         |          |          |          |
  3+10       0.0331       0.19   QV         |          |          |          |
  3+15       0.0345       0.19   QV         |          |          |          |
  3+20       0.0358       0.19   QV         |          |          |          |
  3+25       0.0371       0.19   QV         |          |          |          |
  3+30       0.0385       0.20   QV         |          |          |          |
  3+35       0.0398       0.20   QV         |          |          |          |
  3+40       0.0412       0.20   Q V        |          |          |          |
  3+45       0.0425       0.20   Q V        |          |          |          |
  3+50       0.0439       0.20   Q V        |          |          |          |
  3+55       0.0453       0.21   Q V        |          |          |          |
  4+ 0       0.0468       0.22   Q V        |          |          |          |
  4+ 5       0.0484       0.22   Q V        |          |          |          |
  4+10       0.0499       0.23   Q V        |          |          |          |
  4+15       0.0515       0.23   Q V        |          |          |          |
  4+20       0.0531       0.23   Q V        |          |          |          |
  4+25       0.0548       0.24   Q V        |          |          |          |
  4+30       0.0566       0.25   |QV        |          |          |          |
  4+35       0.0583       0.26   |QV        |          |          |          |
  4+40       0.0602       0.26   |QV        |          |          |          |
  4+45       0.0620       0.27   |Q V       |          |          |          |
  4+50       0.0639       0.27   |Q V       |          |          |          |
  4+55       0.0658       0.28   |Q V       |          |          |          |
  5+ 0       0.0678       0.29   |Q V       |          |          |          |
  5+ 5       0.0699       0.30   |Q V       |          |          |          |
  5+10       0.0718       0.28   |Q V       |          |          |          |
  5+15       0.0736       0.26   |Q V       |          |          |          |
  5+20       0.0754       0.26   |Q V       |          |          |          |
  5+25       0.0772       0.26   |Q V       |          |          |          |
  5+30       0.0790       0.27   |Q V       |          |          |          |
  5+35       0.0809       0.27   |Q V       |          |          |          |
  5+40       0.0829       0.28   |Q  V      |          |          |          |
  5+45       0.0849       0.30   |Q  V      |          |          |          |
  5+50       0.0870       0.30   |Q  V      |          |          |          |
  5+55       0.0891       0.31   |Q  V      |          |          |          |
  6+ 0       0.0912       0.31   |Q  V      |          |          |          |
  6+ 5       0.0933       0.31   |Q  V      |          |          |          |
  6+10       0.0956       0.32   |Q  V      |          |          |          |
  6+15       0.0978       0.33   |Q  V      |          |          |          |
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 6+20       0.1002      0.34  |Q  V     |         |         |         |
 6+25       0.1026      0.34  |Q   V    |         |         |         |
 6+30       0.1049      0.35  |Q   V    |         |         |         |
 6+35       0.1073      0.35  |Q   V    |         |         |         |
 6+40       0.1098      0.36  |Q   V    |         |         |         |
 6+45       0.1124      0.37  |Q   V    |         |         |         |
 6+50       0.1150      0.38  |Q   V    |         |         |         |
 6+55       0.1176      0.38  |Q   V    |         |         |         |
 7+ 0       0.1203      0.39  |Q   V    |         |         |         |
 7+ 5       0.1229      0.39  |Q    V   |         |         |         |
 7+10       0.1256      0.39  |Q    V   |         |         |         |
 7+15       0.1283      0.39  |Q    V   |         |         |         |
 7+20       0.1310      0.39  |Q    V   |         |         |         |
 7+25       0.1338      0.40  |Q    V   |         |         |         |
 7+30       0.1366      0.41  |Q    V   |         |         |         |
 7+35       0.1395      0.42  |Q    V   |         |         |         |
 7+40       0.1425      0.43  |Q    V   |         |         |         |
 7+45       0.1456      0.45  |Q     V  |         |         |         |
 7+50       0.1487      0.46  |Q     V  |         |         |         |
 7+55       0.1520      0.47  |Q     V  |         |         |         |
 8+ 0       0.1553      0.48  |Q     V  |         |         |         |
 8+ 5       0.1587      0.50  |Q     V  |         |         |         |
 8+10       0.1623      0.52  | Q    V  |         |         |         |
 8+15       0.1660      0.54  | Q     V |         |         |         |
 8+20       0.1699      0.56  | Q     V |         |         |         |
 8+25       0.1738      0.57  | Q     V |         |         |         |
 8+30       0.1777      0.57  | Q     V |         |         |         |
 8+35       0.1817      0.58  | Q     V |         |         |         |
 8+40       0.1857      0.59  | Q      V|         |         |         |
 8+45       0.1899      0.60  | Q      V|         |         |         |
 8+50       0.1941      0.61  | Q      V|         |         |         |
 8+55       0.1984      0.63  | Q      V|         |         |         |
 9+ 0       0.2028      0.64  | Q      V|         |         |         |
 9+ 5       0.2073      0.65  | Q       V         |         |         |
 9+10       0.2120      0.67  | Q       V         |         |         |
 9+15       0.2168      0.70  | Q       V         |         |         |
 9+20       0.2218      0.72  | Q       V         |         |         |
 9+25       0.2268      0.73  | Q       |V        |         |         |
 9+30       0.2320      0.75  |  Q      |V        |         |         |
 9+35       0.2372      0.76  |  Q      |V        |         |         |
 9+40       0.2426      0.78  |  Q      |V        |         |         |
 9+45       0.2481      0.79  |  Q      | V       |         |         |
 9+50       0.2536      0.81  |  Q      | V       |         |         |
 9+55       0.2592      0.82  |  Q      | V       |         |         |
10+ 0       0.2650      0.83  |  Q      |  V      |         |         |
10+ 5       0.2707      0.83  |  Q      |  V      |         |         |
10+10       0.2761      0.78  |  Q      |  V      |         |         |
10+15       0.2809      0.71  | Q       |  V      |         |         |
10+20       0.2855      0.66  | Q       |   V     |         |         |
10+25       0.2900      0.65  | Q       |   V     |         |         |
10+30       0.2943      0.63  | Q       |   V     |         |         |
10+35       0.2987      0.63  | Q       |   V     |         |         |
10+40       0.3033      0.67  | Q       |   V     |         |         |
10+45       0.3083      0.72  | Q       |    V    |         |         |
10+50       0.3134      0.75  | Q       |    V    |         |         |
10+55       0.3186      0.76  |  Q      |    V    |         |         |
11+ 0       0.3239      0.76  |  Q      |    V    |         |         |
11+ 5       0.3292      0.77  |  Q      |     V   |         |         |
11+10       0.3344      0.76  |  Q      |     V   |         |         |
11+15       0.3396      0.75  |  Q      |     V   |         |         |
11+20       0.3448      0.75  |  Q      |     V   |         |         |
11+25       0.3499      0.75  | Q       |      V  |         |         |
11+30       0.3551      0.75  | Q       |      V  |         |         |
11+35       0.3602      0.74  | Q       |      V  |         |         |
11+40       0.3652      0.73  | Q       |      V  |         |         |
11+45       0.3701      0.71  | Q       |       V |         |         |
11+50       0.3749      0.70  | Q       |       V |         |         |
11+55       0.3797      0.70  | Q       |       V |         |         |
12+ 0       0.3846      0.71  | Q       |       V |         |         |
12+ 5       0.3896      0.72  | Q       |        V|         |         |
12+10       0.3949      0.78  |  Q      |        V|         |         |
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12+15       0.4008      0.86  |  Q      |        V|         |         |
12+20       0.4071      0.90  |  Q      |        V|         |         |
12+25       0.4135      0.93  |  Q      |         V         |         |
12+30       0.4201      0.96  |  Q      |         V         |         |
12+35       0.4268      0.98  |  Q      |         V         |         |
12+40       0.4338      1.01  |   Q     |         |V        |         |
12+45       0.4409      1.04  |   Q     |         |V        |         |
12+50       0.4482      1.06  |   Q     |         | V       |         |
12+55       0.4556      1.08  |   Q     |         | V       |         |
13+ 0       0.4631      1.10  |   Q     |         | V       |         |
13+ 5       0.4708      1.12  |   Q     |         |  V      |         |
13+10       0.4789      1.17  |   Q     |         |  V      |         |
13+15       0.4873      1.23  |   Q     |         |  V      |         |
13+20       0.4960      1.26  |    Q    |         |   V     |         |
13+25       0.5049      1.28  |    Q    |         |   V     |         |
13+30       0.5138      1.30  |    Q    |         |    V    |         |
13+35       0.5227      1.29  |    Q    |         |    V    |         |
13+40       0.5309      1.20  |   Q     |         |     V   |         |
13+45       0.5384      1.09  |   Q     |         |     V   |         |
13+50       0.5455      1.02  |   Q     |         |     V   |         |
13+55       0.5523      0.99  |  Q      |         |      V  |         |
14+ 0       0.5590      0.97  |  Q      |         |      V  |         |
14+ 5       0.5657      0.97  |  Q      |         |      V  |         |
14+10       0.5725      0.99  |  Q      |         |       V |         |
14+15       0.5796      1.03  |   Q     |         |       V |         |
14+20       0.5867      1.04  |   Q     |         |       V |         |
14+25       0.5939      1.04  |   Q     |         |        V|         |
14+30       0.6010      1.03  |   Q     |         |        V|         |
14+35       0.6081      1.03  |   Q     |         |        V|         |
14+40       0.6152      1.03  |   Q     |         |         V         |
14+45       0.6222      1.03  |   Q     |         |         V         |
14+50       0.6293      1.02  |   Q     |         |         V         |
14+55       0.6363      1.01  |   Q     |         |         |V        |
15+ 0       0.6432      1.00  |   Q     |         |         |V        |
15+ 5       0.6500      0.99  |  Q      |         |         |V        |
15+10       0.6568      0.98  |  Q      |         |         | V       |
15+15       0.6635      0.97  |  Q      |         |         | V       |
15+20       0.6701      0.96  |  Q      |         |         | V       |
15+25       0.6766      0.95  |  Q      |         |         |  V      |
15+30       0.6830      0.94  |  Q      |         |         |  V      |
15+35       0.6894      0.92  |  Q      |         |         |  V      |
15+40       0.6955      0.88  |  Q      |         |         |   V     |
15+45       0.7012      0.83  |  Q      |         |         |   V     |
15+50       0.7068      0.81  |  Q      |         |         |   V     |
15+55       0.7122      0.79  |  Q      |         |         |   V     |
16+ 0       0.7176      0.78  |  Q      |         |         |    V    |
16+ 5       0.7227      0.75  | Q       |         |         |    V    |
16+10       0.7270      0.62  | Q       |         |         |    V    |
16+15       0.7301      0.45  |Q        |         |         |    V    |
16+20       0.7325      0.35  |Q        |         |         |    V    |
16+25       0.7346      0.30  |Q        |         |         |     V   |
16+30       0.7364      0.27  |Q        |         |         |     V   |
16+35       0.7381      0.24  Q         |         |         |     V   |
16+40       0.7396      0.22  Q         |         |         |     V   |
16+45       0.7409      0.19  Q         |         |         |     V   |
16+50       0.7421      0.17  Q         |         |         |     V   |
16+55       0.7432      0.16  Q         |         |         |     V   |
17+ 0       0.7442      0.15  Q         |         |         |     V   |
17+ 5       0.7453      0.15  Q         |         |         |     V   |
17+10       0.7463      0.16  Q         |         |         |     V   |
17+15       0.7475      0.17  Q         |         |         |     V   |
17+20       0.7488      0.18  Q         |         |         |     V   |
17+25       0.7501      0.19  Q         |         |         |     V   |
17+30       0.7514      0.19  Q         |         |         |     V   |
17+35       0.7527      0.19  Q         |         |         |     V   |
17+40       0.7540      0.19  Q         |         |         |      V  |
17+45       0.7553      0.19  Q         |         |         |      V  |
17+50       0.7566      0.19  Q         |         |         |      V  |
17+55       0.7579      0.18  Q         |         |         |      V  |
18+ 0       0.7590      0.17  Q         |         |         |      V  |
18+ 5       0.7602      0.17  Q         |         |         |      V  |
```

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  18+10        0.7613       0.16  Q         |         |         |      V  |
  18+15        0.7625       0.16  Q         |         |         |      V  |
  18+20        0.7636       0.16  Q         |         |         |      V  |
  18+25        0.7647       0.16  Q         |         |         |      V  |
  18+30        0.7658       0.16  Q         |         |         |      V  |
  18+35        0.7669       0.16  Q         |         |         |      V  |
  18+40        0.7679       0.15  Q         |         |         |      V  |
  18+45        0.7689       0.14  Q         |         |         |      V  |
  18+50        0.7698       0.13  Q         |         |         |      V  |
  18+55        0.7706       0.12  Q         |         |         |      V  |
  19+ 0        0.7713       0.10  Q         |         |         |      V  |
  19+ 5        0.7720       0.10  Q         |         |         |      V  |
  19+10        0.7727       0.10  Q         |         |         |      V  |
  19+15        0.7734       0.11  Q         |         |         |      V  |
  19+20        0.7742       0.12  Q         |         |         |       V |
  19+25        0.7751       0.13  Q         |         |         |       V |
  19+30        0.7761       0.14  Q         |         |         |       V |
  19+35        0.7770       0.14  Q         |         |         |       V |
  19+40        0.7780       0.14  Q         |         |         |       V |
  19+45        0.7789       0.13  Q         |         |         |       V |
  19+50        0.7797       0.12  Q         |         |         |       V |
  19+55        0.7805       0.11  Q         |         |         |       V |
  20+ 0        0.7812       0.10  Q         |         |         |       V |
  20+ 5        0.7818       0.09  Q         |         |         |       V |
  20+10        0.7825       0.10  Q         |         |         |       V |
  20+15        0.7832       0.11  Q         |         |         |       V |
  20+20        0.7840       0.11  Q         |         |         |       V |
  20+25        0.7848       0.11  Q         |         |         |       V |
  20+30        0.7856       0.12  Q         |         |         |       V |
  20+35        0.7864       0.12  Q         |         |         |       V |
  20+40        0.7872       0.12  Q         |         |         |       V |
  20+45        0.7880       0.12  Q         |         |         |       V |
  20+50        0.7888       0.12  Q         |         |         |       V |
  20+55        0.7896       0.11  Q         |         |         |       V |
  21+ 0        0.7902       0.10  Q         |         |         |       V |
  21+ 5        0.7908       0.09  Q         |         |         |       V |
  21+10        0.7915       0.10  Q         |         |         |       V |
  21+15        0.7923       0.11  Q         |         |         |       V |
  21+20        0.7930       0.11  Q         |         |         |       V |
  21+25        0.7937       0.10  Q         |         |         |       V |
  21+30        0.7944       0.09  Q         |         |         |        V|
  21+35        0.7950       0.09  Q         |         |         |        V|
  21+40        0.7956       0.10  Q         |         |         |        V|
  21+45        0.7964       0.11  Q         |         |         |        V|
  21+50        0.7971       0.11  Q         |         |         |        V|
  21+55        0.7978       0.10  Q         |         |         |        V|
  22+ 0        0.7985       0.09  Q         |         |         |        V|
  22+ 5        0.7991       0.09  Q         |         |         |        V|
  22+10        0.7997       0.10  Q         |         |         |        V|
  22+15        0.8004       0.10  Q         |         |         |        V|
  22+20        0.8012       0.11  Q         |         |         |        V|
  22+25        0.8019       0.10  Q         |         |         |        V|
  22+30        0.8025       0.09  Q         |         |         |        V|
  22+35        0.8031       0.09  Q         |         |         |        V|
  22+40        0.8037       0.09  Q         |         |         |        V|
  22+45        0.8043       0.08  Q         |         |         |        V|
  22+50        0.8049       0.08  Q         |         |         |        V|
  22+55        0.8054       0.08  Q         |         |         |        V|
  23+ 0        0.8060       0.08  Q         |         |         |        V|
  23+ 5        0.8065       0.08  Q         |         |         |        V|
  23+10        0.8071       0.08  Q         |         |         |        V|
  23+15        0.8076       0.08  Q         |         |         |        V|
  23+20        0.8082       0.08  Q         |         |         |        V|
  23+25        0.8087       0.08  Q         |         |         |        V|
  23+30        0.8093       0.08  Q         |         |         |        V|
  23+35        0.8098       0.08  Q         |         |         |        V|
  23+40        0.8104       0.08  Q         |         |         |        V|
  23+45        0.8109       0.08  Q         |         |         |        V|
  23+50        0.8115       0.08  Q         |         |         |        V|
  23+55        0.8120       0.08  Q         |         |         |        V|
  24+ 0        0.8125       0.08  Q         |         |         |        V|
```

```
   24+ 5        0.8131       0.07  Q         |         |         |        V|
   24+10        0.8135       0.06  Q         |         |         |        V|
   24+15        0.8137       0.04  Q         |         |         |        V|
   24+20        0.8139       0.02  Q         |         |         |        V|
   24+25        0.8140       0.02  Q         |         |         |        V|
   24+30        0.8141       0.01  Q         |         |         |        V|
   24+35        0.8142       0.01  Q         |         |         |        V|
   24+40        0.8142       0.01  Q         |         |         |        V|
   24+45        0.8143       0.01  Q         |         |         |        V|
   24+50        0.8143       0.01  Q         |         |         |        V|
   24+55        0.8143       0.00  Q         |         |         |        V|
   25+ 0        0.8144       0.00  Q         |         |         |        V|
   25+ 5        0.8144       0.00  Q         |         |         |        V|
   25+10        0.8144       0.00  Q         |         |         |        V|
   25+15        0.8144       0.00  Q         |         |         |        V|
   25+20        0.8144       0.00  Q         |         |         |        V|
   25+25        0.8144       0.00  Q         |         |         |        V|
   25+30        0.8144       0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

Basin B – 2-Year, 24-Hour Storm Duration

```
U n i t   H y d r o g r a p h   A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
       Study date  09/29/15 File: BASINBEX242.out

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------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6279

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
IRONWOOD PRE-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 2-YEAR, 24-HOUR STORM DURATION
FILENAME: BASINBEX

--------------------------------------------------------------------
Drainage Area =     111.68(Ac.)  =      0.175 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =     111.68(Ac.)  =      0.175 Sq. Mi.
USER Entry of lag time in hours
Lag time =    0.209 Hr.
Lag time =    12.52 Min.
25% of lag time =     3.13 Min.
40% of lag time =     5.01 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
      111.68           2.00                 223.36

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
      111.68           5.00                 558.40

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.000(In)
Area Averaged 100-Year Rainfall =    5.000(In)

Point rain (area averaged) =    2.000(In)
Areal adjustment factor =   99.98 %
Adjusted average point rain =    2.000(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
   111.680           79.90         0.000
 Total Area Entered =    111.68(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
79.9  62.9      0.439     0.000        0.439       1.000      0.439
                                                  Sum (F) =   0.439
```

Attachment: Preliminary Water Quality Management Plan (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
Area averaged mean soil loss (F) (In/Hr) =  0.439
Minimum soil loss rate ((In/Hr)) =  0.219
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.900
--------------------------------------------------------------------

               U n i t   H y d r o g r a p h
                      VALLEY S-Curve
--------------------------------------------------------------------
               Unit Hydrograph Data
--------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                            Graph %           (CFS)
--------------------------------------------------------------------
    1   0.083          39.937          4.346              4.892
    2   0.167          79.875         17.838             20.077
    3   0.250         119.812         26.719             30.073
    4   0.333         159.750         17.477             19.670
    5   0.417         199.687          8.542              9.614
    6   0.500         239.624          5.384              6.059
    7   0.583         279.562          4.019              4.523
    8   0.667         319.499          3.085              3.472
    9   0.750         359.436          2.441              2.748
   10   0.833         399.374          1.944              2.188
   11   0.917         439.311          1.525              1.717
   12   1.000         479.249          1.257              1.414
   13   1.083         519.186          1.164              1.310
   14   1.167         559.123          0.918              1.033
   15   1.250         599.061          0.766              0.863
   16   1.333         638.998          0.643              0.723
   17   1.417         678.935          0.517              0.582
   18   1.500         718.873          0.405              0.456
   19   1.583         758.810          0.399              0.450
   20   1.667         798.748          0.399              0.450
   21   1.750         838.685          0.212              0.239
                               Sum = 100.000   Sum=     112.552
----------------------------------------------------------------------

The following loss rate calculations reflect use of the minimum calculated loss
rate subtracted from the Storm Rain to produce the maximum Effective Rain value

 Unit Time   Pattern   Storm Rain     Loss rate(In./Hr)     Effective
      (Hr.)  Percent   (In/Hr)         Max    |    Low        (In/Hr)
  1   0.08     0.07     0.016        (  0.778)       0.014        0.002
  2   0.17     0.07     0.016        (  0.775)       0.014        0.002
  3   0.25     0.07     0.016        (  0.772)       0.014        0.002
  4   0.33     0.10     0.024        (  0.769)       0.022        0.002
  5   0.42     0.10     0.024        (  0.766)       0.022        0.002
  6   0.50     0.10     0.024        (  0.763)       0.022        0.002
  7   0.58     0.10     0.024        (  0.760)       0.022        0.002
  8   0.67     0.10     0.024        (  0.757)       0.022        0.002
  9   0.75     0.10     0.024        (  0.754)       0.022        0.002
 10   0.83     0.13     0.032        (  0.751)       0.029        0.003
 11   0.92     0.13     0.032        (  0.748)       0.029        0.003
 12   1.00     0.13     0.032        (  0.745)       0.029        0.003
 13   1.08     0.10     0.024        (  0.742)       0.022        0.002
 14   1.17     0.10     0.024        (  0.739)       0.022        0.002
 15   1.25     0.10     0.024        (  0.736)       0.022        0.002
 16   1.33     0.10     0.024        (  0.734)       0.022        0.002
 17   1.42     0.10     0.024        (  0.731)       0.022        0.002
 18   1.50     0.10     0.024        (  0.728)       0.022        0.002
 19   1.58     0.10     0.024        (  0.725)       0.022        0.002
 20   1.67     0.10     0.024        (  0.722)       0.022        0.002
 21   1.75     0.10     0.024        (  0.719)       0.022        0.002
 22   1.83     0.13     0.032        (  0.716)       0.029        0.003
 23   1.92     0.13     0.032        (  0.713)       0.029        0.003
 24   2.00     0.13     0.032        (  0.710)       0.029        0.003
 25   2.08     0.13     0.032        (  0.707)       0.029        0.003
 26   2.17     0.13     0.032        (  0.705)       0.029        0.003
 27   2.25     0.13     0.032        (  0.702)       0.029        0.003
```

28	2.33	0.13	0.032	(0.699)	0.029	0.003
29	2.42	0.13	0.032	(0.696)	0.029	0.003
30	2.50	0.13	0.032	(0.693)	0.029	0.003
31	2.58	0.17	0.040	(0.690)	0.036	0.004
32	2.67	0.17	0.040	(0.687)	0.036	0.004
33	2.75	0.17	0.040	(0.685)	0.036	0.004
34	2.83	0.17	0.040	(0.682)	0.036	0.004
35	2.92	0.17	0.040	(0.679)	0.036	0.004
36	3.00	0.17	0.040	(0.676)	0.036	0.004
37	3.08	0.17	0.040	(0.673)	0.036	0.004
38	3.17	0.17	0.040	(0.671)	0.036	0.004
39	3.25	0.17	0.040	(0.668)	0.036	0.004
40	3.33	0.17	0.040	(0.665)	0.036	0.004
41	3.42	0.17	0.040	(0.662)	0.036	0.004
42	3.50	0.17	0.040	(0.660)	0.036	0.004
43	3.58	0.17	0.040	(0.657)	0.036	0.004
44	3.67	0.17	0.040	(0.654)	0.036	0.004
45	3.75	0.17	0.040	(0.651)	0.036	0.004
46	3.83	0.20	0.048	(0.649)	0.043	0.005
47	3.92	0.20	0.048	(0.646)	0.043	0.005
48	4.00	0.20	0.048	(0.643)	0.043	0.005
49	4.08	0.20	0.048	(0.640)	0.043	0.005
50	4.17	0.20	0.048	(0.638)	0.043	0.005
51	4.25	0.20	0.048	(0.635)	0.043	0.005
52	4.33	0.23	0.056	(0.632)	0.050	0.006
53	4.42	0.23	0.056	(0.629)	0.050	0.006
54	4.50	0.23	0.056	(0.627)	0.050	0.006
55	4.58	0.23	0.056	(0.624)	0.050	0.006
56	4.67	0.23	0.056	(0.621)	0.050	0.006
57	4.75	0.23	0.056	(0.619)	0.050	0.006
58	4.83	0.27	0.064	(0.616)	0.058	0.006
59	4.92	0.27	0.064	(0.613)	0.058	0.006
60	5.00	0.27	0.064	(0.611)	0.058	0.006
61	5.08	0.20	0.048	(0.608)	0.043	0.005
62	5.17	0.20	0.048	(0.605)	0.043	0.005
63	5.25	0.20	0.048	(0.603)	0.043	0.005
64	5.33	0.23	0.056	(0.600)	0.050	0.006
65	5.42	0.23	0.056	(0.598)	0.050	0.006
66	5.50	0.23	0.056	(0.595)	0.050	0.006
67	5.58	0.27	0.064	(0.592)	0.058	0.006
68	5.67	0.27	0.064	(0.590)	0.058	0.006
69	5.75	0.27	0.064	(0.587)	0.058	0.006
70	5.83	0.27	0.064	(0.585)	0.058	0.006
71	5.92	0.27	0.064	(0.582)	0.058	0.006
72	6.00	0.27	0.064	(0.579)	0.058	0.006
73	6.08	0.30	0.072	(0.577)	0.065	0.007
74	6.17	0.30	0.072	(0.574)	0.065	0.007
75	6.25	0.30	0.072	(0.572)	0.065	0.007
76	6.33	0.30	0.072	(0.569)	0.065	0.007
77	6.42	0.30	0.072	(0.567)	0.065	0.007
78	6.50	0.30	0.072	(0.564)	0.065	0.007
79	6.58	0.33	0.080	(0.561)	0.072	0.008
80	6.67	0.33	0.080	(0.559)	0.072	0.008
81	6.75	0.33	0.080	(0.556)	0.072	0.008
82	6.83	0.33	0.080	(0.554)	0.072	0.008
83	6.92	0.33	0.080	(0.551)	0.072	0.008
84	7.00	0.33	0.080	(0.549)	0.072	0.008
85	7.08	0.33	0.080	(0.546)	0.072	0.008
86	7.17	0.33	0.080	(0.544)	0.072	0.008
87	7.25	0.33	0.080	(0.541)	0.072	0.008
88	7.33	0.37	0.088	(0.539)	0.079	0.009
89	7.42	0.37	0.088	(0.536)	0.079	0.009
90	7.50	0.37	0.088	(0.534)	0.079	0.009
91	7.58	0.40	0.096	(0.532)	0.086	0.010
92	7.67	0.40	0.096	(0.529)	0.086	0.010
93	7.75	0.40	0.096	(0.527)	0.086	0.010
94	7.83	0.43	0.104	(0.524)	0.094	0.010
95	7.92	0.43	0.104	(0.522)	0.094	0.010
96	8.00	0.43	0.104	(0.519)	0.094	0.010
97	8.08	0.50	0.120	(0.517)	0.108	0.012
98	8.17	0.50	0.120	(0.515)	0.108	0.012

99	8.25	0.50	0.120	(0.512)	0.108	0.012
100	8.33	0.50	0.120	(0.510)	0.108	0.012
101	8.42	0.50	0.120	(0.507)	0.108	0.012
102	8.50	0.50	0.120	(0.505)	0.108	0.012
103	8.58	0.53	0.128	(0.503)	0.115	0.013
104	8.67	0.53	0.128	(0.500)	0.115	0.013
105	8.75	0.53	0.128	(0.498)	0.115	0.013
106	8.83	0.57	0.136	(0.496)	0.122	0.014
107	8.92	0.57	0.136	(0.493)	0.122	0.014
108	9.00	0.57	0.136	(0.491)	0.122	0.014
109	9.08	0.63	0.152	(0.489)	0.137	0.015
110	9.17	0.63	0.152	(0.486)	0.137	0.015
111	9.25	0.63	0.152	(0.484)	0.137	0.015
112	9.33	0.67	0.160	(0.482)	0.144	0.016
113	9.42	0.67	0.160	(0.479)	0.144	0.016
114	9.50	0.67	0.160	(0.477)	0.144	0.016
115	9.58	0.70	0.168	(0.475)	0.151	0.017
116	9.67	0.70	0.168	(0.473)	0.151	0.017
117	9.75	0.70	0.168	(0.470)	0.151	0.017
118	9.83	0.73	0.176	(0.468)	0.158	0.018
119	9.92	0.73	0.176	(0.466)	0.158	0.018
120	10.00	0.73	0.176	(0.463)	0.158	0.018
121	10.08	0.50	0.120	(0.461)	0.108	0.012
122	10.17	0.50	0.120	(0.459)	0.108	0.012
123	10.25	0.50	0.120	(0.457)	0.108	0.012
124	10.33	0.50	0.120	(0.455)	0.108	0.012
125	10.42	0.50	0.120	(0.452)	0.108	0.012
126	10.50	0.50	0.120	(0.450)	0.108	0.012
127	10.58	0.67	0.160	(0.448)	0.144	0.016
128	10.67	0.67	0.160	(0.446)	0.144	0.016
129	10.75	0.67	0.160	(0.444)	0.144	0.016
130	10.83	0.67	0.160	(0.441)	0.144	0.016
131	10.92	0.67	0.160	(0.439)	0.144	0.016
132	11.00	0.67	0.160	(0.437)	0.144	0.016
133	11.08	0.63	0.152	(0.435)	0.137	0.015
134	11.17	0.63	0.152	(0.433)	0.137	0.015
135	11.25	0.63	0.152	(0.431)	0.137	0.015
136	11.33	0.63	0.152	(0.429)	0.137	0.015
137	11.42	0.63	0.152	(0.426)	0.137	0.015
138	11.50	0.63	0.152	(0.424)	0.137	0.015
139	11.58	0.57	0.136	(0.422)	0.122	0.014
140	11.67	0.57	0.136	(0.420)	0.122	0.014
141	11.75	0.57	0.136	(0.418)	0.122	0.014
142	11.83	0.60	0.144	(0.416)	0.130	0.014
143	11.92	0.60	0.144	(0.414)	0.130	0.014
144	12.00	0.60	0.144	(0.412)	0.130	0.014
145	12.08	0.83	0.200	(0.410)	0.180	0.020
146	12.17	0.83	0.200	(0.408)	0.180	0.020
147	12.25	0.83	0.200	(0.406)	0.180	0.020
148	12.33	0.87	0.208	(0.404)	0.187	0.021
149	12.42	0.87	0.208	(0.402)	0.187	0.021
150	12.50	0.87	0.208	(0.400)	0.187	0.021
151	12.58	0.93	0.224	(0.398)	0.202	0.022
152	12.67	0.93	0.224	(0.396)	0.202	0.022
153	12.75	0.93	0.224	(0.394)	0.202	0.022
154	12.83	0.97	0.232	(0.392)	0.209	0.023
155	12.92	0.97	0.232	(0.390)	0.209	0.023
156	13.00	0.97	0.232	(0.388)	0.209	0.023
157	13.08	1.13	0.272	(0.386)	0.245	0.027
158	13.17	1.13	0.272	(0.384)	0.245	0.027
159	13.25	1.13	0.272	(0.382)	0.245	0.027
160	13.33	1.13	0.272	(0.380)	0.245	0.027
161	13.42	1.13	0.272	(0.378)	0.245	0.027
162	13.50	1.13	0.272	(0.376)	0.245	0.027
163	13.58	0.77	0.184	(0.374)	0.166	0.018
164	13.67	0.77	0.184	(0.372)	0.166	0.018
165	13.75	0.77	0.184	(0.370)	0.166	0.018
166	13.83	0.77	0.184	(0.368)	0.166	0.018
167	13.92	0.77	0.184	(0.366)	0.166	0.018
168	14.00	0.77	0.184	(0.365)	0.166	0.018
169	14.08	0.90	0.216	(0.363)	0.194	0.022

170	14.17	0.90	0.216	(0.361)	0.194	0.022
171	14.25	0.90	0.216	(0.359)	0.194	0.022
172	14.33	0.87	0.208	(0.357)	0.187	0.021
173	14.42	0.87	0.208	(0.355)	0.187	0.021
174	14.50	0.87	0.208	(0.354)	0.187	0.021
175	14.58	0.87	0.208	(0.352)	0.187	0.021
176	14.67	0.87	0.208	(0.350)	0.187	0.021
177	14.75	0.87	0.208	(0.348)	0.187	0.021
178	14.83	0.83	0.200	(0.346)	0.180	0.020
179	14.92	0.83	0.200	(0.345)	0.180	0.020
180	15.00	0.83	0.200	(0.343)	0.180	0.020
181	15.08	0.80	0.192	(0.341)	0.173	0.019
182	15.17	0.80	0.192	(0.339)	0.173	0.019
183	15.25	0.80	0.192	(0.338)	0.173	0.019
184	15.33	0.77	0.184	(0.336)	0.166	0.018
185	15.42	0.77	0.184	(0.334)	0.166	0.018
186	15.50	0.77	0.184	(0.332)	0.166	0.018
187	15.58	0.63	0.152	(0.331)	0.137	0.015
188	15.67	0.63	0.152	(0.329)	0.137	0.015
189	15.75	0.63	0.152	(0.327)	0.137	0.015
190	15.83	0.63	0.152	(0.326)	0.137	0.015
191	15.92	0.63	0.152	(0.324)	0.137	0.015
192	16.00	0.63	0.152	(0.322)	0.137	0.015
193	16.08	0.13	0.032	(0.321)	0.029	0.003
194	16.17	0.13	0.032	(0.319)	0.029	0.003
195	16.25	0.13	0.032	(0.317)	0.029	0.003
196	16.33	0.13	0.032	(0.316)	0.029	0.003
197	16.42	0.13	0.032	(0.314)	0.029	0.003
198	16.50	0.13	0.032	(0.313)	0.029	0.003
199	16.58	0.10	0.024	(0.311)	0.022	0.002
200	16.67	0.10	0.024	(0.309)	0.022	0.002
201	16.75	0.10	0.024	(0.308)	0.022	0.002
202	16.83	0.10	0.024	(0.306)	0.022	0.002
203	16.92	0.10	0.024	(0.305)	0.022	0.002
204	17.00	0.10	0.024	(0.303)	0.022	0.002
205	17.08	0.17	0.040	(0.302)	0.036	0.004
206	17.17	0.17	0.040	(0.300)	0.036	0.004
207	17.25	0.17	0.040	(0.299)	0.036	0.004
208	17.33	0.17	0.040	(0.297)	0.036	0.004
209	17.42	0.17	0.040	(0.296)	0.036	0.004
210	17.50	0.17	0.040	(0.294)	0.036	0.004
211	17.58	0.17	0.040	(0.293)	0.036	0.004
212	17.67	0.17	0.040	(0.291)	0.036	0.004
213	17.75	0.17	0.040	(0.290)	0.036	0.004
214	17.83	0.13	0.032	(0.288)	0.029	0.003
215	17.92	0.13	0.032	(0.287)	0.029	0.003
216	18.00	0.13	0.032	(0.285)	0.029	0.003
217	18.08	0.13	0.032	(0.284)	0.029	0.003
218	18.17	0.13	0.032	(0.283)	0.029	0.003
219	18.25	0.13	0.032	(0.281)	0.029	0.003
220	18.33	0.13	0.032	(0.280)	0.029	0.003
221	18.42	0.13	0.032	(0.279)	0.029	0.003
222	18.50	0.13	0.032	(0.277)	0.029	0.003
223	18.58	0.10	0.024	(0.276)	0.022	0.002
224	18.67	0.10	0.024	(0.275)	0.022	0.002
225	18.75	0.10	0.024	(0.273)	0.022	0.002
226	18.83	0.07	0.016	(0.272)	0.014	0.002
227	18.92	0.07	0.016	(0.271)	0.014	0.002
228	19.00	0.07	0.016	(0.269)	0.014	0.002
229	19.08	0.10	0.024	(0.268)	0.022	0.002
230	19.17	0.10	0.024	(0.267)	0.022	0.002
231	19.25	0.10	0.024	(0.266)	0.022	0.002
232	19.33	0.13	0.032	(0.264)	0.029	0.003
233	19.42	0.13	0.032	(0.263)	0.029	0.003
234	19.50	0.13	0.032	(0.262)	0.029	0.003
235	19.58	0.10	0.024	(0.261)	0.022	0.002
236	19.67	0.10	0.024	(0.259)	0.022	0.002
237	19.75	0.10	0.024	(0.258)	0.022	0.002
238	19.83	0.07	0.016	(0.257)	0.014	0.002
239	19.92	0.07	0.016	(0.256)	0.014	0.002
240	20.00	0.07	0.016	(0.255)	0.014	0.002

241	20.08	0.10	0.024	(0.254)	0.022	0.002
242	20.17	0.10	0.024	(0.253)	0.022	0.002
243	20.25	0.10	0.024	(0.252)	0.022	0.002
244	20.33	0.10	0.024	(0.250)	0.022	0.002
245	20.42	0.10	0.024	(0.249)	0.022	0.002
246	20.50	0.10	0.024	(0.248)	0.022	0.002
247	20.58	0.10	0.024	(0.247)	0.022	0.002
248	20.67	0.10	0.024	(0.246)	0.022	0.002
249	20.75	0.10	0.024	(0.245)	0.022	0.002
250	20.83	0.07	0.016	(0.244)	0.014	0.002
251	20.92	0.07	0.016	(0.243)	0.014	0.002
252	21.00	0.07	0.016	(0.242)	0.014	0.002
253	21.08	0.10	0.024	(0.241)	0.022	0.002
254	21.17	0.10	0.024	(0.240)	0.022	0.002
255	21.25	0.10	0.024	(0.239)	0.022	0.002
256	21.33	0.07	0.016	(0.238)	0.014	0.002
257	21.42	0.07	0.016	(0.238)	0.014	0.002
258	21.50	0.07	0.016	(0.237)	0.014	0.002
259	21.58	0.10	0.024	(0.236)	0.022	0.002
260	21.67	0.10	0.024	(0.235)	0.022	0.002
261	21.75	0.10	0.024	(0.234)	0.022	0.002
262	21.83	0.07	0.016	(0.233)	0.014	0.002
263	21.92	0.07	0.016	(0.233)	0.014	0.002
264	22.00	0.07	0.016	(0.232)	0.014	0.002
265	22.08	0.10	0.024	(0.231)	0.022	0.002
266	22.17	0.10	0.024	(0.230)	0.022	0.002
267	22.25	0.10	0.024	(0.229)	0.022	0.002
268	22.33	0.07	0.016	(0.229)	0.014	0.002
269	22.42	0.07	0.016	(0.228)	0.014	0.002
270	22.50	0.07	0.016	(0.227)	0.014	0.002
271	22.58	0.07	0.016	(0.227)	0.014	0.002
272	22.67	0.07	0.016	(0.226)	0.014	0.002
273	22.75	0.07	0.016	(0.225)	0.014	0.002
274	22.83	0.07	0.016	(0.225)	0.014	0.002
275	22.92	0.07	0.016	(0.224)	0.014	0.002
276	23.00	0.07	0.016	(0.224)	0.014	0.002
277	23.08	0.07	0.016	(0.223)	0.014	0.002
278	23.17	0.07	0.016	(0.223)	0.014	0.002
279	23.25	0.07	0.016	(0.222)	0.014	0.002
280	23.33	0.07	0.016	(0.222)	0.014	0.002
281	23.42	0.07	0.016	(0.221)	0.014	0.002
282	23.50	0.07	0.016	(0.221)	0.014	0.002
283	23.58	0.07	0.016	(0.221)	0.014	0.002
284	23.67	0.07	0.016	(0.220)	0.014	0.002
285	23.75	0.07	0.016	(0.220)	0.014	0.002
286	23.83	0.07	0.016	(0.220)	0.014	0.002
287	23.92	0.07	0.016	(0.220)	0.014	0.002
288	24.00	0.07	0.016	(0.219)	0.014	0.002

```
               (Loss Rate Not Used)
    Sum =     100.0                                    Sum =     2.4
       Flood volume = Effective rainfall      0.20(In)
        times area     111.7(Ac.)/[(In)/(Ft.)] =       1.9(Ac.Ft)
       Total soil loss =      1.80(In)
       Total soil loss =    16.748(Ac.Ft)
       Total rainfall =      2.00(In)
       Flood volume =       81062.0 Cubic Feet
       Total soil loss =      729558.0 Cubic Feet
       --------------------------------------------------------------------
        Peak flow rate of this hydrograph =      2.946(CFS)
       --------------------------------------------------------------------
       ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                           24 - H O U R   S T O R M
                      R u n o f f     H y d r o g r a p h
       --------------------------------------------------------------------
                   Hydrograph in   5   Minute intervals ((CFS))

       --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 -----------------------------------------------------------------------
   0+ 5       0.0001      0.01  Q         |         |         |         |
   0+10       0.0003      0.04  Q         |         |         |         |
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0+15       0.0009      0.09  Q          |         |         |         |
0+20       0.0018      0.12  Q          |         |         |         |
0+25       0.0029      0.15  Q          |         |         |         |
0+30       0.0042      0.19  Q          |         |         |         |
0+35       0.0056      0.21  Q          |         |         |         |
0+40       0.0072      0.22  Q          |         |         |         |
0+45       0.0088      0.23  Q          |         |         |         |
0+50       0.0105      0.25  Q          |         |         |         |
0+55       0.0123      0.27  VQ         |         |         |         |
1+ 0       0.0143      0.30  VQ         |         |         |         |
1+ 5       0.0165      0.31  VQ         |         |         |         |
1+10       0.0186      0.31  VQ         |         |         |         |
1+15       0.0206      0.29  VQ         |         |         |         |
1+20       0.0225      0.28  VQ         |         |         |         |
1+25       0.0244      0.28  VQ         |         |         |         |
1+30       0.0263      0.27  VQ         |         |         |         |
1+35       0.0282      0.27  VQ         |         |         |         |
1+40       0.0301      0.27  VQ         |         |         |         |
1+45       0.0319      0.27  VQ         |         |         |         |
1+50       0.0339      0.28  VQ         |         |         |         |
1+55       0.0359      0.29  VQ         |         |         |         |
2+ 0       0.0381      0.32  VQ         |         |         |         |
2+ 5       0.0403      0.33  VQ         |         |         |         |
2+10       0.0427      0.34  VQ         |         |         |         |
2+15       0.0450      0.34  VQ         |         |         |         |
2+20       0.0474      0.35  |Q         |         |         |         |
2+25       0.0498      0.35  |Q         |         |         |         |
2+30       0.0523      0.35  |Q         |         |         |         |
2+35       0.0547      0.36  |Q         |         |         |         |
2+40       0.0573      0.37  |Q         |         |         |         |
2+45       0.0601      0.40  |Q         |         |         |         |
2+50       0.0629      0.42  |Q         |         |         |         |
2+55       0.0659      0.42  |Q         |         |         |         |
3+ 0       0.0688      0.43  |Q         |         |         |         |
3+ 5       0.0718      0.43  |Q         |         |         |         |
3+10       0.0748      0.44  |Q         |         |         |         |
3+15       0.0779      0.44  |Q         |         |         |         |
3+20       0.0809      0.44  |Q         |         |         |         |
3+25       0.0840      0.44  |Q         |         |         |         |
3+30       0.0870      0.45  |Q         |         |         |         |
3+35       0.0901      0.45  |Q         |         |         |         |
3+40       0.0932      0.45  |QV        |         |         |         |
3+45       0.0963      0.45  |QV        |         |         |         |
3+50       0.0994      0.45  |QV        |         |         |         |
3+55       0.1026      0.47  |QV        |         |         |         |
4+ 0       0.1060      0.49  |QV        |         |         |         |
4+ 5       0.1095      0.51  | Q        |         |         |         |
4+10       0.1131      0.52  | Q        |         |         |         |
4+15       0.1167      0.52  | Q        |         |         |         |
4+20       0.1203      0.53  | Q        |         |         |         |
4+25       0.1241      0.55  | Q        |         |         |         |
4+30       0.1281      0.58  | Q        |         |         |         |
4+35       0.1322      0.59  | Q        |         |         |         |
4+40       0.1363      0.60  | Q        |         |         |         |
4+45       0.1405      0.61  | QV       |         |         |         |
4+50       0.1447      0.62  | QV       |         |         |         |
4+55       0.1491      0.64  | QV       |         |         |         |
5+ 0       0.1537      0.66  | QV       |         |         |         |
5+ 5       0.1583      0.67  | QV       |         |         |         |
5+10       0.1628      0.65  | QV       |         |         |         |
5+15       0.1670      0.61  | QV       |         |         |         |
5+20       0.1710      0.59  | QV       |         |         |         |
5+25       0.1751      0.59  | QV       |         |         |         |
5+30       0.1793      0.61  | QV       |         |         |         |
5+35       0.1836      0.62  | QV       |         |         |         |
5+40       0.1880      0.64  | Q V      |         |         |         |
5+45       0.1926      0.67  | Q V      |         |         |         |
5+50       0.1974      0.69  | Q V      |         |         |         |
5+55       0.2022      0.70  | Q V      |         |         |         |
6+ 0       0.2070      0.70  | Q V      |         |         |         |
6+ 5       0.2119      0.71  | Q V      |         |         |         |
```

Attachment: Preliminary Water Quality Management Plan (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
 6+10       0.2169      0.73  | Q V     |         |         |         |
 6+15       0.2221      0.75  |  QV     |         |         |         |
 6+20       0.2274      0.77  |  QV     |         |         |         |
 6+25       0.2328      0.78  |  Q V    |         |         |         |
 6+30       0.2382      0.79  |  Q V    |         |         |         |
 6+35       0.2437      0.80  |  Q V    |         |         |         |
 6+40       0.2493      0.82  |  Q V    |         |         |         |
 6+45       0.2551      0.84  |  Q V    |         |         |         |
 6+50       0.2610      0.86  |  Q V    |         |         |         |
 6+55       0.2670      0.87  |  Q V    |         |         |         |
 7+ 0       0.2731      0.88  |  Q V    |         |         |         |
 7+ 5       0.2791      0.88  |  Q V    |         |         |         |
 7+10       0.2852      0.89  |  Q  V   |         |         |         |
 7+15       0.2914      0.89  |  Q  V   |         |         |         |
 7+20       0.2975      0.90  |  Q  V   |         |         |         |
 7+25       0.3038      0.91  |  Q  V   |         |         |         |
 7+30       0.3103      0.94  |  Q  V   |         |         |         |
 7+35       0.3169      0.96  |  Q  V   |         |         |         |
 7+40       0.3237      0.98  |  Q  V   |         |         |         |
 7+45       0.3307      1.01  |   Q  V  |         |         |         |
 7+50       0.3378      1.04  |   Q  V  |         |         |         |
 7+55       0.3452      1.07  |   Q  V  |         |         |         |
 8+ 0       0.3527      1.10  |   Q  V  |         |         |         |
 8+ 5       0.3605      1.13  |   Q  V  |         |         |         |
 8+10       0.3685      1.17  |   Q  V  |         |         |         |
 8+15       0.3770      1.23  |   Q   V |         |         |         |
 8+20       0.3857      1.27  |    Q  V |         |         |         |
 8+25       0.3946      1.29  |    Q  V |         |         |         |
 8+30       0.4035      1.30  |    Q  V |         |         |         |
 8+35       0.4126      1.31  |    Q  V |         |         |         |
 8+40       0.4218      1.34  |    Q   V|         |         |         |
 8+45       0.4312      1.37  |    Q   V|         |         |         |
 8+50       0.4408      1.39  |    Q   V|         |         |         |
 8+55       0.4506      1.42  |    Q   V|         |         |         |
 9+ 0       0.4606      1.45  |    Q   V|         |         |         |
 9+ 5       0.4708      1.48  |    Q    V         |         |         |
 9+10       0.4814      1.53  |     Q   V         |         |         |
 9+15       0.4923      1.59  |     Q   V         |         |         |
 9+20       0.5035      1.63  |     Q   V         |         |         |
 9+25       0.5150      1.67  |     Q   |V        |         |         |
 9+30       0.5267      1.70  |     Q   |V        |         |         |
 9+35       0.5387      1.73  |     Q   |V        |         |         |
 9+40       0.5508      1.77  |      Q  |V        |         |         |
 9+45       0.5632      1.80  |      Q  | V       |         |         |
 9+50       0.5759      1.83  |      Q  | V       |         |         |
 9+55       0.5887      1.86  |      Q  | V       |         |         |
10+ 0       0.6017      1.90  |      Q  | V       |         |         |
10+ 5       0.6148      1.89  |      Q  |  V      |         |         |
10+10       0.6271      1.79  |      Q  |  V      |         |         |
10+15       0.6384      1.64  |     Q   |  V      |         |         |
10+20       0.6489      1.53  |     Q   |  V      |         |         |
10+25       0.6592      1.49  |    Q    |   V     |         |         |
10+30       0.6692      1.46  |    Q    |   V     |         |         |
10+35       0.6792      1.46  |    Q    |   V     |         |         |
10+40       0.6897      1.52  |     Q   |   V     |         |         |
10+45       0.7009      1.63  |     Q   |    V    |         |         |
10+50       0.7126      1.70  |     Q   |    V    |         |         |
10+55       0.7245      1.73  |     Q   |    V    |         |         |
11+ 0       0.7365      1.74  |     Q   |    V    |         |         |
11+ 5       0.7485      1.75  |      Q  |     V   |         |         |
11+10       0.7606      1.74  |     Q   |     V   |         |         |
11+15       0.7724      1.73  |     Q   |     V   |         |         |
11+20       0.7843      1.72  |     Q   |     V   |         |         |
11+25       0.7961      1.71  |     Q   |      V  |         |         |
11+30       0.8078      1.71  |     Q   |      V  |         |         |
11+35       0.8196      1.70  |     Q   |      V  |         |         |
11+40       0.8311      1.67  |     Q   |      V  |         |         |
11+45       0.8422      1.62  |     Q   |       V |         |         |
11+50       0.8532      1.59  |     Q   |       V |         |         |
11+55       0.8642      1.60  |     Q   |       V |         |         |
12+ 0       0.8753      1.61  |     Q   |       V |         |         |
```

```
12+ 5       0.8866      1.65  |     Q   |        V|         |         |
12+10       0.8988      1.76  |      Q  |        V|         |         |
12+15       0.9121      1.93  |      Q  |        V|         |         |
12+20       0.9262      2.05  |       Q |        V|         |         |
12+25       0.9408      2.12  |       Q |         V         |         |
12+30       0.9557      2.17  |       Q |         V         |         |
12+35       0.9710      2.22  |       Q |         V         |         |
12+40       0.9867      2.28  |        Q|         |V        |         |
12+45       1.0029      2.35  |        Q|         |V        |         |
12+50       1.0194      2.40  |        Q|         |V        |         |
12+55       1.0362      2.44  |        Q|         | V       |         |
13+ 0       1.0534      2.49  |        Q|         | V       |         |
13+ 5       1.0708      2.54  |         Q         |  V      |         |
13+10       1.0890      2.64  |         Q         |  V      |         |
13+15       1.1081      2.77  |         |Q        |  V      |         |
13+20       1.1279      2.87  |         |Q        |   V     |         |
13+25       1.1479      2.91  |         |Q        |   V     |         |
13+30       1.1682      2.95  |         |Q        |    V    |         |
13+35       1.1884      2.93  |         |Q        |    V    |         |
13+40       1.2075      2.77  |         |Q        |    V    |         |
13+45       1.2248      2.52  |         Q         |     V   |         |
13+50       1.2411      2.36  |        Q|         |     V   |         |
13+55       1.2568      2.28  |        Q|         |      V  |         |
14+ 0       1.2722      2.24  |       Q |         |      V  |         |
14+ 5       1.2875      2.22  |       Q |         |      V  |         |
14+10       1.3031      2.26  |        Q|         |       V |         |
14+15       1.3192      2.34  |        Q|         |       V |         |
14+20       1.3356      2.38  |        Q|         |       V |         |
14+25       1.3520      2.38  |        Q|         |        V|         |
14+30       1.3683      2.37  |        Q|         |        V|         |
14+35       1.3845      2.36  |        Q|         |        V|         |
14+40       1.4007      2.35  |        Q|         |         V         |
14+45       1.4168      2.35  |        Q|         |         V         |
14+50       1.4330      2.34  |        Q|         |         V         |
14+55       1.4490      2.32  |        Q|         |         |V        |
15+ 0       1.4648      2.30  |        Q|         |         |V        |
15+ 5       1.4805      2.28  |        Q|         |         |V        |
15+10       1.4960      2.25  |        Q|         |         | V       |
15+15       1.5113      2.22  |       Q |         |         | V       |
15+20       1.5264      2.20  |       Q |         |         | V       |
15+25       1.5414      2.17  |       Q |         |         |  V      |
15+30       1.5561      2.14  |       Q |         |         |  V      |
15+35       1.5706      2.11  |       Q |         |         |  V      |
15+40       1.5846      2.03  |       Q |         |         |   V     |
15+45       1.5979      1.93  |      Q  |         |         |   V     |
15+50       1.6107      1.86  |      Q  |         |         |   V     |
15+55       1.6233      1.82  |      Q  |         |         |   V     |
16+ 0       1.6357      1.80  |      Q  |         |         |    V    |
16+ 5       1.6475      1.72  |     Q   |         |         |    V    |
16+10       1.6576      1.47  |    Q    |         |         |    V    |
16+15       1.6652      1.10  |   Q     |         |         |    V    |
16+20       1.6710      0.85  |  Q      |         |         |    V    |
16+25       1.6760      0.73  | Q       |         |         |     V   |
16+30       1.6805      0.65  | Q       |         |         |     V   |
16+35       1.6845      0.59  | Q       |         |         |     V   |
16+40       1.6881      0.52  | Q       |         |         |     V   |
16+45       1.6913      0.46  |Q        |         |         |     V   |
16+50       1.6942      0.42  |Q        |         |         |     V   |
16+55       1.6969      0.39  |Q        |         |         |     V   |
17+ 0       1.6994      0.36  |Q        |         |         |     V   |
17+ 5       1.7018      0.35  |Q        |         |         |     V   |
17+10       1.7044      0.37  |Q        |         |         |     V   |
17+15       1.7071      0.40  |Q        |         |         |     V   |
17+20       1.7100      0.42  |Q        |         |         |     V   |
17+25       1.7130      0.43  |Q        |         |         |     V   |
17+30       1.7160      0.43  |Q        |         |         |     V   |
17+35       1.7190      0.43  |Q        |         |         |     V   |
17+40       1.7220      0.43  |Q        |         |         |      V  |
17+45       1.7250      0.43  |Q        |         |         |      V  |
17+50       1.7279      0.43  |Q        |         |         |      V  |
17+55       1.7308      0.42  |Q        |         |         |      V  |
```

```
18+ 0       1.7336      0.40  |Q         |         |         |      V  |
18+ 5       1.7362      0.38  |Q         |         |         |      V  |
18+10       1.7388      0.38  |Q         |         |         |      V  |
18+15       1.7414      0.37  |Q         |         |         |      V  |
18+20       1.7439      0.37  |Q         |         |         |      V  |
18+25       1.7465      0.37  |Q         |         |         |      V  |
18+30       1.7490      0.37  |Q         |         |         |      V  |
18+35       1.7515      0.36  |Q         |         |         |      V  |
18+40       1.7539      0.35  |Q         |         |         |      V  |
18+45       1.7561      0.32  |Q         |         |         |      V  |
18+50       1.7582      0.30  |Q         |         |         |      V  |
18+55       1.7601      0.28  |Q         |         |         |      V  |
19+ 0       1.7618      0.25  Q          |         |         |      V  |
19+ 5       1.7634      0.23  Q          |         |         |      V  |
19+10       1.7650      0.24  Q          |         |         |      V  |
19+15       1.7667      0.25  |Q         |         |         |      V  |
19+20       1.7685      0.27  |Q         |         |         |       V |
19+25       1.7705      0.29  |Q         |         |         |       V |
19+30       1.7726      0.31  |Q         |         |         |       V |
19+35       1.7749      0.32  |Q         |         |         |       V |
19+40       1.7770      0.32  |Q         |         |         |       V |
19+45       1.7791      0.30  |Q         |         |         |       V |
19+50       1.7810      0.28  |Q         |         |         |       V |
19+55       1.7828      0.26  |Q         |         |         |       V |
20+ 0       1.7844      0.23  Q          |         |         |       V |
20+ 5       1.7859      0.22  Q          |         |         |       V |
20+10       1.7875      0.23  Q          |         |         |       V |
20+15       1.7892      0.24  Q          |         |         |       V |
20+20       1.7909      0.26  |Q         |         |         |       V |
20+25       1.7927      0.26  |Q         |         |         |       V |
20+30       1.7945      0.26  |Q         |         |         |       V |
20+35       1.7964      0.27  |Q         |         |         |       V |
20+40       1.7982      0.27  |Q         |         |         |       V |
20+45       1.8000      0.27  |Q         |         |         |       V |
20+50       1.8019      0.26  |Q         |         |         |       V |
20+55       1.8036      0.25  Q          |         |         |       V |
21+ 0       1.8051      0.22  Q          |         |         |       V |
21+ 5       1.8066      0.21  Q          |         |         |       V |
21+10       1.8081      0.22  Q          |         |         |       V |
21+15       1.8098      0.24  Q          |         |         |       V |
21+20       1.8115      0.25  Q          |         |         |       V |
21+25       1.8131      0.24  Q          |         |         |       V |
21+30       1.8146      0.22  Q          |         |         |        V|
21+35       1.8160      0.21  Q          |         |         |        V|
21+40       1.8175      0.22  Q          |         |         |        V|
21+45       1.8192      0.24  Q          |         |         |        V|
21+50       1.8209      0.25  Q          |         |         |        V|
21+55       1.8225      0.24  Q          |         |         |        V|
22+ 0       1.8240      0.21  Q          |         |         |        V|
22+ 5       1.8254      0.21  Q          |         |         |        V|
22+10       1.8269      0.22  Q          |         |         |        V|
22+15       1.8285      0.24  Q          |         |         |        V|
22+20       1.8302      0.25  Q          |         |         |        V|
22+25       1.8318      0.23  Q          |         |         |        V|
22+30       1.8333      0.21  Q          |         |         |        V|
22+35       1.8347      0.20  Q          |         |         |        V|
22+40       1.8360      0.20  Q          |         |         |        V|
22+45       1.8373      0.19  Q          |         |         |        V|
22+50       1.8386      0.19  Q          |         |         |        V|
22+55       1.8399      0.19  Q          |         |         |        V|
23+ 0       1.8412      0.19  Q          |         |         |        V|
23+ 5       1.8425      0.18  Q          |         |         |        V|
23+10       1.8438      0.18  Q          |         |         |        V|
23+15       1.8450      0.18  Q          |         |         |        V|
23+20       1.8463      0.18  Q          |         |         |        V|
23+25       1.8475      0.18  Q          |         |         |        V|
23+30       1.8488      0.18  Q          |         |         |        V|
23+35       1.8500      0.18  Q          |         |         |        V|
23+40       1.8513      0.18  Q          |         |         |        V|
23+45       1.8525      0.18  Q          |         |         |        V|
23+50       1.8538      0.18  Q          |         |         |        V|
```

```
  23+55       1.8550      0.18  Q          |         |         |        V|
  24+ 0       1.8562      0.18  Q          |         |         |        V|
  24+ 5       1.8574      0.17  Q          |         |         |        V|
  24+10       1.8584      0.14  Q          |         |         |        V|
  24+15       1.8590      0.09  Q          |         |         |        V|
  24+20       1.8595      0.06  Q          |         |         |        V|
  24+25       1.8598      0.05  Q          |         |         |        V|
  24+30       1.8600      0.04  Q          |         |         |        V|
  24+35       1.8602      0.03  Q          |         |         |        V|
  24+40       1.8604      0.02  Q          |         |         |        V|
  24+45       1.8605      0.02  Q          |         |         |        V|
  24+50       1.8606      0.01  Q          |         |         |        V|
  24+55       1.8607      0.01  Q          |         |         |        V|
  25+ 0       1.8607      0.01  Q          |         |         |        V|
  25+ 5       1.8608      0.01  Q          |         |         |        V|
  25+10       1.8608      0.01  Q          |         |         |        V|
  25+15       1.8609      0.00  Q          |         |         |        V|
  25+20       1.8609      0.00  Q          |         |         |        V|
  25+25       1.8609      0.00  Q          |         |         |        V|
  25+30       1.8609      0.00  Q          |         |         |        V|
  25+35       1.8609      0.00  Q          |         |         |        V|
  25+40       1.8609      0.00  Q          |         |         |         V
-----------------------------------------------------------------------
```

Post-Project Condition Unit Hydrograph Calculations

Basin A – 2-Year, 24-Hour Storm Duration

```
U n i t   H y d r o g r a p h   A n a l y s i s

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2014, Version 9.0
      Study date  09/29/15 File: BASINAP242.out

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6279

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 2-YEAR, 24-HOUR STORM DURATION
FILENAME: BASINAP

--------------------------------------------------------------------
Drainage Area =      48.87(Ac.)  =      0.076 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =      48.87(Ac.)  =      0.076 Sq. Mi.
USER Entry of lag time in hours
Lag time =    0.192 Hr.
Lag time =    11.51 Min.
25% of lag time =     2.88 Min.
40% of lag time =     4.60 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       48.87           2.00                  97.74

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
       48.87           5.00                 244.35

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.000(In)
Area Averaged 100-Year Rainfall =    5.000(In)

Point rain (area averaged) =    2.000(In)
Areal adjustment factor =   99.99 %
Adjusted average point rain =    2.000(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
    48.870           74.50         0.271
 Total Area Entered =     48.87(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
74.5  56.4      0.507     0.271        0.383       1.000      0.383
                                                  Sum (F) =   0.383
```

```
Area averaged mean soil loss (F) (In/Hr) =  0.383
Minimum soil loss rate ((In/Hr)) =  0.192
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.683
---------------------------------------------------------------------

               U n i t   H y d r o g r a p h
                      VALLEY S-Curve
--------------------------------------------------------------------
               Unit Hydrograph Data
---------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                            Graph %           (CFS)
---------------------------------------------------------------------
    1   0.083          43.434          4.936              2.431
    2   0.167          86.869         20.645             10.168
    3   0.250         130.303         28.213             13.895
    4   0.333         173.738         15.754              7.759
    5   0.417         217.172          7.683              3.784
    6   0.500         260.607          5.127              2.525
    7   0.583         304.041          3.828              1.885
    8   0.667         347.476          2.859              1.408
    9   0.750         390.910          2.298              1.132
   10   0.833         434.344          1.749              0.862
   11   0.917         477.779          1.384              0.681
   12   1.000         521.213          1.267              0.624
   13   1.083         564.648          0.991              0.488
   14   1.167         608.082          0.817              0.402
   15   1.250         651.517          0.666              0.328
   16   1.333         694.951          0.515              0.254
   17   1.417         738.386          0.434              0.214
   18   1.500         781.820          0.434              0.214
   19   1.583         825.255          0.399              0.197
                               Sum = 100.000   Sum=      49.252
----------------------------------------------------------------------
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The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.016	(0.679)	0.011	0.005
2	0.17	0.07	0.016	(0.677)	0.011	0.005
3	0.25	0.07	0.016	(0.674)	0.011	0.005
4	0.33	0.10	0.024	(0.671)	0.016	0.008
5	0.42	0.10	0.024	(0.669)	0.016	0.008
6	0.50	0.10	0.024	(0.666)	0.016	0.008
7	0.58	0.10	0.024	(0.664)	0.016	0.008
8	0.67	0.10	0.024	(0.661)	0.016	0.008
9	0.75	0.10	0.024	(0.658)	0.016	0.008
10	0.83	0.13	0.032	(0.656)	0.022	0.010
11	0.92	0.13	0.032	(0.653)	0.022	0.010
12	1.00	0.13	0.032	(0.651)	0.022	0.010
13	1.08	0.10	0.024	(0.648)	0.016	0.008
14	1.17	0.10	0.024	(0.645)	0.016	0.008
15	1.25	0.10	0.024	(0.643)	0.016	0.008
16	1.33	0.10	0.024	(0.640)	0.016	0.008
17	1.42	0.10	0.024	(0.638)	0.016	0.008
18	1.50	0.10	0.024	(0.635)	0.016	0.008
19	1.58	0.10	0.024	(0.633)	0.016	0.008
20	1.67	0.10	0.024	(0.630)	0.016	0.008
21	1.75	0.10	0.024	(0.628)	0.016	0.008
22	1.83	0.13	0.032	(0.625)	0.022	0.010
23	1.92	0.13	0.032	(0.623)	0.022	0.010
24	2.00	0.13	0.032	(0.620)	0.022	0.010
25	2.08	0.13	0.032	(0.618)	0.022	0.010
26	2.17	0.13	0.032	(0.615)	0.022	0.010
27	2.25	0.13	0.032	(0.613)	0.022	0.010
28	2.33	0.13	0.032	(0.610)	0.022	0.010
29	2.42	0.13	0.032	(0.608)	0.022	0.010

30	2.50	0.13	0.032	(0.605)	0.022	0.010
31	2.58	0.17	0.040	(0.603)	0.027	0.013
32	2.67	0.17	0.040	(0.600)	0.027	0.013
33	2.75	0.17	0.040	(0.598)	0.027	0.013
34	2.83	0.17	0.040	(0.595)	0.027	0.013
35	2.92	0.17	0.040	(0.593)	0.027	0.013
36	3.00	0.17	0.040	(0.590)	0.027	0.013
37	3.08	0.17	0.040	(0.588)	0.027	0.013
38	3.17	0.17	0.040	(0.585)	0.027	0.013
39	3.25	0.17	0.040	(0.583)	0.027	0.013
40	3.33	0.17	0.040	(0.581)	0.027	0.013
41	3.42	0.17	0.040	(0.578)	0.027	0.013
42	3.50	0.17	0.040	(0.576)	0.027	0.013
43	3.58	0.17	0.040	(0.573)	0.027	0.013
44	3.67	0.17	0.040	(0.571)	0.027	0.013
45	3.75	0.17	0.040	(0.569)	0.027	0.013
46	3.83	0.20	0.048	(0.566)	0.033	0.015
47	3.92	0.20	0.048	(0.564)	0.033	0.015
48	4.00	0.20	0.048	(0.561)	0.033	0.015
49	4.08	0.20	0.048	(0.559)	0.033	0.015
50	4.17	0.20	0.048	(0.557)	0.033	0.015
51	4.25	0.20	0.048	(0.554)	0.033	0.015
52	4.33	0.23	0.056	(0.552)	0.038	0.018
53	4.42	0.23	0.056	(0.549)	0.038	0.018
54	4.50	0.23	0.056	(0.547)	0.038	0.018
55	4.58	0.23	0.056	(0.545)	0.038	0.018
56	4.67	0.23	0.056	(0.542)	0.038	0.018
57	4.75	0.23	0.056	(0.540)	0.038	0.018
58	4.83	0.27	0.064	(0.538)	0.044	0.020
59	4.92	0.27	0.064	(0.535)	0.044	0.020
60	5.00	0.27	0.064	(0.533)	0.044	0.020
61	5.08	0.20	0.048	(0.531)	0.033	0.015
62	5.17	0.20	0.048	(0.529)	0.033	0.015
63	5.25	0.20	0.048	(0.526)	0.033	0.015
64	5.33	0.23	0.056	(0.524)	0.038	0.018
65	5.42	0.23	0.056	(0.522)	0.038	0.018
66	5.50	0.23	0.056	(0.519)	0.038	0.018
67	5.58	0.27	0.064	(0.517)	0.044	0.020
68	5.67	0.27	0.064	(0.515)	0.044	0.020
69	5.75	0.27	0.064	(0.512)	0.044	0.020
70	5.83	0.27	0.064	(0.510)	0.044	0.020
71	5.92	0.27	0.064	(0.508)	0.044	0.020
72	6.00	0.27	0.064	(0.506)	0.044	0.020
73	6.08	0.30	0.072	(0.503)	0.049	0.023
74	6.17	0.30	0.072	(0.501)	0.049	0.023
75	6.25	0.30	0.072	(0.499)	0.049	0.023
76	6.33	0.30	0.072	(0.497)	0.049	0.023
77	6.42	0.30	0.072	(0.495)	0.049	0.023
78	6.50	0.30	0.072	(0.492)	0.049	0.023
79	6.58	0.33	0.080	(0.490)	0.055	0.025
80	6.67	0.33	0.080	(0.488)	0.055	0.025
81	6.75	0.33	0.080	(0.486)	0.055	0.025
82	6.83	0.33	0.080	(0.484)	0.055	0.025
83	6.92	0.33	0.080	(0.481)	0.055	0.025
84	7.00	0.33	0.080	(0.479)	0.055	0.025
85	7.08	0.33	0.080	(0.477)	0.055	0.025
86	7.17	0.33	0.080	(0.475)	0.055	0.025
87	7.25	0.33	0.080	(0.473)	0.055	0.025
88	7.33	0.37	0.088	(0.470)	0.060	0.028
89	7.42	0.37	0.088	(0.468)	0.060	0.028
90	7.50	0.37	0.088	(0.466)	0.060	0.028
91	7.58	0.40	0.096	(0.464)	0.066	0.030
92	7.67	0.40	0.096	(0.462)	0.066	0.030
93	7.75	0.40	0.096	(0.460)	0.066	0.030
94	7.83	0.43	0.104	(0.458)	0.071	0.033
95	7.92	0.43	0.104	(0.456)	0.071	0.033
96	8.00	0.43	0.104	(0.453)	0.071	0.033
97	8.08	0.50	0.120	(0.451)	0.082	0.038
98	8.17	0.50	0.120	(0.449)	0.082	0.038
99	8.25	0.50	0.120	(0.447)	0.082	0.038
100	8.33	0.50	0.120	(0.445)	0.082	0.038

Attachment: Preliminary Water Quality Management Plan (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

101	8.42	0.50	0.120	(0.443)	0.082	0.038
102	8.50	0.50	0.120	(0.441)	0.082	0.038
103	8.58	0.53	0.128	(0.439)	0.087	0.041
104	8.67	0.53	0.128	(0.437)	0.087	0.041
105	8.75	0.53	0.128	(0.435)	0.087	0.041
106	8.83	0.57	0.136	(0.433)	0.093	0.043
107	8.92	0.57	0.136	(0.431)	0.093	0.043
108	9.00	0.57	0.136	(0.429)	0.093	0.043
109	9.08	0.63	0.152	(0.427)	0.104	0.048
110	9.17	0.63	0.152	(0.424)	0.104	0.048
111	9.25	0.63	0.152	(0.422)	0.104	0.048
112	9.33	0.67	0.160	(0.420)	0.109	0.051
113	9.42	0.67	0.160	(0.418)	0.109	0.051
114	9.50	0.67	0.160	(0.416)	0.109	0.051
115	9.58	0.70	0.168	(0.414)	0.115	0.053
116	9.67	0.70	0.168	(0.412)	0.115	0.053
117	9.75	0.70	0.168	(0.410)	0.115	0.053
118	9.83	0.73	0.176	(0.409)	0.120	0.056
119	9.92	0.73	0.176	(0.407)	0.120	0.056
120	10.00	0.73	0.176	(0.405)	0.120	0.056
121	10.08	0.50	0.120	(0.403)	0.082	0.038
122	10.17	0.50	0.120	(0.401)	0.082	0.038
123	10.25	0.50	0.120	(0.399)	0.082	0.038
124	10.33	0.50	0.120	(0.397)	0.082	0.038
125	10.42	0.50	0.120	(0.395)	0.082	0.038
126	10.50	0.50	0.120	(0.393)	0.082	0.038
127	10.58	0.67	0.160	(0.391)	0.109	0.051
128	10.67	0.67	0.160	(0.389)	0.109	0.051
129	10.75	0.67	0.160	(0.387)	0.109	0.051
130	10.83	0.67	0.160	(0.385)	0.109	0.051
131	10.92	0.67	0.160	(0.383)	0.109	0.051
132	11.00	0.67	0.160	(0.382)	0.109	0.051
133	11.08	0.63	0.152	(0.380)	0.104	0.048
134	11.17	0.63	0.152	(0.378)	0.104	0.048
135	11.25	0.63	0.152	(0.376)	0.104	0.048
136	11.33	0.63	0.152	(0.374)	0.104	0.048
137	11.42	0.63	0.152	(0.372)	0.104	0.048
138	11.50	0.63	0.152	(0.370)	0.104	0.048
139	11.58	0.57	0.136	(0.369)	0.093	0.043
140	11.67	0.57	0.136	(0.367)	0.093	0.043
141	11.75	0.57	0.136	(0.365)	0.093	0.043
142	11.83	0.60	0.144	(0.363)	0.098	0.046
143	11.92	0.60	0.144	(0.361)	0.098	0.046
144	12.00	0.60	0.144	(0.359)	0.098	0.046
145	12.08	0.83	0.200	(0.358)	0.137	0.063
146	12.17	0.83	0.200	(0.356)	0.137	0.063
147	12.25	0.83	0.200	(0.354)	0.137	0.063
148	12.33	0.87	0.208	(0.352)	0.142	0.066
149	12.42	0.87	0.208	(0.351)	0.142	0.066
150	12.50	0.87	0.208	(0.349)	0.142	0.066
151	12.58	0.93	0.224	(0.347)	0.153	0.071
152	12.67	0.93	0.224	(0.345)	0.153	0.071
153	12.75	0.93	0.224	(0.344)	0.153	0.071
154	12.83	0.97	0.232	(0.342)	0.158	0.073
155	12.92	0.97	0.232	(0.340)	0.158	0.073
156	13.00	0.97	0.232	(0.338)	0.158	0.073
157	13.08	1.13	0.272	(0.337)	0.186	0.086
158	13.17	1.13	0.272	(0.335)	0.186	0.086
159	13.25	1.13	0.272	(0.333)	0.186	0.086
160	13.33	1.13	0.272	(0.332)	0.186	0.086
161	13.42	1.13	0.272	(0.330)	0.186	0.086
162	13.50	1.13	0.272	(0.328)	0.186	0.086
163	13.58	0.77	0.184	(0.326)	0.126	0.058
164	13.67	0.77	0.184	(0.325)	0.126	0.058
165	13.75	0.77	0.184	(0.323)	0.126	0.058
166	13.83	0.77	0.184	(0.322)	0.126	0.058
167	13.92	0.77	0.184	(0.320)	0.126	0.058
168	14.00	0.77	0.184	(0.318)	0.126	0.058
169	14.08	0.90	0.216	(0.317)	0.148	0.068
170	14.17	0.90	0.216	(0.315)	0.148	0.068
171	14.25	0.90	0.216	(0.313)	0.148	0.068

172	14.33	0.87	0.208	(0.312)	0.142	0.066
173	14.42	0.87	0.208	(0.310)	0.142	0.066
174	14.50	0.87	0.208	(0.309)	0.142	0.066
175	14.58	0.87	0.208	(0.307)	0.142	0.066
176	14.67	0.87	0.208	(0.305)	0.142	0.066
177	14.75	0.87	0.208	(0.304)	0.142	0.066
178	14.83	0.83	0.200	(0.302)	0.137	0.063
179	14.92	0.83	0.200	(0.301)	0.137	0.063
180	15.00	0.83	0.200	(0.299)	0.137	0.063
181	15.08	0.80	0.192	(0.298)	0.131	0.061
182	15.17	0.80	0.192	(0.296)	0.131	0.061
183	15.25	0.80	0.192	(0.295)	0.131	0.061
184	15.33	0.77	0.184	(0.293)	0.126	0.058
185	15.42	0.77	0.184	(0.292)	0.126	0.058
186	15.50	0.77	0.184	(0.290)	0.126	0.058
187	15.58	0.63	0.152	(0.289)	0.104	0.048
188	15.67	0.63	0.152	(0.287)	0.104	0.048
189	15.75	0.63	0.152	(0.286)	0.104	0.048
190	15.83	0.63	0.152	(0.284)	0.104	0.048
191	15.92	0.63	0.152	(0.283)	0.104	0.048
192	16.00	0.63	0.152	(0.281)	0.104	0.048
193	16.08	0.13	0.032	(0.280)	0.022	0.010
194	16.17	0.13	0.032	(0.278)	0.022	0.010
195	16.25	0.13	0.032	(0.277)	0.022	0.010
196	16.33	0.13	0.032	(0.276)	0.022	0.010
197	16.42	0.13	0.032	(0.274)	0.022	0.010
198	16.50	0.13	0.032	(0.273)	0.022	0.010
199	16.58	0.10	0.024	(0.271)	0.016	0.008
200	16.67	0.10	0.024	(0.270)	0.016	0.008
201	16.75	0.10	0.024	(0.269)	0.016	0.008
202	16.83	0.10	0.024	(0.267)	0.016	0.008
203	16.92	0.10	0.024	(0.266)	0.016	0.008
204	17.00	0.10	0.024	(0.265)	0.016	0.008
205	17.08	0.17	0.040	(0.263)	0.027	0.013
206	17.17	0.17	0.040	(0.262)	0.027	0.013
207	17.25	0.17	0.040	(0.261)	0.027	0.013
208	17.33	0.17	0.040	(0.259)	0.027	0.013
209	17.42	0.17	0.040	(0.258)	0.027	0.013
210	17.50	0.17	0.040	(0.257)	0.027	0.013
211	17.58	0.17	0.040	(0.255)	0.027	0.013
212	17.67	0.17	0.040	(0.254)	0.027	0.013
213	17.75	0.17	0.040	(0.253)	0.027	0.013
214	17.83	0.13	0.032	(0.252)	0.022	0.010
215	17.92	0.13	0.032	(0.250)	0.022	0.010
216	18.00	0.13	0.032	(0.249)	0.022	0.010
217	18.08	0.13	0.032	(0.248)	0.022	0.010
218	18.17	0.13	0.032	(0.247)	0.022	0.010
219	18.25	0.13	0.032	(0.246)	0.022	0.010
220	18.33	0.13	0.032	(0.244)	0.022	0.010
221	18.42	0.13	0.032	(0.243)	0.022	0.010
222	18.50	0.13	0.032	(0.242)	0.022	0.010
223	18.58	0.10	0.024	(0.241)	0.016	0.008
224	18.67	0.10	0.024	(0.240)	0.016	0.008
225	18.75	0.10	0.024	(0.238)	0.016	0.008
226	18.83	0.07	0.016	(0.237)	0.011	0.005
227	18.92	0.07	0.016	(0.236)	0.011	0.005
228	19.00	0.07	0.016	(0.235)	0.011	0.005
229	19.08	0.10	0.024	(0.234)	0.016	0.008
230	19.17	0.10	0.024	(0.233)	0.016	0.008
231	19.25	0.10	0.024	(0.232)	0.016	0.008
232	19.33	0.13	0.032	(0.231)	0.022	0.010
233	19.42	0.13	0.032	(0.230)	0.022	0.010
234	19.50	0.13	0.032	(0.229)	0.022	0.010
235	19.58	0.10	0.024	(0.228)	0.016	0.008
236	19.67	0.10	0.024	(0.227)	0.016	0.008
237	19.75	0.10	0.024	(0.225)	0.016	0.008
238	19.83	0.07	0.016	(0.224)	0.011	0.005
239	19.92	0.07	0.016	(0.223)	0.011	0.005
240	20.00	0.07	0.016	(0.222)	0.011	0.005
241	20.08	0.10	0.024	(0.221)	0.016	0.008
242	20.17	0.10	0.024	(0.221)	0.016	0.008

243	20.25	0.10	0.024	(0.220)	0.016	0.008
244	20.33	0.10	0.024	(0.219)	0.016	0.008
245	20.42	0.10	0.024	(0.218)	0.016	0.008
246	20.50	0.10	0.024	(0.217)	0.016	0.008
247	20.58	0.10	0.024	(0.216)	0.016	0.008
248	20.67	0.10	0.024	(0.215)	0.016	0.008
249	20.75	0.10	0.024	(0.214)	0.016	0.008
250	20.83	0.07	0.016	(0.213)	0.011	0.005
251	20.92	0.07	0.016	(0.212)	0.011	0.005
252	21.00	0.07	0.016	(0.211)	0.011	0.005
253	21.08	0.10	0.024	(0.211)	0.016	0.008
254	21.17	0.10	0.024	(0.210)	0.016	0.008
255	21.25	0.10	0.024	(0.209)	0.016	0.008
256	21.33	0.07	0.016	(0.208)	0.011	0.005
257	21.42	0.07	0.016	(0.207)	0.011	0.005
258	21.50	0.07	0.016	(0.207)	0.011	0.005
259	21.58	0.10	0.024	(0.206)	0.016	0.008
260	21.67	0.10	0.024	(0.205)	0.016	0.008
261	21.75	0.10	0.024	(0.204)	0.016	0.008
262	21.83	0.07	0.016	(0.204)	0.011	0.005
263	21.92	0.07	0.016	(0.203)	0.011	0.005
264	22.00	0.07	0.016	(0.202)	0.011	0.005
265	22.08	0.10	0.024	(0.202)	0.016	0.008
266	22.17	0.10	0.024	(0.201)	0.016	0.008
267	22.25	0.10	0.024	(0.200)	0.016	0.008
268	22.33	0.07	0.016	(0.200)	0.011	0.005
269	22.42	0.07	0.016	(0.199)	0.011	0.005
270	22.50	0.07	0.016	(0.199)	0.011	0.005
271	22.58	0.07	0.016	(0.198)	0.011	0.005
272	22.67	0.07	0.016	(0.197)	0.011	0.005
273	22.75	0.07	0.016	(0.197)	0.011	0.005
274	22.83	0.07	0.016	(0.196)	0.011	0.005
275	22.92	0.07	0.016	(0.196)	0.011	0.005
276	23.00	0.07	0.016	(0.195)	0.011	0.005
277	23.08	0.07	0.016	(0.195)	0.011	0.005
278	23.17	0.07	0.016	(0.194)	0.011	0.005
279	23.25	0.07	0.016	(0.194)	0.011	0.005
280	23.33	0.07	0.016	(0.194)	0.011	0.005
281	23.42	0.07	0.016	(0.193)	0.011	0.005
282	23.50	0.07	0.016	(0.193)	0.011	0.005
283	23.58	0.07	0.016	(0.193)	0.011	0.005
284	23.67	0.07	0.016	(0.192)	0.011	0.005
285	23.75	0.07	0.016	(0.192)	0.011	0.005
286	23.83	0.07	0.016	(0.192)	0.011	0.005
287	23.92	0.07	0.016	(0.192)	0.011	0.005
288	24.00	0.07	0.016	(0.192)	0.011	0.005

```
                (Loss Rate Not Used)
    Sum =     100.0                                  Sum =     7.6
      Flood volume = Effective rainfall      0.63(In)
       times area      48.9(Ac.)/[(In)/(Ft.)] =       2.6(Ac.Ft)
      Total soil loss =      1.37(In)
      Total soil loss =     5.564(Ac.Ft)
      Total rainfall =      2.00(In)
      Flood volume =      112388.7 Cubic Feet
      Total soil loss =      242373.6 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      4.108(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f      H y d r o g r a p h
      --------------------------------------------------------------------
                 Hydrograph in    5   Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft    Q(CFS)  0        2.5       5.0       7.5      10.0
 -----------------------------------------------------------------------
   0+ 5       0.0001      0.01  Q         |         |         |         |
   0+10       0.0005      0.06  Q         |         |         |         |
   0+15       0.0015      0.13  Q         |         |         |         |
   0+20       0.0027      0.18  Q         |         |         |         |
```

```
0+25       0.0042     0.22  Q         |         |         |         |
0+30       0.0061     0.27  VQ        |         |         |         |
0+35       0.0082     0.30  VQ        |         |         |         |
0+40       0.0104     0.32  VQ        |         |         |         |
0+45       0.0127     0.33  VQ        |         |         |         |
0+50       0.0151     0.35  VQ        |         |         |         |
0+55       0.0177     0.38  VQ        |         |         |         |
1+ 0       0.0206     0.42  VQ        |         |         |         |
1+ 5       0.0236     0.44  VQ        |         |         |         |
1+10       0.0265     0.43  VQ        |         |         |         |
1+15       0.0293     0.40  VQ        |         |         |         |
1+20       0.0320     0.39  VQ        |         |         |         |
1+25       0.0346     0.38  VQ        |         |         |         |
1+30       0.0372     0.38  VQ        |         |         |         |
1+35       0.0399     0.38  VQ        |         |         |         |
1+40       0.0425     0.38  VQ        |         |         |         |
1+45       0.0451     0.38  VQ        |         |         |         |
1+50       0.0477     0.39  VQ        |         |         |         |
1+55       0.0506     0.41  VQ        |         |         |         |
2+ 0       0.0536     0.44  VQ        |         |         |         |
2+ 5       0.0568     0.46  VQ        |         |         |         |
2+10       0.0601     0.47  VQ        |         |         |         |
2+15       0.0634     0.48  VQ        |         |         |         |
2+20       0.0667     0.48  |Q        |         |         |         |
2+25       0.0701     0.49  |Q        |         |         |         |
2+30       0.0734     0.49  |Q        |         |         |         |
2+35       0.0769     0.50  |Q        |         |         |         |
2+40       0.0805     0.52  |VQ       |         |         |         |
2+45       0.0843     0.56  |VQ       |         |         |         |
2+50       0.0884     0.58  |VQ       |         |         |         |
2+55       0.0924     0.59  |VQ       |         |         |         |
3+ 0       0.0966     0.60  |VQ       |         |         |         |
3+ 5       0.1007     0.61  |VQ       |         |         |         |
3+10       0.1049     0.61  |VQ       |         |         |         |
3+15       0.1092     0.61  |VQ       |         |         |         |
3+20       0.1134     0.62  |VQ       |         |         |         |
3+25       0.1177     0.62  |VQ       |         |         |         |
3+30       0.1219     0.62  |VQ       |         |         |         |
3+35       0.1262     0.62  |VQ       |         |         |         |
3+40       0.1305     0.62  | Q       |         |         |         |
3+45       0.1348     0.62  | Q       |         |         |         |
3+50       0.1391     0.63  | Q       |         |         |         |
3+55       0.1436     0.66  | Q       |         |         |         |
4+ 0       0.1484     0.69  | Q       |         |         |         |
4+ 5       0.1533     0.71  | Q       |         |         |         |
4+10       0.1582     0.72  | Q       |         |         |         |
4+15       0.1632     0.73  | Q       |         |         |         |
4+20       0.1683     0.74  | Q       |         |         |         |
4+25       0.1736     0.77  | VQ      |         |         |         |
4+30       0.1792     0.81  | VQ      |         |         |         |
4+35       0.1849     0.83  | VQ      |         |         |         |
4+40       0.1906     0.84  | VQ      |         |         |         |
4+45       0.1965     0.85  |  Q      |         |         |         |
4+50       0.2024     0.86  |  Q      |         |         |         |
4+55       0.2085     0.89  |  Q      |         |         |         |
5+ 0       0.2149     0.93  |  Q      |         |         |         |
5+ 5       0.2214     0.94  |  Q      |         |         |         |
5+10       0.2275     0.90  |  Q      |         |         |         |
5+15       0.2333     0.84  |  Q      |         |         |         |
5+20       0.2389     0.81  |  Q      |         |         |         |
5+25       0.2445     0.82  |  Q      |         |         |         |
5+30       0.2504     0.85  |  Q      |         |         |         |
5+35       0.2564     0.87  |  Q      |         |         |         |
5+40       0.2625     0.90  |  QV     |         |         |         |
5+45       0.2690     0.94  |  QV     |         |         |         |
5+50       0.2756     0.96  |  QV     |         |         |         |
5+55       0.2822     0.97  |  QV     |         |         |         |
6+ 0       0.2889     0.97  |  QV     |         |         |         |
6+ 5       0.2957     0.99  |  QV     |         |         |         |
6+10       0.3027     1.02  |   Q     |         |         |         |
6+15       0.3100     1.05  |   Q     |         |         |         |
```

```
 6+20       0.3174      1.08  |   Q     |         |         |         |
 6+25       0.3249      1.09  |   QV    |         |         |         |
 6+30       0.3324      1.10  |   QV    |         |         |         |
 6+35       0.3400      1.11  |   QV    |         |         |         |
 6+40       0.3479      1.14  |   QV    |         |         |         |
 6+45       0.3560      1.18  |   QV    |         |         |         |
 6+50       0.3643      1.20  |   QV    |         |         |         |
 6+55       0.3726      1.21  |   QV    |         |         |         |
 7+ 0       0.3810      1.22  |   QV    |         |         |         |
 7+ 5       0.3895      1.23  |   Q V   |         |         |         |
 7+10       0.3980      1.23  |   Q V   |         |         |         |
 7+15       0.4065      1.24  |   Q V   |         |         |         |
 7+20       0.4150      1.24  |   Q V   |         |         |         |
 7+25       0.4238      1.27  |    QV   |         |         |         |
 7+30       0.4328      1.31  |    QV   |         |         |         |
 7+35       0.4420      1.34  |    QV   |         |         |         |
 7+40       0.4515      1.37  |    QV   |         |         |         |
 7+45       0.4613      1.42  |    Q V  |         |         |         |
 7+50       0.4712      1.45  |    Q V  |         |         |         |
 7+55       0.4815      1.49  |    Q V  |         |         |         |
 8+ 0       0.4920      1.53  |     QV  |         |         |         |
 8+ 5       0.5029      1.57  |     QV  |         |         |         |
 8+10       0.5141      1.64  |     QV  |         |         |         |
 8+15       0.5260      1.72  |     Q V |         |         |         |
 8+20       0.5382      1.77  |      QV |         |         |         |
 8+25       0.5505      1.79  |      QV |         |         |         |
 8+30       0.5630      1.81  |      QV |         |         |         |
 8+35       0.5756      1.83  |      QV |         |         |         |
 8+40       0.5884      1.87  |      Q V|         |         |         |
 8+45       0.6016      1.91  |      Q V|         |         |         |
 8+50       0.6150      1.94  |      Q V|         |         |         |
 8+55       0.6286      1.98  |      Q V|         |         |         |
 9+ 0       0.6426      2.03  |       QV|         |         |         |
 9+ 5       0.6569      2.07  |       Q V         |         |         |
 9+10       0.6716      2.14  |       Q V         |         |         |
 9+15       0.6869      2.22  |       Q V         |         |         |
 9+20       0.7025      2.27  |        QV         |         |         |
 9+25       0.7186      2.33  |        Q|V        |         |         |
 9+30       0.7349      2.38  |        Q|V        |         |         |
 9+35       0.7516      2.42  |        Q|V        |         |         |
 9+40       0.7686      2.46  |        Q|V        |         |         |
 9+45       0.7859      2.51  |         Q V       |         |         |
 9+50       0.8034      2.55  |         Q V       |         |         |
 9+55       0.8213      2.59  |         Q V       |         |         |
10+ 0       0.8395      2.64  |         Q  V      |         |         |
10+ 5       0.8576      2.63  |         Q  V      |         |         |
10+10       0.8746      2.47  |        Q|  V      |         |         |
10+15       0.8900      2.23  |       Q |  V      |         |         |
10+20       0.9045      2.11  |       Q |   V     |         |         |
10+25       0.9186      2.05  |       Q |   V     |         |         |
10+30       0.9324      2.01  |       Q |   V     |         |         |
10+35       0.9463      2.01  |       Q |   V     |         |         |
10+40       0.9609      2.12  |       Q |   V     |         |         |
10+45       0.9765      2.28  |        Q|    V    |         |         |
10+50       0.9928      2.36  |        Q|    V    |         |         |
10+55       1.0093      2.40  |        Q|    V    |         |         |
11+ 0       1.0260      2.42  |        Q|    V    |         |         |
11+ 5       1.0428      2.43  |        Q|     V   |         |         |
11+10       1.0594      2.42  |        Q|     V   |         |         |
11+15       1.0759      2.39  |        Q|     V   |         |         |
11+20       1.0923      2.38  |        Q|     V   |         |         |
11+25       1.1086      2.37  |        Q|      V  |         |         |
11+30       1.1249      2.37  |        Q|      V  |         |         |
11+35       1.1412      2.36  |        Q|      V  |         |         |
11+40       1.1571      2.31  |        Q|      V  |         |         |
11+45       1.1725      2.24  |       Q |       V |         |         |
11+50       1.1877      2.21  |       Q |       V |         |         |
11+55       1.2029      2.21  |       Q |       V |         |         |
12+ 0       1.2183      2.24  |       Q |       V |         |         |
12+ 5       1.2341      2.29  |        Q|        V|         |         |
12+10       1.2511      2.47  |        Q|        V|         |         |
```

Attachment: Preliminary Water Quality Management Plan (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

```
12+15       1.2699      2.72  |         Q        V|         |         |
12+20       1.2896      2.86  |         |Q       V|         |         |
12+25       1.3100      2.96  |         |Q        V         |         |
12+30       1.3309      3.04  |         | Q       V         |         |
12+35       1.3522      3.10  |         | Q       V         |         |
12+40       1.3741      3.19  |         | Q       |V        |         |
12+45       1.3968      3.28  |         |  Q      |V        |         |
12+50       1.4198      3.35  |         |  Q      | V       |         |
12+55       1.4433      3.41  |         |  Q      | V       |         |
13+ 0       1.4672      3.47  |         |  Q      | V       |         |
13+ 5       1.4916      3.54  |         |   Q     |  V      |         |
13+10       1.5170      3.70  |         |   Q     |  V      |         |
13+15       1.5438      3.89  |         |    Q    |  V      |         |
13+20       1.5714      4.01  |         |     Q   |   V     |         |
13+25       1.5994      4.07  |         |     Q   |   V     |         |
13+30       1.6277      4.11  |         |     Q   |    V    |         |
13+35       1.6558      4.07  |         |     Q   |    V    |         |
13+40       1.6820      3.81  |         |    Q    |     V   |         |
13+45       1.7057      3.44  |         |  Q      |     V   |         |
13+50       1.7281      3.24  |         | Q       |     V   |         |
13+55       1.7497      3.15  |         | Q       |      V  |         |
14+ 0       1.7710      3.08  |         | Q       |      V  |         |
14+ 5       1.7921      3.06  |         | Q       |      V  |         |
14+10       1.8136      3.13  |         | Q       |       V |         |
14+15       1.8360      3.25  |         | Q       |       V |         |
14+20       1.8587      3.30  |         |  Q      |       V |         |
14+25       1.8815      3.30  |         |  Q      |        V|         |
14+30       1.9040      3.27  |         |  Q      |        V|         |
14+35       1.9264      3.26  |         |  Q      |        V|         |
14+40       1.9489      3.25  |         |  Q      |         V         |
14+45       1.9712      3.25  |         |  Q      |         V         |
14+50       1.9936      3.24  |         | Q       |         V         |
14+55       2.0157      3.21  |         | Q       |         |V        |
15+ 0       2.0375      3.17  |         | Q       |         |V        |
15+ 5       2.0592      3.15  |         | Q       |         |V        |
15+10       2.0807      3.11  |         | Q       |         | V       |
15+15       2.1018      3.07  |         | Q       |         | V       |
15+20       2.1228      3.04  |         | Q       |         | V       |
15+25       2.1435      3.01  |         | Q       |         |  V      |
15+30       2.1639      2.96  |         |Q        |         |  V      |
15+35       2.1840      2.91  |         |Q        |         |  V      |
15+40       2.2032      2.79  |         |Q        |         |   V     |
15+45       2.2214      2.64  |         Q         |         |   V     |
15+50       2.2390      2.55  |         Q         |         |   V     |
15+55       2.2563      2.51  |         Q         |         |   V     |
16+ 0       2.2734      2.48  |        Q|         |         |    V    |
16+ 5       2.2896      2.36  |        Q|         |         |    V    |
16+10       2.3031      1.96  |      Q  |         |         |    V    |
16+15       2.3129      1.42  |    Q    |         |         |    V    |
16+20       2.3205      1.11  |   Q     |         |         |    V    |
16+25       2.3271      0.96  |  Q      |         |         |     V   |
16+30       2.3330      0.85  |  Q      |         |         |     V   |
16+35       2.3383      0.77  |  Q      |         |         |     V   |
16+40       2.3430      0.69  | Q       |         |         |     V   |
16+45       2.3472      0.60  | Q       |         |         |     V   |
16+50       2.3510      0.55  | Q       |         |         |     V   |
16+55       2.3545      0.51  | Q       |         |         |     V   |
17+ 0       2.3578      0.48  |Q        |         |         |     V   |
17+ 5       2.3610      0.47  |Q        |         |         |     V   |
17+10       2.3644      0.50  |Q        |         |         |     V   |
17+15       2.3682      0.55  | Q       |         |         |     V   |
17+20       2.3722      0.58  | Q       |         |         |     V   |
17+25       2.3763      0.59  | Q       |         |         |     V   |
17+30       2.3804      0.59  | Q       |         |         |     V   |
17+35       2.3845      0.59  | Q       |         |         |     V   |
17+40       2.3886      0.60  | Q       |         |         |      V  |
17+45       2.3928      0.60  | Q       |         |         |      V  |
17+50       2.3969      0.60  | Q       |         |         |      V  |
17+55       2.4009      0.58  | Q       |         |         |      V  |
18+ 0       2.4047      0.55  | Q       |         |         |      V  |
18+ 5       2.4083      0.53  | Q       |         |         |      V  |
```

```
 18+10       2.4119       0.52  | Q        |         |         |      V  |
 18+15       2.4155       0.52  | Q        |         |         |      V  |
 18+20       2.4190       0.51  | Q        |         |         |      V  |
 18+25       2.4225       0.51  | Q        |         |         |      V  |
 18+30       2.4260       0.51  | Q        |         |         |      V  |
 18+35       2.4295       0.50  | Q        |         |         |      V  |
 18+40       2.4328       0.47  |Q         |         |         |      V  |
 18+45       2.4358       0.44  |Q         |         |         |      V  |
 18+50       2.4386       0.41  |Q         |         |         |      V  |
 18+55       2.4412       0.37  |Q         |         |         |      V  |
 19+ 0       2.4435       0.33  |Q         |         |         |      V  |
 19+ 5       2.4456       0.31  |Q         |         |         |      V  |
 19+10       2.4478       0.32  |Q         |         |         |      V  |
 19+15       2.4503       0.35  |Q         |         |         |      V  |
 19+20       2.4528       0.37  |Q         |         |         |       V |
 19+25       2.4555       0.40  |Q         |         |         |       V |
 19+30       2.4585       0.44  |Q         |         |         |       V |
 19+35       2.4617       0.45  |Q         |         |         |       V |
 19+40       2.4647       0.44  |Q         |         |         |       V |
 19+45       2.4675       0.41  |Q         |         |         |       V |
 19+50       2.4701       0.39  |Q         |         |         |       V |
 19+55       2.4726       0.35  |Q         |         |         |       V |
 20+ 0       2.4747       0.32  |Q         |         |         |       V |
 20+ 5       2.4768       0.30  |Q         |         |         |       V |
 20+10       2.4790       0.31  |Q         |         |         |       V |
 20+15       2.4813       0.34  |Q         |         |         |       V |
 20+20       2.4838       0.36  |Q         |         |         |       V |
 20+25       2.4863       0.36  |Q         |         |         |       V |
 20+30       2.4888       0.37  |Q         |         |         |       V |
 20+35       2.4913       0.37  |Q         |         |         |       V |
 20+40       2.4939       0.37  |Q         |         |         |       V |
 20+45       2.4964       0.37  |Q         |         |         |       V |
 20+50       2.4990       0.37  |Q         |         |         |       V |
 20+55       2.5013       0.34  |Q         |         |         |       V |
 21+ 0       2.5034       0.30  |Q         |         |         |       V |
 21+ 5       2.5054       0.29  |Q         |         |         |       V |
 21+10       2.5075       0.31  |Q         |         |         |       V |
 21+15       2.5099       0.34  |Q         |         |         |       V |
 21+20       2.5122       0.35  |Q         |         |         |       V |
 21+25       2.5145       0.33  |Q         |         |         |       V |
 21+30       2.5165       0.30  |Q         |         |         |        V|
 21+35       2.5185       0.29  |Q         |         |         |        V|
 21+40       2.5206       0.30  |Q         |         |         |        V|
 21+45       2.5229       0.33  |Q         |         |         |        V|
 21+50       2.5252       0.34  |Q         |         |         |        V|
 21+55       2.5275       0.32  |Q         |         |         |        V|
 22+ 0       2.5295       0.29  |Q         |         |         |        V|
 22+ 5       2.5314       0.28  |Q         |         |         |        V|
 22+10       2.5335       0.30  |Q         |         |         |        V|
 22+15       2.5358       0.33  |Q         |         |         |        V|
 22+20       2.5382       0.34  |Q         |         |         |        V|
 22+25       2.5404       0.32  |Q         |         |         |        V|
 22+30       2.5424       0.29  |Q         |         |         |        V|
 22+35       2.5443       0.28  |Q         |         |         |        V|
 22+40       2.5462       0.27  |Q         |         |         |        V|
 22+45       2.5480       0.26  |Q         |         |         |        V|
 22+50       2.5498       0.26  |Q         |         |         |        V|
 22+55       2.5516       0.26  |Q         |         |         |        V|
 23+ 0       2.5533       0.26  |Q         |         |         |        V|
 23+ 5       2.5551       0.26  |Q         |         |         |        V|
 23+10       2.5568       0.25  |Q         |         |         |        V|
 23+15       2.5586       0.25  |Q         |         |         |        V|
 23+20       2.5603       0.25  |Q         |         |         |        V|
 23+25       2.5621       0.25  |Q         |         |         |        V|
 23+30       2.5638       0.25  |Q         |         |         |        V|
 23+35       2.5655       0.25  |Q         |         |         |        V|
 23+40       2.5672       0.25  |Q         |         |         |        V|
 23+45       2.5690       0.25  |Q         |         |         |        V|
 23+50       2.5707       0.25  Q          |         |         |        V|
 23+55       2.5724       0.25  Q          |         |         |        V|
 24+ 0       2.5741       0.25  Q          |         |         |        V|
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  24+ 5       2.5758      0.24  Q          |         |         |        V|
  24+10       2.5770      0.19  Q          |         |         |        V|
  24+15       2.5778      0.12  Q          |         |         |        V|
  24+20       2.5784      0.08  Q          |         |         |        V|
  24+25       2.5788      0.06  Q          |         |         |        V|
  24+30       2.5791      0.04  Q          |         |         |        V|
  24+35       2.5793      0.03  Q          |         |         |        V|
  24+40       2.5795      0.03  Q          |         |         |        V|
  24+45       2.5796      0.02  Q          |         |         |        V|
  24+50       2.5797      0.02  Q          |         |         |        V|
  24+55       2.5798      0.01  Q          |         |         |        V|
  25+ 0       2.5799      0.01  Q          |         |         |        V|
  25+ 5       2.5800      0.01  Q          |         |         |        V|
  25+10       2.5800      0.01  Q          |         |         |        V|
  25+15       2.5800      0.00  Q          |         |         |        V|
  25+20       2.5801      0.00  Q          |         |         |        V|
  25+25       2.5801      0.00  Q          |         |         |        V|
  25+30       2.5801      0.00  Q          |         |         |        V|
-----------------------------------------------------------------------
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Basin B – 2-Year, 24-Hour Storm Duration

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       U n i t   H y d r o g r a p h   A n a l y s i s

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              Study date  09/29/15 File: BASINBP242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 6279

---------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



---------------------------------------------------------------------
IRONWOOD POST-PROJECT CONDITION HYDROLOGY
UNIT HYDROGRAPH ANALYSIS, 2-YEAR, 24-HOUR STORM DURATION
FILENAME: BASINBP

--------------------------------------------------------------------
Drainage Area =     111.68(Ac.)  =      0.175 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =     111.68(Ac.)  =      0.175 Sq. Mi.
USER Entry of lag time in hours
Lag time =    0.209 Hr.
Lag time =    12.52 Min.
25% of lag time =     3.13 Min.
40% of lag time =     5.01 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
      111.68           2.00                223.36

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
      111.68           5.00                558.40

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    2.000(In)
Area Averaged 100-Year Rainfall =    5.000(In)

Point rain (area averaged) =    2.000(In)
Areal adjustment factor =   99.98 %
Adjusted average point rain =    2.000(In)

Sub-Area Data:
Area(Ac.)          Runoff Index   Impervious %
   111.680           74.70         0.175
 Total Area Entered =    111.68(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
74.7  56.6      0.504     0.175        0.425       1.000      0.425
                                                  Sum (F) =   0.425
```

Area averaged mean soil loss (F) (In/Hr) = 0.425
Minimum soil loss rate ((In/Hr)) = 0.212
(for 24 hour storm duration)
Soil low loss rate (decimal) = 0.760

U n i t H y d r o g r a p h
VALLEY S-Curve

Unit Hydrograph Data

Unit time period (hrs)		Time % of lag	Distribution Graph %	Unit Hydrograph (CFS)
1	0.083	39.937	4.346	4.892
2	0.167	79.875	17.838	20.077
3	0.250	119.812	26.719	30.073
4	0.333	159.750	17.477	19.670
5	0.417	199.687	8.542	9.614
6	0.500	239.624	5.384	6.059
7	0.583	279.562	4.019	4.523
8	0.667	319.499	3.085	3.472
9	0.750	359.436	2.441	2.748
10	0.833	399.374	1.944	2.188
11	0.917	439.311	1.525	1.717
12	1.000	479.249	1.257	1.414
13	1.083	519.186	1.164	1.310
14	1.167	559.123	0.918	1.033
15	1.250	599.061	0.766	0.863
16	1.333	638.998	0.643	0.723
17	1.417	678.935	0.517	0.582
18	1.500	718.873	0.405	0.456
19	1.583	758.810	0.399	0.450
20	1.667	798.748	0.399	0.450
21	1.750	838.685	0.212	0.239
			Sum = 100.000	Sum= 112.552

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.016	(0.753)	0.012	0.004
2	0.17	0.07	0.016	(0.750)	0.012	0.004
3	0.25	0.07	0.016	(0.747)	0.012	0.004
4	0.33	0.10	0.024	(0.744)	0.018	0.006
5	0.42	0.10	0.024	(0.742)	0.018	0.006
6	0.50	0.10	0.024	(0.739)	0.018	0.006
7	0.58	0.10	0.024	(0.736)	0.018	0.006
8	0.67	0.10	0.024	(0.733)	0.018	0.006
9	0.75	0.10	0.024	(0.730)	0.018	0.006
10	0.83	0.13	0.032	(0.727)	0.024	0.008
11	0.92	0.13	0.032	(0.724)	0.024	0.008
12	1.00	0.13	0.032	(0.721)	0.024	0.008
13	1.08	0.10	0.024	(0.719)	0.018	0.006
14	1.17	0.10	0.024	(0.716)	0.018	0.006
15	1.25	0.10	0.024	(0.713)	0.018	0.006
16	1.33	0.10	0.024	(0.710)	0.018	0.006
17	1.42	0.10	0.024	(0.707)	0.018	0.006
18	1.50	0.10	0.024	(0.704)	0.018	0.006
19	1.58	0.10	0.024	(0.702)	0.018	0.006
20	1.67	0.10	0.024	(0.699)	0.018	0.006
21	1.75	0.10	0.024	(0.696)	0.018	0.006
22	1.83	0.13	0.032	(0.693)	0.024	0.008
23	1.92	0.13	0.032	(0.690)	0.024	0.008
24	2.00	0.13	0.032	(0.688)	0.024	0.008
25	2.08	0.13	0.032	(0.685)	0.024	0.008
26	2.17	0.13	0.032	(0.682)	0.024	0.008
27	2.25	0.13	0.032	(0.679)	0.024	0.008

28	2.33	0.13	0.032	(0.676)	0.024	0.008
29	2.42	0.13	0.032	(0.674)	0.024	0.008
30	2.50	0.13	0.032	(0.671)	0.024	0.008
31	2.58	0.17	0.040	(0.668)	0.030	0.010
32	2.67	0.17	0.040	(0.665)	0.030	0.010
33	2.75	0.17	0.040	(0.663)	0.030	0.010
34	2.83	0.17	0.040	(0.660)	0.030	0.010
35	2.92	0.17	0.040	(0.657)	0.030	0.010
36	3.00	0.17	0.040	(0.655)	0.030	0.010
37	3.08	0.17	0.040	(0.652)	0.030	0.010
38	3.17	0.17	0.040	(0.649)	0.030	0.010
39	3.25	0.17	0.040	(0.646)	0.030	0.010
40	3.33	0.17	0.040	(0.644)	0.030	0.010
41	3.42	0.17	0.040	(0.641)	0.030	0.010
42	3.50	0.17	0.040	(0.638)	0.030	0.010
43	3.58	0.17	0.040	(0.636)	0.030	0.010
44	3.67	0.17	0.040	(0.633)	0.030	0.010
45	3.75	0.17	0.040	(0.630)	0.030	0.010
46	3.83	0.20	0.048	(0.628)	0.036	0.012
47	3.92	0.20	0.048	(0.625)	0.036	0.012
48	4.00	0.20	0.048	(0.622)	0.036	0.012
49	4.08	0.20	0.048	(0.620)	0.036	0.012
50	4.17	0.20	0.048	(0.617)	0.036	0.012
51	4.25	0.20	0.048	(0.615)	0.036	0.012
52	4.33	0.23	0.056	(0.612)	0.043	0.013
53	4.42	0.23	0.056	(0.609)	0.043	0.013
54	4.50	0.23	0.056	(0.607)	0.043	0.013
55	4.58	0.23	0.056	(0.604)	0.043	0.013
56	4.67	0.23	0.056	(0.602)	0.043	0.013
57	4.75	0.23	0.056	(0.599)	0.043	0.013
58	4.83	0.27	0.064	(0.596)	0.049	0.015
59	4.92	0.27	0.064	(0.594)	0.049	0.015
60	5.00	0.27	0.064	(0.591)	0.049	0.015
61	5.08	0.20	0.048	(0.589)	0.036	0.012
62	5.17	0.20	0.048	(0.586)	0.036	0.012
63	5.25	0.20	0.048	(0.583)	0.036	0.012
64	5.33	0.23	0.056	(0.581)	0.043	0.013
65	5.42	0.23	0.056	(0.578)	0.043	0.013
66	5.50	0.23	0.056	(0.576)	0.043	0.013
67	5.58	0.27	0.064	(0.573)	0.049	0.015
68	5.67	0.27	0.064	(0.571)	0.049	0.015
69	5.75	0.27	0.064	(0.568)	0.049	0.015
70	5.83	0.27	0.064	(0.566)	0.049	0.015
71	5.92	0.27	0.064	(0.563)	0.049	0.015
72	6.00	0.27	0.064	(0.561)	0.049	0.015
73	6.08	0.30	0.072	(0.558)	0.055	0.017
74	6.17	0.30	0.072	(0.556)	0.055	0.017
75	6.25	0.30	0.072	(0.553)	0.055	0.017
76	6.33	0.30	0.072	(0.551)	0.055	0.017
77	6.42	0.30	0.072	(0.548)	0.055	0.017
78	6.50	0.30	0.072	(0.546)	0.055	0.017
79	6.58	0.33	0.080	(0.543)	0.061	0.019
80	6.67	0.33	0.080	(0.541)	0.061	0.019
81	6.75	0.33	0.080	(0.539)	0.061	0.019
82	6.83	0.33	0.080	(0.536)	0.061	0.019
83	6.92	0.33	0.080	(0.534)	0.061	0.019
84	7.00	0.33	0.080	(0.531)	0.061	0.019
85	7.08	0.33	0.080	(0.529)	0.061	0.019
86	7.17	0.33	0.080	(0.527)	0.061	0.019
87	7.25	0.33	0.080	(0.524)	0.061	0.019
88	7.33	0.37	0.088	(0.522)	0.067	0.021
89	7.42	0.37	0.088	(0.519)	0.067	0.021
90	7.50	0.37	0.088	(0.517)	0.067	0.021
91	7.58	0.40	0.096	(0.515)	0.073	0.023
92	7.67	0.40	0.096	(0.512)	0.073	0.023
93	7.75	0.40	0.096	(0.510)	0.073	0.023
94	7.83	0.43	0.104	(0.507)	0.079	0.025
95	7.92	0.43	0.104	(0.505)	0.079	0.025
96	8.00	0.43	0.104	(0.503)	0.079	0.025
97	8.08	0.50	0.120	(0.500)	0.091	0.029
98	8.17	0.50	0.120	(0.498)	0.091	0.029

Attachment: Preliminary Water Quality Management Plan (2437 : Ironwood Village (PEN16-0077 through PEN16-0081))

99	8.25	0.50	0.120	(0.496)	0.091	0.029
100	8.33	0.50	0.120	(0.493)	0.091	0.029
101	8.42	0.50	0.120	(0.491)	0.091	0.029
102	8.50	0.50	0.120	(0.489)	0.091	0.029
103	8.58	0.53	0.128	(0.487)	0.097	0.031
104	8.67	0.53	0.128	(0.484)	0.097	0.031
105	8.75	0.53	0.128	(0.482)	0.097	0.031
106	8.83	0.57	0.136	(0.480)	0.103	0.033
107	8.92	0.57	0.136	(0.477)	0.103	0.033
108	9.00	0.57	0.136	(0.475)	0.103	0.033
109	9.08	0.63	0.152	(0.473)	0.115	0.036
110	9.17	0.63	0.152	(0.471)	0.115	0.036
111	9.25	0.63	0.152	(0.468)	0.115	0.036
112	9.33	0.67	0.160	(0.466)	0.122	0.038
113	9.42	0.67	0.160	(0.464)	0.122	0.038
114	9.50	0.67	0.160	(0.462)	0.122	0.038
115	9.58	0.70	0.168	(0.460)	0.128	0.040
116	9.67	0.70	0.168	(0.457)	0.128	0.040
117	9.75	0.70	0.168	(0.455)	0.128	0.040
118	9.83	0.73	0.176	(0.453)	0.134	0.042
119	9.92	0.73	0.176	(0.451)	0.134	0.042
120	10.00	0.73	0.176	(0.449)	0.134	0.042
121	10.08	0.50	0.120	(0.446)	0.091	0.029
122	10.17	0.50	0.120	(0.444)	0.091	0.029
123	10.25	0.50	0.120	(0.442)	0.091	0.029
124	10.33	0.50	0.120	(0.440)	0.091	0.029
125	10.42	0.50	0.120	(0.438)	0.091	0.029
126	10.50	0.50	0.120	(0.436)	0.091	0.029
127	10.58	0.67	0.160	(0.434)	0.122	0.038
128	10.67	0.67	0.160	(0.431)	0.122	0.038
129	10.75	0.67	0.160	(0.429)	0.122	0.038
130	10.83	0.67	0.160	(0.427)	0.122	0.038
131	10.92	0.67	0.160	(0.425)	0.122	0.038
132	11.00	0.67	0.160	(0.423)	0.122	0.038
133	11.08	0.63	0.152	(0.421)	0.115	0.036
134	11.17	0.63	0.152	(0.419)	0.115	0.036
135	11.25	0.63	0.152	(0.417)	0.115	0.036
136	11.33	0.63	0.152	(0.415)	0.115	0.036
137	11.42	0.63	0.152	(0.413)	0.115	0.036
138	11.50	0.63	0.152	(0.411)	0.115	0.036
139	11.58	0.57	0.136	(0.409)	0.103	0.033
140	11.67	0.57	0.136	(0.407)	0.103	0.033
141	11.75	0.57	0.136	(0.405)	0.103	0.033
142	11.83	0.60	0.144	(0.403)	0.109	0.035
143	11.92	0.60	0.144	(0.401)	0.109	0.035
144	12.00	0.60	0.144	(0.399)	0.109	0.035
145	12.08	0.83	0.200	(0.397)	0.152	0.048
146	12.17	0.83	0.200	(0.395)	0.152	0.048
147	12.25	0.83	0.200	(0.393)	0.152	0.048
148	12.33	0.87	0.208	(0.391)	0.158	0.050
149	12.42	0.87	0.208	(0.389)	0.158	0.050
150	12.50	0.87	0.208	(0.387)	0.158	0.050
151	12.58	0.93	0.224	(0.385)	0.170	0.054
152	12.67	0.93	0.224	(0.383)	0.170	0.054
153	12.75	0.93	0.224	(0.381)	0.170	0.054
154	12.83	0.97	0.232	(0.379)	0.176	0.056
155	12.92	0.97	0.232	(0.377)	0.176	0.056
156	13.00	0.97	0.232	(0.375)	0.176	0.056
157	13.08	1.13	0.272	(0.373)	0.207	0.065
158	13.17	1.13	0.272	(0.371)	0.207	0.065
159	13.25	1.13	0.272	(0.369)	0.207	0.065
160	13.33	1.13	0.272	(0.368)	0.207	0.065
161	13.42	1.13	0.272	(0.366)	0.207	0.065
162	13.50	1.13	0.272	(0.364)	0.207	0.065
163	13.58	0.77	0.184	(0.362)	0.140	0.044
164	13.67	0.77	0.184	(0.360)	0.140	0.044
165	13.75	0.77	0.184	(0.358)	0.140	0.044
166	13.83	0.77	0.184	(0.357)	0.140	0.044
167	13.92	0.77	0.184	(0.355)	0.140	0.044
168	14.00	0.77	0.184	(0.353)	0.140	0.044
169	14.08	0.90	0.216	(0.351)	0.164	0.052

170	14.17	0.90	0.216	(0.349)	0.164	0.052
171	14.25	0.90	0.216	(0.348)	0.164	0.052
172	14.33	0.87	0.208	(0.346)	0.158	0.050
173	14.42	0.87	0.208	(0.344)	0.158	0.050
174	14.50	0.87	0.208	(0.342)	0.158	0.050
175	14.58	0.87	0.208	(0.340)	0.158	0.050
176	14.67	0.87	0.208	(0.339)	0.158	0.050
177	14.75	0.87	0.208	(0.337)	0.158	0.050
178	14.83	0.83	0.200	(0.335)	0.152	0.048
179	14.92	0.83	0.200	(0.334)	0.152	0.048
180	15.00	0.83	0.200	(0.332)	0.152	0.048
181	15.08	0.80	0.192	(0.330)	0.146	0.046
182	15.17	0.80	0.192	(0.328)	0.146	0.046
183	15.25	0.80	0.192	(0.327)	0.146	0.046
184	15.33	0.77	0.184	(0.325)	0.140	0.044
185	15.42	0.77	0.184	(0.323)	0.140	0.044
186	15.50	0.77	0.184	(0.322)	0.140	0.044
187	15.58	0.63	0.152	(0.320)	0.115	0.036
188	15.67	0.63	0.152	(0.318)	0.115	0.036
189	15.75	0.63	0.152	(0.317)	0.115	0.036
190	15.83	0.63	0.152	(0.315)	0.115	0.036
191	15.92	0.63	0.152	(0.314)	0.115	0.036
192	16.00	0.63	0.152	(0.312)	0.115	0.036
193	16.08	0.13	0.032	(0.310)	0.024	0.008
194	16.17	0.13	0.032	(0.309)	0.024	0.008
195	16.25	0.13	0.032	(0.307)	0.024	0.008
196	16.33	0.13	0.032	(0.306)	0.024	0.008
197	16.42	0.13	0.032	(0.304)	0.024	0.008
198	16.50	0.13	0.032	(0.303)	0.024	0.008
199	16.58	0.10	0.024	(0.301)	0.018	0.006
200	16.67	0.10	0.024	(0.299)	0.018	0.006
201	16.75	0.10	0.024	(0.298)	0.018	0.006
202	16.83	0.10	0.024	(0.296)	0.018	0.006
203	16.92	0.10	0.024	(0.295)	0.018	0.006
204	17.00	0.10	0.024	(0.293)	0.018	0.006
205	17.08	0.17	0.040	(0.292)	0.030	0.010
206	17.17	0.17	0.040	(0.291)	0.030	0.010
207	17.25	0.17	0.040	(0.289)	0.030	0.010
208	17.33	0.17	0.040	(0.288)	0.030	0.010
209	17.42	0.17	0.040	(0.286)	0.030	0.010
210	17.50	0.17	0.040	(0.285)	0.030	0.010
211	17.58	0.17	0.040	(0.283)	0.030	0.010
212	17.67	0.17	0.040	(0.282)	0.030	0.010
213	17.75	0.17	0.040	(0.280)	0.030	0.010
214	17.83	0.13	0.032	(0.279)	0.024	0.008
215	17.92	0.13	0.032	(0.278)	0.024	0.008
216	18.00	0.13	0.032	(0.276)	0.024	0.008
217	18.08	0.13	0.032	(0.275)	0.024	0.008
218	18.17	0.13	0.032	(0.274)	0.024	0.008
219	18.25	0.13	0.032	(0.272)	0.024	0.008
220	18.33	0.13	0.032	(0.271)	0.024	0.008
221	18.42	0.13	0.032	(0.270)	0.024	0.008
222	18.50	0.13	0.032	(0.268)	0.024	0.008
223	18.58	0.10	0.024	(0.267)	0.018	0.006
224	18.67	0.10	0.024	(0.266)	0.018	0.006
225	18.75	0.10	0.024	(0.264)	0.018	0.006
226	18.83	0.07	0.016	(0.263)	0.012	0.004
227	18.92	0.07	0.016	(0.262)	0.012	0.004
228	19.00	0.07	0.016	(0.261)	0.012	0.004
229	19.08	0.10	0.024	(0.259)	0.018	0.006
230	19.17	0.10	0.024	(0.258)	0.018	0.006
231	19.25	0.10	0.024	(0.257)	0.018	0.006
232	19.33	0.13	0.032	(0.256)	0.024	0.008
233	19.42	0.13	0.032	(0.255)	0.024	0.008
234	19.50	0.13	0.032	(0.253)	0.024	0.008
235	19.58	0.10	0.024	(0.252)	0.018	0.006
236	19.67	0.10	0.024	(0.251)	0.018	0.006
237	19.75	0.10	0.024	(0.250)	0.018	0.006
238	19.83	0.07	0.016	(0.249)	0.012	0.004
239	19.92	0.07	0.016	(0.248)	0.012	0.004
240	20.00	0.07	0.016	(0.247)	0.012	0.004

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241  20.08     0.10      0.024       (  0.246)      0.018        0.006
242  20.17     0.10      0.024       (  0.245)      0.018        0.006
243  20.25     0.10      0.024       (  0.243)      0.018        0.006
244  20.33     0.10      0.024       (  0.242)      0.018        0.006
245  20.42     0.10      0.024       (  0.241)      0.018        0.006
246  20.50     0.10      0.024       (  0.240)      0.018        0.006
247  20.58     0.10      0.024       (  0.239)      0.018        0.006
248  20.67     0.10      0.024       (  0.238)      0.018        0.006
249  20.75     0.10      0.024       (  0.237)      0.018        0.006
250  20.83     0.07      0.016       (  0.236)      0.012        0.004
251  20.92     0.07      0.016       (  0.235)      0.012        0.004
252  21.00     0.07      0.016       (  0.234)      0.012        0.004
253  21.08     0.10      0.024       (  0.234)      0.018        0.006
254  21.17     0.10      0.024       (  0.233)      0.018        0.006
255  21.25     0.10      0.024       (  0.232)      0.018        0.006
256  21.33     0.07      0.016       (  0.231)      0.012        0.004
257  21.42     0.07      0.016       (  0.230)      0.012        0.004
258  21.50     0.07      0.016       (  0.229)      0.012        0.004
259  21.58     0.10      0.024       (  0.228)      0.018        0.006
260  21.67     0.10      0.024       (  0.227)      0.018        0.006
261  21.75     0.10      0.024       (  0.227)      0.018        0.006
262  21.83     0.07      0.016       (  0.226)      0.012        0.004
263  21.92     0.07      0.016       (  0.225)      0.012        0.004
264  22.00     0.07      0.016       (  0.224)      0.012        0.004
265  22.08     0.10      0.024       (  0.224)      0.018        0.006
266  22.17     0.10      0.024       (  0.223)      0.018        0.006
267  22.25     0.10      0.024       (  0.222)      0.018        0.006
268  22.33     0.07      0.016       (  0.221)      0.012        0.004
269  22.42     0.07      0.016       (  0.221)      0.012        0.004
270  22.50     0.07      0.016       (  0.220)      0.012        0.004
271  22.58     0.07      0.016       (  0.219)      0.012        0.004
272  22.67     0.07      0.016       (  0.219)      0.012        0.004
273  22.75     0.07      0.016       (  0.218)      0.012        0.004
274  22.83     0.07      0.016       (  0.218)      0.012        0.004
275  22.92     0.07      0.016       (  0.217)      0.012        0.004
276  23.00     0.07      0.016       (  0.217)      0.012        0.004
277  23.08     0.07      0.016       (  0.216)      0.012        0.004
278  23.17     0.07      0.016       (  0.216)      0.012        0.004
279  23.25     0.07      0.016       (  0.215)      0.012        0.004
280  23.33     0.07      0.016       (  0.215)      0.012        0.004
281  23.42     0.07      0.016       (  0.214)      0.012        0.004
282  23.50     0.07      0.016       (  0.214)      0.012        0.004
283  23.58     0.07      0.016       (  0.214)      0.012        0.004
284  23.67     0.07      0.016       (  0.213)      0.012        0.004
285  23.75     0.07      0.016       (  0.213)      0.012        0.004
286  23.83     0.07      0.016       (  0.213)      0.012        0.004
287  23.92     0.07      0.016       (  0.213)      0.012        0.004
288  24.00     0.07      0.016       (  0.212)      0.012        0.004
               (Loss Rate Not Used)
    Sum =     100.0                                        Sum =     5.8
      Flood volume = Effective rainfall      0.48(In)
       times area     111.7(Ac.)/[(In)/(Ft.)] =       4.5(Ac.Ft)
      Total soil loss =      1.52(In)
      Total soil loss =    14.143(Ac.Ft)
      Total rainfall =      2.00(In)
      Flood volume =      194548.8 Cubic Feet
      Total soil loss =      616071.2 Cubic Feet
      --------------------------------------------------------------------
       Peak flow rate of this hydrograph =      7.070(CFS)
      --------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 -----------------------------------------------------------------------
   0+ 5       0.0001      0.02  Q         |         |         |         |
   0+10       0.0008      0.10  Q         |         |         |         |
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0+15       0.0022      0.21  Q         |         |         |         |
0+20       0.0043      0.30  VQ        |         |         |         |
0+25       0.0068      0.37  VQ        |         |         |         |
0+30       0.0100      0.45  VQ        |         |         |         |
0+35       0.0135      0.51  V Q       |         |         |         |
0+40       0.0172      0.54  V Q       |         |         |         |
0+45       0.0211      0.56  V Q       |         |         |         |
0+50       0.0251      0.59  V Q       |         |         |         |
0+55       0.0295      0.64  V Q       |         |         |         |
1+ 0       0.0344      0.71  V Q       |         |         |         |
1+ 5       0.0395      0.75  V Q       |         |         |         |
1+10       0.0446      0.73  V Q       |         |         |         |
1+15       0.0494      0.69  V Q       |         |         |         |
1+20       0.0540      0.67  V Q       |         |         |         |
1+25       0.0585      0.66  V Q       |         |         |         |
1+30       0.0631      0.66  V Q       |         |         |         |
1+35       0.0676      0.66  V Q       |         |         |         |
1+40       0.0721      0.66  V Q       |         |         |         |
1+45       0.0767      0.66  V Q       |         |         |         |
1+50       0.0812      0.67  V Q       |         |         |         |
1+55       0.0861      0.70  V Q       |         |         |         |
2+ 0       0.0913      0.76  V  Q      |         |         |         |
2+ 5       0.0968      0.80  V  Q      |         |         |         |
2+10       0.1024      0.81  V  Q      |         |         |         |
2+15       0.1081      0.83  V  Q      |         |         |         |
2+20       0.1138      0.83  |V Q      |         |         |         |
2+25       0.1196      0.84  |V Q      |         |         |         |
2+30       0.1255      0.84  |V Q      |         |         |         |
2+35       0.1314      0.86  |V Q      |         |         |         |
2+40       0.1375      0.90  |V Q      |         |         |         |
2+45       0.1441      0.96  |V Q      |         |         |         |
2+50       0.1510      1.00  |V Q      |         |         |         |
2+55       0.1580      1.02  |V  Q     |         |         |         |
3+ 0       0.1652      1.03  |V  Q     |         |         |         |
3+ 5       0.1723      1.04  |V  Q     |         |         |         |
3+10       0.1796      1.05  |V  Q     |         |         |         |
3+15       0.1869      1.06  |V  Q     |         |         |         |
3+20       0.1942      1.06  |V  Q     |         |         |         |
3+25       0.2015      1.07  |V  Q     |         |         |         |
3+30       0.2089      1.07  |V  Q     |         |         |         |
3+35       0.2163      1.07  |V  Q     |         |         |         |
3+40       0.2236      1.07  | V Q     |         |         |         |
3+45       0.2311      1.08  | V Q     |         |         |         |
3+50       0.2385      1.09  | V Q     |         |         |         |
3+55       0.2463      1.13  | V Q     |         |         |         |
4+ 0       0.2544      1.18  | V Q     |         |         |         |
4+ 5       0.2629      1.22  | V Q     |         |         |         |
4+10       0.2714      1.24  | V Q     |         |         |         |
4+15       0.2801      1.25  | V  Q    |         |         |         |
4+20       0.2888      1.27  | V  Q    |         |         |         |
4+25       0.2979      1.32  | V  Q    |         |         |         |
4+30       0.3074      1.38  | V  Q    |         |         |         |
4+35       0.3172      1.42  | V  Q    |         |         |         |
4+40       0.3272      1.44  | V  Q    |         |         |         |
4+45       0.3372      1.46  |  V Q    |         |         |         |
4+50       0.3474      1.48  |  V Q    |         |         |         |
4+55       0.3579      1.53  |  V  Q   |         |         |         |
5+ 0       0.3689      1.59  |  V  Q   |         |         |         |
5+ 5       0.3800      1.62  |  V  Q   |         |         |         |
5+10       0.3907      1.56  |  V  Q   |         |         |         |
5+15       0.4008      1.46  |  V Q    |         |         |         |
5+20       0.4105      1.41  |  V Q    |         |         |         |
5+25       0.4203      1.42  |  V Q    |         |         |         |
5+30       0.4303      1.46  |  V Q    |         |         |         |
5+35       0.4406      1.50  |  V Q    |         |         |         |
5+40       0.4513      1.54  |   V Q   |         |         |         |
5+45       0.4623      1.61  |   V Q   |         |         |         |
5+50       0.4737      1.65  |   V Q   |         |         |         |
5+55       0.4852      1.67  |   V Q   |         |         |         |
6+ 0       0.4968      1.68  |   V Q   |         |         |         |
6+ 5       0.5085      1.70  |   V Q   |         |         |         |
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 6+10       0.5205      1.75  |   V Q   |         |         |         |
 6+15       0.5330      1.81  |   V  Q  |         |         |         |
 6+20       0.5457      1.85  |   V  Q  |         |         |         |
 6+25       0.5587      1.88  |    V Q  |         |         |         |
 6+30       0.5717      1.89  |    V Q  |         |         |         |
 6+35       0.5848      1.91  |    V Q  |         |         |         |
 6+40       0.5983      1.96  |    V Q  |         |         |         |
 6+45       0.6122      2.02  |    V  Q |         |         |         |
 6+50       0.6265      2.07  |    V  Q |         |         |         |
 6+55       0.6408      2.09  |    V  Q |         |         |         |
 7+ 0       0.6553      2.11  |    V  Q |         |         |         |
 7+ 5       0.6699      2.12  |    V  Q |         |         |         |
 7+10       0.6846      2.13  |     V Q |         |         |         |
 7+15       0.6993      2.13  |     V Q |         |         |         |
 7+20       0.7141      2.15  |     V Q |         |         |         |
 7+25       0.7292      2.19  |     V Q |         |         |         |
 7+30       0.7447      2.25  |     V  Q|         |         |         |
 7+35       0.7606      2.30  |     V  Q|         |         |         |
 7+40       0.7768      2.36  |     V  Q|         |         |         |
 7+45       0.7936      2.44  |      V Q|         |         |         |
 7+50       0.8108      2.49  |      V Q|         |         |         |
 7+55       0.8284      2.56  |      V  Q         |         |         |
 8+ 0       0.8465      2.63  |      V  Q         |         |         |
 8+ 5       0.8651      2.70  |      V  Q         |         |         |
 8+10       0.8845      2.81  |      V  |Q        |         |         |
 8+15       0.9048      2.95  |       V |Q        |         |         |
 8+20       0.9257      3.04  |       V | Q       |         |         |
 8+25       0.9469      3.09  |       V | Q       |         |         |
 8+30       0.9684      3.12  |       V | Q       |         |         |
 8+35       0.9901      3.15  |       V | Q       |         |         |
 8+40       1.0122      3.21  |        V| Q       |         |         |
 8+45       1.0349      3.28  |        V|  Q      |         |         |
 8+50       1.0579      3.35  |        V|  Q      |         |         |
 8+55       1.0814      3.41  |        V|  Q      |         |         |
 9+ 0       1.1054      3.49  |        V|  Q      |         |         |
 9+ 5       1.1300      3.56  |         V   Q     |         |         |
 9+10       1.1553      3.67  |         V   Q     |         |         |
 9+15       1.1815      3.81  |         V    Q    |         |         |
 9+20       1.2084      3.91  |         V    Q    |         |         |
 9+25       1.2360      4.00  |         |V   Q    |         |         |
 9+30       1.2641      4.09  |         |V    Q   |         |         |
 9+35       1.2928      4.16  |         |V    Q   |         |         |
 9+40       1.3220      4.24  |         |V    Q   |         |         |
 9+45       1.3518      4.33  |         | V    Q  |         |         |
 9+50       1.3820      4.39  |         | V    Q  |         |         |
 9+55       1.4128      4.47  |         | V    Q  |         |         |
10+ 0       1.4441      4.55  |         | V     Q |         |         |
10+ 5       1.4754      4.54  |         |  V    Q |         |         |
10+10       1.5051      4.31  |         |  V   Q  |         |         |
10+15       1.5321      3.93  |         |  V Q    |         |         |
10+20       1.5575      3.68  |         |  VQ     |         |         |
10+25       1.5820      3.57  |         |   Q     |         |         |
10+30       1.6061      3.50  |         |  QV     |         |         |
10+35       1.6302      3.49  |         |  QV     |         |         |
10+40       1.6553      3.65  |         |   Q     |         |         |
10+45       1.6822      3.91  |         |    Q    |         |         |
10+50       1.7102      4.07  |         |    VQ   |         |         |
10+55       1.7387      4.14  |         |    VQ   |         |         |
11+ 0       1.7676      4.18  |         |    VQ   |         |         |
11+ 5       1.7965      4.20  |         |     Q   |         |         |
11+10       1.8253      4.19  |         |     Q   |         |         |
11+15       1.8539      4.14  |         |     Q   |         |         |
11+20       1.8822      4.12  |         |     Q   |         |         |
11+25       1.9106      4.11  |         |     QV  |         |         |
11+30       1.9388      4.11  |         |     QV  |         |         |
11+35       1.9670      4.09  |         |     QV  |         |         |
11+40       1.9946      4.01  |         |     QV  |         |         |
11+45       2.0213      3.89  |         |    Q  V |         |         |
11+50       2.0477      3.83  |         |    Q  V |         |         |
11+55       2.0741      3.83  |         |    Q  V |         |         |
12+ 0       2.1007      3.87  |         |    Q  V |         |         |
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12+ 5       2.1279      3.95  |         |    Q   V|         |         |
12+10       2.1571      4.23  |         |     Q  V|         |         |
12+15       2.1890      4.64  |         |       QV|         |         |
12+20       2.2228      4.91  |         |        Q|         |         |
12+25       2.2578      5.08  |         |         Q         |         |
12+30       2.2937      5.22  |         |         Q         |         |
12+35       2.3304      5.33  |         |         VQ        |         |
12+40       2.3681      5.47  |         |         |Q        |         |
12+45       2.4069      5.63  |         |         |VQ       |         |
12+50       2.4466      5.76  |         |         |V Q      |         |
12+55       2.4870      5.86  |         |         | VQ      |         |
13+ 0       2.5281      5.97  |         |         | VQ      |         |
13+ 5       2.5700      6.09  |         |         |  VQ     |         |
13+10       2.6136      6.33  |         |         |  V Q    |         |
13+15       2.6595      6.66  |         |         |  V  Q   |         |
13+20       2.7069      6.88  |         |         |   V  Q  |         |
13+25       2.7550      6.99  |         |         |   V  Q  |         |
13+30       2.8037      7.07  |         |         |    V  Q |         |
13+35       2.8521      7.03  |         |         |    V  Q |         |
13+40       2.8979      6.65  |         |         |    VQ   |         |
13+45       2.9396      6.05  |         |         |   Q V   |         |
13+50       2.9786      5.66  |         |         | Q   V   |         |
13+55       3.0164      5.48  |         |         |Q     V  |         |
14+ 0       3.0534      5.37  |         |         |Q     V  |         |
14+ 5       3.0901      5.33  |         |         |Q     V  |         |
14+10       3.1274      5.42  |         |         |Q      V |         |
14+15       3.1660      5.61  |         |         | Q     V |         |
14+20       3.2053      5.71  |         |         | Q     V |         |
14+25       3.2447      5.71  |         |         | Q      V|         |
14+30       3.2838      5.68  |         |         | Q      V|         |
14+35       3.3227      5.65  |         |         | Q      V|         |
14+40       3.3616      5.64  |         |         | Q       V         |
14+45       3.4004      5.64  |         |         | Q       V         |
14+50       3.4391      5.62  |         |         | Q       V         |
14+55       3.4775      5.58  |         |         | Q       |V        |
15+ 0       3.5155      5.51  |         |         | Q       |V        |
15+ 5       3.5531      5.46  |         |         |Q        |V        |
15+10       3.5903      5.40  |         |         |Q        | V       |
15+15       3.6270      5.33  |         |         |Q        | V       |
15+20       3.6634      5.28  |         |         |Q        | V       |
15+25       3.6993      5.22  |         |         Q         |  V      |
15+30       3.7347      5.14  |         |         Q         |  V      |
15+35       3.7695      5.06  |         |         Q         |  V      |
15+40       3.8031      4.88  |         |        Q|         |   V     |
15+45       3.8350      4.63  |         |       Q |         |   V     |
15+50       3.8657      4.46  |         |      Q  |         |   V     |
15+55       3.8958      4.37  |         |      Q  |         |   V     |
16+ 0       3.9256      4.32  |         |      Q  |         |    V    |
16+ 5       3.9540      4.13  |         |     Q   |         |    V    |
16+10       3.9783      3.52  |         |   Q     |         |    V    |
16+15       3.9964      2.63  |         Q         |         |    V    |
16+20       4.0104      2.04  |       Q |         |         |    V    |
16+25       4.0225      1.75  |     Q   |         |         |     V   |
16+30       4.0332      1.56  |     Q   |         |         |     V   |
16+35       4.0429      1.41  |    Q    |         |         |     V   |
16+40       4.0515      1.26  |    Q    |         |         |     V   |
16+45       4.0592      1.11  |   Q     |         |         |     V   |
16+50       4.0661      1.01  |   Q     |         |         |     V   |
16+55       4.0725      0.93  |  Q      |         |         |     V   |
17+ 0       4.0786      0.88  |  Q      |         |         |     V   |
17+ 5       4.0844      0.84  |  Q      |         |         |     V   |
17+10       4.0905      0.88  |  Q      |         |         |     V   |
17+15       4.0971      0.97  |  Q      |         |         |     V   |
17+20       4.1041      1.02  |   Q     |         |         |     V   |
17+25       4.1112      1.03  |   Q     |         |         |     V   |
17+30       4.1184      1.04  |   Q     |         |         |     V   |
17+35       4.1256      1.04  |   Q     |         |         |     V   |
17+40       4.1327      1.04  |   Q     |         |         |      V  |
17+45       4.1399      1.04  |   Q     |         |         |      V  |
17+50       4.1471      1.04  |   Q     |         |         |      V  |
17+55       4.1540      1.01  |   Q     |         |         |      V  |
```

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18+ 0       4.1606      0.95  |  Q      |         |         |      V  |
18+ 5       4.1669      0.92  |  Q      |         |         |      V  |
18+10       4.1731      0.90  |  Q      |         |         |      V  |
18+15       4.1793      0.90  |  Q      |         |         |      V  |
18+20       4.1854      0.89  |  Q      |         |         |      V  |
18+25       4.1915      0.89  |  Q      |         |         |      V  |
18+30       4.1976      0.88  |  Q      |         |         |      V  |
18+35       4.2036      0.87  |  Q      |         |         |      V  |
18+40       4.2093      0.83  |  Q      |         |         |      V  |
18+45       4.2146      0.77  |  Q      |         |         |      V  |
18+50       4.2196      0.72  | Q       |         |         |      V  |
18+55       4.2242      0.66  | Q       |         |         |      V  |
19+ 0       4.2282      0.59  | Q       |         |         |      V  |
19+ 5       4.2320      0.55  | Q       |         |         |      V  |
19+10       4.2359      0.56  | Q       |         |         |      V  |
19+15       4.2401      0.60  | Q       |         |         |      V  |
19+20       4.2445      0.64  | Q       |         |         |       V |
19+25       4.2492      0.68  | Q       |         |         |       V |
19+30       4.2543      0.75  | Q       |         |         |       V |
19+35       4.2597      0.78  |  Q      |         |         |       V |
19+40       4.2649      0.76  |  Q      |         |         |       V |
19+45       4.2698      0.71  | Q       |         |         |       V |
19+50       4.2744      0.67  | Q       |         |         |       V |
19+55       4.2787      0.62  | Q       |         |         |       V |
20+ 0       4.2826      0.56  | Q       |         |         |       V |
20+ 5       4.2862      0.53  | Q       |         |         |       V |
20+10       4.2900      0.54  | Q       |         |         |       V |
20+15       4.2940      0.59  | Q       |         |         |       V |
20+20       4.2982      0.62  | Q       |         |         |       V |
20+25       4.3025      0.63  | Q       |         |         |       V |
20+30       4.3069      0.63  | Q       |         |         |       V |
20+35       4.3113      0.64  | Q       |         |         |       V |
20+40       4.3157      0.64  | Q       |         |         |       V |
20+45       4.3201      0.64  | Q       |         |         |       V |
20+50       4.3245      0.63  | Q       |         |         |       V |
20+55       4.3286      0.60  | Q       |         |         |       V |
21+ 0       4.3323      0.54  | Q       |         |         |       V |
21+ 5       4.3358      0.51  | Q       |         |         |       V |
21+10       4.3395      0.53  | Q       |         |         |       V |
21+15       4.3434      0.58  | Q       |         |         |       V |
21+20       4.3475      0.60  | Q       |         |         |       V |
21+25       4.3515      0.57  | Q       |         |         |       V |
21+30       4.3551      0.52  | Q       |         |         |        V|
21+35       4.3585      0.50  |Q        |         |         |        V|
21+40       4.3621      0.52  | Q       |         |         |        V|
21+45       4.3660      0.57  | Q       |         |         |        V|
21+50       4.3701      0.59  | Q       |         |         |        V|
21+55       4.3740      0.57  | Q       |         |         |        V|
22+ 0       4.3775      0.52  | Q       |         |         |        V|
22+ 5       4.3809      0.49  |Q        |         |         |        V|
22+10       4.3845      0.52  | Q       |         |         |        V|
22+15       4.3884      0.57  | Q       |         |         |        V|
22+20       4.3924      0.59  | Q       |         |         |        V|
22+25       4.3963      0.56  | Q       |         |         |        V|
22+30       4.3999      0.51  | Q       |         |         |        V|
22+35       4.4032      0.48  |Q        |         |         |        V|
22+40       4.4064      0.47  |Q        |         |         |        V|
22+45       4.4096      0.46  |Q        |         |         |        V|
22+50       4.4127      0.45  |Q        |         |         |        V|
22+55       4.4158      0.45  |Q        |         |         |        V|
23+ 0       4.4189      0.45  |Q        |         |         |        V|
23+ 5       4.4220      0.44  |Q        |         |         |        V|
23+10       4.4250      0.44  |Q        |         |         |        V|
23+15       4.4280      0.44  |Q        |         |         |        V|
23+20       4.4311      0.44  |Q        |         |         |        V|
23+25       4.4341      0.44  |Q        |         |         |        V|
23+30       4.4371      0.44  |Q        |         |         |        V|
23+35       4.4401      0.44  |Q        |         |         |        V|
23+40       4.4431      0.43  |Q        |         |         |        V|
23+45       4.4461      0.43  |Q        |         |         |        V|
23+50       4.4490      0.43  |Q        |         |         |        V|
```

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   23+55        4.4520       0.43  |Q         |         |         |        V|
   24+ 0        4.4550       0.43  |Q         |         |         |        V|
   24+ 5        4.4578       0.41  |Q         |         |         |        V|
   24+10        4.4602       0.34  |Q         |         |         |        V|
   24+15        4.4617       0.22  Q          |         |         |        V|
   24+20        4.4627       0.15  Q          |         |         |        V|
   24+25        4.4634       0.11  Q          |         |         |        V|
   24+30        4.4640       0.09  Q          |         |         |        V|
   24+35        4.4645       0.07  Q          |         |         |        V|
   24+40        4.4649       0.05  Q          |         |         |        V|
   24+45        4.4652       0.04  Q          |         |         |        V|
   24+50        4.4654       0.04  Q          |         |         |        V|
   24+55        4.4656       0.03  Q          |         |         |        V|
   25+ 0        4.4658       0.02  Q          |         |         |        V|
   25+ 5        4.4659       0.02  Q          |         |         |        V|
   25+10        4.4660       0.01  Q          |         |         |        V|
   25+15        4.4661       0.01  Q          |         |         |        V|
   25+20        4.4661       0.01  Q          |         |         |        V|
   25+25        4.4662       0.01  Q          |         |         |        V|
   25+30        4.4662       0.00  Q          |         |         |        V|
   25+35        4.4662       0.00  Q          |         |         |        V|
   25+40        4.4662       0.00  Q          |         |         |         V
-----------------------------------------------------------------------
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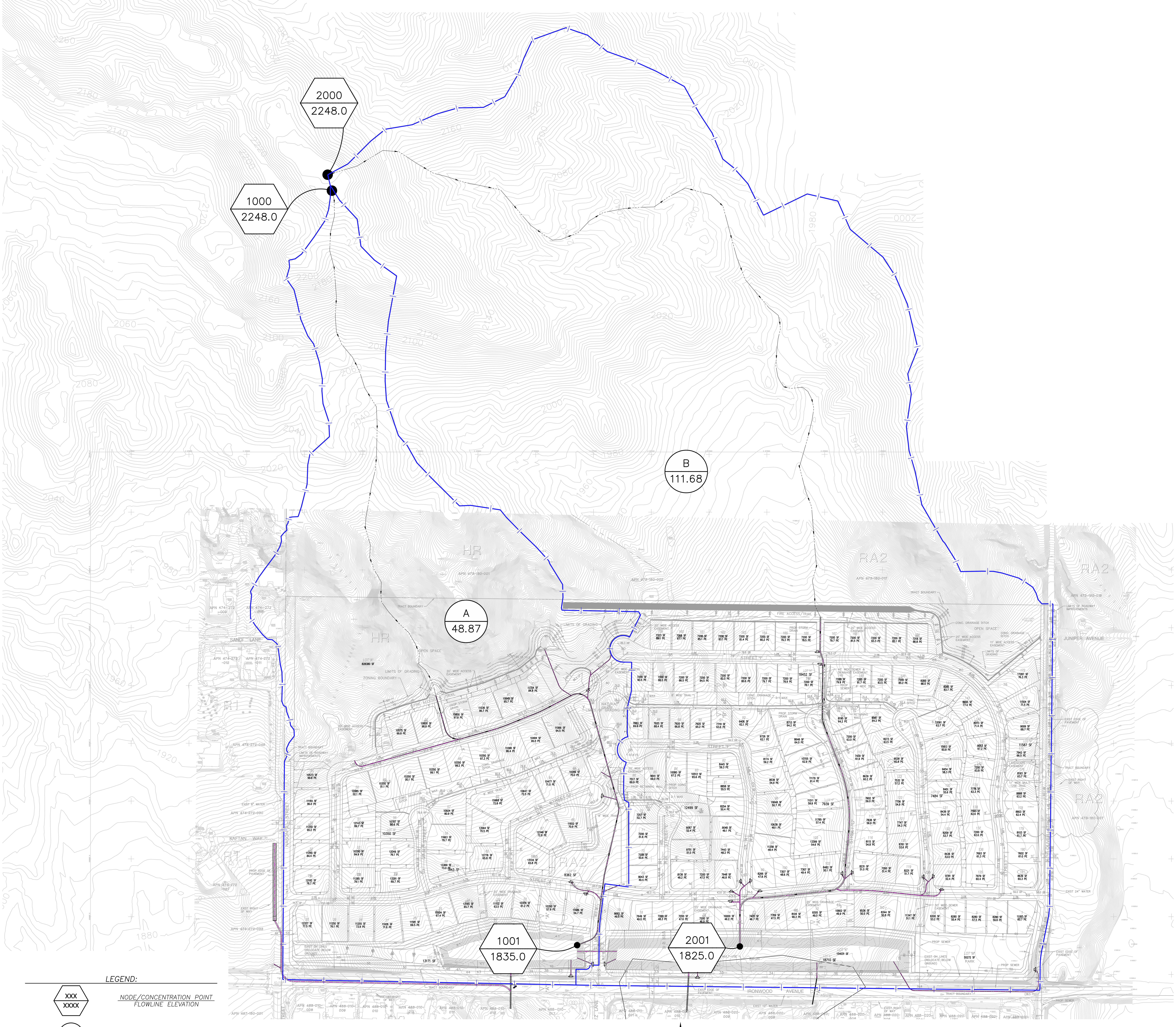
Unit Hydrograph Hydrology Map

TENTATIVE TRACT MAP NO. 37001
CITY OF MORENO VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
UNIT HYDROGRAPH HYDROLOGY MAP



LEGEND:

XXX / XXXX	NODE/CONCENTRATION POINT FLOWLINE ELEVATION
XX / XX.XX	SUB AREA ACRES
	FLOW PATH
	WATERSHED TRIBUTARY TO EACH BASIN

GRAPHIC SCALE
120' 0 60' 120' 240'
1" = 120'

JLC Engineering & Consulting, Inc.
36263 CALLE DE LOBO
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

FIGURE 4
TTM 37001
UNIT HYDROGRAPH HYDROLOGY MAP

Drawing Name: O:\150.06.14\Engineering\Hydrology_Plan\Exhibits\Unit Hydrograph Map.dwg
Last Opened: Sep 30, 2015 - 3:19pm by jcarver

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

Detailed Operations and Maintenance Plans will be provided during final engineering.

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

Education Materials will be provided during final engineering